Environmental Impact Assessment Report (EIAR)

Proposed Cahermurphy West Wind Farm, Co. Clare

Chapter 3: Site Design and Consideration of Reasonable Alternatives

3. CONSIDERATION OF 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 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 Environmental Impact Assessment Report (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. of Ch. 1: Introduction, for the purposes of this EIAR, the various project components are described using the following references: 'Proposed Project', 'the Site', 'Proposed Wind Farm' and 'Proposed Grid Connection'.

This section of the EIAR contains a description of the reasonable alternatives that were studied by the developer, 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 project, connection to the national grid and transport route options to the site. This section also outlines the design considerations in relation to the wind farm, including the associated substation, construction compound and borrow pits. It provides an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

Non-environmental Factors

EIA is confined to the potential significant environmental effects 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.

3.1.2 Methodology

The EU Guidance Document (EU, 2017) on the preparation of EIAR 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, the EU Guidance Document (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 (EPA, 2022) 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 is deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required.*"

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

- 'Do Nothing' Alternative;
- Alternative Site Locations;
- Alternative Renewable Energy Technologies;
- Alternative Turbine Numbers and Turbine Sizes;
- Alternative Turbine Layouts and Development Design;
- Alternative Design of Ancillary Structures;
- Alternative Grid Connection Route Options;
- Alternative Transport Route and Site Access
- Alternative Enhancement Lands; and
- Alternative Mitigation Measures.

Each of these is addressed in the following sections.

When considering a wind farm development, given the intrinsic link between layout and design, the two will be considered together in this chapter.

3.2 'Do-Nothing' Alternative'

Article IV, Part 3 of the EIA Directive states that the EIAR 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 land-use option to the development of a renewable energy project at the Site would be to leave it as it is, with no changes made to existing land-use practices of coniferous forestry and agriculture on the Proposed Wind Farm site and public road corridor along the Proposed Grid Connection. In doing so, the environmental effects in terms of emissions are likely to be slightly negative due to the increased level of continuous operation of forestry machinery at the Proposed Wind Farm (inclusive of Hen Harrier Enhancement Lands). The opportunity to capture the available renewable energy resource and offset the continued forestry and farming emissions, as well as offset emissions form non-renewable sources, would be lost, as would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions. The opportunity to generate local employment, local authority development contributions, rates and investment in the local area would also be lost. On the basis of the positive environmental and economic effects arising from the project, when compared to the do-nothing alternative, the do–nothing alternative was not the preferable, nor chosen option. It should also be clarified that the existing surrounding land uses can and will continue in conjunction with this Proposed Project.

A comparison of the potential environmental effects of the 'Do-Nothing' Alternative when compared against the chosen option of developing a renewable energy project at this site are presented in Table 3-1 below.

Table 3-1 Comparison of environmental effects when compared against the chosen option of developing a renewable energy project (the Proposed Project.

Environmental Consideration	'Do Nothing' Alternative	Developing a renewable energy project (Chosen option)
Population & Human Health (incl. Shadow Flicker)	No increase in local employment and no long-term financial contributions towards the local community from local authority rates payments or community benefit fund. No potential for shadow flicker and noise to affect sensitive receptors.	Up to 90 jobs would be created during the construction, operation, and decommissioning phases of the Proposed Wind Farm, 30-50 jobs will be created to focus on the Proposed Grid Connection. Rates payments for the Proposed Project will contribute significant funds to Clare County Council, which will be redirected to the provision of public services within the county. The Proposed Project has the potential to generate up to €8,800,000 over the proposed 35 year lifespan. Based on the assessment detailed in Chapter 5 and the mitigation measures proposed, there will be no significant effects related to shadow flicker and noise from the Proposed Project.

Environmental Consideration	'Do Nothing' Alternative	Developing a renewable energy project (Chosen option)
Biodiversity & Ornithology	No habitat loss. No potential for collision risk for birds and bats.	As detailed in Chapter 6, the development has been designed to avoid or mitigate impacts on biodiversity. As detailed in the Bat Report in Appendix 6-2 of this EIAR, taking into consideration the sensitive design of the project, the proposed best practice and adaptive mitigation measures, significant residual effects on bats are not anticipated. As detailed in Chapter 7, the Collision Risk Assessment (CRA) indicates that the impact of the Proposed Project on birds corresponds to a low to very low effect significance. The management of the Hen Harrier Enhancement Lands will result in long term positive effects for hen harrier and floral and faunal species which would benefit from the reinstatement of bog and heathland, and management of intensively grazed grasslands.
Land, Soils & Geology	No excavation of large volumes of peat and spoil.	As detailed in the assessment in Chapter 8, there is no net loss of peat, subsoil or bedrock as a result of the Proposed Project. Peat and subsoil will be relocated within the Site.
Geotechnical/Peat Stability	Neutral	The findings of the Peat Stability Assessment Report indicate that the site has an acceptable margin of safety, a low risk of peat failure and is suitable for the Proposed Project.

Environmental Consideration	'Do Nothing' Alternative	Developing a renewable energy project (Chosen option)
Water (Hydrology & Hydrogeology)	Neutral	As discussed in Chapter 9, no significant effects on surface water or groundwater quality will occur.
Air & Climate	Will not provide the opportunity for an overall increase in air quality or significant reduction of greenhouse gasses. Will not assist in achieving the renewable energy targets set out in the Climate Action Plan.	As detailed in the assessment in Chapter 11, whilst there will be carbon losses during the construction phase of the Proposed Project due to the use of machinery and loss of habitat, over the proposed 35-year lifetime of the Proposed Project, 40,600 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation per annum.
Noise & Vibration	No potential for noise impacts on nearby sensitive receptors.	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 Project during the construction, operational and decommissioning phases.
Cultural Heritage & Archaeology	No potential for impacts on unrecorded, subsurface archaeology.	As detailed in the assessment in Chapter 13, the potential direct effects on Cultural Heritage (archaeology, architecture and cultural heritage) will not be significant. The significance of indirect effects on Cultural Heritage (archaeology, architecture and cultural heritage) will be Imperceptible to Moderate.
Landscape & Visual	Neutral	As detailed in the assessment in Chapter 14, the lack of nearby highly sensitive landscape and visual receptors, and the strategic siting of infrastructure will mitigate any potential for

Environmental Consideration	'Do Nothing' Alternative	Developing a renewable energy project (Chosen option)
		significant landscape and visual effects.
Material Assets	No additional traffic generated, or accommodation works carried out on the local road network and therefore no direct or indirect effects on roads and traffic. No potential for effects on telecommunications, aviation or waste management services.	As detailed in Chapter 15, there will be a temporary negative slight impact on traffic volumes during the construction phase of the Proposed Project. A detailed Traffic Management Plan incorporating all the mitigation measures will be agreed with the roads authority prior to construction works commencing on site. Results from the telecom operator consultations and desktop survey analysis indicate that the turbine layout will not impact any of the Telecom Operator radio networks. Results from the aviation scoping consultations, desktop survey analysis and Aviation Review Statement (Appendix 15-6) indicate that the Proposed Project will not have any significant impacts on aviation.

It should also be noted that the '*Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report'* (European Union, 2017)[1] states:

> *In some cases, however, the 'do-nothing' scenario cannot be considered a feasible policy option, as a Project is very clearly needed: for example, if another policy dictates an action, such as a waste management plan, which requires improved waste management, then a new plant must be built.*

By progressing the Proposed Project there is an opportunity to enhance employment and investment in the local area and to capture the available renewable energy resource within County Clare, thus contributing to meeting county, national and international climate targets such as the Climate Action and Low Carbon Development (Amendment) Act 2021, Climate Action Plans (particularly CAP25) and European Green Deal, the emissions reductions targets of which Ireland is currently not on track to meet. The Proposed Project will also contribute to securing and

[1] *Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report', (European Union, 2017). Available at: https://circabc.europa.eu/ui/group/3b48eff1-b955-423f-9086-0d85ad1c5879/library/b7451988-d869-4fee-80de-0935695f67f2/details?download=true*

safeguarding the electricity grid and reducing reliance on external fuel sources. As such it was deemed that the Do-Nothing Alternative was not the preferred option.

3.3 Alternative Site Locations

The primary criteria for site identification by Cahermurphy Renewables DAC focused on compliance with the Clare County Development Plan 2023-2029 and the identification of suitable sites within a designated Strategic Area and/or those deemed Acceptable in Principle for windfarm development as shown on the mapping within the Clare County Development Plan 2023-2029 Volume 6 Clare Wind Energy strategy capable of accommodating a medium to large number of wind turbines. Three areas were highlighted that were primarily in locations classified as 'strategic areas', which had low surrounding population densities a reduced number of environmental constraints, presented land use access opportunities and were surrounded by suitably sized road infrastructure to enable turbine component delivery

The potential suitable site land blocks which emerged from this review are Area A, Area B and Area C, as shown below in Figure 3-1.

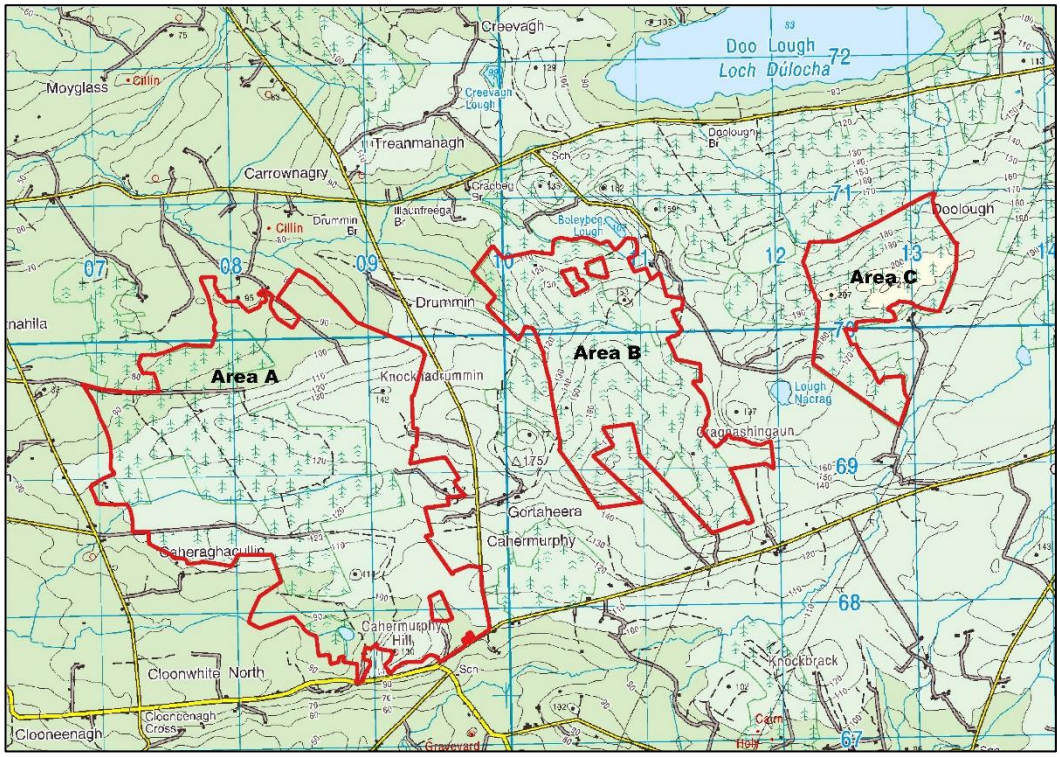


Figure 3-1: Areas A, B and C

3.3.1 Suitability of the Candidate Site

Area A was chosen as the candidate site (henceforth referred to as the 'candidate wind farm site'), due to the lesser number of ecological constraints when compared with those associated with Areas B and C (presence of Cragnashingaun Bogs NHA directly bordering these sites, for example) and the considerably smaller size of Area C. The table below details the environmental and design constraints considered by theme:

Table 3-2: Comparative Study of Candidate Sites

Theme	Area A	Area B	Area C
Power Output	Increased area would lead to a larger amount of turbines and a larger power output	Decreased area would lead to a lesser amount of turbines and reduced power output	Decreased area would lead to a lesser amount of turbines and reduced power output
Biodiversity	No Natura 2000 or nationally designated sites within 1km of the site	Directly adjacent Cragnashingaun Bogs NHA	Directly adjacent Cragnashingaun Bogs NHA
Hydrology	Downstream connectivity with Natura 2000 sites	Downstream connectivity with Natura 2000 sites	Downstream connectivity with Natura 2000 sites, direct hydrological connectivity with Doo lough.
Population	Low population density. Greater number of nearby dwellings.	Low population density. Lower number of nearby dwellings.	Low population density. Lower number of nearby dwellings.

The candidate wind farm site was further examined under the following headings in order to confirm its suitability for wind energy development.

- Planning Policy
- Proximity of Existing Grid Infrastructure
- Designated Sites
- Average Wind Speeds
- Population Density

3.3.1.1 Planning Policy

The Clare County Development Plan 2023 – 2029 (CDP) was formally adopted by Elected Members of Clare County Council on March 9th, 2023. The CDP officially came into effect on April 20th, 2023 and provides overall guidance for the proper planning and development of County Clare through the use of supporting policies and objectives.

The CDP recognises its position in supporting the delivery of meaningful action on climate change. Climate action is thus an important strategic objective of the CDP, with aims to achieve decarbonisation and climate resilience as a county. This has been reflected in Chapter 2, in addition to other climate action and renewable energy related objectives introduced throughout the CDP.

