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ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED DERRYNADARRAGH WIND FARM, CO. KILDARE & CO. OFFALY

Volume 2 - Main EIAR

Chapter 3 – Site Selection & Alternatives

Prepared for:

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3.1 Introduction

The following chapter, in accordance with EIA guidance document: '*Guidance on the preparation of the Environmental Impact Assessment Report'* (EU, 2017), sets out the reasonable alternatives which were considered by the Applicant for the Proposed Development. It provides a summary of the rationale for selecting the chosen design/layout having considered the site constraints, comments from prescribed bodies, comments from the general public, and environmental impacts. It describes the site selection process, alternative design philosophies, alternative layouts and the do-nothing alternative.

3.2 Statement of Authority

This chapter was prepared by Ms Robyn Nicholl of Fehily Timoney and Company.

Ms. Robyn Nicholl is a Principal Planner with Fehily Timoney and Company and holds a Masters' degree in Urban and Rural Design, and a Bachelor's degree in Environmental Planning from Queens University, Belfast. She has worked in planning consultancy for over twelve years and has prepared planning policy, population and human health impact assessments, and assessment of reasonable alternatives to proposed developments for environmental reports and wind farm EIARs. Robyn's key capabilities are planning policy, environmental constraints assessment, report writing, managing Technical Consultants and reviewing their reporting.

This chapter has been reviewed by Mr Jim Hughes. Mr Jim Hughes holds a Bachelor (Hons) Degree in Public Administration (Development) from the University of Limerick, a Masters in Town Planning from Queens University Belfast and a Level 8 Diploma in EIA/SEA Management from University College Dublin. Jim is a professional Town Planner with over 21 years' experience across the planning and development sector. Jim has led major Irish infrastructure projects in the planning, environmental assessment and permitting disciplines. Jim has an in-depth knowledge of the Irish planning system in the context of renewable energy (Wind, Solar, BESS) having provided planning advice to clients and Senior Council on the O'Grainne V An Bord Pleanála High Court Case, the Daly v Kilronan High Court Case and the North Kildare Wind Farm v An Bord Pleanála High Court Case. Jim is also a member of the WEI and SEAI Planning & Environmental committee.

3.3 Project Objective

From the outset, it was important for the applicant to identify a site capable of accommodating a new renewable energy project greater than 6 turbines, and producing up to maximum 64.8MW MEC within the counties of Offaly, Kildare and Laois. The applicant has a wealth of knowledge and expertise developing a range of renewable energy developments such as wind and solar, and are therefore aware of the land take required for some types of renewable energy developments to achieve such large scale outputs.

3.4 Alternative Assessment

The requirement in relation to alternatives in the EIA process is set out in the *European Union Directive 2011/92/EU, as amended by Directive 2014/52/EU on assessment of the effects of certain public and private Projects on the environment* (the "EIA Directive"). Article 5 (1)(d) states that an EIAR should include:

> *"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."*

This is further reinforced in Annex IV of the EIA Directive which states that the information provided in an EIAR should include:

> *"2. A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

This chapter has particular regard to the environmental considerations which influenced the selection of alternatives and details the evolution of the Proposed Development through alternatives considered, indicating the main reasons for selecting the chosen option taking into account the effects on the receiving environment and considering the comparison of environmental effects of each alternative.

The alternatives considered have been described in line with the EPA 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (2022). The 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."*

This Chapter also details non-environmental factors of the design process where they are relevant to the evolution of the Proposed Development.

Consequently, taking account of the legislation and guidance requirements, this chapter of the EIAR addresses alternatives under the following main headings:

- 'Do Nothing' Alternative;
- Alternative Locations (Strategic Site Selection);
- Alternative Renewable Energy Technologies;
- Alternative Layouts (Turbine Numbers, Layout and Design);
- Alternative Design (including Transport Routes and Site Access);
- Alternative Grid Connection Routes; and
- Alternative methods for trenching.

3.4.1 Do-Nothing Alternative

Article IV, Part 3 of the EIA Directive states that the EIAR should include "a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge". This is referred to as the "do nothing" alternative.

Through its commitments under CAP 24 and CAP 25, Ireland is obliged to ensure that 80% of the total energy consumed in heating, electricity and transport is generated from renewable resources by 2030. This is in order to help reduce the nation's CO2 emissions and to promote the use of indigenous renewable sources of energy. These targets have been incorporated into national policy, most recently within the latest Climate Action Plans (2024 & 2025). Of note is the European Commission Guidance (EU, 2017)[1] which acknowledges that the do-nothing scenario may not be a reasonable alternative where there is a pressing need for the project supported by policy.

Under the "Do-Nothing" scenario, the Proposed Development would not proceed i.e. the development of a renewable energy project is not pursued, and the Site remains in use as agriculture, peatland, and forestry, with no anticipated changes made to the current land-use practices.

In the "Do-Nothing" scenario, the prospect of creating sustainable energy through both Co. Offaly and Co. Kildare wind energy resources would be lost at this location. The nation's ability to produce sustainable energy and reduce greenhouse gas emissions to meet EU targets and National targets, as set out above, would be stifled. This may contribute to Ireland incurring significant financial penalties from the EU if targets are not achieved, and result in continued global warming. Additionally, it would affect Ireland's commitment to "pursue efforts" to limit warming as agreed to in the Paris Agreement (2015). This will result in continued likely significant negative effects to air quality and climate.

According to EirGrid's 'Generation Capacity Statement 2023-2032' (Eirgrid, January 2024), the energy demand in Ireland is forecasted to increase 43% by 2032 (median scenario). This is a marked increase on previously predicted forecasts with the 2020-2029 Generation Capacity Statement predicting only 33% (median scenario) increase in demand. Much of this revised forecasting is attributable to the predicted demand by data centres, with the CSO statistical publication of 'Data Centres Metered Electricity Consumption' (23 July 2024) noting that energy demand by data centres increased by 20% between 2022 and 2023. EirGrid's publication predicts that 30% of all electricity demand is expected to come from data centres by 2032.

Under the "Do-Nothing" scenario, the socio-economic benefits associated with the Proposed Development will be lost. These benefits include approximately 100 no. jobs during the construction, operation and maintenance phases of the Proposed Development (and a similar number during decommissioning). Please refer to Chapter 2 – Proposed Description of Development which sets out the full extent of the Community Benefit to be provided, should the scheme go ahead. Furthermore, under the "Do-Nothing" scenario the local community will not benefit economically from the community benefit fund associated with the Proposed Development which could be used to improve physical and social infrastructure in the locality.

[1] European Commission (2017), Guidance on the preparation of the environmental impact assessment report (Directive 2011/92/EU as amended by 2014/52/EU)

In the "Do-Nothing" scenario, the potential environmental effects of the Proposed Development as set out throughout this EIAR will not occur. Table 3-1, below, sets out the potential effects of the 'do-nothing scenario' compared to the residual effects associated with the Derrynadarragh Wind Farm in relation to the various environmental topics covered in the individual chapters of this EIAR.

Refer to each respective chapter for full details of residual effects Strategic Site Selection.

Table 3-1: Comparison of Potential Residual Environmental Effects vs. 'Do-nothing'

Environmental Consideration	Residual Effect of the Proposed Development	'Do-nothing' Alternative
Air and Climate	Slight to moderate temporary localised residual effect arising from fugitive dust emissions during construction. Long-term positive effect on climate due to reduce in burning of fossil fuels. It is estimated that the Proposed Development will have an annual Export Capacity up to 64.8 MW depending on the power rating employed. Subsequently, this will result in the net displacement of approx. 109,661 to 124,030 tonnes of CO2 over the proposed 35 year lifetime of the wind farm, equating to 65,461 to 76,019 tonnes of CO2 per annum (please refer to EIAR Chapter 7 – Air and Climate). In conclusion, as established in Chapter 7 – Air Quality and Climate, there are no significant effects on air or climate arising from the proposed Development.	Fossil fuel power stations will likely continue to be the primary alternative to provide the required quantities of electricity resulting in greenhouse gas and other air pollutant emissions.
Noise and Vibration	While the operational wind farm noise levels meet the daytime and night-time noise limits derived using the Wind Energy Development Guidelines 2006, for some receptors a new source of noise introduced into the local soundscape. As such the Proposed Development would pose a long term moderately significant effect for such sensitive receptors (refer to Chapter 8 – Noise and Vibration). In conclusion, as established in Chapter 8 – Noise and Vibration, there are no significant effects arising from the Proposed Development.	Under the Do-Nothing scenario, the Proposed Development is not constructed or operated. It is expected that the existing land uses at the site will continue in the absence of the Proposed Development, with prevailing noise levels unchanged.

Environmental Consideration	Residual Effect of the Proposed Development	'Do-nothing' Alternative
Biodiversity	The construction of the wind farm will not result in significant effects for any national or European designated sites, subject to the implementation of mitigation measures. The Proposed Development is upstream to the River Barrow and River Nore SAC and the Grand Canal pNHA. Subject to the implementation of the Mitigation Measures outlined in Chapter 9: Biodiversity and the BEMP, the residual effects will limit them to being negligible/not significant and in certain circumstances will result in a long-term likely positive effect, such as the fencing of the riparian zones to improve habitats and the inclusion of silt traps to improve water quality. Please refer to the BEMP at Appendix 2.2 for full details of enhancement measures proposed. In relation to terrestrial ecology, the Proposed Development has undergone a robust iterative design phase in order to avoid and minimise any potential direct or indirect effects upon sensitive habitats within the study area, most of which are predominantly peatland(see EIAR Chapter 9 – Biodiversity). The residual impact following the successful implementation of the Biodiversity Enhancement Management Plan and its proposed monitoring programme will not have significant adverse effects but instead will have and a long-term likely positive significant effect. There are a number of badger setts located within the site boundary, with the layout being designed to avoid the offset buffers and any direct impact upon the setts. The successful implementation of measures outlined in the BEMP is anticipated to have a not significant adverse effect.	Under the Do-Nothing scenario the agricultural, forestry and turbary practices at the site will continue, with their respective impacts on biodiversity remaining unaltered. The opportunity to improve biodiversity through improved habitats and improved water quality within the site and along the Cushina River and downstream with the Riparian protection zone and with wetland drains would be lost (Refer to BEMP for full extent of enhancement measures proposed).

Environmental Consideration	Residual Effect of the Proposed Development	'Do-nothing' Alternative
	In conclusion, as established in Chapter 9 – Biodiversity and the accompanying Natura Impact Statement (NIS), there are no significant effects arising from the Proposed Development. Please refer to the aforementioned documents for further information.	
Ornithology	The Proposed Development has potential to cause temporary displacement of birds during construction which will have a slight-imperceptible reversable residual effect on birds (see EIAR Chapter 9 – Biodiversity). The Collision Risk Model (Appendix 10.1, Volume III of the EIAR) FOR THE Overall, the residual effects on Avian ecology are deemed to be of very low likely significance. Any impact or collision risk/displacement associated with bird species is assessed on local populations, and its effects on the national populations is therefore negligible (refer to Chapter 10 – Ornithology) for the Proposed Development assesses that the potential effects on bird will be negligible to low significance on a regionally important population over the long term. In conclusion, as established in Chapter 9 – Biodiversity and Chapter 10 - Ornithology, there are no significant effects arising from the Proposed Development.	Neutral from an ornithology perspective, as existing flight patterns and flight lines will remain.
Soils, Geology, and Hydrogeology	Following the implementation of mitigation measures, the residual effect significance on the receiving environment is determined to be imperceptible during the construction phase and imperceptible during the operational phase of the Proposed Development.	In the Do-Nothing scenario, it is likely that the current land uses will continue for the foreseeable future. The effect on the Land, Soils and Geology would remain largely unaltered as a result.

