



Moyvannan Electricity Substation

Environmental Impact Assessment Report

Chapter 2: Assessment of Project Alternatives

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2.1 Introduction

The presentation and consideration of the various reasonable project alternatives investigated is an important requirement of the EIAR process and the single most effective means of avoiding likely significant effects on the environment. As described in **Chapter 1**, the EIAR process is highly iterative involving a constant interchange between project designers and competent experts, with designers continually adjusting the design in response to identified environmental constraints, and vice versa, including with the embedding of mitigation measures in the emerging project design. The purpose of this chapter is to record the key outcomes of this process and to document the assessment of the range of alternatives considered.

The EIA Directive requires that an EIAR must 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 environmental effects'.

This provision requires an EIAR to present transparent and objective evidence on the range of reasonable alternatives which were examined, analysed and evaluated, and which led to the adoption and selection of the final project as described in **Chapter 3**. The *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2022) state that it is generally sufficient to provide a broad description of each of the main alternatives considered, identifying the key issues associated with each of them, and to demonstrate how environmental constraints were taken into account. A detailed assessment (or 'mini-EIA') of each alternative is not required.

2.2 Alternatives Considered

The consideration of alternatives is a dynamic process, and alternatives may be identified at many levels and stages during the evolution of a project, from strategic site location selection through to site layouts, design, technologies and on to mitigation and any monitoring measures. Alternatives that are available for consideration at the earlier stages of a project, particularly at the design and scoping stages, are considered to represent the greatest opportunity for the avoidance of likely significant effects on the environment. As environmental issues emerged during the EIAR/project design process, alternative designs were also considered, and additional mitigation options considered towards the end of the process.

The purpose of this project is to provide a means of connecting the extant permitted Seven Hills Wind Farm to the national electricity grid in order to export renewable electricity generated by the wind farm. Therefore, the consideration of the range of possible alternatives is limited by this circumstance.

Accordingly, the 'Do-Nothing' alternative was not considered a reasonable option; however, for completeness, it has been addressed below. An Bord Pleanála has previously determined that the Seven Hills Wind Farm accords with the principles of proper planning and sustainable development, accords with the provisions of the *Roscommon County Development Plan 2022-2028* and seeks to assist in securing a number of objectives set out in regional and national policy regarding the delivery of

renewable energy and climate change targets. The reasonable alternatives considered in undertaking this EIAR were therefore as follows:-

- Alternative grid connections options;
- Alternative substation locations;
- Alternative substation design technologies;
- Alternative electricity line route options; and,
- Alternative construction material delivery routes.

Each of these alternatives were considered relevant to the project and its specific characteristics and are discussed in further detail below, including an assessment and comparison of likely significant environmental effects and indicating the main reasons for choosing the project, as proposed.

2.3 Assessment of Alternatives

2.3.1 'Do Nothing' Alternative

Current national Government policy in respect of energy production and the reduction of greenhouse gas emissions are all collectively very strongly supportive of the rapid, increased generation of renewable electricity, including wind energy, to reverse climate breakdown and the transition of energy production away from fossil fuels.

The *Climate & Low Carbon Development (Amendment) Bill 2021* provides for one of the most ambitious decarbonisation pathways anywhere in the world. To achieve a 51% reduction in greenhouse gas emissions by 2030, the statutory *Climate Action Plan 2024* commits to a renewable energy generation target of at least 80% by 2030. It is acknowledged that onshore wind will continue to play a vital role in achieving this target, particularly over the next five years, with an installed capacity target of 6 gigawatts (GW) by 2025 and 9GW by 2030.

Accordingly, due to the critical importance of connecting permitted onshore wind energy developments to the national electricity network to enable the transition to a low carbon economy in accordance national, regional and local policies; and the recognised imperative of generating electricity from renewable sources, as outlined above; the 'Do Nothing' alternative was not considered a reasonable alternative.

In the 'Do Nothing' alternative, the status quo in terms of the local environment of the project site would remain unchanged with gradually evolving managed farmland remaining the prominent land use.

2.3.2 Alternative Substation Locations

As described, the purpose of the project is to facilitate the connection of the permitted Seven Hills Wind Farm to the national electricity network. It was previously anticipated that the wind farm would connect to the existing Athlone 110kV electricity substation; however, following further, more recent, evaluations of the available electrical capacity within this substation, it has been concluded that this connection point is currently no longer optimal.

Accordingly, the Developer commenced an appraisal of existing 110kV electricity substations in the region to determine the feasibility of connection and, separately, an assessment of existing transmission lines to determine the possibility of connecting

directly to a transmission line. For a range of technical (electrical) reasons, it was concluded that the most appropriate means of connecting to the national electricity network is via a new electricity substation located along the Athlone-Lanesborough 110kV overhead transmission line.

Strategic site selection to avoid intrinsic environmental sensitivity is the principal mitigation option for projects. Some locations have more inherent environmental sensitivities than others and an assessment of alternative locations can therefore avoid such locations in favour of locations which have fewer constraints and more capacity to sustainably assimilate a project.