The Interim Wind Energy Strategy (WES) for County Clare 2023-2029 was published in April 2023 and is incorporated into the CDP as Volume 6. The WES has been developed as a planning framework to support the implementation of wind developments in the county.

The WES 2023-2029 highlights 11 Strategic objectives that outline the overall rationale behind the strategy, with the aim of contributing to national legally binding targets while also capitalising on those opportunities associated with the generation and harnessing of wind energy in a sustainable matter. A key objective being:

"To promote economic development through wind energy and other renewables in the County, underpinning the need for energy security, the promotion and establishment of a low carbon economy and the development of green business within the County."

Lands classified under the WES have been developed for wind farm developments based on specific objectives. The definitions of the on-shore wind energy classifications, as per the WES are outlined below –

'Strategic Areas' are considered to be highly suitable for wind energy developments and are of strategic importance due to key factors which include:

- Viable Wind Speeds;
- Proximity to grid;
- Slopes less than 15 degrees;
- Distance from properties; and
- Excludes all SAC's SPA's and NHA's.

'Acceptable in Principle' are areas considered suitable for Wind Energy developments due to key factors which include:

- Viable wind speeds;
- Proximity to grid;
- Slopes less than 15 degrees;
- Excludes SAC's and SPA's and avoids most NHA's; and
- Low population density.

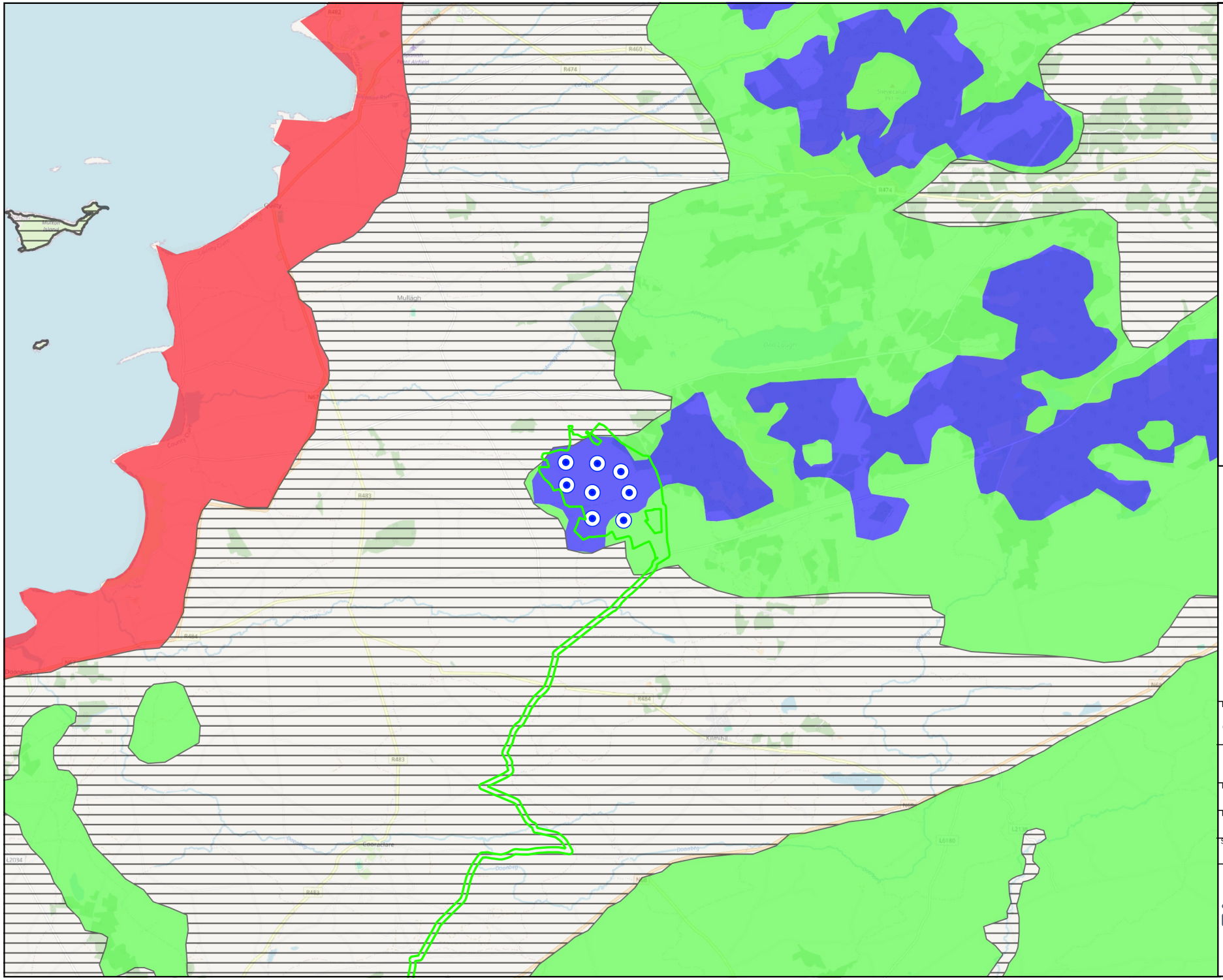
'Open to Consideration' areas are evaluated on a case-by-case basis subject to:

- Viable wind speeds;
- Proximity to the grid; and
- Variable population densities

'Not Normally Permissible' areas are not, in principle, considered as suitable locations for Wind Energy developments due to sensitivity arising from:

- Large number of natural heritage designations; or
- Important recreational/tourism area:
- Large number of archaeological sites
- HDA and SEA recommendations

The majority of the candidate wind farm site is located within an area designated primarily as a 'Strategic Area' with a small part of the site being located within an area designated as 'Acceptable in Principle'. Strategic areas are considered suitable for wind farm development with good/excellent wind resources, access to grid, distance from properties and location outside designated sites. A target of minimum 400MW from these areas is identified in the WES. Acceptable in Principle areas are also considered suitable for wind farm development with sufficient wind speeds, access to grid and established patterns of inquiries. A target of minimum 150MW from these areas is identified in the WES.


Map Legend
EIAR Site Boundary
Proposed Turbine Location
Clare Wind Energy Strategy
(2023-2029)
Acceptable in Principle
Not Normally Permissible
Open to Consideration
Strategic Areas
N
Microsoft product screen shots reprinted
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Drawing Title
Clare Wind Energy Strategy
Project Title
Cahermurphy West Wind Farm
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Scale
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Date
08.01.2026
MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Further details on Planning Policy and the range of other provisions within the CDP that support the provision of renewable energy, including the objectives are listed in Chapter 2, as well as the accompanying planning report to this EIAR.

3.3.1.2 Existing Grid Infrastructure

The candidate wind farm site is located in proximity to 3 no. existing electrical substations and therefore a wind energy development at this location has multiple options for connection to the national electricity grid. The 110kV Booltiagh electrical substation is located approximately 6.6km east of the candidate site boundary at its closest point, as the crow flies. The 110kV Slievecallan electrical substation is located approximately 7.4km northeast of the candidate wind farm site boundary at its closest point. The Moneypoint 110kV electrical substation is located approximately 16.7km southwest from the candidate wind farm site boundary. Ultimately, the Moneypoint 110kV electrical substation was chosen due to capacity issues at the Booltiagh and Slievecallan substations identified through communication with Eirgrid. The preferred grid connection route option includes for underground 110kV electrical cabling from the proposed onsite 110kV electrical substation within the Proposed Wind Farm site to the Moneypoint 110kV electrical substation. The underground cable route measures approximately 25 km in length, located primarily (96% of the route) within the public road corridor.

3.3.1.3 Designated Sites

There are no Natura 2000 or nationally designated sites located within the candidate wind farm site boundary. The nearest Natura 2000 site, i.e., Special Area of Conservation (SAC) or Special Protection Area (SPA), to the candidate site is Carrowmore Point to Spanish Point and Islands SAC, located approximately 5.9km west of the candidate site boundary. The nearest SPA is the Mid-Clare Coast SPA, located approximately 5.9km west of the candidate site. Both these Natura 2000 sites overlap and are closest to the candidate site boundary at the same location. Cragnashingaun Bogs Natural Heritage Area (NHA) is located 1.9km east of the candidate wind farm site boundary.

3.3.1.4 Average Wind Speeds

The Irish Wind Atlas produced by Sustainable Energy Authority of Ireland (SEAI) shows average wind speeds for the country. With the upland nature of the landscape, the Wind Atlas shows that wind speeds on the candidate wind farm site range from 8.8m/s to 9.2m/s at a 100m elevation. Such wind speeds indicate that this site is viable for commercial wind energy development.

3.3.1.5 Population Density

The Applicant sought to identify an area with a relatively low population density. Having reviewed the settlement patterns in the vicinity, the candidate wind farm site emerged as suitable to accommodate a wind energy development. The population density of the Population Study Area as described in Ch. 5: Population and Human Health of this EIAR is 13.21 persons per square kilometre. This is significantly lower than the average national population density of 73.27 persons per square kilometre. Further to this, the closest dwelling to the Proposed Project is located 743m northwest of the nearest turbine. This meets the requirements as set out in the '*Draft Revised Wind Energy Development Guidelines December 2019*' (Department of Housing, Local Government and Heritage, 2019) for a setback distance from occupied dwellings of 4 times tip height from a turbine (i.e., 740m in the case of the maximum proposed tip height for this Proposed Project), and significantly exceeds the 500m setback recommendation within the *Wind Energy Development Guidelines 2006* (Department of Housing, Local Government and Heritage, 2006). Although the 4 times tip height requirement suggested in the draft Guidelines has not been officially adopted, the developer has applied the setback in the site selection and design process as

it is considered best practice. There are 29 no. residential properties located within 1km of the proposed turbines but outside of the 4 times tip hight buffer area.

3.3.1.6 Summary

The purpose of the site identification exercise was to identify an area that would be capable of accommodating a wind farm development while minimising the potential for adverse impact on the environment. In order to satisfy this requirement, a significant landholding that would yield a sufficient viable area for the siting of each element of the Proposed Project was required.

The candidate wind farm site, which will be named 'Cahermurphy West Wind Farm' (henceforth referred to as the "Proposed Wind Farm" site) is located within an existing commercial forestry property which allows the site to take advantage of existing access roads. This, when combined with the high wind speeds and distance from protected sites and households, further highlights the suitability of the site as it can make further sustainable use of these established items of infrastructure.

The Cahermurphy West site does not overlap with any environmental designations and is also located in an area with a very low population density, relative to the national average, with viable annual wind speeds. Furthermore, the Proposed Wind Farm site is also designated as a 'Strategic Area' and 'Acceptable In Principle' within the functional area of Clare County Council for the provision of wind farm development, further highlighting its suitability.

3.4 Alternative Renewable Energy Technologies

Both onshore and offshore wind energy development will be required to ensure Ireland reaches the target set in the Climate Action Plan to source 80 per cent of our electricity from renewable energy by 2030. It is not a case of 'either' 'or'. When considering other renewable energy technologies in the area, the Applicant considered commercial solar energy production as an alternative on the Proposed Wind Farm site. Cahermurphy West Wind Farm was screened for capacity to accommodate a solar energy farm but due to the undulating nature of the site coupled with the presence of adverse soil conditions for solar, it was not deemed viable from an operations or functionality perspective.

Commercial solar energy production is the harnessing and conversion of sunlight into electricity using photovoltaic (PV) arrays (panels). Solar PVs have a smaller capacity factor than wind farms. The capacity factor of solar PV panels in the southwest of Ireland is approximately 10%[2], compared to the capacity factor of the Proposed Wind Farm site of 36%[3]. As discussed in Section 4.2.1 in Chapter 4 of this EIAR, the potential installed capacity of the Proposed Wind Farm site will be up to 57.6 MW, which has the potential to produce up to 181,647 MWh of electricity per year, equating to supplying electricity to approximately 43,249 Irish households annually. A solar PV array with the same potential installed capacity would produce a significantly lower electricity supply which could only serve between approximately 10,500 and 13,500 Irish households per year or one quarter of the electricity that a wind farm of similar MW output could produce.

In order to supply the same number of households with electricity per year as the Proposed Wind Farm site, a solar PV array would require a potential installed capacity of between 184.7 MW and 233.3 MW, thus requiring a permanent development footprint approximately 10 times the size of the Proposed Wind Farm site (At 0.7ha per MW for Solar PV,) to achieve the same electricity output as the Proposed Wind Farm for which the permanent footprint will be 15.55ha. In addition,

[2] *Teagasc, Solar PV. Available at: https://www.teagasc.ie/rural-economy/rural-development/energy/technologies/solar-pv/*
[3] *EirGrid, 2022 Enduring Connection Policy 2.2 Constraints Report for Solar and Wind ECP-2-2-Solar-and-Wind-Constraints-Report-Area-D-v1.0.pdf (eirgridgroup.com)*
The Proposed Project is located within the D wind region for Ireland with an associated 2024 capacity factor of 36%.

as described in Table 3-3 below, a solar development, of this scale, would have a higher potential environmental effect on Hydrology and Hydrogeology, Traffic and Transport (construction phase) and Biodiversity and Birds (habitat loss, glint and glare) at the site. A comparison of the potential environmental effects of the development of such a solar PV array against the chosen option of developing wind turbines at the Proposed Wind Farm site is presented in Table 3-3 below.