Environmental Consideration	Residual Effect of the Proposed Development	'Do-nothing' Alternative
	In conclusion, as established in Chapter 11 – Soils, Geology and Hydrogeology, there are no significant effects arising from the Proposed Development.	
Hydrology and Water Quality and FRA	Potential effects on hydrology and water quality will be mitigated through the design of the Proposed Development. In relation to the construction phase of the Proposed Development, these mitigation measures are detailed in Chapter 12 and in Appendix 12.1, 12.2, and 12.3 of this EIAR. Through the implementation of these measures, the residual impacts of the construction stage are not significant and there will be no perceivable impact on the Figile River sub-catchments and River Barrow and River Nore SAC. Regarding the operational phase of the Proposed Development, potential impacts were determined to be non-significant. Following the implementation of precautionary measures such as visual monitoring and water quality monitoring, the residual risk is maintained as non-significant. Lastly, following the implementation of mitigation measures, the residual impacts associated with the decommissioning phase of the Proposed Development are deemed to be non-significant likely effect. In conclusion, as established in Chapter 12 – Hydrology and Water Quality, there are no significant effects arising from the Proposed Development.	If the Proposed Development was to not proceed, it is anticipated that programmes of measures under the Water Framework Directive will result in maintenance or will result in gradual improvement in catchment quality. Furthermore, the opportunity to improve habitat through the inclusion of Riparian Protection Zones along Cushina River bank, and improve water quality with wetland drains and silt traps would be lost (Please refer to BEMP at Appendix 9.1 for full extent of enhancement measures proposed).

Environmental Consideration	Residual Effect of the Proposed Development	'Do-nothing' Alternative
Population and Human Health	A long-term slight positive effect will occur with respect to Population and Human health due to the creation of job opportunities and the community benefit fund. Other positive residual effects include, inter alia, the provision of clean, renewable electricity which would otherwise be emitted through the burning of fossil fuels; capital investment in the area through the community benefit fund and the potential upgrading of the amenities in the area; and decreases in the cost of electricity. Please refer to EIAR Chapter 6 – Population and Human Health for more details. In conclusion, as established in Chapter 6 – Population and Human Health, there are no significant effects arising from the Proposed Development.	No economic benefit for the local area due to no provision of a community benefit fund. No employment opportunities as a result of the construction operation and decommissioning of the Proposed Development. Opportunity lost to helping achieve the States renewable electricity targets which could have an indirect impact on climate change and consequently health.
Traffic and Transport	The construction of the Proposed Development will lead to additional construction traffic and vehicular movements, including HGV's, along existing roadways during the construction phase. As outlined in EIAR Chapter 14 – Traffic and Transportation, following the implementation of mitigation measures this will have a slight, negative, temporary to short term impact on the local road network. In conclusion, as established in Chapter 14 – Traffic and Transport, there are no significant effects arising from the Proposed Development.	If the Proposed Development is not constructed, existing traffic patterns will likely remain.

Environmental Consideration	Residual Effect of the Proposed Development	'Do-nothing' Alternative
Archaeology and Cultural Heritage	The mitigation measures presented at Section 15.10 of Chapter 15 – Archaeology and Cultural Heritage will provide for either the preservation *in situ* of any currently unknown archaeological features within the proposed development site, or the proper and adequate recording of this resource. Preservation *in situ* shall allow for a negligible magnitude of impact resulting in a potential not significant/imperceptible significance of effect in the context of residual effects on the unrecorded archaeological resource. Preservation by record shall allow for a high magnitude of impact, albeit ameliorated by the creation of a full and detailed archaeological record, the results of which shall be publicly disseminated. This shall result in a potential slight/moderate range of significance of effect in the context of residual impacts on the unrecorded archaeological resource. While the operation phase of the proposed wind farm will result in indirect, slight to moderate, adverse, residual effects on the visual settings of cultural heritage constraints within the environs of the Site following mitigation. these effects will be reversed following the decommissioning phase. In conclusion, as established in Chapter 15 – Archaeology and Cultural Heritage, there are no significant effects arising from the Proposed Development.	Neutral – under the do nothing scenario the development will not proceed and the existing environment will remain the same.

Environmental Consideration	Residual Effect of the Proposed Development	'Do-nothing' Alternative
Landscape and Visual	Based on the visual impact assessments outlined within EIAR Chapter 16 – Landscape and Visual Impact Assessment, the visual effects range from 'Substantial–Moderate' to 'Imperceptible'. All of the higher effects relate to the nearest views of the Proposed Development, which principally represent local community receptors. Whilst the Proposed Development will be a prominent and distinctive feature and will appear at a considerable scale from some of the closest viewpoints, the turbines are generally well accommodated within this broad, productive landscape context in terms of their scale and function. Other existing wind energy development within the study area results in the proposed wind farm being perceived as an addition to a familiar and characteristic feature of this midlands landscape setting and without generating any undue visual effects in terms of turbine stacking, spatial ambiguity or visual tension with other wind farms. Overall, it is **considered that the proposed project will result in visual impacts that are not significant**. Furthermore, the surrounding landscape context is already influenced by existing wind farms in the near vicinity. Please refer to Chapter 16 – Landscape and Visual Impact Assessment. In conclusion, as established in Chapter 16 – Landscape and visual, there are no significant effects arising from the Proposed Development.	Neutral

Environmental Consideration	Residual Effect of the Proposed Development	'Do-nothing' Alternative
Telecommunications, Aviation and Material Assets	Following the implementation of mitigation measures, the residual effect on the receiving environment is determined to have no significant impact with respect to telecommunications and aviation during the construction and operational phase of the Proposed Development. In relation to material assets (utility infrastructure) the residual impact on the receiving environment is determined to provide a long-term positive impact on electricity infrastructure in the area. Please refer to EIAR Chapter 17 – Material Assets, Telecommunications and Aviation. Long term slight positive effect due to renewable energy supply during the operational phase. Long term slight positive effect for the continued operation of grid and electrical infrastructure. In conclusion, as established in Chapter 17 of this EIAR, there are no significant effects arising from the Proposed Development.	If the Proposed Development were not to proceed, there would be no change to the existing telecommunications, broadcasting and aviation operations in the area. And no offset to fossil fuel use with regards to material assets.

3.4.2 Alternative Renewable Energy Technologies

Alternative sources of energy generation form part of the renewable energy development portfolio of the Applicant, and a number of options were considered at a high level prior to the Strategic Site Selection. The alternative renewable energy source considered was solar, which was requested for consideration by locals during the early consultation engagement. Commercial solar energy production is the harnessing and conversion of sunlight into electricity using photovoltaic arrays (panels).

In order to achieve the same energy output from solar energy, a site would require a significantly larger development footprint due to the significant difference in capacity factors between solar and wind technologies and the footprint of the technology infrastructure. The capacity factor of solar energy is significantly lower than that of wind energy, requiring approximately three times the installed capacity of the Proposed Development to produce the same amount of energy. Solar farms require c. 1 hectare per MW, the land area required for the solar array itself would be in the region of 65 hectares, this is excluding associated operating infrastructure.

A comparison of the potential environmental effects of the development of a solar PV array when compared against a proposed wind farm (with both options having the same MW output) is presented hereunder.

Table 3-2: Comparison of environmental effects for an alternative solar technology

Environmental Considerations	Solar PV Array	Wind Farm
Air & Climate	Requires a larger installed capacity to achieve the same output however solar energy requires less steel and less concrete than wind energy and therefore has a lower embodied carbon value.	Despite requiring a lower installed capacity to achieve the same output, the volume of steel and concrete required and the related embodied carbon for wind turbines would be higher.
Noise & Vibration	Less potential for noise impacts on nearby sensitive receptors (generally in construction only).	Increased potential for noise impacts on sensitive receptors during construction given more intensive construction techniques and during operation of turbine components.
Biodiversity	Larger footprint would result in greater habitat loss and lower opportunity to avoid habitats of higher value and greater loss of bat foraging and commuting habitat. Solar panels have the capacity to reflect polarised light, which can attract aquatic insects, which has the potential to impact their reproductive biology.	Smaller footprint with associated lower potential for habitat loss.
Ornithology	Potentially larger area of habitat loss for birds, in particular ground nesting birds. Bird collision risk from solar panels is very low.	Bird collisions with wind turbines. Habitats for ground nesting birds retained.
Land, Soils, Geology	Shallower excavations with less requirement for spoil management. However, will have a larger footprint and as such greater potential to encounter dolines, requiring excavation for stabilisation.	Will require piled foundation solutions with greater potential for geological and hydrogeological interaction.
Hydrology & Water Quality	Larger development footprint, likely requiring greater number of drain crossings / interactions with greater potential for sediment runoff. Incompatible with areas of flooding.	Smaller development footprint requiring fewer drain crossings. Turbines are compatible with being constructed within areas of flooding.
Population & Human Health	Potential for glint and glare impacts on local road users. Increased land take and associated loss of agricultural land use.	Potential for shadow flicker controlled in accordance with Wind Energy Guidelines. Existing agricultural land use can continue.
Material Assets	Higher risk from fire and electrical faults. Higher potential for interaction with local services e.g. the high pressure gas main in the area.	Socketed and piled foundations required due to dolines on site. However, this increases confidence in turbine stability.

Environmental Considerations	Solar PV Array	Wind Farm
Traffic & Transport	Potential for greater traffic volumes during construction phase due to the number of solar panels required to achieve the same output.	Fewer deliveries will be made however greater need for internal site management of spoil due to larger foundations.
Archaeology & Cultural Heritage	Larger footprint has higher potential to unearth undiscovered cultural artefacts, however foundations are relatively shallow.	Smaller footprint with lower potential to unearth undiscovered cultural artifacts.
Landscape & Visual	Potentially less visible from surrounding area due to screening from forestry and topography	More visible at a greater distance from the site.
Telecoms & Aviation	Larger land take requirements with greater potential for interface with telecommunications and aviation.	There is one radio network (Three Ireland) which crosses a portion of the site to the north. One private airfield is located within 10km of the site (Clonbullogue Airfield) however the Aviation Review Statement prepared by AI Bridges confirms there will be no impact to the aviation activities at the airfield.

3.4.2.1 Outcome

The objective of the applicant was to identify a site capable of producing approximately 65MW of MEC in a suitably zoned location within Offaly and Kildare. A solar energy project was discounted due to the significantly larger land take requirement to deliver comparable energy output to a wind farm as it was not in line with the project objective.

3.4.3 Strategic Site Selection Process

Prior to the selection of the site for this proposed development, the Applicant undertook a detailed screening exercise using selection criteria and several stages to assess the potential of accommodating a wind farm development. The site selection criteria included:

- Compliance with County Development Plan Policies and Designations
- Scale of available land to accommodate a Wind Farm, taking into account turbine spacing requirements
- Natura 2000 sites
- Avoidance of Environmental Designations
- Separation distance from dwellings
- Level of visual impact
- Proximity to National Electricity Grid
- Wind Resource
- Site accessibility

This methodology applied represents Best Practice and generally aligns with the SEAI LARS[2] approach.

A technical review of potential candidate sites for both wind and solar energy development over a wide area in the region including the 3 counties of Offaly, Kildare and Laois (see Figure 3-1) was conducted using a desk-based geographical information system (GIS) screening exercise. The first step in the selection process was to examine high level constraints to eliminate areas which were deemed unsuitable for both solar and wind development. This identified all registered environmental designations (SAC, NHA, SPA), protected views, cultural and heritage sites, and other areas of special sensitivity.