In the first instance, a strategic examination of lands along the entirety of the Athlone-Lanesborough 110kV overhead electricity transmission line was undertaken to identify potentially suitable sites which, in the first instance, did not display any fundamental or obvious environmental constraints and, secondly, could accommodate a development of the scale required. While not a key criteria in the identification process, site locations which were closer to the permitted Seven Hills Wind Farm were deemed to be preferable as they would result in a reduced requirement for interconnecting underground infrastructure and, consequently, reduced effects on traffic, transport and the road network.

On the basis of this examination, 2 no. possible locations were identified as potentially suitable for the development of an electricity substation in this general area, as follows:-

- **Option L1:** Barry More, Kiltoom, Co. Roscommon; and,
- **Option L2:** Moyvannan, Kiltoom, Co. Roscommon.

Each of these options were consequently selected for further detailed technical and environmental assessment, as detailed below. The alternative locations are illustrated at **Annex 2.1**.

Table 2.1 below provides an overview of a comparative assessment of environmental constraints and opportunities associated with both alternative locations and the emerging preferred location based on each environmental factor. In undertaking this assessment, the criteria provided in Schedule 7 of the Planning Regulations together with the general environmental factors included in Article 3(1) of the EIA Directive were used as a framework for analysis.

Location	Option L1	Option L2	Emerging Preferred Option
Factor			
Population & Human Health	Relatively low density of dwellings in vicinity of identified location; however, the small settlement of Curraghmore is located c. 1km to the west while there are a notable number of located within 500m of the identified location.	Low density of dwellings in vicinity of identified location with a substantial separation distance (c. 300m) to the nearest dwelling.	Option L2
Biodiversity	The identified location comprises a mix of land cover including agricultural pasture, forestry, and scrub. This location is within c. 1.2km of both the Lough Ree Special Area of Conservation (SAC) and Lough Ree Special	The identified location comprises heavily managed agricultural pasture with occasional hedgerows. The location is within c. 1.8km of both the Lough Ree Special Area of Conservation (SAC) and Lough Ree Special	Option L2

	Protection Area (SPA). Ballynamona Bog and Corkip Lough SAC is located c. 5km to the west.	Protection Area (SPA). Lough Funshingagh SAC is located c. 2.8km to the northwest. A number of small un-named turloughs are also located to the southwest of the identified lands.	
Land & Soil	The location is mapped as being primarily underlain by 'Limestone Till'; while 'Cutover Peat' is located immediately west of the subject lands.	The location is mapped as being predominately underlain by 'Limestone Till', 'Bedrock at Surface' and 'Karstified Limestone Bedrock at Surface'.	Option L1
Water	There are no surface water features located within or adjacent to the identified location.	There are no surface water features located within or adjacent to the identified location.	Option L1 or Option L2
Air Quality & Climate	No constraints identified. Development would result in a positive overall effect.	No constraints identified. Development would result in a positive overall effect.	Option L1 or Option L2
Landscape	The identified lands are located within the Lower Lough Ree & Athlone Environs landscape character area which is assessed to be of 'Very High' landscape value; however, the <i>Roscommon County Development Plan 2022-2028</i> does not refer to any specific constraints or landscape pressures. There are no scenic views or prospects in the vicinity of the identified location.	The identified lands are located within the Mid Lough Ree Pastureland landscape character area and is assessed to be of 'Very High' landscape value. However, the <i>Roscommon County Development Plan 2022-2028</i> indicates that, other than along the shores of Lough Ree, this landscape character area is not particularly sensitive to development. There are no scenic views or prospects in the immediate vicinity of the identified location. This location also provides for increased separation distance between residential dwellings and the project.	Option L2
Cultural Heritage	There are no cultural heritage features within the identified lands or in the immediate vicinity.	A recorded standing stone is located within the immediate environs of the identified lands; but is not visible on the ground. While there are features within the wider landscape, the characteristics of the project are not likely to present as a significant constraint/risk.	Option L1
Noise & Vibration	A number of receptors (dwellings) are located within 500m of the identified location and could experience noise effects.	Due to the limited number (and less than Option L1) of receptors (dwellings) in the vicinity and available separation distances, significant construction and operational phase effects are assessed as unlikely.	Option L2
Material Assets (Transport & Access; Aviation; and	No likely significant transport constraints identified. Location can be readily accessed via national and local roads.	No likely significant transport constraints identified. Location can be readily accessed via national and local roads;	Option L1 or Option L2

Telecommunication)	Existing telecommunication masts in wider vicinity of identified location but no likely significant telecommunications constraints identified. Due to the low height of the proposed infrastructure, no effects on aviation are anticipated.	however, some minor upgrade works may be required to the adjacent L7551 local road. Existing telecommunication masts in wider vicinity of identified location but no likely significant telecommunications constraints identified. Due to the low height of the proposed infrastructure, no effects on aviation are anticipated.	
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Table 2.1: Environmental Assessment of Alternative Locations

Based on this analysis, it was determined that both locations are generally capable of accommodating a project of the type proposed and that neither exhibit any overwhelming environmental constraints. However, due to the substantially greater separation distances to residential dwellings; and the reduced likelihood of adverse effects on population & human health, landscape and noise & vibration; it was concluded that Option L2 was a more suitable location for a project of this overall size and scale.