Table 3-3 Comparison of environmental effects when compared against the chosen option (wind turbines)

Environmental Consideration	Solar PV Array	Wind Turbines (Chosen option)
Population & Human Health (incl. Shadow Flicker)	No potential for shadow flicker to affect sensitive receptors. Potential for glint and glare impacts on local road users and residential receptors.	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 Project. No potential for glint and glare impacts on local receptors.
Biodiversity & Ornithology	Larger development footprint would result in greater habitat loss. No potential for collision risk for birds or bats. Potential for glint and glare impacts on birds.	As detailed in Chapter 6, the development has been designed to avoid or mitigate impacts on biodiversity. As detailed in the Bat Report in Appendix 6-2 of this EIAR, taking into consideration the sensitive design of the project, the proposed best practice and adaptive mitigation measures, significant residual effects on bats are not anticipated. As detailed in Chapter 7, the Collision Risk Assessment (CRA) indicated that the impact of the Proposed Project on birds corresponds to a low to very low effect significance. No potential for glint and glare impacts on birds.
Land, Soils & Geology	Shallower excavations involved in solar PV array developments would result in reduced volume of spoil to be excavated.	As detailed in the assessment in Chapter 8, no significant effects on soils and subsoils will occur. Peat depths recorded across the Site are considered shallow for an upland blanket bog.

Environmental Consideration	Solar PV Array	Wind Turbines (Chosen option)
Geotechnical/Peat Stability	Shallower excavations involved in solar PV array developments would decrease the potential for peat instability.	The findings of the Peat Stability Assessment Report determine that the site has an acceptable margin of safety and a low risk of peat failure and is suitable for the Proposed Project.
Hydrology & Hydrogeology	A solar PV array development would require a significantly larger area of forestry to be permanently felled and replaced with renewable energy development therefore increasing the potential for silt laden runoff to enter receiving watercourses. Shallower excavations involved in solar PV array developments would result in reduced volume of spoil to be excavated, therefore reducing the potential for silt-laden runoff to enter receiving waterbodies.	As detailed in the assessment in Chapter 9, no significant effects on surface water or groundwater quality will occur.
Air & Climate	Solar PV array technology would result in a slightly longer carbon payback period.	As detailed in the assessment in Chapter 11, whilst there will be carbon emissions associated with the construction phase and ongoing monitoring of the Proposed Wind Farm during the operational phase, over the proposed 35-year lifetime of the Proposed Project, 1,298,850,000 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation. The minimum tonnage of carbon dioxide that could be saved by the Proposed Project is 37,110 tonnes per annum. A Solar array with a 57MW installed capacity would likely save approximately 25,000 tonnes of carbon per annum.
Noise & Vibration	While noise and vibrations will be lower for a Solar PV array during the operational phase, noise and vibration levels would be expected	Based on the assessment detailed in Chapter 12 and the mitigation measures proposed, there will be no

Environmental Consideration	Solar PV Array	Wind Turbines (Chosen option)
	to be similar to that of a wind farm development during construction and decommissioning.	significant effects on sensitive receptors due to an increase in noise levels from the Proposed Project during the construction, operational and decommissioning phases.
Cultural Heritage & Archaeology	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.	As detailed in the assessment in Chapter 13, the significance of direct effects on Cultural Heritage (archaeology, architecture and cultural heritage) will be Not Significant. The significance of indirect effects on Cultural Heritage (archaeology, architecture and cultural heritage) will be Imperceptible to Moderate.
Landscape & Visual	Potentially less visible from surrounding area due to screening from forestry and topography.	As detailed in the assessment in Chapter 14, the lack of nearby highly sensitive landscape and visual receptors, and the strategic siting of infrastructure will mitigate any potential for significant landscape and visual effects.
Material Assets	Potential for greater traffic volumes on the external road network during construction phase due to the number of solar panels required to achieve the same output. Less potential for effects on telecommunications, aviation or waste management services.	As detailed in Chapter 15, there will be a temporary negative slight impact on traffic volumes during the construction phase of the Proposed Project. A detailed Traffic Management Plan incorporating all the mitigation measures will be agreed with the roads authority prior to construction works commencing on site. Results from the telecom operator consultations and desktop survey analysis indicate that the turbine layout will not impact any of the Telecom Operator radio networks.

Environmental Consideration	Solar PV Array	Wind Turbines (Chosen option)
		The findings of aviation consultations concludes that with the prescribed mitigation measures, the residual effects are not significant.

For the reasons set out above, the proposal for a wind energy renewable energy development at the Proposed Wind Farm site was considered to be the most efficient method of electricity production with a smaller development footprint and a lower potential for significant environmental effects than a solar energy development with the equivalent electricity supply capacity.

3.5 Alternative Turbine Numbers and Turbine Sizes

The proposed wind turbines, for the purpose of the assessments within this EIAR, will each have a potential power output of 6.3 – 7.2 megawatts (MW). It is proposed to install 8 turbines at the site which are estimated to achieve a minimum output of 50.4 MW and a maximum output of 57.6 MW. Such an output could also be achieved on the Proposed Wind Farm site by using smaller turbine technology (for example 2.5 MW machines). However, this would necessitate the installation of between 20 no. and 23 no. turbines to achieve a similar output range. Furthermore, the use of smaller turbines would not make efficient use of the wind resource available having regard to the nature of the Proposed Wind Farm site.

A larger number of smaller turbines would result in the wind farm occupying a greater footprint within the site, with a larger amount of supporting infrastructure being required (i.e., roads etc.) and increasing the potential for negative environmental effects to occur.

The proposed wind turbines to be installed on the site will have a ground-to-blade tip height between 180m and 185m, a hub height between 98.5m and 110.5m, and a rotor diameter between 149m and 163m (blade length between 74.5m and 81.5m). The proposed number of turbines takes account of all environmental 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 Proposed Wind Farm site. The 8-turbine layout selected for the Proposed Project has the smallest development footprint of the other alternatives considered, while still achieving the optimum output at a more consistent level than would be achievable using different turbines.

The use of alternative smaller turbines at this site would not be appropriate as they would fail to make the most efficient use of the wind resource passing over the site due to the fact that stronger windspeeds are present at higher elevations, which shorter turbines would fail to harness. Furthermore, the increased use of materials, excavation and movement of peat and increase in visual effect associated with a larger number of smaller turbines would result in a higher level of negative environmental effects than the chosen option.

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 taller wind turbines on the Proposed Wind Farm site are presented in Table 3-4 below.

Table 3-4 Comparison of environmental effects when compared against the chosen option (larger wind turbines)

Environmental Consideration	20 no. to 23 no. Turbine Layout	8 no. turbine layout (Chosen option)
Population & Human Health (incl. Shadow Flicker)	Likely potential for increased shadow flicker impacts on nearby sensitive receptors due to the increased number of turbines.	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 Project.
Biodiversity & Ornithology	Larger development footprint would result in greater habitat loss and potential for displacement. Increased number of turbines would likely result in increased levels of bird strike.	Smaller footprint would result in less habitat being lost. As detailed in Chapter 6, the development has been designed to avoid or mitigate impacts on biodiversity. As detailed in Chapter 7, the Collision Risk Assessment (CRA) indicated that the impact of the Proposed Project on birds corresponds to a Low to Very Low effect significance.
Land, Soils & Geology	Larger development footprint would result in greater volumes of peat and spoil to be excavated and managed.	Smaller footprint would result in smaller volume of soils to be excavated and managed. As detailed in the assessment in Chapter 8, no significant effects on soils and subsoils will occur.
Geotechnical/Peat Stability	Increased levels of excavations required for 20-23 turbines may lead to an increased risk of peat instability at the Site. The findings of the Peat Stability Assessment Report indicate that the Site has an acceptable margin of safety, a low risk of peat failure and is suitable for the Proposed Project.	Decreased levels of excavations required for 8 turbines would lead to a decreased risk of peat instability at the Site. The findings of the Peat Stability Risk Assessment indicate that the Site has an acceptable margin of safety, a low to negligible risk of peat failure and is suitable for the Proposed Project.
Water (Hydrology and Hydrogeology)	Larger development footprint, therefore, increasing the potential for silt laden runoff to enter receiving watercourses.	Smaller footprint would result in less potential for silt-laden run-off to enter a watercourse.

Environmental Consideration	20 no. to 23 no. Turbine Layout	8 no. turbine layout (Chosen option)
		As detailed in the assessment in Chapter 9, no significant effects on surface water or groundwater quality will occur.
Air & Climate	Increased potential for vehicle emissions and dust emissions due to an increased volume of construction material and turbine component deliveries to the site. Given the smaller number of turbines would have the same/similar power outputs as fewer, larger turbines. A similar level of carbon dioxide would be offset, however, as mentioned above, increased levels of construction would ensure that this figure would be lower than that of fewer larger turbines.	A smaller footprint would result in less dust and vehicle emissions during the construction phase. As detailed in the assessment in Chapter 11, over the proposed 35-year lifetime of the Proposed Project, 1,298,850, tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation. The minimum tonnage of carbon dioxide that could be saved by the Proposed Project is 37,110 tonnes per annum.
Noise & Vibration	Potential for increased noise levels during all phases at nearby sensitive receptors due to greater number of turbines coupled with reduced separation distance between residential dwellings and turbine locations. Potential for increased noise and vibration levels due to additional turbine deliveries and associated construction and decommissioning activities throughout the site.	Potential for less noise impacts on nearby sensitive receptors during the construction, operational and decommissioning phases. 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 Project during the construction, operational and decommissioning phases.
Cultural Heritage & Archaeology	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.	As detailed in the assessment in Chapter 13, the significance of direct effects on Cultural Heritage (archaeology, architecture and cultural heritage) will be Not Significant. The significance of indirect effects on Cultural Heritage (archaeology, architecture

Environmental Consideration	20 no. to 23 no. Turbine Layout	8 no. turbine layout (Chosen option)
		and cultural heritage) will be Imperceptible to Moderate.
Landscape & Visual	A larger number of smaller turbines would be expected to have a greater landscape and visual impact given a more densely 'clustered' turbine layout. A greater number of smaller turbines would likely stretch along a greater horizontal extent from certain viewpoints and would likely be more visually extensive relative to the Site and therefore potentially more visually disruptive. However, it should also be acknowledged that turbines of a larger tip height may also have a broader zone of theoretical visibility, and may be visible from a larger set-back distance, whereas many smaller turbines may be visually obscured by topography or other features which provided visual screening.	As detailed in the assessment in Chapter 14, the lack of nearby highly sensitive landscape and visual receptors, and the strategic siting of infrastructure will mitigate any potential for significant landscape and visual effects.
Material Assets	Potential for greater traffic volumes during construction phase due to larger development footprint and requirement for more construction materials and turbine components. Greater potential for effects on telecommunications, aviation or waste management services.	Less traffic volumes due to smaller footprint and less component deliveries. As detailed in Chapter 15, there will be a temporary negative slight impact on traffic volumes during the construction phase of the Proposed Project. A detailed Traffic Management Plan incorporating all the mitigation measures will be agreed with the roads authority prior to construction works commencing on site. Results from the telecom operator consultations and desktop survey analysis indicate that the turbine layout will not impact any of the Telecom Operator radio networks.

Environmental Consideration	20 no. to 23 no. Turbine Layout	8 no. turbine layout (Chosen option)
		The findings of aviation consultation concludes that with the prescribed mitigation measures, the residual effects are not significant.

For the reasons set out above, the proposal for fewer, but taller turbines at the Proposed Wind Farm site was considered to be the most efficient method of electricity production, with a smaller development footprint and a lower potential for significant environmental effects than the alternative proposal of a larger number of smaller turbines.

3.6 Alternative Turbine Layout and Development Design

The design of the Proposed Wind Farm site has been an informed and collaborative process from the outset, involving the designers, developers, engineers, environmental, ecological, hydrological and geotechnical, archaeological specialists and traffic consultants. The design process has also taken account of the recommendations and comments of the relevant statutory and non-statutory organisations, near neighbours / the local community and local authorities as detailed in Section 2.5 of Chapter 2.

The aim of the process being to reduce the potential for environmental effects while designing a project capable of being constructed and viable.

Throughout the preparation of the EIAR, the layout of the Proposed Wind Farm site has been revised and refined to take account of the findings of all site investigations, baseline assessments and external feedback received from the local community, which have brought the design from its first initial layout to the current proposed layout.

3.6.1 Detailed Constraints Mapping

The design and layout of the Proposed Project follows the recommendations and guidelines set out in the '*Wind Energy Development Guidelines'* (Department of the Environment, Heritage and Local Government, 2006) (the Guidelines) and the '*Best Practice Guidelines for the Irish Wind Energy Industry'* (Irish Wind Energy Association, 2012).

Currently, proposed changes to the development management standards associated with onshore wind energy developments are outlined in the Draft Revised Wind Energy Development Guidelines, December 2019 (draft 2019 Guidelines). At time of writing, the draft Guidelines have not yet been adopted, and the relevant guidelines for the purposes of section 28 of the Planning and Development Act 2000, as amended, remain those issued in 2006.

An initial 8 no. turbine layout was proposed following a preliminary desk-based constraints assessment, while also factoring the design and site survey data previously gathered at the Cahermurphy site. A more detailed constraints mapping exercise was then carried out to inform the final proposed turbine layout.