The process of identifying a suitable site is influenced by many factors. At a macro scale, the national and regional planning policy together with distance from designated sites; available grid capacity; sufficient land availability; cumulative impacts with existing and permitted solar and wind farms, as well as other existing, permitted and proposed developments, and available wind speeds in an area are all integral factors. Additionally, other interrelated factors are considered including: the solar farm or wind farm must, in non-environmental terms, be commercially viable to ensure it will attract the necessary project finance to progress to the construction phase and ultimately deliver renewable electricity to the National Grid which is an objective of National energy policy.

3.4.3.1 Wind Farm – Initial Screening

Prior to selection of a site suitable for such development, a detailed screening exercise was undertaken by the Applicant using a number of criteria and stages to assess the potential of a large number of possible sites, on lands, suitable to accommodate a new wind energy development in the counties of Kildare, Laois and Offaly. In locating potential sites, the Applicant carried out a desk-based Geographical Information System (GIS) screening exercise, see Figure 3-1 for study area. This identified all designated conservation sites (SAC, SPA, NHA), cultural heritage sites (NMS and NIAH), and other areas of special sensitivity (specified in relevant development plans).

[2] Sustainable Energy Authority of Ireland, Methodology for Local Authority Renewable Energy Strategies (April 2013) - Methodology-for-Local-Authority-Renewable-Energy-Strategies.pdf.

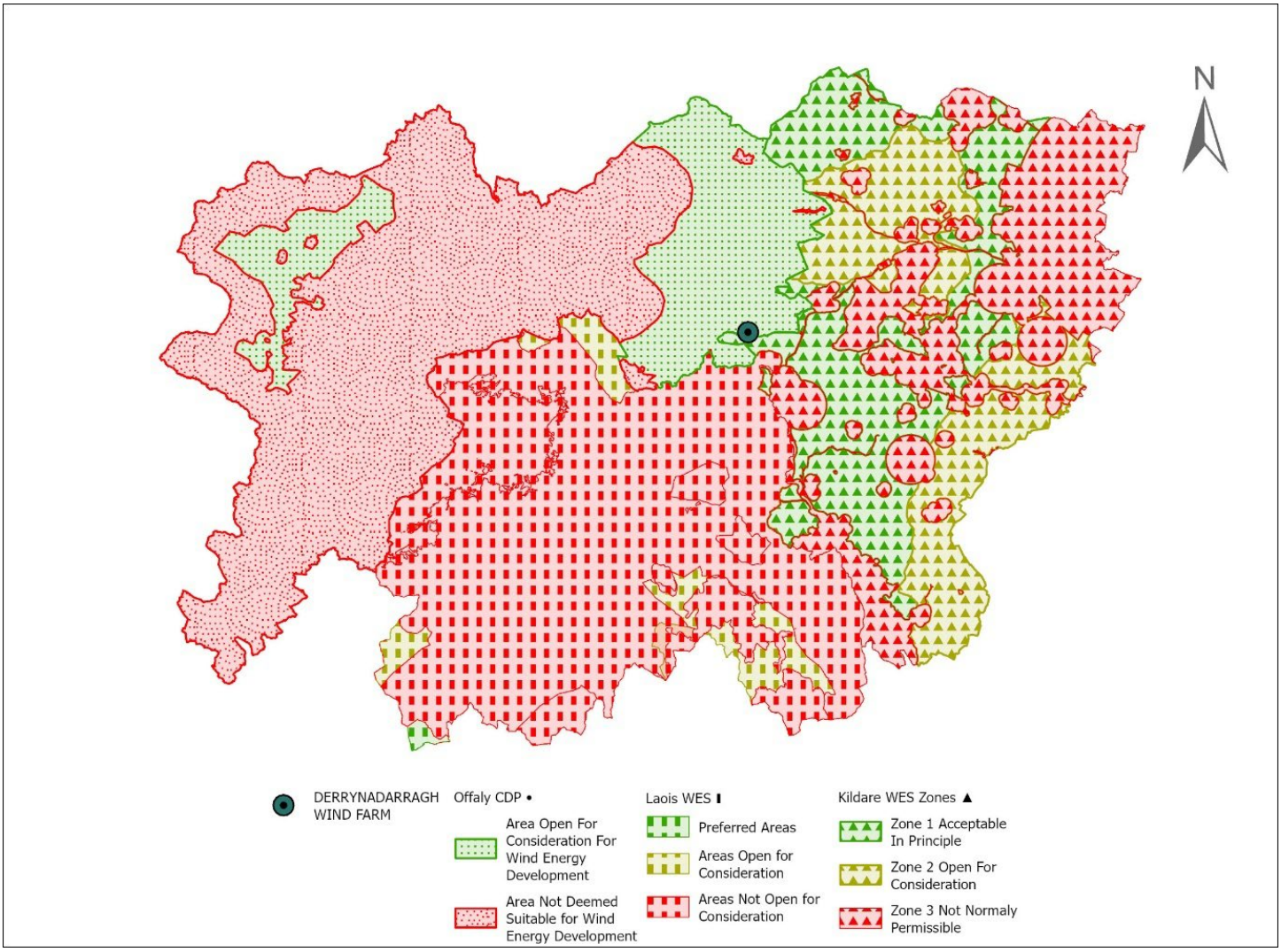

Figure 3-1: Study Area for Phase 1 – Initial Screening of Site Selection

The following steps were then undertaken for the screening process:

- Phase 1 Initial Screening
- Phase 2 Other Constraints and Facilitators

3.4.3.1.1 Phase 1 Screening

A number of criteria were applied in order to identify which lands/sites might be available, in principle, for wind energy development in Kildare, Laois and Offaly.

The selection criteria included:

- Separation distance from dwellings
- Natura 2000 sites
- Avoidance of Environmental Designations
- Lands utilised for other wind farm developments.

- Compliance with County Development Plan Policies and Designations
- Map of county development plans and designations

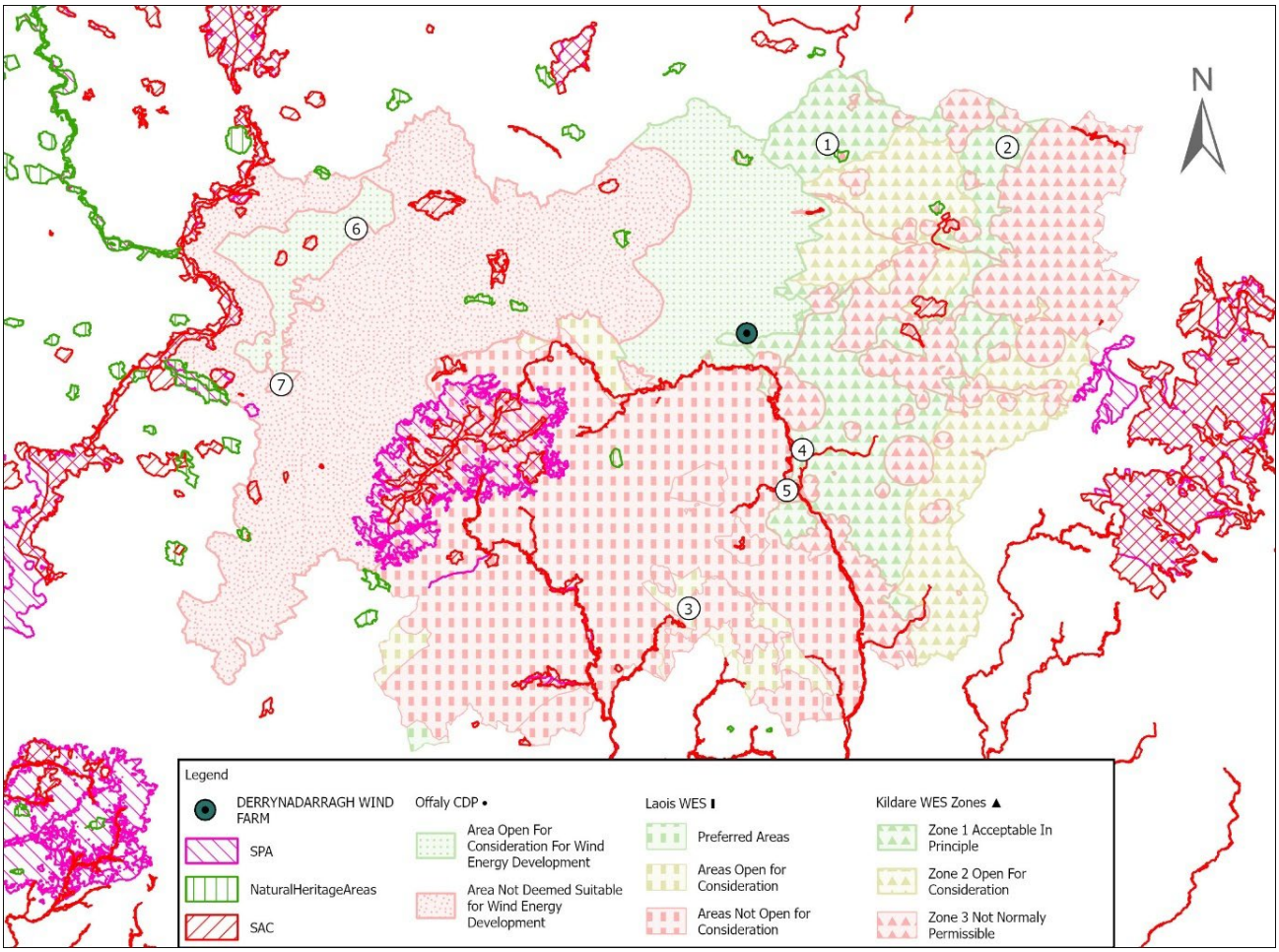

Figure 3-2: Results from Phase 1 Screening

The results derived from applying the Phase 1 Screening, identified a total of 8 no. potential wind farm sites, as shown at Figure 3-2.

3.4.3.1.2 Phase 2 Screening

The 8 no. sites identified through Phase 1 Screening were then subject to further assessment based on the following criteria:

- Proximity to Environmental designations
- Residential density considerations
- Potential project scale
- National monuments
- Amenity, Tourist or Scenic Areas
- Proximity to National Electricity Grid
- Wind Resource

- Proximity to protected airspaces.

The application of the above criteria resulted in the discounting of further sites, leaving a reduced number of sites for further assessment. A total of 7 no. sites were removed from further consideration for the following reasons: removed from further consideration for the following reasons:

Ref on Map 3	Reason for deselection
1	Proximity to Motor way and impact on protected air space
2	Proximity to Motor way and impact protected air space
3	Not of sufficient scale for viable project
4	Proximity to Barrow SAC
5	Proximity to Barrow SAC
6	Visual impact on Lough Bora
7	Landscape sensitivity

The site selection process was, by necessity, strategic and desk-based in nature in order to devise a short list of candidate sites. This is considered industry best practice, a rational and appropriate approach and its implementation was underscored by desk study research, local knowledge from Applicant Land Agent(s) in addition to site observations. Alternative locations were eliminated in the early stages of the site selection process due to quantum of land available, as the goal for this project was to deliver a large-scale wind farm of more than 6 no. wind turbines. Following a comprehensive assessment of all criteria, the proposed development site was deemed the most optimal to progress as a potential wind farm location.

3.4.3.2 Wind Farm – Site Validation

The proposed development site was further examined under the following headings to confirm its suitability for wind energy development. The main policy, planning and environmental issues considered for the validation of this wind farm site included:

- Consistently high average annual wind speeds;
- Obtainable, and commercially viable grid connection;
- Polices included in the Local Area Development Plans
- Located outside areas designated for protection of ecological species and habitats;
- Adjacency of residential properties;
- Access issues for turbine delivery and construction activities; and
- Site topography.

The above exercises, based on several key environmental, technical and policy-related criteria, determined that the proposed site selected is most in comparison to reasonable alternatives.. The site has satisfied key criteria required for successful wind energy development and these are presented in Table 3-3.

Table 3-3: Summary of Site Suitability Criteria

Suitability Criteria	Proposed Development Site
Wind Resource	The predicted wind speeds at the Site vary between 7.5 to 7.6m/sec as shown in Sustainable Energy Ireland's Wind Atlas.
Proximity to Grid	The site will connect into the new Bracklone Substation (currently under construction), via 11.4km cabling from the proposed on-site 110kV substation to Bracklone Substation.
Compliance with Planning Designation	As set out within EIAR Chapter 4 – Planning Policy, The Offaly County Development Plan (CDP) 2021 – 2027 marks the site as being within an area 'Open to Consideration'. The Kildare County Development Plan (CDP) 2023–2029 identifies the site as "Acceptable in Principle" for wind energy. The proposed development will contribute towards the achievement of the 466.3MW target stated in the County Offaly CDP/ Wind Energy Strategy, and remaining 107MW noted as a realistic target up to end of plan period within the Kildare CDP.
Avoidance of Environmental Designations	There are no Natura 2000 sites within the development footprint. The nearest identified site is the River Barrow and River Nore SAC 5km south of the permanent development footprint. Please refer to Chapter 9 – Biodiversity and Chapter 10 – Ornithology.
Separation distance from dwellings	Minimum setback distance of 4 times tip height of the turbines to non-involved landowners was adopted which significantly exceeds the separation distance suggested in the Wind Energy Development Guidelines (2006).
Site accessibility	Primary site access, , for the delivery of turbine components and access required for the maintenance of turbines during the operational phase of the Proposed Development,can be achieved from the northwest along the R419.
Level of Visual Impact	The landscape character and landscape sensitives of the site were assessed and it was considered that the site has the capacity to absorb a wind farm of scale.

3.4.4 Alternative Turbine Numbers, Layout and Design

The design of the wind turbine layout has been an informed and collaborative process of constraints assessment from the outset, involving engineers, environmental, hydrological, geotechnical, archaeological and transport specialists. The objective of which is the avoidance of significant environmental effects while designing a project which is technically feasible and maximising wind resource. Throughout the preparation of the EIAR, the layout of the Proposed Development has been revised and refined to take account of the findings of all site investigations and surveys, consultation and impact assessment, all of which have brought the design from its first initial layout of 7 no. turbines (Figure 3-3) to the current proposed layout of 9 no. turbines (Figure 3-11).

Constraints and environmental sensitivities were first identified, and buffers applied in order to determined appropriate areas within the site to accommodate development. This constraints exercise resulted in a developable area being defined. Once the viable area is established, the siting requirements of the wind turbines in terms of separation distances etc. are considered and a preliminary layout can be developed for the site. A comparison of environmental effects following this design approach and not following it, i.e. applying mitigation by design versus a design which does not consider the various environmental factors of the receiving environment is presented in Table 3-4.

Once the site was identified the Scoping Consultation exercise with statutory bodies was undertaken, showcasing a Site Location (Red Line Boundary) within the information issued to consultees. A detailed overview of the responses received are set out in EIAR Chapter 5 – EIA Scoping and Consultation. In particular, the response received from NPWS provided insight into the degrading issues along the Cushina River, therefore it was agreed with the applicant that measures would be proposed through this development to seek to improve water quality and habitats in this locality of the Cushina River.

Table 3-4: Comparison of Potential Residual Environmental Effects – Mitigation by Design and Potential Effects.

Environmental Consideration	Mitigation by Design Utilised in the Derrynadarragh Wind Farm Project	Potential Effect if Mitigation by Design is not Included
Residential Amenity	The applicant set a minimum of 500m set back from all inhibited dwellings, in line with the Wind Energy Development Guidelines (WEDGs 2006) and regard to the Draft WEDGs 2019. Following completion of layout optimisation, a separation distance of 744m (4 times tip height) was achieved from the closest non financially involved landowner, with the closest financially involved landowner located over 745m from the nearest proposed wind turbine.	Potential for effect on residential amenity due to noise, vibration, and dust during the construction stage. Further impact on residential amenity during the operational phase in the form of visual effects, noise, and shadow flicker would be anticipated if an appropriate setback distance was not applied.
Flora and Fauna	Avoidance of designated sites and mitigation designed to avoid potential effects on any qualifying interest, species, and/or sensitive habitats. As outlined in Chapter 9 – Biodiversity and related Appendices, areas of higher habitat value were avoided. Drainage Design applies SuDS to protect watercourses.	Potential for effect on hydrology, aquatic habitats and species, and water quality and hydromorphology effects downstream. Potential for loss of habitats of high ecological value.

Environmental Consideration	Mitigation by Design Utilised in the Derrynadarragh Wind Farm Project	Potential Effect if Mitigation by Design is not Included
	Implementation of Riparian Buffer Zones of at least 50m between proposed development and watercourses. Integrate peatland management into the project. Refer to Appendix 2.1 - CEMP, Chapter 9 – Biodiversity, and Appendix 2.2 - BEMP.	
Ornithology	Positioning the turbines within more open areas away from busier flight paths. Limit the need to remove habitat with high potential to support birds e.g. placing turbines in areas of higher historic burning rather than in higher quality meadows. Isolation of areas of high-quality grassland / health habitat to be retained and managed. Enhancement of agricultural lands of birds, refer to Chapter 10 – Ornithology and BEMP.	Potential effect to avifauna associated with the construction phase including possible deterioration of habitats and disturbance or displacement of birds (see Appendix 10.1 – Collision Risk Model).
Soils and Geology	Location and alignments of hardstands and access tracks that are sympathetic to the natural topography in order to reduce cut/fill and to limit potential effects on geology and soils stability. A detailed assessment of peat depths and trial pits/site investigation was undertaken to inform the design process of the Site which sought to avoid areas of deep peat. Layout is appropriately set back from known sensitive geological features e.g. fault lines and areas of high landslide susceptibility. Please refer to Chapter 11 – Soils and Geology for further information.	Alternative development footprint would result in greater volumes of overburden to be excavated. Potential for development on ground with unsuitable slope.

Environmental Consideration	Mitigation by Design Utilised in the Derrynadarragh Wind Farm Project	Potential Effect if Mitigation by Design is not Included
Hydrology and Water Quality	Minimum 50m set back of infrastructure from all watercourses was applied where reasonably possible. Adaptation of design to existing hydrological regime (streams and drainage channels) and inclusion of SuDS and comprehensive surface water management plan for the site. Design of clear span bridge to avoid in-stream works. Please refer to Chapter 12 – Flooding, Hydrology and Water Quality.	Potential effect to the existing hydrological regime in the absence of SuDS. Potential for runoff to directly discharge to streams. Potential migration of silt or petrochemicals to watercourses. Potential effect on water quality and aquatic biodiversity. Potential effect on designated sites downstream.
Noise and Vibration	Ensure compliance with the relevant guideline limits for noise. A 744m setback between the turbines and non-financially involved dwellings has been achieved which will assist in maintaining residential amenity at local dwellings.	Potential for effect to residential amenity at nearby dwellings due to reduced separation distances.
Shadow Flicker	Shadow flicker detection systems will be installed in turbines to avoid shadow flicker at nearby dwellings, in line with the Draft Revised Wind Energy Development Guidelines (2019). Please refer to Chapter 12 – Shadow Flicker for further information relating to this.	Potential effect on residential amenity due to shadow flicker at nearby dwellings if control measures are not applied.
Cultural Heritage	Design takes cognisance of nearby recorded monuments and avoids them and their zone of notification. See Chapter 15 - Archaeology & Cultural Heritage.	Potential effect on cultural heritage assets if infrastructure is placed in proximity to protected features.
Traffic and Transportation	Balance of cut and fill within the site to reduce road haulage – please refer to Chapter 2 – Description of development, and Chapter 14 – Traffic and Transportation.	Potential for greater traffic volumes during construction phase if material usage on site is not balanced and large volumes of external material are required.
Landscape and Visual	Design considerations of sensitive visual receptors in the greater area and uses the natural topography to reduce visual effects. Please refer to Chapter 16 – Landscape and Visual.	Potential negative visual effect on sensitive visual receptors and potential effect on residential amenity if not considered in the design of the wind farm.

It is also important to flag at this stage, that during the door-to-door consultation with the local community, a request was made by a local resident for the applicant to consider development of a solar farm in this location instead. While this was not part of the original project objective, the potential to incorporate solar panels was explored. A Solar Farm on this site was discounted due to the fact that a large portion of the available lands falls within a floodplain, making it unsuitable for solar panel installation.

3.4.4.1 Wind Farm Design Iterations

Alternative layouts for the Proposed Development were developed in an iterative design process which aimed to avoid environmental sensitivities, minimise potential environmental effects both on and off site and to maximise the wind potential on site. The design has been carried out in accordance with industry guidelines and best practice, namely the Department of Environment, Heritage and Local Government's (DoEHLG) Wind Energy Development Guidelines (2006), The Department of Housing, Planning and Local Government's (DoHPLG), and the Irish Wind Energy Association Best Practice Guidelines (2012). The design process of the Proposed Development has had regard to the Draft Revised Wind Energy Development Guidelines (2019) in the aesthetic considerations in the siting and design of the wind farm and in terms of mitigation by design including increased setback from nearby dwellings and the policy regarding zero shadow flicker.

The design of the Proposed Development was an iterative process which considered a range of alternative designs throughout the evolution of the project. FT worked closely with DANU, the clients appointed Electrical Engineers for design of the Grid Connection. The design iterations were influenced by potential environmental effects identified throughout the environmental assessment, leading to the evolution of the developable area of the project and the establishment of the final design as proposed. 5 no. design iterations were considered throughout the progression of the project, shown in Table 3-5.

A comparison of all the design iterations is presented in Figure 3-3 to Figure 3-6.

Table 3-5: Alternative Wind Farm Design Options.

Layout No.	No. of Wind Turbines	Tip Height (m)	Rotor Diameter (m)	Total Approx. Installed Capacity (MW)
Preliminary Design*	7	Range: 179m to 183.5m	150-163	35-50
Design Iteration 1	9	185m	162m	64.8MW
Design Iteration 2	9	185m	162m	64.8MW
Design Iteration 3	9	186m	162m	64.8MW
Design Iteration 4	9	186m	162m	64.8MW
* The Preliminary Design stage consisted of 3 no. different turbine models meaning that there would be a range of tip heights, rotor diameter, and MW output capacity.				

The layout of the turbines and associated infrastructure for the Derrynadarragh Wind Farm evolved over five key design iterations, each shaped by progressively more detailed site assessments and technical feedback. The process began with the establishment of the developable area and an initial layout (Preliminary Design – Figure 3-1), which included a 7-turbine arrangement. This early design aimed to optimise performance while limiting wind take.

As the design progressed through Iterations 1, 2, 3 (Figure 3-2, Figure 3-3 and Figure 3-4), refinements were made in response to environmental, ecological, geotechnical and hydrological surveys, noise and shadow flicker modelling, and feedback from the project team, Developer, local residents, service providers, environmental stakeholders, and landowners. Enhanced habitat mapping, peat probing, and ground investigations—along with consideration of site-specific constraints such as flood areas, watercourses, and ecologically sensitive areas—also informed these revisions. This led to the increase from 7 to 9 no. turbines, once the flood assessment had been undertaken to understand extent.

Further design refinements through Design Iteration 4 (Figure 3-5) were required as a number of turbines were guided by input from ecologists, geotechnical and civil engineers, and hydrologists. The final design balances technical feasibility with environmental responsibility, incorporating considerations such as access feasibility, buffer zones (e.g. habitat buffers), and updated ground condition data. The project philosophy of mitigation by avoidance was central to achieving a layout with the least potential environmental effect.