The detailed constraints mapping process involved the placing of buffers (separation distance) around different types of constraints so as to identify clearly the areas within which no development works will take place. The size of the buffer zone for each constraint has been assigned using standards presented in the documents listed above. The constraints maps for the site encompasses the following constraints and associated buffers:

- Residential dwellings plus a minimum 740 metre buffer (meeting the requirement of 4 x maximum tip height separation distance as required by the draft Guidelines. Although not adopted, the developer has applied the setback in this instance as it is considered best practice.) (Refer to Chapter 5 Population and Human Health of EIAR);
- Designated sites plus 100 metre buffer (Refer to Chapter 6 Biodiversity of EIAR and Natura Impact Statement);
- Rivers and streams plus 50 metre buffer (Refer to Chapter 9 Hydrology & Hydrogeology of EIAR);
- Recorded Archaeological Sites and Monuments/Protected Structures plus 30 metre buffer (Refer to Chapter 14 Cultural Heritage of the EIAR);

- Telecommunication Links plus operator specific buffer (Refer to Chapter 15 Material Assets of EIAR).

Facilitators at the site build on the existing advantages and include the following:

- Available, positively zoned lands for wind energy development;
- Good wind resource; and
- Existing access points and general accessibility of all areas of the site due to existing forestry road infrastructure.

A constraints map showcasing the physical and environmental constraints are presented in Figure 3-3.

The final proposed turbine layout was then developed to take account of all the constraints mentioned above including their associated buffer zones and the separation distance required between them.

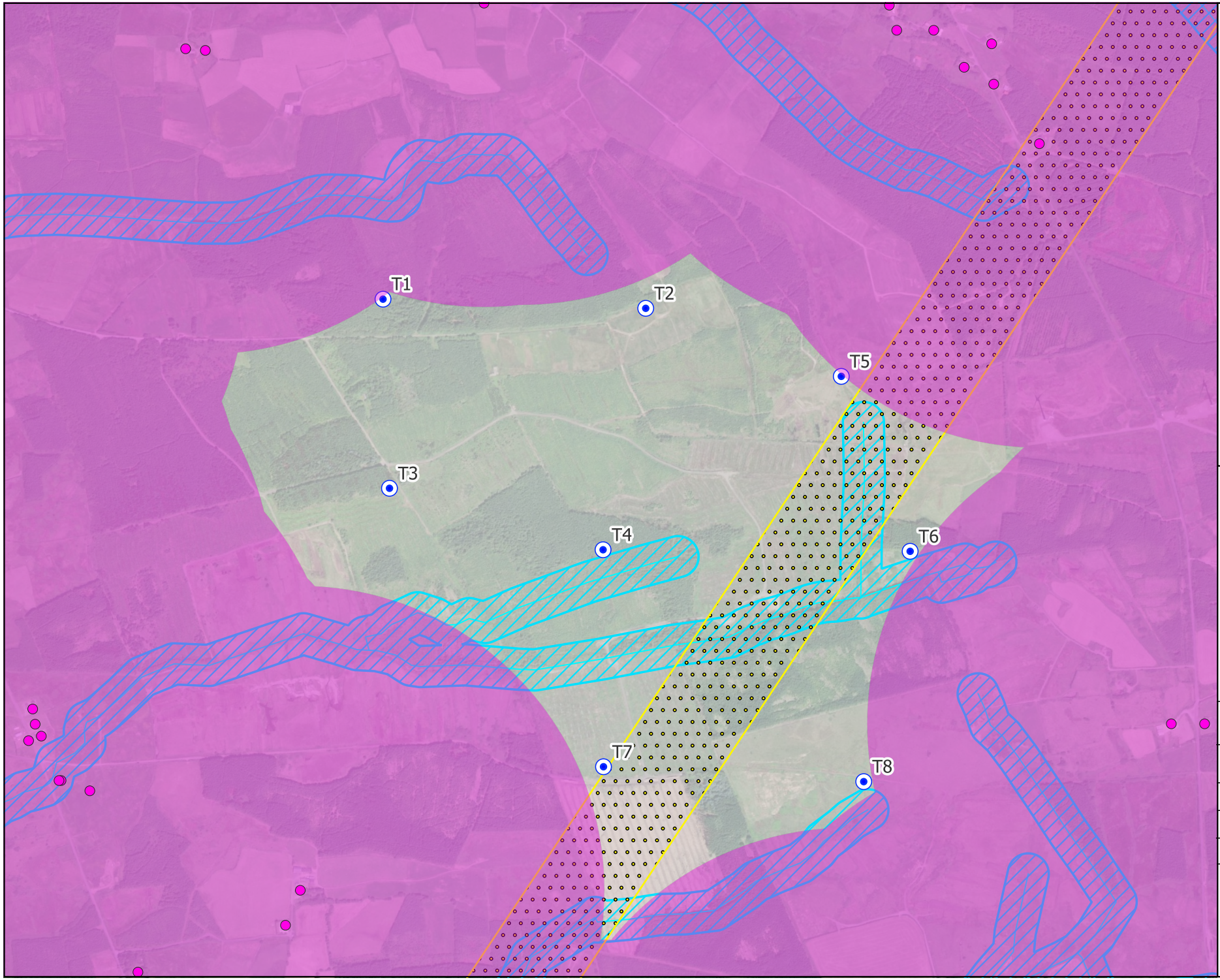
Following the mapping of all known constraints described above, detailed site investigations were carried out by the project team. The ecological assessment of the site encompassed habitat mapping and extensive surveying of birds and other fauna. These assessments, as described in Chapters 6 Biodiversity and Chapter 7 Birds of this EIAR, informed 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 of the site examined the proposed locations for turbines, roads and other components of the Proposed Project, such as the substation, borrow pits and the construction compounds. Where specific areas were deemed as being unsuitable (e.g., poor ground conditions, unmapped watercourses) for the siting of turbines or roads, etc., alternative infrastructure locations within the Proposed Wind Farm site were proposed and assessed, taking into account the areas that were already ruled out of consideration. The turbine layout for the Proposed Wind Farm site was also informed by wind data and the results of noise and shadow flicker assessments as they became available.

3.6.2 Turbine Layout

The final proposed turbine layout takes account of all site constraints and the distances to be maintained between turbines from houses, roads, etc. The layout is based on a combination of the results of all site investigations and surveys that have been carried out during the EIAR process, the community engagement process that began in 2022 (Refer to Appendix 2-3 of this EIAR) and the scoping with statutory and non-statutory consultees (refer to Section 2.5.3 of this EIAR). As information regarding the site of the Proposed Wind Farm site was compiled and assessed, the proposed layout has been revised and amended to take account of the physical constraints of the site and the requirement for buffer zones and availability of land as well as cumulative impacts.

The selection of turbine number and layout has also had regard to wind-take, noise and shadow flicker effects and the separation distance between turbines. The EIAR and Proposed Wind Farm site design process was an iterative process, where findings at each stage of the assessment were used to further refine the turbine layout, always with the intention of minimising the potential for environmental impacts.

While the initial turbine layout was similarly 8 no. turbines, the final 'proposed layout' was refined and turbines were relocated following the scoping exercise and deep peat depths encountered at various locations on the Site. The Proposed Wind Farm site went through 3 no. separate iterations. Due to their similarities, and given the minor amendments to the layouts, all 3 no. turbine layout iterations have not been discussed individually, but Figures 3-3 to 3-7 below gives an indication of how the design of the turbine layout evolved during the design process.



Map Legend

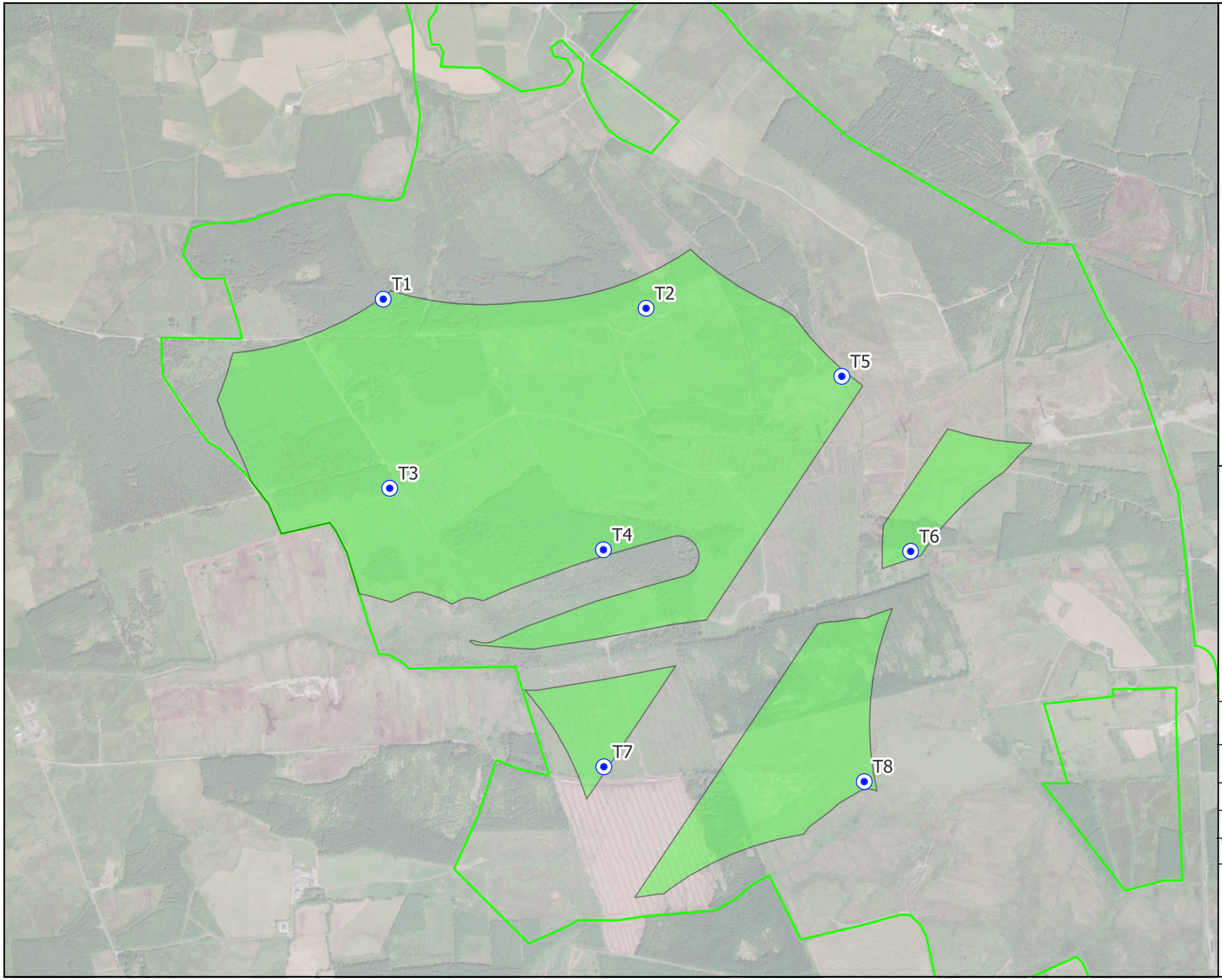
- Proposed Turbine Locations
- Sensitive Receptors
- 740m Sensitive Receptor Buffer
- Watercourses
- Watercourses 50m Buffer
- Enet Link 115m Buffer

Drawing Title: Physical and Environmental Constraints

Project Title: Cahermurphy West Wind Farm

Drawn By	Checked By
MC	EMC
Project No.	Drawing No.
230843	Figure 3-3
Scale	Date
1:12,000	08.01.2026

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

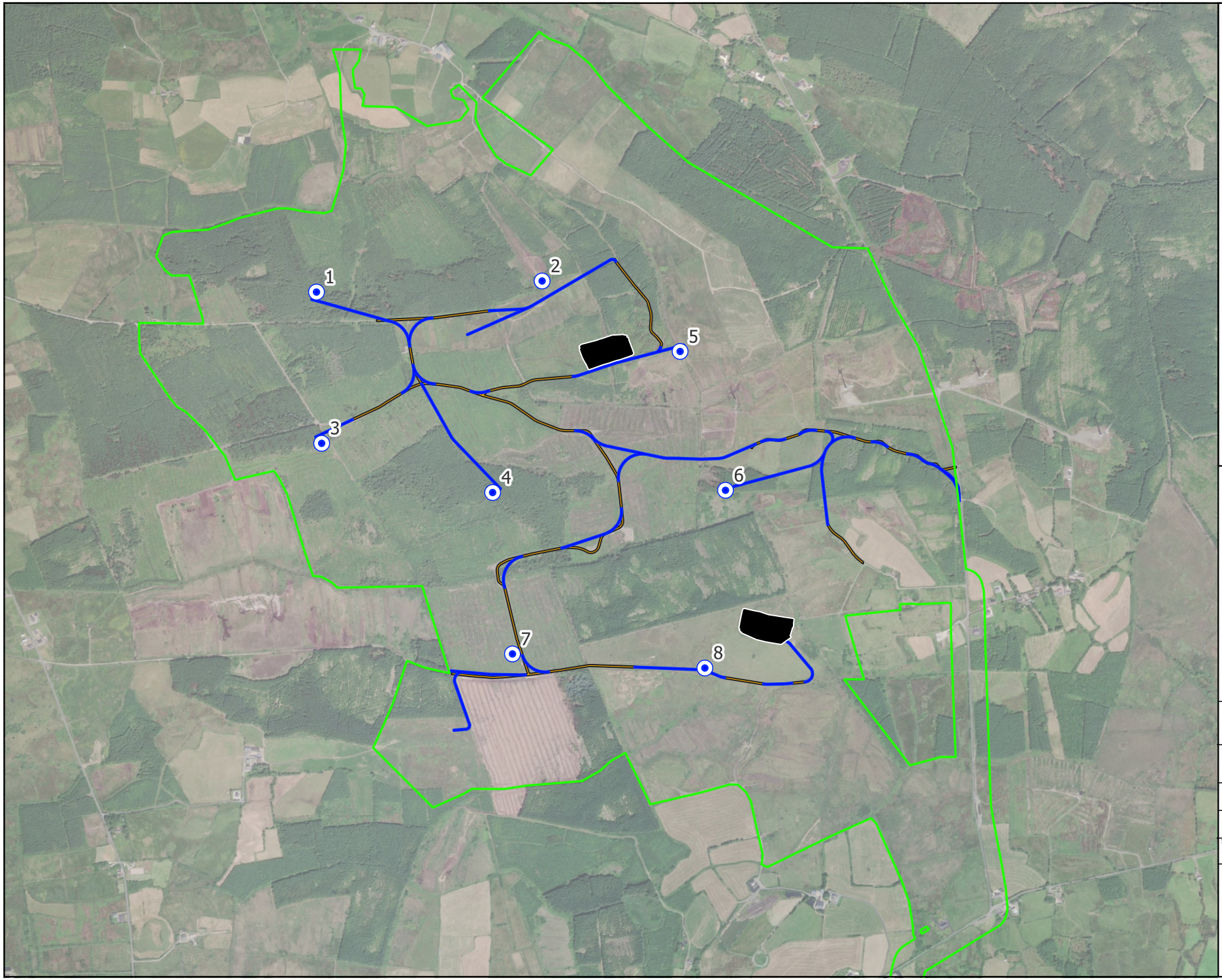
- EIAR Site Boundary
- Proposed Turbine Locations
- Turbine Developable Area