A comparison of the potential environmental effects associated with the various design iterations is presented in Table 3-6.

Preliminary Design

Having undertaken an initial site assessment, and prior to the full duration of ecological surveys being prepared, a preliminary site layout was designed. At this stage the layout was taking into account 2 no. potential site access points to the north along the R419. Turbine T3 was positioned partly within the 'Medium Landscape Sensitivity' area, as per the Offaly CDP. At this early design stage, the offset distance between T6 and the Cushina River was approximately 30m.

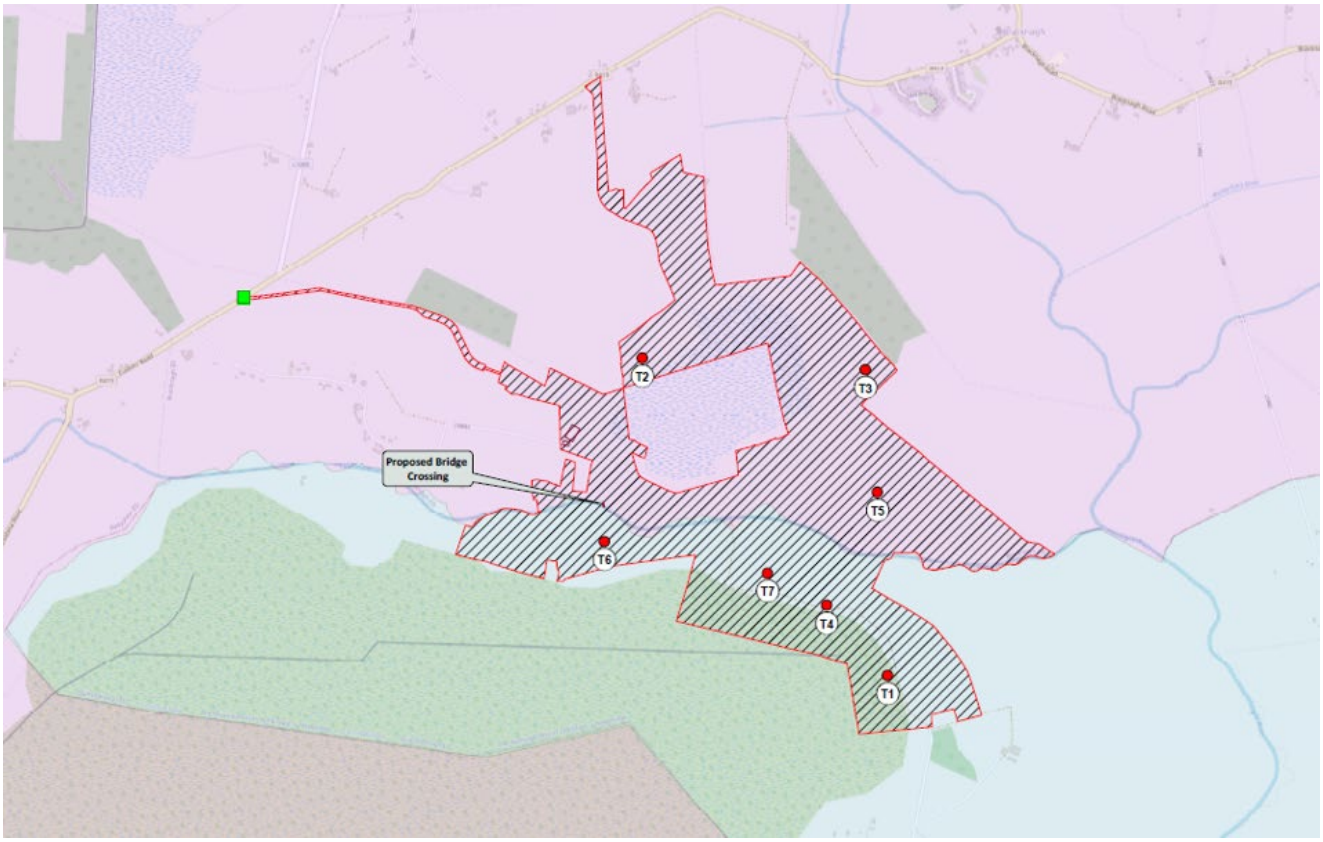

Figure 3-3: Preliminary Design (7 no. Turbine Arrangement)

Design Iteration 1

Having prepared a flood model, and undertaken a Flood Risk Assessment, it was at this stage of the design process that the full flood extents were understood. An additional 2 no. turbines were subsequently incorporated into the overall site layout, with the balance between facilitating renewable energy development to meet national and local policy objectives and achieving an appropriate layout within the site context. At this stage the substation compound was identified, which was chosen as it fell outside of the flood extents and did not encroach on priority habitat.

Figure 3-4: Design Iteration 1 (9 no. Turbine Arrangement)

Design Iteration 2

The evolution of the layout at this stage was focused on micro siting of turbines taking account of how they sit in the landscape and ensuring appropriate setbacks are being achieved with regards to the Cushina River, residential receptors, and ecological/habitat constraints. The substation footprint altered at this point of the process through discussions with DANU (the appointed Grid Connection Designers) around substation size and capacity appropriate for the site.

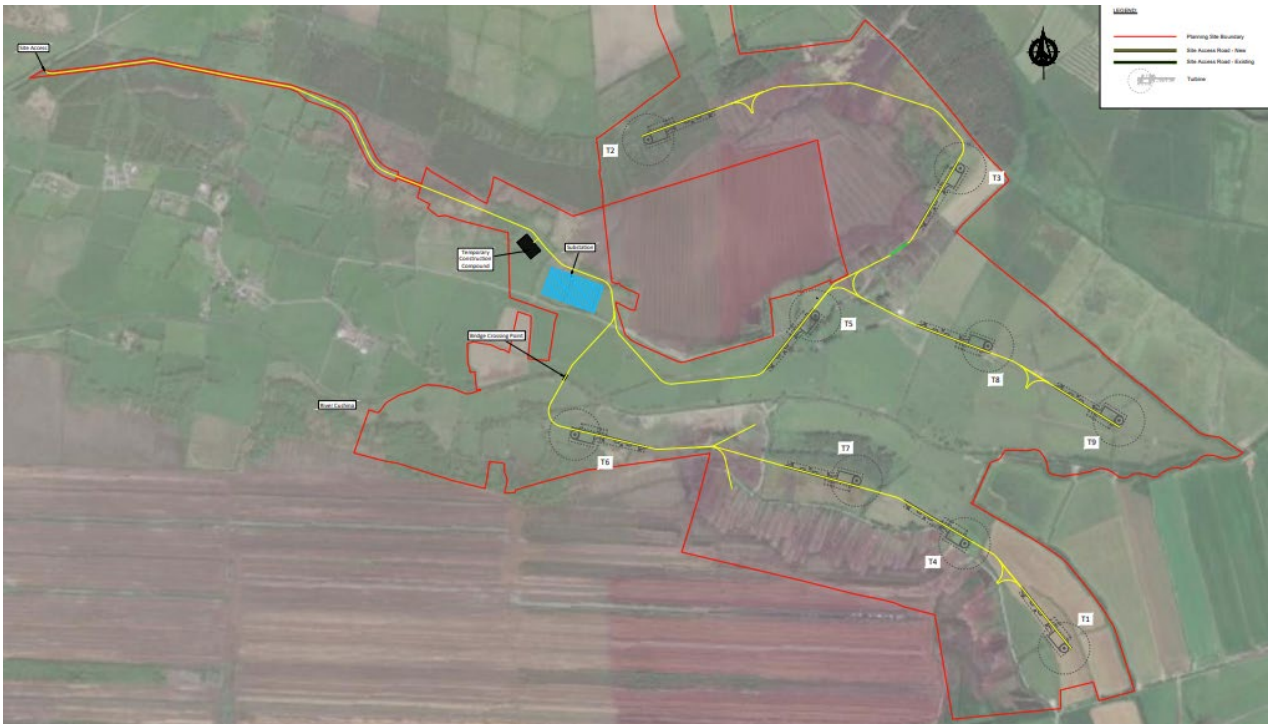

Figure 3-5: Design Iteration 2 (9 no. Turbine Arrangement)

Design Iteration 3

Further refinement at this stage was guided by input from geotechnical and civil engineers, ecologists, and hydrologists. This led to internal access track amendments and further micro siting of turbines in order to achieve an optimal layout for wind energy through realignment of existing tracks, avoidance of existing drains onsite, and also ensuring that the turbines sit in harmony with the surrounding environment and habitats.

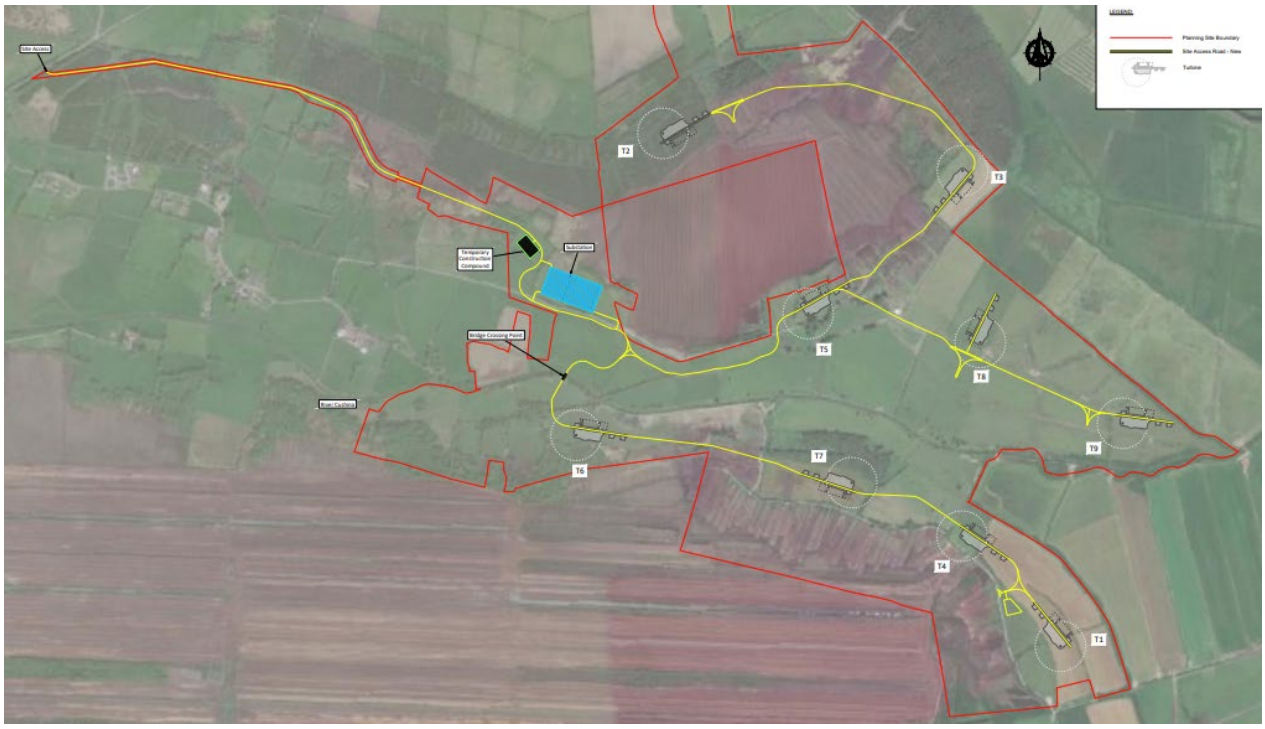

Figure 3-6: Design Iteration 3 (9 no. Turbine Arrangement)

Design Iteration 4

The final design balances technical feasibility with environmental responsibility, incorporating the ecological buffers of the badger setts and Cushina River, including offsets from the deep peat areas, and micro siting of T02 to ensure avoidance of the Three Ireland Radio link which crosses the site to the north.