Drawing Title: Turbine Developable Area

Project Title: Cahermurphy West Wind Farm

Drawn By	Checked By
MC	EMC
Project No.	Drawing No.
230843	Figure 3-4
Scale	Date
1:12,000	08.01.2026

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Proposed New Roads
- Proposed Borrow Pits
- Existing Roads to be Upgraded

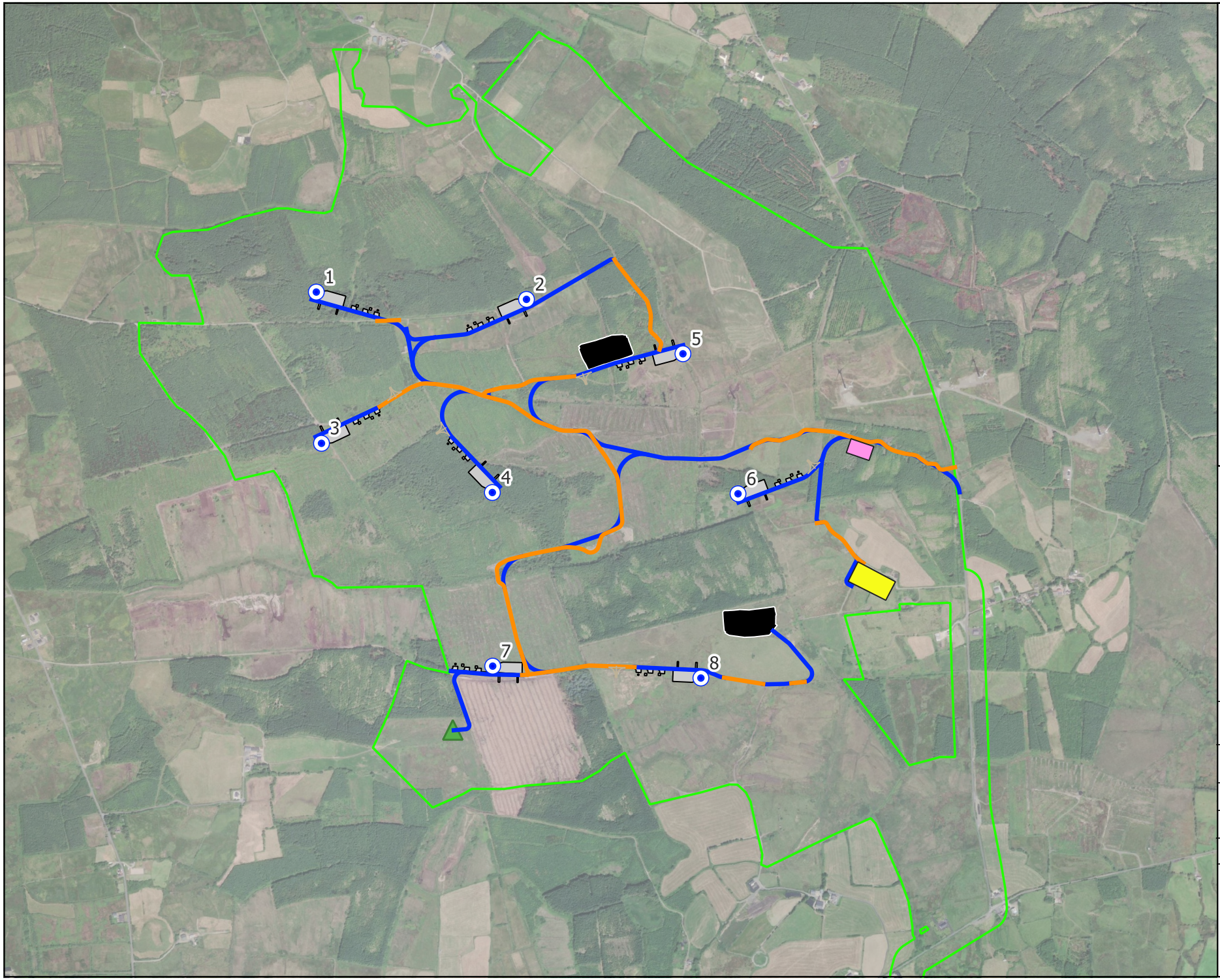
N

Drawing Title

Layout Iteration No. 1

Project Title: Cahermurphy West Wind Farm	
Drawn By: MC	Checked By: EMC
Project No.: 230843	Drawing No.: Figure 3-5
Scale: 1:15,000	Date: 25.02.2026

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Proposed New Roads
- Proposed Borrow Pits
- Existing Roads to be Upgraded
- Proposed Turbine Hardstands
- Proposed Met Mast
- Proposed 110kV Substation
- Proposed Temporary Construction Compoun

Drawing Title

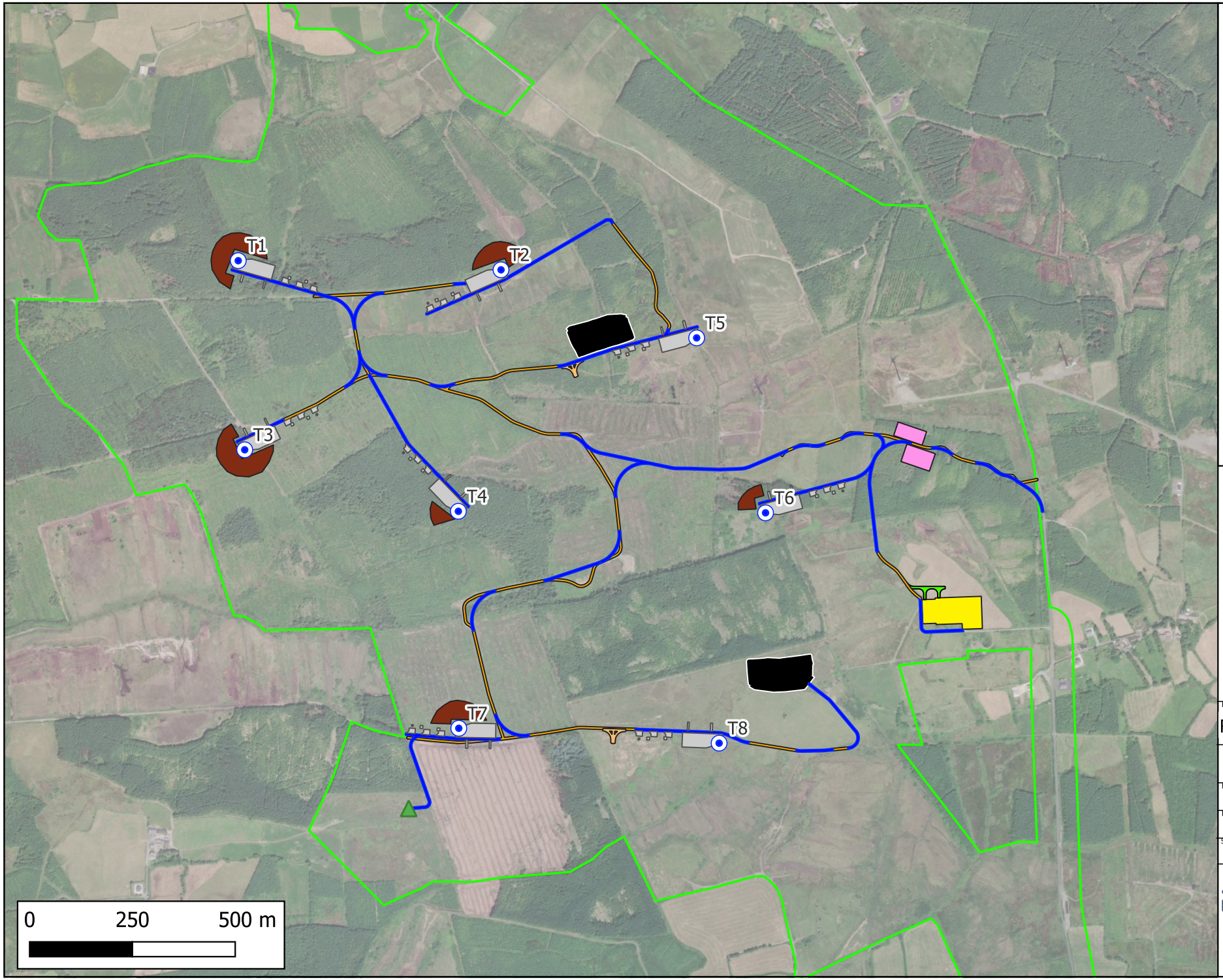
Layout Iteration No. 2

Project Title

Cahermurphy West Wind Farm

Drawn By	Checked By
MC	EMC
Project No.	Drawing No.
230843	Figure 3-6
Scale	Date
1:15,000	25.02.2026

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- EIAR Site Boundary
- Proposed Turbine Location
- Proposed Met Mast Location
- Proposed Hardstand
- Existing Roads to be Upgraded
- Proposed New Roads
- Temporary Transformer Delivery Road
- Proposed Turning Heads
- Proposed 110kV Substation
- Proposed Temporary Construction Compounds
- Peat Placement Areas
- Proposed Borrow Pit

Drawing Title
Final Proposed Layout

Project Title
Cahermurphy West Wind Farm

Drawn By	Checked By
MC	EMC
Project No.	Drawing No.
230843	Figure 3-7
Scale	Date
1:12,000	08.01.2026

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

3.6.2.1.1 Proposed Layout Iteration No. 1

The Cahermurphy site is extensively studied and well understood, with surveys having been carried out at the Site since 2019 by the Applicant. As such, an indicative 8 no. turbine layout was initially considered which sought to avoid areas of deep peat on sit and other environmental sensitivities, whilst also utilising existing roads where possible. The results of a desk study helped optimise the new layout, ensuring all turbine locations were located outside all mapped environmental sensitivities buffers (e.g 50m hydrological feature buffers). However, the turbine locations did not change significantly from the initial proposed locations.

3.6.2.1.2 Proposed Turbine Layout Iteration No. 2 & Final Turbine Layout

Given that the Site was previously well understood, it should be highlighted that turbine layout Iteration 2 and the chosen final turbine layout are not hugely different to that proposed in Iteration 1. Following detailed constraints mapping exercises, scoping responses, environmental site walkovers, and feedback from the project team, Turbines No. 5, 6, 7 and 8 were microsited. Turbines 5,6 and 8 were microsited to avoid areas of deeper peat, whilst Turbine No. 7 was microsited 70m southwest in order to avoid the Enet operator provided 115m telecommunications buffer requested during the Telecoms scoping exercise. Whilst there were no alterations to turbine locations between Iteration 2 and the chosen final turbine layout, the Turbine No. 6 hardstanding was adjusted slightly in order to suitably accommodate peat and spoil storage around the turbine whilst also ensuring no works will occur within 50m of the watercourse south of the turbine, which was discovered to be longer than mapped by the EPA upon a site visit.

A comparison of the potential environmental effects of Layout Iteration No. 1 and Iteration No. 2 against the final proposed turbine layout are presented in Table 3-5 below.