A number of biodiversity enhancement measures have been incorporated into the layout design (full detail of these is enclosed within the BEMP) which include:

- Fencing off bog woodland habitat to prevent livestock access - allowing the recovery of the ground and encouraging natural regeneration of the native habitat.
- A riparian zone is to be located within the site on the northern bank of the Cushina River, which will be fenced off to create a riparian zone ranging from 5m to 35m wide, running west to east.
- All drains within the site boundary which flow into the Cushina River from the north will have in-ditch wetland. Sediment trapping designed as an in-ditch wetland which will be effective in reducing sediment load reaching Cushina River and seeks to enhance the wetland biodiversity in the drains where they are implemented.

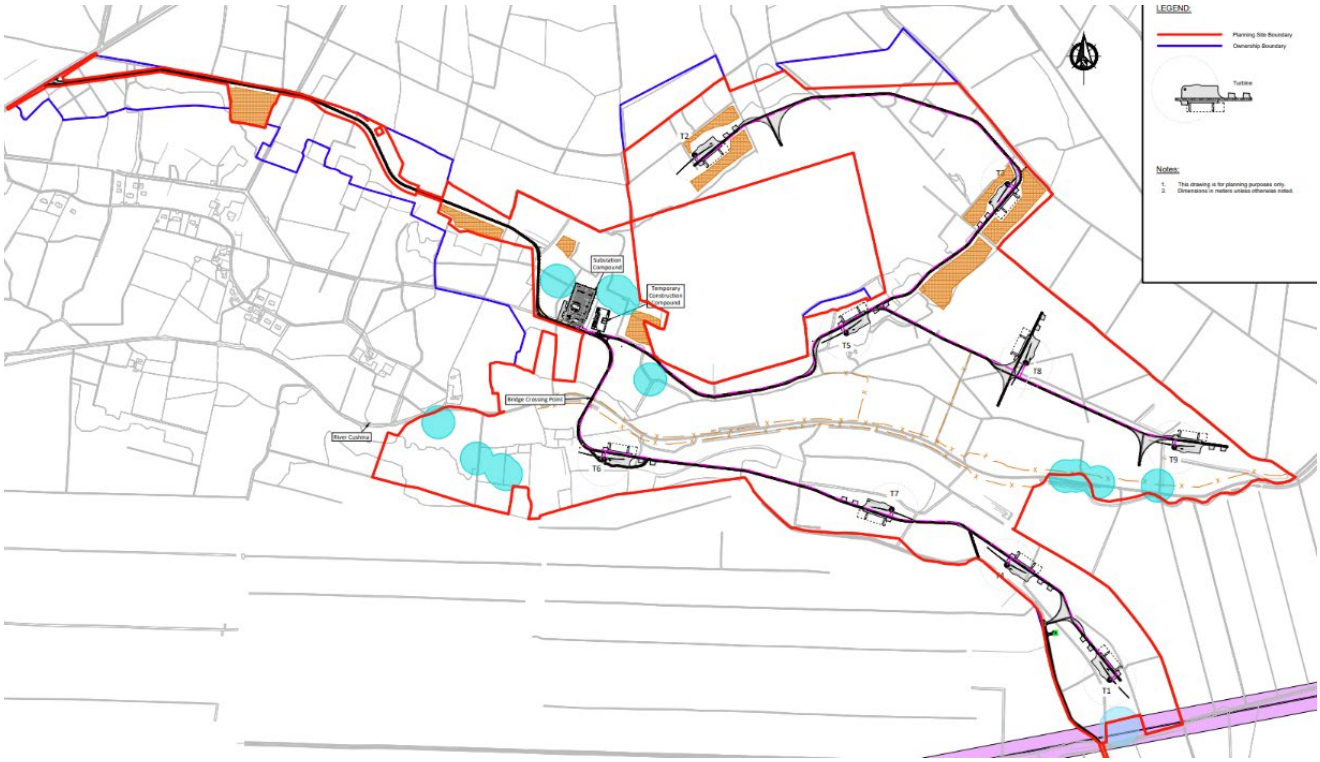

Figure 3-7: Design Iteration 4 (9 no. Turbine Arrangement)

Table 3-6: Comparison of Potential Residual Environmental Effects of the Wind Farm Design Iterations

Environmental Consideration	Preliminary Design Option	Design Iteration 1	Design Iteration 2	Design Iteration 3	Design Iteration 4
Air & Climate	Slightly reduced long-term positive effects on air quality and climate due to reduced power output (7 no. turbines). Long-term positive effects on air quality due to production of clean renewable electricity.	Greater effects during construction due to greater CO2 emissions due to greater number of turbines (9 no. turbines). Slightly greater potential for dust emissions due to larger area of excavation. Long-term positive effects on air quality and climate due to production of clean renewable electricity.	Long-term positive effects on air quality and climate due to production of clean renewable electricity.	Long-term positive effects on air quality due to production of clean renewable electricity.	Long-term positive effects on air quality due to production of clean renewable electricity. No likely significant effects are expected to arise from the development subject to proposed mitigation measures being provided.
Noise & Vibration	Slightly less noise effects on nearby sensitive receptors due to a lower number of turbines (7 no.). However, potential for greater noise effects on nearby sensitive receptors due to potential access point being located further along R419 (closer to Ardra) and internal access track running closer to nearby sensitive receptors.	Potential for greater noise effects on nearby sensitive receptors due to greater number of turbines (9 no.). However, slightly less noise effects on nearby sensitive receptors due to site access and internal access track being located further south and south west. Design achieves appropriate setback distances. 4x tip setback achieved for non-involved landowners.	Slightly less noise effects on nearby sensitive receptors due to a reduction in turbine numbers (15 no.) Design achieves appropriate setback distances. 4x tip height setback achieved for non-involved landowners. Slight to moderate significance of effects , with dwellings closest to the project.	Design achieves appropriate setback distances. 4x tip height setback achieved for non-involved landowners. Slight to moderate significance of effects , with dwellings closest to the project.	Slightly less noise effects on nearby sensitive receptors due to a reduction in turbine numbers (14 no.) Design achieves appropriate setback distances. 4x tip height setback achieved for non-involved landowners. Slight to moderate significance of effects , with dwellings closest to the project. No likely significant effects are expected to arise from the development.

Environmental Consideration	Preliminary Design Option	Design Iteration 1	Design Iteration 2	Design Iteration 3	Design Iteration 4
Biodiversity	Reduced habitat loss due to reduced area of hardstanding's (7 no). Reduced potential of collision risk due to smaller number of turbines.	Greater habitat loss due to greater area of hardstanding's. (9 no.). Greater potential of collision risk due to greater number of turbine blades.	Inclusion of BEMP lands resulting in a long-term positive effect on the Site.	Inclusion of BEMP lands resulting in a long-term positive effect on the Site.	Protection of habitat (badgers) and further development of BEMP lands resulting in a long-term positive effect on the Site. No likely significant effects are expected to arise from the development.
Land, Soils, Geology	Smaller area of excavation and soil disturbance required due to smaller number of turbines (7 no).	Larger area of excavation and soil disturbance required due to greater number of turbines (9 no). No significant residual effects following implementation of mitigation measures.	No significant residual effects following implementation of mitigation measures.	No significant residual effects following implementation of mitigation measures.	No significant residual effects following implementation of mitigation measures. No likely significant effects are expected to arise from the development.
Flood, Hydrology & Water Quality	2 no. turbines sited within 1 in 100yr flood zone. 1 no. turbine (T6) located within 50m of existing watercourses. No-significant residual effects following mitigation.	2 no. turbines sited within 1 in 100yr flood zone. No turbines located within 50m of existing watercourses. No-significant residual effects following mitigation.	2 no. turbines sited within 1 in 100yr flood zone. No turbines located within 50m of existing watercourses. No-significant residual effects following mitigation.	2 no. turbines sited within 1 in 100yr flood zone. No turbines located within 50m of existing watercourses. No-significant residual effects following mitigation.	2 no. turbines sited within 1 in 100yr flood zone. No turbines located within 50m of existing watercourses. No-significant residual effects following mitigation. No likely significant effects are expected to arise from the development.

Environmental Consideration	Preliminary Design Option	Design Iteration 1	Design Iteration 2	Design Iteration 3	Design Iteration 4
Population & Human Health	Slightly reduced potential for adverse effects on residential amenity due to smaller visual envelope and heightened noise as a result of the smaller number of turbines (7 no).	Slightly greater potential for effects on residential amenity due to greater visual envelope and heightened noise as a result of the greater number of turbines (9 no).	Design achieves appropriate setback distances. 4x tip height setback achieved for non-involved landowners. Slight to moderate significant effect, with dwellings closest to the project.	Design achieves appropriate setback distances. 4x tip height setback achieved for non-involved landowners. Slight to moderate significant effect, with dwellings closest to the project.	Design achieves appropriate setback distances. 4x tip height setback achieved for non-involved landowners. Slight to moderate significance of impact, with dwellings closest to the project. No likely significant effects are expected to arise from the development.
Traffic & Transport	Similar potential effectsfollowing mitigation.	Similar potential effectsfollowing mitigation.	Similar potential effectsfollowing mitigation.	Similar potential effectsfollowing mitigation.	Similar potential impacts following mitigation. No likely significant effects are expected to arise from the development.
Archaeology & Cultural Heritage	No expected adverse effects to existing cultural heritage feature within the site through avoidance.	No expected adverse effects to existing cultural heritage feature within the site through avoidance.	No expected adverse effects to existing cultural heritage feature within the site through avoidance.	No expected adverse effects to existing cultural heritage feature within the site through avoidance.	No expected adverse effects to existing cultural heritage feature within the site through avoidance. No likely significant effects are expected to arise from the development.

Environmental Consideration	Preliminary Design Option	Design Iteration 1	Design Iteration 2	Design Iteration 3	Design Iteration 4
Landscape & Visual	Slightly reduced potential visual effects associated with greater number of turbines (7 no.).	Slightly greater potential visual effects associated with greater number of turbines (9 no.).	Similar potential effects following mitigation.	Similar potential effectsfollowing mitigation.	Similar potential impacts following mitigation. No likely significant effects are expected to arise from the development.
Telecoms & Aviation and Material Assets	No expected adverse effects.	No expected adverse effects.	No expected adverse effects.	No expected adverse effects.	. No likely significant effects are expected to arise from the development.

The final design iteration was chosen to take forward for the proposed project as it strikes a balance between energy production capacity and avoidance of environmental sensitivities. The chosen option provides for the greatest amount of energy production while avoiding potential significant impacts on the receiving environment and achieving appropriate setback from dwellings and sensitive environmental receptors.

The Noise considerations suggested within the Kildare WES and Offaly CDP Development Management Standard 'DMS-109' are based on the requirements outlined in the Draft Revised Wind Energy Development Guidelines, published by the Department of Housing, Planning and Local Government in 2019. Given the technical errors, ambiguities and inconsistencies contained in the 2019 Draft WEDGs, discussed in Section 8.4.3.2.1, compliance with points a, b and c within section 6.10 of the Kildare Wind Energy Strategy, and the final bullet point relating to human health in relation to noise disturbance of 'DMS-109' of the Offaly CDP is not possible.

Having regard to both the Kildare Wind Energy Strategy and Offaly 'Development Management Standard 'DMS-109', the proposed development materially contravenes the Kildare CDP 2023-2029 and Offaly CDO 2021-2027 in respect of Noise compliance. However it is important to note that the proposal will comply with the Kildare CDP 2023-2029 and Offaly CDP 2021-2027 in all other respects. The material contravention is discussed in more detail at Chapter 8 – Noise and Vibration of Volume II of the EIAR.

3.4.5 Alternative Transport Routes and Site Access

Wind turbine components (blades, nacelles and towers) are not manufactured in Ireland and therefore must be imported from overseas and transported overland to the Site. Alternative transport routes to the Site were considered in relation to turbine components, general construction-related traffic, and site access locations.

A Delivery Route Selection and Assessment was carried out by Pell Frischmann Consulting (the Consultant) to identify the optimum delivery route to site. The turbine delivery transport route will utilise the motorways, national and primary roads available insofar as possible to ensure the road network has the capacity to manage the large/abnormal loads proposed. Once the route leaves the national road there were limited options available to site. The route chosen was such to reduce potential for interaction with third party lands while finding the most direct route to Site.

Ultimately the most viable turbine delivery / abnormal load route from Junction 5 of the M6 Motorway to the Site was determined as follows:

- The Turbine components will be delivered to the Galway Port and travel to the M6;
- At Junction 5, depart the M6 and continue south on the N52;
- Depart the N52 to the east of Tullamore and turn left onto the R420, eastbound;
- Turn left onto the R402 northbound;
- Continue north and then east on the R402 through Ballinager and Daingean;
- Turn right from the R402 onto the R400 travelling south; and
- Remain on the R400 until reaching Corbetstown where loads would keep left at the junction to join the R419 then proceed northeast towards the site entrance.

The objective will be to maintain the strategic capacity and safety of the M6 and N52 carriageway at all times, cognisant of the Regional Spatial and Economic Strategy, with key sectoral priorities for maintaining the N52 national road network to a robust and safe standard for users.

As presented in Chapter 14 – Traffic and Transportation of this EIAR and shown on planning drawings, a mixture between permanent accommodation and minor temporary accommodation works will be required to allow for abnormal load delivery. Some temporary hardcore surfacing will be required at roundabouts or area of oversail. One specific location has been identified were permanent accommodation works involving creation of a bridge is required. Further details are set out at Chapter 14 – Traffic and Transportation of this EIAR.

The location of the on-site construction compounds were selected relative to the location of the access into the Site and proximity to the on-site substation.

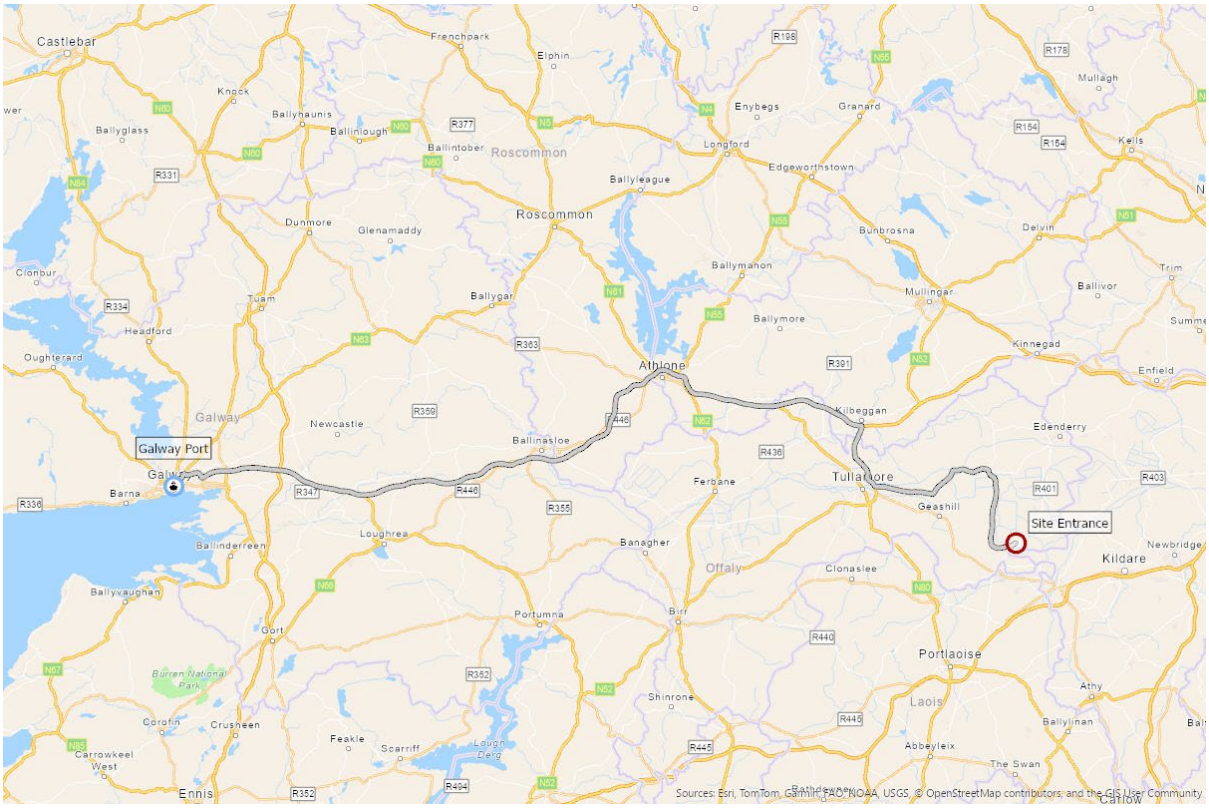

Figure 3-8: Site Access

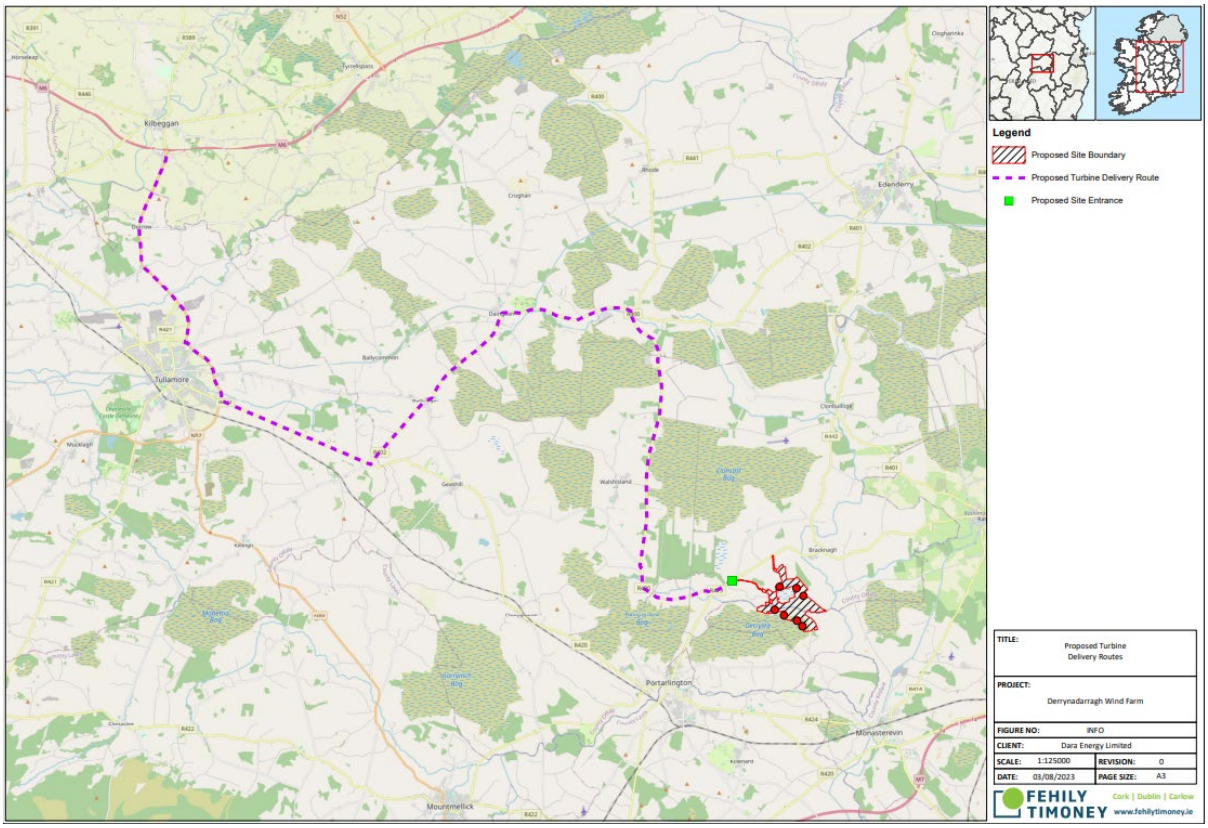

Figure 3-9: TDR Option from Galway Port to site

3.4.6 Alternative Grid Connection Routes

Danu Energy Consulting (the Consultant) were engaged by Dara Energy Ltd (the Applicant) to identify and analyse potential grid connection options available for the Derrynadarragh Wind Farm Project. An initial desk study was completed to identify potential substations and grid connection routes to Derrynadarragh Wind Farm. Several substations were selected in proximity to the wind farm, and potential grid routes were identified to connect to the proposed wind farm substation. These substations are outlined within Figure 3-10.

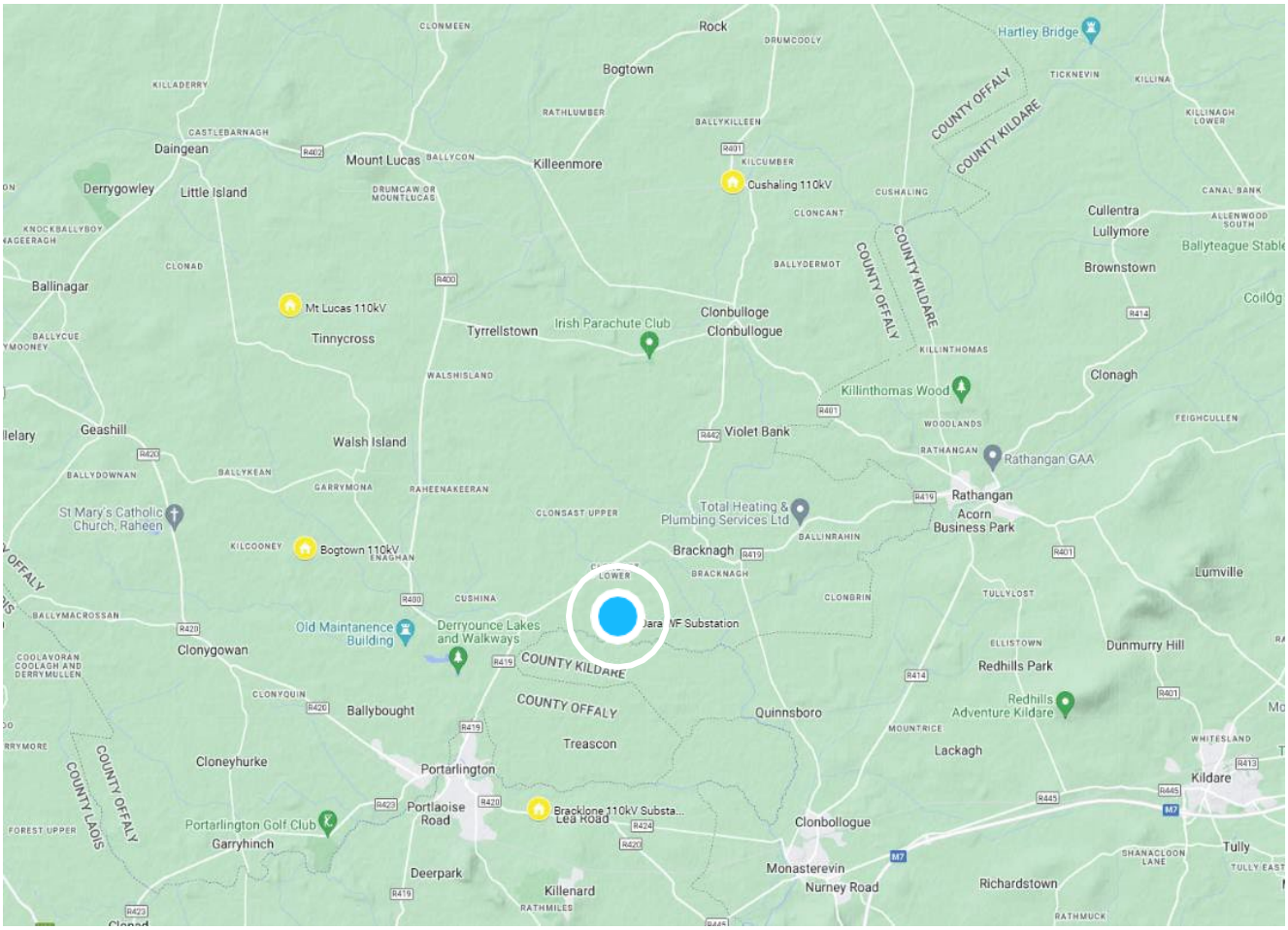

Figure 3-10: Various Substation identified for consideration (shown by yellow points)