Table 3-5 Comparison of environmental effects Iteration No. 1 and Iteration No. 2 when compared against the chosen option (final proposed turbine layout)

Environmental Consideration	Proposed Turbine Layout Iteration No. 1	Proposed Turbine Layout Iteration No. 2	Final Proposed Turbine Layout
Population & Human Health (incl. Shadow Flicker)	Neutral	Neutral	Neutral The Applicant commits to zero shadow flicker at all sensitive receptors.
Biodiversity & Ornithology	Neutral	Neutral	Neutral As detailed in Chapter 6, the development has been designed to avoid or mitigate impacts on biodiversity. As detailed in Chapter 7, the Collision Risk Assessment (CRA) indicated that the impact of the Proposed Project on birds

Environmental Consideration	Proposed Turbine Layout Iteration No. 1	Proposed Turbine Layout Iteration No. 2	Final Proposed Turbine Layout
			corresponds to a Low to Very Low effect significance.
Land, Soils & Geology	Turbines being positioned within areas of deeper peat would lead to increased peat excavation volumes.	Turbines positioned outside of deeper peat would lead to decreased peat excavation volumes.	Turbines being positioned outside of deeper peat will lead to decreased peat extraction volumes. As detailed in the assessment in Chapter 8, no significant effects on soils and subsoils will occur.
Geotechnical/Peat Stability	Neutral	Neutral	Neutral The findings of the Peat Stability Assessment Report indicate that the site has an acceptable margin of safety, a low risk of peat failure and is suitable for the Proposed Project.
Water (Hydrology and Hydrogeology)	Positioning of the Turbine No. 6 hardstanding would encroach the 50m hydrological buffer and lead to an increased potential for silt-laden runoff to enter the unmapped section of the Knocknahila More stream the south of the turbine location.	Positioning of the Turbine No. 6 hardstanding would encroach the 50m hydrological buffer and lead to an increased potential for silt-laden runoff to enter the unmapped section of the Knocknahila More stream the south of the turbine location.	Repositioning of the Turbine 6 hardstanding results in a reduced potential for silt-laden runoff to enter the unmapped section of the Knocknahila More stream the south of the turbine location As detailed in the assessment in Chapter 9, no significant effects on surface water or groundwater quality will occur as a result of the Proposed Project.
Air & Climate	Neutral	Neutral	As detailed in the assessment in Chapter 11, over the proposed 35-year lifetime of the

Environmental Consideration	Proposed Turbine Layout Iteration No. 1	Proposed Turbine Layout Iteration No. 2	Final Proposed Turbine Layout
			Proposed Project, 1,298,850 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation. The minimum tonnage of carbon dioxide that could be saved by the Proposed Project is 37,110 tonnes per annum.
Noise & Vibration	Neutral	Neutral	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 Project during the construction, operational and decommissioning phases.
Cultural Heritage & Archaeology	Neutral	Neutral	Based on the assessment detailed in Chapter 13 and the mitigation measures proposed, there will be no significant effects on archaeological and cultural heritage due to the construction, operation and decommissioning of the proposed turbines as a result of the Proposed Project.
Landscape & Visual	Neutral	Neutral	As detailed in the assessment in Chapter 14, the lack of nearby highly sensitive landscape and visual receptors, and the

Environmental Consideration	Proposed Turbine Layout Iteration No. 1	Proposed Turbine Layout Iteration No. 2	Final Proposed Turbine Layout
			strategic siting of infrastructure will mitigate any potential for significant landscape and visual effects.
Material Assets	Neutral.	Neutral	As detailed in Chapter 15, there will be a temporary, slight, negative impact on traffic volumes during the construction phase of the Proposed Project. A detailed Traffic Management Plan incorporating all the mitigation measures will be agreed with the roads authority prior to construction works commencing on site. Results from the telecom operator consultations and desktop survey analysis indicate that the turbine layout will not impact any of the Telecom Operator radio networks. The findings of the aviation consultations that with the prescribed mitigation measures, the residual effects are not significant.

3.6.3 Road Layout

Access tracks are required onsite in order to enable transport of infrastructure and construction materials within the Proposed Wind Farm site. Such tracks must be of a gradient and width sufficient to allow safe movement of equipment and vehicles. It was decided at an early stage during the design of the Proposed Wind Farm site that maximum possible use would be made of existing roadways and tracks, where available and where possible, to minimise the potential for impacts by using new roads as an alternative.

As the overall site layout was finalised, the most suitable routes between each component of the development were identified, taking into account the extensive network of existing roads and the physical constraints of the Proposed Wind Farm site. Locations were identified where upgrading of the existing road would be required and where new roads are to be constructed, in order to ensure suitable access to and linkages between the various project elements, and efficient movement around the Proposed Wind Farm site.

An alternative option to making maximum use of the existing road network within the Proposed Wind Farm site would be to construct an entirely new road network, having no regard to existing roads or tracks. This approach was not favourable, as it would create the potential for additional significant environmental effects to occur in relation to land, soils and geology (increased excavation and aggregate requirements), hydrology (increased number of new watercourse crossings) and biodiversity (increased habitat loss).

A comparison of the potential environmental effects of constructing an entirely new road network when compared against maximising the use of the existing road network is presented in Table 3-6 below.

Table 3-6 Comparison of environmental effects when compared against the chosen option (maximising the use if the existing road network)

Environmental Consideration	Entirely New Road Network	Use and Upgrade of Existing Roads (Chosen option)
Population & Human Health	Potential for increased impacts on residential amenity due to increased noise and dust emissions due to the need for additional crushed stone during the construction stage.	The road upgrades will have less of an impact on population and human health due to lesser dust and noise emissions given the reduced extent of works at the Site
Biodiversity & Ornithology	Larger, new development footprint would result in greater habitat loss.	Smaller footprint due to road widening would result in less habitat being lost.
Land, Soils & Geology	Larger, new development footprint would result in greater volumes of peat and spoil to be excavated and stored. Larger volume of stone required from on-site borrow pit and off-site quarries for road construction.	Smaller volume of soils and stone to be excavated and managed.
Geotechnical/Peat Stability	Neutral	Neutral
Water (Hydrology and Hydrogeology)	Larger, new development footprint and increased number of new watercourse crossings, therefore, increasing the potential for silt laden runoff to enter receiving watercourses.	Less potential for silt-laden run-off to enter a watercourse.

Environmental Consideration	Entirely New Road Network	Use and Upgrade of Existing Roads (Chosen option)
Air & Climate	Potential for greater dust emissions due to the requirement of an increased volume of stone from the on-site borrow pit and off-site quarries. Potential for greater vehicular emissions due to and increased volume of construction traffic.	Less dust and vehicle emissions during the construction works on the road upgrades.
Noise & Vibration	Potential for increased noise impacts on nearby sensitive receptors during the construction of the new roads.	Less noise impacts on nearby sensitive receptors during the construction of the road upgrades.
Cultural Heritage & Archaeology	Larger, new development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.	Smaller development footprint would decrease potential for impacts on unrecorded subsurface archaeology
Landscape & Visual	Neutral	Neutral - There is no material environmental effect difference between both options considered.
Material Assets	Potential for greater traffic volumes during construction phase due to larger, new development footprint and requirement for more construction materials. Greater potential for effects on waste management services.	Less traffic volumes due to road upgrades. Less potential for effects on waste management services.

For the reasons set out above, the proposal for the use and upgrade of existing roads at the Proposed Wind Farm site was considered to be the most efficient method of developing a renewable energy project with the lesser potential for significant environmental effects.

3.7 Alternative Design of Ancillary Structures

The ancillary infrastructure required for the Proposed Project includes a 110kV grid connection, met mast, on-site 110kV electrical substation, TDR accommodation roads and 2 no. borrow pits.

3.7.1 Borrow Pit

The majority of material required for the construction of access roads and turbine bases will be obtained from the 2 no. proposed borrow pits onsite which will be located approximately 155m

northeast of Turbine No. 8 and approximately 150m west of Turbine No.5 as shown on Figure 5-7. The use of onsite borrow pits represents an efficient use of existing onsite resources. It eliminates the need to transport large volumes of construction materials along the local public road network to the site. The locations for the borrow pits were identified taking into account the site characteristics, including topography, ground conditions, habitat type and surface water features.

An alternative to using on-site borrow pits was the option of sourcing all stone and hardcore materials from a licensed quarry or quarries in the vicinity of the site. The movement of the volume of material required for the construction of 8 no. turbine wind farm would result in a significant increase in construction traffic and heavy loads, in combination with a potential for an increase in noise and dust emissions along the haul routes and was therefore considered a less preferable option. The cost of importing the required volume of crushed stone was also a factor in choosing to obtain stone from an on-site borrow pits.

A comparison of the potential environmental effects when comparing the sourcing of stone from local, off-site quarries against the chosen option (on-site borrow pits) is presented in Table 3-7 below.

Table 3-7 Comparison of environmental effects when compared against the chosen option.

Environmental Consideration	Sourcing all stone from local, off-site quarries	Obtaining material from 2 no. Borrow Pits (Chosen option)
Population & Human Health	Potential for increased vehicular, noise and dust emissions from increased traffic movements, due to the volume of rock to be transported to the site along the public road network, which could be a nuisance to local residents along the haul route.	Lower vehicular, noise and dust emissions from fewer traffic movements to/from offsite quarries.
Biodiversity & Ornithology	Potential increase in habitat loss as there would be no on-site borrow pit and, therefore, additional peat placement areas would be required within the site.	1 no. borrow pit is located within coniferous forestry which is of low habitat value whilst the second is located in improved grassland. The borrow pits will be reinstated with peat and spoil and left to revegetate
Land, Soils & Geology	Additional peat placement areas would be required as an on-site borrow pit would not be available for the placement of excavated peat and spoil.	The on-site borrow pits will be used for peat and spoil repository, reducing this requirement elsewhere on the site.
Water	Increased potential for silt laden runoff to enter watercourses due to additional peat placement areas being required within the site.	Decreased potential for silt laden runoff to enter watercourses due to the avoidance of additional peat placement areas being required within the site. As detailed in the assessment in Chapter 9, no significant effects

Environmental Consideration	Sourcing all stone from local, off-site quarries	Obtaining material from 2 no. Borrow Pits (Chosen option)
		on surface water or groundwater quality will occur
Air & Climate	Potential for increased vehicular and dust emissions from increased traffic movements between the Site and local quarries, due to the volume of rock to be excavated. Increase in movement of delivery vehicles throughout the Site would also lead to an increase in vehicular emissions.	Lower vehicular and dust emissions from fewer traffic movements within the Site and between the Site and local quarries.
Noise & Vibration	Reduced potential for noise and vibration effects on local sensitive receptors as no large-scale rock breaking or blasting required within the site. Increased potential for noise and vibration effects on sensitive receptors along haul routes due to volume of traffic required to transport the volume of crushed stone needed for the construction of the Proposed Project.	Increased potential for noise and vibration effects on local sensitive receptors due to large-scale rock breaking and blasting required within the Site. However, decreased potential for noise and vibration effects on sensitive receptors along haul routes due to the availability of crushed stone within the site. As discussed in Chapter 12 *'Noise and Vibration'*, noise levels at the nearest sensitive receptors lie well within the best practice construction noise criteria whether or not breaking or blasting occurs at the proposed borrow pits.
Cultural Heritage & Archaeology	Slightly smaller development footprint and the removal of the requirement to excavate c.180,000m^3 of stone at borrow pit locations would reduce the potential for impacts on unrecorded, subsurface archaeology.	Slightly larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology As outlined in Chapter 13 *'Cultural Heritage'*, there will be no significant effects on unrecorded subsurface archaeology with mitigation as appropriate mitigation measures to protect unrecorded subsurface archaeology within the Site.
Landscape & Visual	Reduced landscape and visual effects as no open rock face would be visible from certain viewpoints.	Increased landscape and visual effects due to the open borrow pits for the duration of the construction phase. As detailed in

Environmental Consideration	Sourcing all stone from local, off-site quarries	Obtaining material from 2 no. Borrow Pits (Chosen option)
		Chapter 4 and 14 of the EIAR, the borrow pits will be infilled with peat and spoil in the site and left to reseed. As such and visual effects associated with the borrow pits will only be short-term in nature.
Material Assets	Significantly higher traffic volumes on the public road network during construction phase due to the volume of crushed stone required to be transported to the Site. Neutral in terms of impact on waste management services.	Significantly lower traffic volumes on the public road network during construction phase due to the volume of crushed stone available onsite. Neutral in terms of impact on waste management services.

For the reasons set out above, the proposal of obtaining materials from multiple borrow pits at the Proposed Wind Farm site was considered to be the most efficient method of developing a renewable energy project with the lesser potential for significant environmental effects.

3.7.2 Proposed 110kV Electrical Substation

The selection of the location of the on-site substation has had regard to the constraints of the Site, outlined in Section 3.6.1 above. As previously mentioned, the Cahermurphy site has been subject to thorough site investigation prior to the initial wind farm design and as such, the initial substation location has not changed since the initial wind farm design. The chosen location within the Site was considered to be most suitable as it contained low peat depths, featured existing access tracks, didn't require any felling of forestry and had suitable land availability. Ease of access, ensuring a suitable setback from turbine locations, and the chosen Grid Connection route and access were also taken into consideration. It should also be noted that while the operational lifespan of the proposed turbines is 35 years (following which they may be replaced subject to a future permission or decommissioned as proposed in this planning application) the electrical substation and associated infrastructure will become an EirGrid asset and will be permanent and will continue to form part of the electrical infrastructure of the area in the event of the remainder of the site being decommissioned.

3.8 Alternative Grid Connection Route Options

3.8.1 Proposed Grid Connection

The Proposed Wind Farm site will connect to the national grid via underground 110kV electrical cabling, located primarily within the public road corridor. Underground medium voltage electrical cables will transmit the power output from each wind turbine to the proposed onsite 110kV electrical substation, and from there to the existing Moneypoint 110 kV electrical GIS substation, via an underground 110kV electrical cabling route, measuring approximately 25 km in length.

A key consideration in determining the grid connection method for a proposed wind energy development is whether the cabling is undergrounded or run as an overhead line. While overhead lines (OHL) are less expensive and allow for easier repairs when required, underground cables (UGC) will have no visual impact. Underground grid connection routes are also considered to be the preferred option of connecting Wind Energy Developments to the national grid. For this reason, it was considered that underground cables would be a preferable alternative to overhead lines. The draft Wind Energy Guidelines 2019 also indicate that underground cables are the preferred option for connection of a wind energy development to the national grid.

The output of the wind farm is such that it needs to connect to a 110kV electrical substation. 3 no. 110kV substations were analysed when considering the grid connection.

- Moneypoint 400kV/110kV Electrical Substation;
- Booltiagh 110kV Electrical Substation, and
- Slievecallan 110kV Electrical Substation.

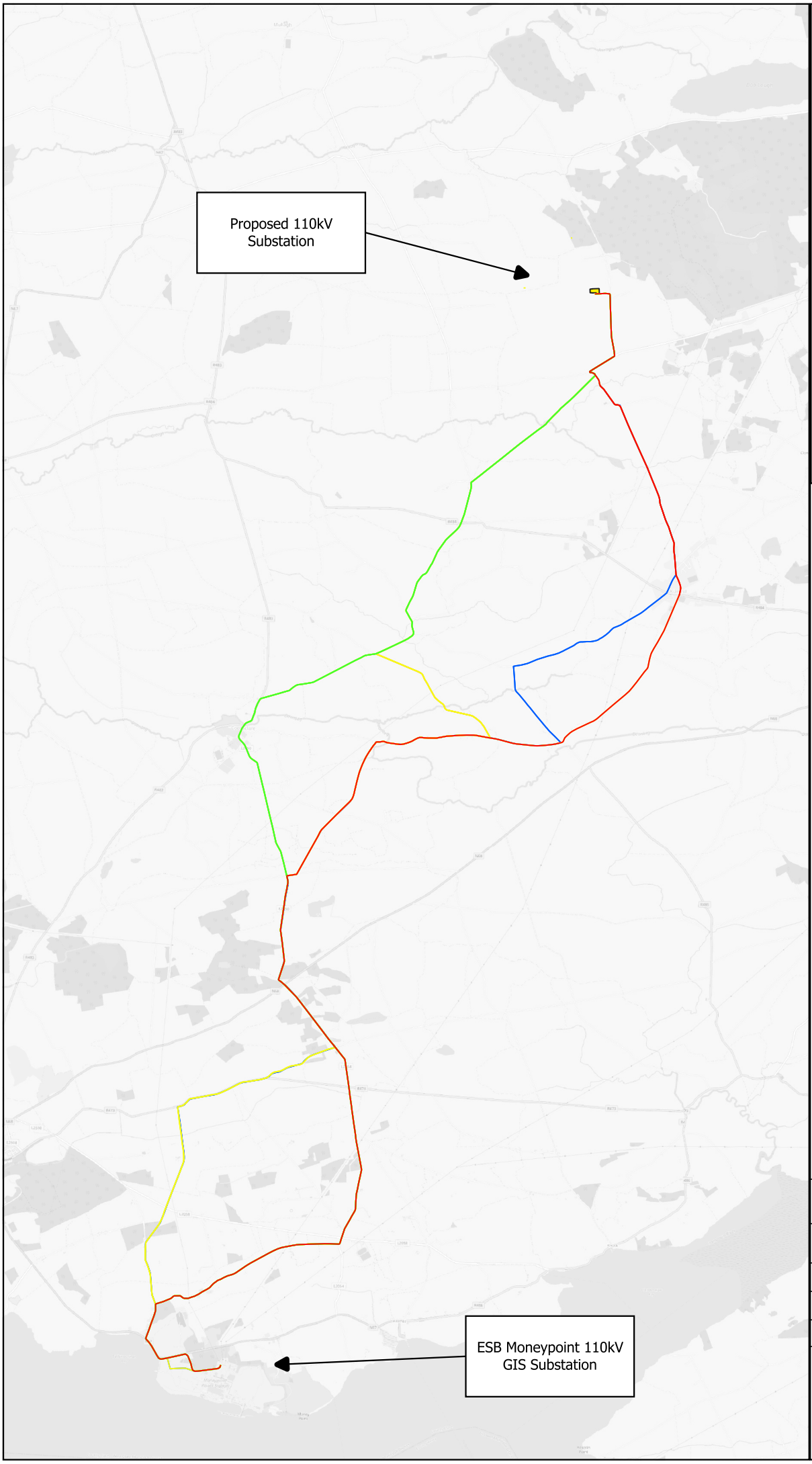
Due to capacity constraints at Booltiagh and Slieve Callan identified during communications with EirGrid, it was decided that Moneypoint would be the most viable connection point.

A number of underground grid connection cabling routes to Moneypoint were considered and assessed in order to determine which route would be brought forward as the grid connection route to be assessed as part of the overall project within the EIAR. 5 no. routes connecting to the Moneypoint 110kV substation were initially proposed by TLI Group, as shown in Table-3-8 and Figure 3-8a. After constraints (inclusive of number of bridge and culvert crossings, overall length, length in national/public/secondary/tertiary roads, as well as the willingness of third party landowners to provide the required consent) were identified and considered, a single preferred grid connection route (UGC Route Option 4) was selected, as shown in Figure 3-8b below.

Further studies were undertaken by TLI to refine the preferred grid connection route and avoid any large section of Grid Connection works along the N67 National Road and adjacent to the Lower River Shannon SAC/River Shannon and River Fergus Estuaries SPA. An updated preferred grid connection route (hereafter referred to as the Proposed Grid Connection) was chosen which primarily follows the same route as the previously preferred grid connection route, however, differs in that rather than turning west at the L-2054/L-20542 junction and connecting to the 110kV Moneypoint substation, it continues along the L-2054 south, along the L-20543, then east on to the L-20544 and L-6154, and along the N67 for approximately 315m before connecting to Moneypoint 110kV substation via ESB tracks in the north of the premises. Approximately 24km of the Proposed Grid Connection route is located within the Public Road Network, 160m within the Proposed Wind Farm site and 837m within private lands. The Proposed Grid Connection route will feature 36 no. Joint Bays, 6 no. Bridge Crossings and 18 no. Culvert Crossings. Horizontal Directional Drilling will be required at 12 locations.

Table 3-8: Evaluation of Grid Connection Routes

Route Option	*Length of UGC (km)*	*Access to Moneypoint (km)*	*Length of UGC in National roads (km)*	*Length of UGC in Primary roads (km)*	*Length of UGC in Secondary / Tertiary road (km)*	*No. of Major Watercourse / HDD Crossings*	*No. of Third party consents required*	*Length of UGC Off road / Private (km)*	*Urban Catchment areas*
UGC Route Option 1 (Ruby)	25.7	1.630	0.000	7.88	16.11	6	2	0.15	1 (Kilmihil Village)
UGC Route Option 2 (Green)	22.5	1.630	0.000	8.93	11.78	6	6	0.55	1 (Cooraclare Village)
UGC Route Option 3 (Yellow)	23.9	1.630	0.000	18.37	2.04	9	10	0.85	1 (Cooraclare Village)
UGC Route Option 4 (Orange)	26.0	1.630	0.000	2.37	19.7	7	6	0.45	N/A
UGC Route Option 5 (Blue)	26.4	1.630	0.000	5.10	17.67	8	6	0.45	1 (Kilmihil Village)



Map Legend

- EIAR Site Boundary
- Proposed 110kV Substation
- Grid Option 1
- Grid Option 2
- Grid Option 3
- Grid Option 4
- Grid Option 5

Drawing Title: Initial Grid Connection Options

Project Title: Cahermurphy West Wind Farm

Drawn By	Checked By
MC	EMC
Project No.	Drawing No.
230843	Figure 3-8a
Scale	Date
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MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Map Legend

- EIAR Site Boundary
- Proposed 110kV Substation
- Initial Preferred Grid Connection

Drawing Title: Initial Preferred Grid Connection

Project Title: Cahermurphy West Wind Farm

Drawn By	Checked By
MC	EMC
Project No.	Drawing No.
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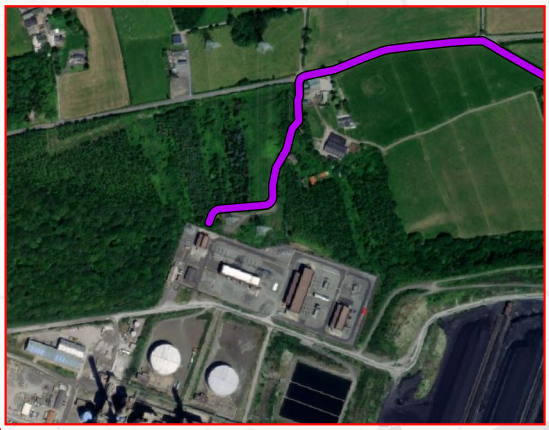
MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Proposed 110kV Substation



ESB Moneypoint 110kV GIS Substation

Map Legend

EIAR Site Boundary

Proposed 110kV Substation

Drawing Title: Proposed Grid Connection Route

Project Title: Cahermurphy West Wind Farm

Drawn By	Checked By
MC	EMC
Project No.	Drawing No.
230843	Figure 3-8c
Scale	Date
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MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Based on the environmental considerations outlined above, the Proposed Grid Connection route to Moneypoint 110kV substation was selected. The Proposed Grid Connection route (as shown in Figure 3-8c) requires no additional watercourse crossings over the initially selected UGC Route Option 4, which reduces the potential for silt-laden water to enter any additional natural watercourses.

For the reasons set out above, the proposal to develop an UGC to the Moneypoint 110kV Substation was considered to be the most efficient method of electricity production with the lesser potential for significant environmental effects.

3.9 Alternative Transport Route and Site Access

Wind turbine components (blades, nacelles and towers) are not manufactured in Ireland and therefore must be imported from overseas and transported overland to the Proposed Wind Farm site. Alternative ports of entry were considered and with regard to the selection of a transport route to the Proposed Wind Farm site, in relation to the turbine delivery route and associated site access locations.

3.9.1 Port of Entry

The alternatives considered for the port of entry of wind turbines into Ireland for the Proposed Project included Port of Galway, Shannon Foynes Port 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 offer a roll-on roll-off procedure to facilitate import of wind turbines. All three ports and indeed others in the state, offer potential for the importing of turbine components. The primary chosen port of entry is Shannon Foynes due to its proximity and accessibility from the port to the national and regional roads towards the Proposed Project. Shannon Foynes represents to closest port to the Site and would therefore result in less vehicular emissions due to turbine component delivery, less alterations to the existing road network or private lands to facilitate the delivery of turbine components, as well as less potential for traffic and transport impacts due to the shorter distance to the Site.

3.9.2 Turbine Delivery Route

For turbine components and other abnormal loads (e.g., prefabricated buildings for construction compound areas etc.) transport, cognisance was taken of the haul routes used for other wind farm developments in the local area in addition to the general preference to minimise the requirement for significant accommodation or widening works along the public road network and associated environmental effects. Multiple turbine delivery routes, as well as methods of transport were considered when deciding a preferred route.

3.9.2.1 Turbine Delivery Route Option A

Turbine Delivery Option A involved the delivery of turbine components from Shannon Foynes Port in Co. Limerick to the Proposed Project site. The route involved utilising the National Road networks (N69, N18, M18, N85 and N68), the Regional Road network (R484, R483) and the local road network (L-2048, L-6254). Option A involved the turbine delivery vehicle entering the Proposed Wind Farm site off the L-6254, through a Coillte forestry block in the townland of Cahermurphy

This route utilised the N68 National Secondary Road from Ennis to its junction with the R484 Regional Road, which provides access to Kilmihil village. From Kilmihil, the turbine delivery route continues on the R484 towards Creegh. At Creegh, the turbine delivery route turns right at the crossroad onto a local road passing Creegh North, Clooneenagh and Cahermurphy Hill after which it takes a left north onto the L-6254 local road approaching Cahermurphy Wind Farm from the south. Option A involved the turbine delivery vehicle entering the Proposed Wind Farm site off the L-6254, through a Coillte forestry block in the townland of Cahermurphy.

This option was screened out due to vehicle turning constraints, increased watercourse crossings when compared to alternative routes and a significant number of third party land access requirements. The length of the delivery route from the N68/R484 junction to the site was approximately 21.1 kilometres.

3.9.2.2 Turbine Delivery Option B

Turbine Delivery Option B involved the delivery of turbine components from Shannon Foynes Port in Co. Limerick to the Proposed Project site, following the same delivery route as Option A. Option B however involves the turbine delivery vehicle passing through two fields to the west of Kilmihil, and subsequently travelling along the L-2074, L-2080 and L-2082 north towards the Site. The TDR traverses through fields at two locations along the L-2082 in the townlands of Castlepark and Cahermurphy, before connecting with the L-2048. The TDR then travels along the L-2048 for approximately 290m before turning to the north onto the L-6254 where it travels for approximately 1.2km before reaching the site entrance. The length of the route from the N68/R484 junction is also considerably shorter at approximately 11.3 kilometres, while also avoiding the village of Creegh which has a number of watercourse crossing and third party land constraints.

The turbine delivery route options are shown on Figure 3-9. Both turbine delivery route options would require accommodation works and road widening works, while Option B requires more extensive works to overcome the vehicle turning constraints whilst being agreeable to third party landowners and Option A required increased amounts of accommodation works within third party lands due to its length.

Option B was selected as the preferred turbine delivery route as there were less potential pinch points where widening is required, given the shorter distance., Therefore, there are also fewer third-party landowner agreements required along the route compared to Option A. Option B will also reduce the level of disturbance during the delivery given the shorter distance and utilisation of a lesser travelled road (the L-2082), rather than travelling an additional 8.5km on the busy N68 National road and roughly 6.2km on the L-2048 local road (see Section 15.1.4 of chapter 15 for traffic count details).