A total of 4 no. 110kV substations were identified within 20km of the wind farm which have connection capacity, and these were then considered further as potential grid connections for the proposal. It is important to note that all 3 no. options are either existing substations or are currently under construction:

- Bogtown
- Bracklone
- Cushaling

From these 3 no. identified substations, a total of 5 no. potential grid route options were identified connecting from the proposed onsite substation, as shown at Figure 3-11 below.

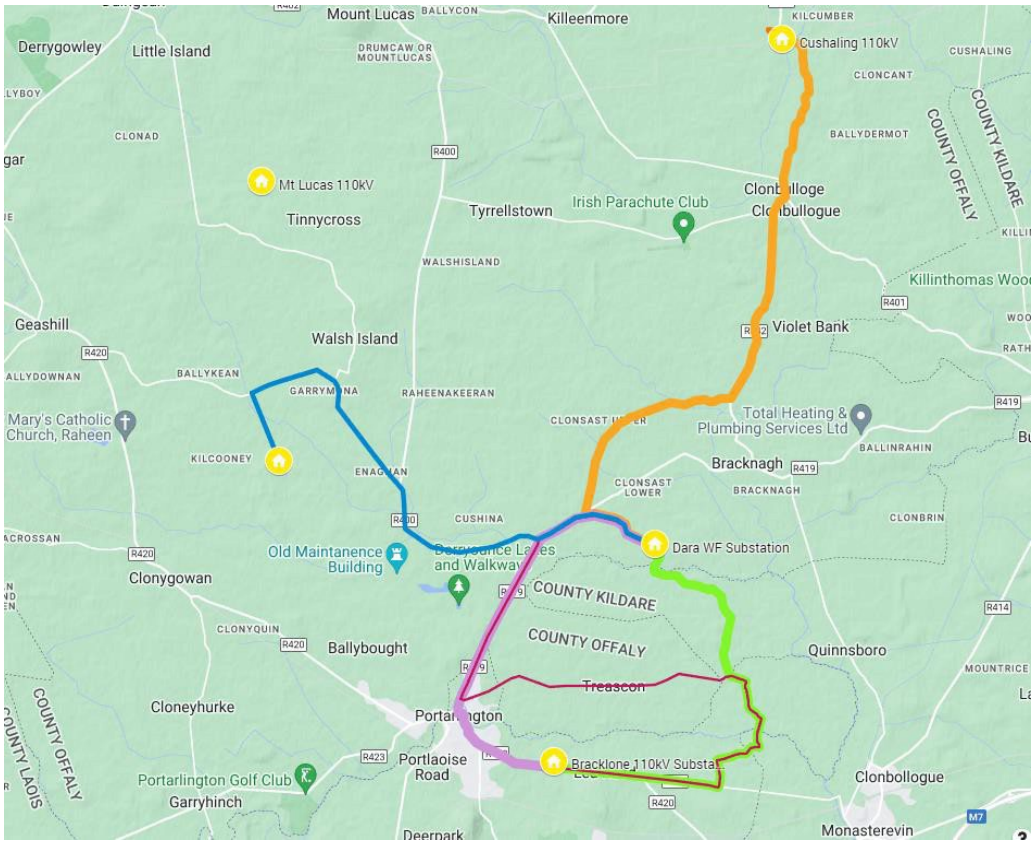

Figure 3-11: Potential Grid Route Options

Route 1	Green – Bracklone eastern route
Route 2	Orange – Cushaling
Route 3	Purple – Bracklone [western route through Portarlington]
Route 4	Pink – Bracklone [north of Portarlington]
Route 5	Blue – Bogtown [Moanvane Wind Farm]

The identified grid routes were compared against the following criteria:

- Route Length [km], including:
  - Route length on private lands [km]
  - Route length on public road [km]
  - National Road [km]
  - Regional Road [km]
  - Local Roads [km]
- Potential floating public road (bog road) [km]
- Traffic Management (through towns/villages)
- Existing Utilities (through towns/villages)
- Watercourses & bridge crossings
- Number of HDD crossings along the routes

A summary of the findings for each route is set out within the following table.

	Route 1	Route 2	Route 3	Route 4	Route 5
Route Length [km]	11.2	14.8	9.5	19.5	12.7
Route length private lands [km]	2.8	1.8	1.8	1.8	3.5
Route length public road [km]	8.4	13	7.7	17.7	9.2
National Road [km]	0	0	0	0	0
Regional Road [km]	3.5	8.2	7.5	4.6	4.8
Local Roads [km]	4.9	4.8	0.2	13.1	4.4
Potential floating public road (bog road) [km]	1.2	4	10	20	13
Traffic Management (towns/villages)	N/A	Yes	Yes	Yes	N/A
Existing Utilities (towns/villages)	N/A	Yes	Yes	Yes	N/A
Watercourses & bridge crossings	5	6	2	8	6
HDD crossings	4	4	2	7	3

Following consideration, Routes 3, 4, 5 were discounted due to the significant length of public floating road required at these locations, and thus would be unviable to the Applicant and the Roads Department would not be in favour of same.

An Environmental comparison between Route 1 & Route 2 was undertaken, and the outcomes are set out in further detail within the following table.

Environmental Factor	Grid Connection to 110kV Bracklone Route 1	Grid Connection to 110kV Cushaling Route 2
Population and Human Health	Traffic disruptions during the construction phase.	Traffic disruption during the construction phase along route and to Clonbulloge Village.
Biodiversity	No Effect.	No Effect.
Ornithology	No Effect.	No Effect.
Air and Climate	Emissions during construction phase.	Emissions during construction phase.
Lands and Soils	Temporary removal of overburden during laying of cables.	Temporary removal of overburden during laying of cables.

Environmental Factor	Grid Connection to 110kV Bracklone Route 1	Grid Connection to 110kV Cushaling Route 2
Water	Total of [5] No. water crossings.	Total of 6 No. water crossings.
Noise	Construction phase noise.	Construction phase noise
Landscape	No Effect.	No Effect.
Cultural Heritage	No Effect.	No Effect.
Shadow Flicker	No Effect.	No Effect.
Material Assets	Additional traffic during construction phase 8.4Km.	Additional traffic during construction phase on 13KM and movement of services with Clonbulloge village.

Finally, Route 1 was selected as the preferred option when compared to Route 2, due to the fact that the route length was shorter and it avoided interaction with local villages. Route 2 required passing through of Clonbulloge village, and the associated effects on traffic in the village and disruption to the existing underground services were the main reasons as to why this option was removed from further consideration.

Taking the potential environmental constraints and effects into account, it is considered that the connection between the proposed on-site 110kV substation connecting to the Bracklone 110kV Substation (currently under construction) is considered to be the most appropriate from an environmental perspective.

3.4.7 Alternative Trenching Methodologies

The applicant and design team (FT and DANU) considered the use of both Horizontal Directional Drilling (HDD) versus instream water crossings. HDD was considered the preferred alternative to in-stream construction methods for watercourse crossings along the Grid Connection Route. This approach was thereby selected to avoid direct disturbance to aquatic habitats and to reduce potential impacts on water quality, sedimentation, and biodiversity.

3.4.8 Selection of Turbine dimensions

Following the constraint analysis of the site to determine available development area and following discussions with Turbine suppliers Vestas, Nordex and Enercon on the potential available turbines and the suitability of turbines for the site it was determined that a rotor diameter of 162m and tip height of 186 was the most suitable and economical for the site, and would seek to maximise the contribution to 2030 targets.

3.4.9 Wind Farm Design iterations

Iteration		Driver of change	Benefit/ reason for adaptions
1	Moving project from 7 to 9 turbine layout	Review of Turbine spacing requirements and flood model.	Improve objectives of the project
2	Adjustment of roads hardstand positions to minimise impact on drainage	Review of drainage network relative to turbine positions.	Reduced impact on Drainage network
3	Adjustment position of Substation and temporary compound and position of access road to ensure outside of Badger buffer zones	Identification of Badger setts.	Removal of potential effects on Badgers.
4	T2 Movement	New radio link confirmed by 3.	Removal of potential effects on Telecommunications.
5	Introduction of parking and bench for local usage as an Amenity	Requested at public consultation.	Improved community benefit

3.4.10 Alternative methodology of items within CEMP

Following consultation with the local residents, and during discussions with the Roads Department within Offaly and Laois County Councils, a number of alternative methodologies were considered and are summarised within the below table.

Type of Alternative	Driver for change/selection	Original Design/Option discounted	Amended Design	Benefit
Access route Design and CEMP iteration 1	Consultation with local residences	Use of L10057 for initial construction set up until new access road complete	Use Land of R419, until construction of access road complete	Improved amenity of residence along the L10057

Type of Alternative	Driver for change/selection	Original Design/Option discounted	Amended Design	Benefit
Access route Design and CEMP Iteration 2	Consultation with Offaly Co. Co.	Use Lane of R419, until construction of access road complete	Introduction of Temporary construction compound off R419	Reduced Traffic impact on the R419
Route of Construction material to site from Local Quarries	Consultation with Offaly Co. Co. raised concerns with volume of additional heavy loads on R400	Use of R400 as potential route for delivery of Quarry material	Rerouting of Material trucks away from R400	Reduced road maintenance need on the R400.

3.5 Conclusion

This chapter of the EIAR has described the reasonable alternatives considered throughout the development process for the proposed Derrynadarragh Wind Farm in terms of project design philosophies, technology, size and scale for the development. This Chapter sets out the evolution of the Proposed Development and the alternatives considered. Alternative renewable energy technologies were considered and a comparison of potential environmental effects of the alternatives was provided. The section details the strategic site screening process i.e. the high-level considerations in finding a suitable site for a renewable energy project.

The alternative layouts of the Proposed Development were established through the project philosophy of mitigation by design. Alternative density and scale were considered, and the potential environmental effects of various alternative turbine numbers were compared.

Alternatives were also considered for other individual elements of the Proposed Development including the grid connection route and turbine delivery route. The alternative turbine delivery and grid connection options were examined, and the optimal options was chosen as a result of environmental assessment, as detailed in the comparisons provided throughout this Chapter.

The final proposed layout of the Derrynadarragh Wind Farm as assessed throughout this EIAR is thought to be the optimal design which minimises effects on the receiving environment, while providing significant renewable electricity to the national grid, in line with national energy and climate policy.

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