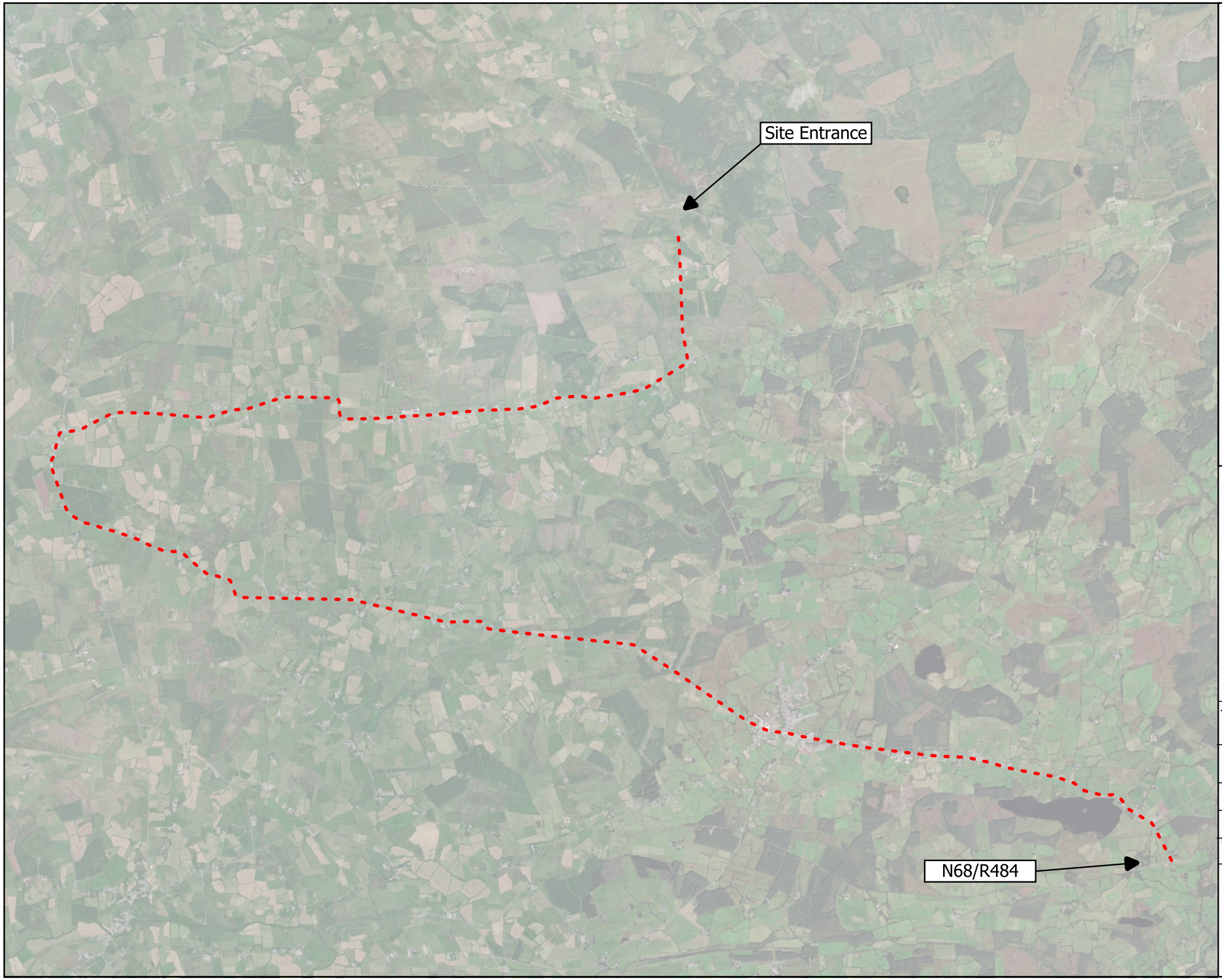
Table 3-9 Comparison of environmental effects when compared against the chosen option (chosen turbine delivery route)

Environmental Consideration	Option A	Option B (Chosen option)
Population & Human Health	Neutral	Neutral
Biodiversity & Ornithology	Potential increase in linear vegetation and habitat loss due to more potential pinch points requiring widening works. Decreased amount of land required for excavate and replace roads in private lands.	Decrease in linear vegetation and habitat loss due to fewer potential pinch points requiring widening works. Increased amount of land required for excavate and replace roads in private lands. These works are not anticipated to have any negative impacts. As outlined in Chapter 6: Biodiversity and Chapter 7: Ornithology, there will not be any significant impacts on biodiversity as a result of the TDR works.

Land, Soils & Geology	Neutral	Neutral
Geotechnical	Decreased level of excavation works due to absence of excavate and replace tracks.	Increased excavation works due to construction of excavate and replace roads.
Water	Increased potential for pollution of watercourses, due to an increased number of watercourse crossings.	Less potential for pollution to watercourses, due to a lesser amount of watercourse crossings. As outlined in Chapter 9: Hydrology and Hydrogeology, there will not be any significant impacts on water quality as a result of the TDR works.
Air & Climate	Increased potential for dust and greenhouse gas emissions along the TDR due to the increased length.	Decreased potential for dust and greenhouse gas emissions along the TDR due to the reduced length.
Noise & Vibration	Increased potential for Noise & Vibration affects at additional sensitive receptors due to the increased length	Decreased potential for Noise & Vibration affects at sensitive receptors due to the reduced length
Cultural Heritage & Archaeology	Less potential for impacts on unrecorded subsurface archaeology.	Increased potential for impacts on unrecorded subsurface archaeology. As discussed in Chapter 13 '*Cultural Heritage*' there are no predicted significant effects on unrecorded subsurface monuments once mitigation measures are in place.
Landscape & Visual	Neutral	Neutral
Material Assets	Potential increase in traffic impacts due to a requirement for more widening works along route. Potential increase in disruption to the public road network and users due to the longer delivery route along busier roads	Decrease in traffic impacts due to fewer widening works along route. Decrease in disruption to the public road network and users due to the shorter delivery route along lesser travelled roads

3.9.3 Delivery Vehicles

The technologies considered for use in the delivery of turbine components consisted of a standard articulated HGV, a blade lifter, as well as a 'clamp and dolly' or blade adapter trailer. After extensive autotrack assessments along the chosen Turbine Delivery Route, it was decided that the 'clamp and dolly' system would lead to the least amount of Turbine Delivery Works and potential environmental effects along the delivery route. The autotrack assessments showcasing the clamp and dolly system along the TDR is included in Chapter 15 of this EIAR.



Map Legend

Turbine Delivery Route Option A

Drawing Title
Turbine Delivery Route Option A

Project Title
Cahermurphy West Wind Farm

Drawn By	Checked By
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Project No.	Drawing No.
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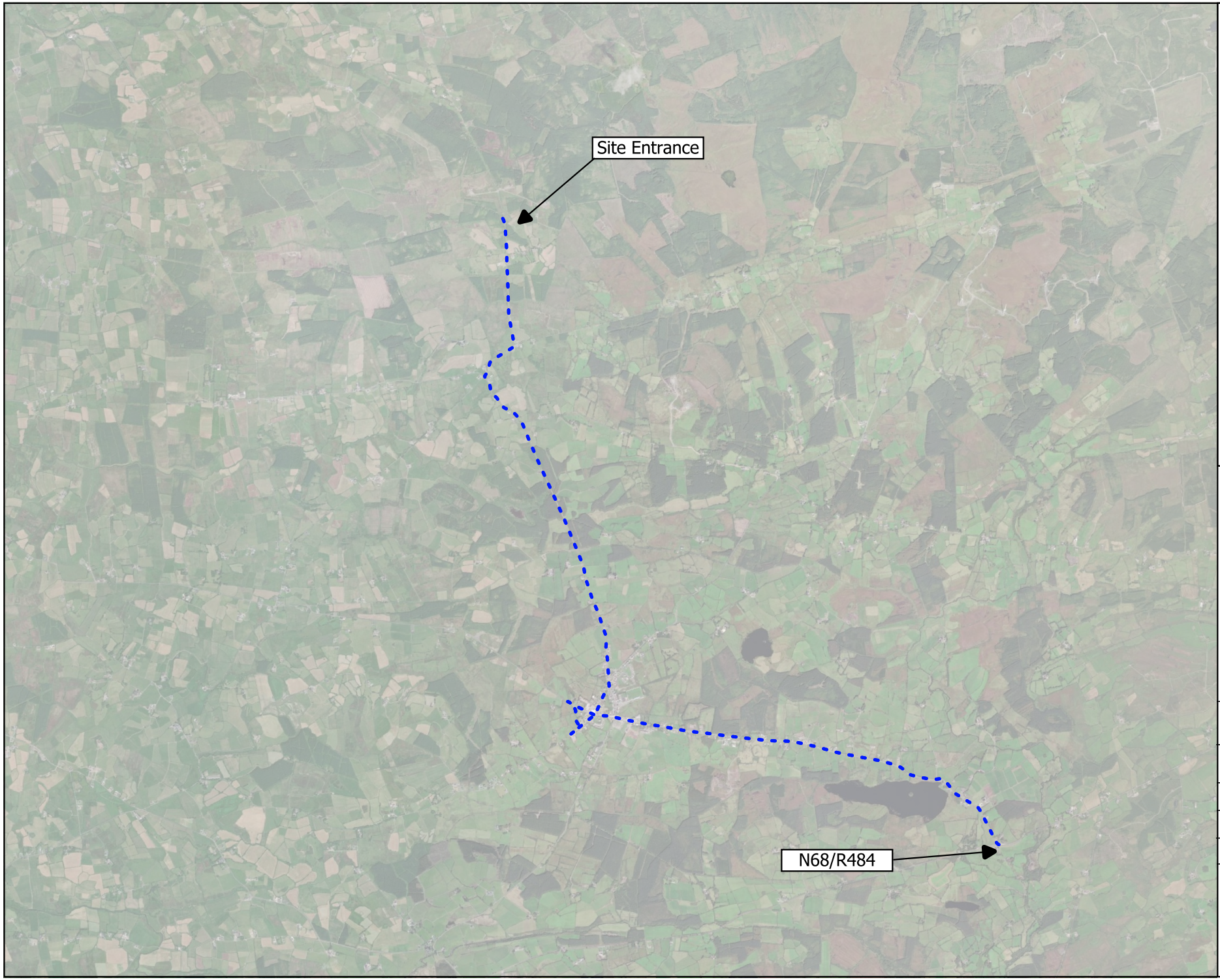
MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

Turbine Delivery Route

N

Drawing Title
Turbine Delivery Route Option A

Project Title
Cahermurphy West Wind Farm

Drawn By	Checked By
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MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

For the reasons set out above, the proposal to use turbine delivery Option B was considered to be the most efficient method of developing a renewable energy project with the lesser potential for significant environmental effects than delivery Option A. Similarly, a clamp and dolly system was decided upon, which allowed for less oversail into third party lands, as well as less hedgerow removal and vegetation trimming.

3.10 Alternative Enhancement Lands

The enhancement lands have been specifically designed to target the two key threats/pressures of high importance on hen harrier, these being forestry and agricultural intensification to mitigate the potential for impacts associated with the Proposed Wind Farm. The enhancement plan aims to provide an increase in the availability of passerine prey within the enhancement lands to offset for the loss of the foraging habitat due to the construction and operation of the Proposed Wind Farm.

As part of the selection process for the enhancement Lands, large forestry plots were identified, occurring on peatland that could be converted to more suitable upland habitats for foraging hen harrier by deforestation. Farmland was also identified that could offer opportunities to significantly improve their ecological value to foraging hen harrier. Rationale for selecting the chosen enhancement lands was based on the largest parcels of land identified that would be suited for hen harrier habitat creation which was available to the Applicant, as well as knowledge of hen harrier foraging and breeding in parcels adjacent to these lands.

The alternative to the Hen Harrier Enhancement Plan is to either not propose these measures or propose measures/ lands which are not suitable and not in line with best practise. Neither of these options are preferable when compared to the chosen option, which will benefit hen harrier.

3.11 Alternative Mitigation Measures

The best practice mitigation measures set out in this EIAR will contribute to reducing any risks and have been designed to break the pathway between the site and any identified environmental receptors.

Mitigation by avoidance has been a key aspect of the Proposed Project's evolution through the selection and design process. Avoidance of the most ecologically sensitive areas of the site limits the potential for environmental effects. As noted above, the site layout aims to avoid environmentally sensitive areas. Where loss of habitat occurs within the site, this has been mitigated by proposing enhancement lands as described in Chapter 6 Biodiversity and Chapter 7 Ornithology of this EIAR. Any forestry felled as part of the Proposed Project will be replaced offsite. The alternative here would be to propose infrastructure within ecologically/ environmentally sensitive areas, which would be considered less environmentally prudent.

The best practice design and mitigation measures set out in this EIAR will contribute to reducing any risks and have been designed to break the pathway between the site and any identified environmental receptors. These mitigation measures are proven effective. The alternative is to either not propose these measures or propose measures which are not best practice and effective and neither of these options are feasible.

3.12 Summary

To conclude, multiple alternatives were considered and researched for multiple components of the Proposed Project, and it was concluded that the Proposed Project and its component parts as described in Chapter 4 of this EIAR is the most environmentally prudent option considered, while ensuring that the project remains both as efficient and commercially viable as possible.

3.13 Difficulties Encountered

No difficulties or limitations were encountered in the preparation of this Chapter.