2.3.3 Alternative Substation Designs

Following the determination that Option L2 represents the preferred alternative, the Developer undertook an analysis of technological design options, including electrical equipment and plant, which could be provided for as part of the proposed substation. Depending on the alternative design technologies deployed, there will be minor variations in terms of internal substation layout and footprint.

It is important to note that the design of such substations must accord with EirGrid specifications and, as such, the scope for installing alternative electrical apparatus and design technologies is very limited.

Within EirGrid specifications for 110kV substations, there are currently 2 no. approved designs (see **Annex 2.2**), as follows.

2.3.3.1 Option SD1: 'Air-Insulated Switchgear' Substation

Air-Insulated switchgear (AIS) substations are conventional switchgear substations which use air as phase-to-ground and phase-to-phase insulation. Air is the primary medium for insulation within these systems; with AIS units having been extensively used for renewable energy development in recent decades. Within AIS substations, electrical equipment is located outdoors and is spaced at a sufficient distance from ground and from other equipment to maintain safe electrical and maintenance clearances.

2.3.3.2 Option SD2: 'Gas-Insulated Switchgear' Substation

Gas-insulated switchgear (GIS) substations comprise standard electrical equipment which includes circuit breakers, current transformers, voltage transformers, disconnect and ground switches, interconnecting busbars, surge arresters, and connections to the electricity grid which are located within a sealed enclosure. GIS enclosures are typically cast or welded aluminium. GIS enclosures are pressure sealed and designed

to remain closed throughout the lifetime of the equipment, which is typically 50-years or more. A GIS substation uses Sulphur Hexafluoride (SF₆) at a moderate pressure for phase-to-phase and phase-to-ground insulation. SF₆ has 2-3 times greater insulating ability of atmospheric air at the same pressure which results in a more compact overall substation size.

2.3.3.3 Assessment of Alternative Substation Design Options

A comprehensive technical and environmental evaluation of Options SD1 and SD2 was undertaken by the Developer to determine which option represented the most suitable and appropriate alternative for the project. It was concluded that both options were feasible from a technical standpoint and that neither option was likely to result in significant environmental effects.

GIS substations are, on occasion, developed as part of renewable energy developments and have a slightly smaller footprint. AIS substations are, however, generally considered to be the most appropriate technology for renewable energy projects. The provision of an AIS substation allows for greater flexibility in terms of any future development which EirGrid may decide to undertake as the project will form a 'node' on the national electricity network to which other projects may seek to connect and, therefore, it is possible that future expansion of the electricity substation may occur.

Therefore, given that both options were technically feasible and that neither option was evaluated as likely to result in significant environmental effects, it was considered that the development of an AIS substation (Option SD1) was preferable due to the greater flexibility afforded by this design. The increased range of options for future development afforded by an AIS substation was considered to outweigh any minor reduction in environmental effects (e.g. slightly reduced level of groundworks due to smaller footprint etc.) which would arise from the development of a GIS substation.

2.3.4 Alternative Electricity Line Route Options

Following the identification of a preferred substation location, the Developer examined a number of routes for the installation of the underground electricity line. The termination point would be a point along the permitted Seven Hills Wind Farm grid connection route. This point was not fixed and was dependent on the most appropriate route. Following an initial evaluation of several potential routes, 2 no. options were identified as being generally viable alternatives, as follows:-

- **Option G1:** Installation of approximately 6.5km of underground electricity line within the L7551, L7556, L2018 and the R362 to its junction with the R363 where it would connect to the permitted Seven Hills Wind Farm grid connection; and,
- **Option G2:** Installation of approximately 9.5km of underground electricity line within the L7551, L7556, L2018, L2022 and the L7558 to its junction with the R363 where it would connect to the permitted Seven Hills Wind Farm grid connection.

These route options are illustrated at **Annex 2.3** and further evaluated at **Table 2.2** below.

Design & Layout	Option G1	Option G2	Emerging Preferred Option
Factor			

Population & Human Health	Relatively low density of dwellings along the route of the underground electricity line and in the vicinity of substation. Likelihood of temporary disruption to local residents and traffic during construction works.	Higher density of dwellings in the vicinity of the substation and along the route of underground electricity line; particularly in closer proximity to Curraghmore and Bellanamulla. This route is also over a longer distance with an increased likelihood of temporary disruption to local residents and traffic during construction works when compared to Option G1.	Option G1
Biodiversity	Identified route is generally not sensitive due to being predominately located within carriageway of public roads. Where the route is located on private lands it is generally located within an existing laneway. The route traverses the Cross River which discharges to the River Shannon Callows SAC and Middle Shannon Callows SPA c. 8.5km downstream of the crossing point.	Identified route is generally not sensitive due to being predominately located within carriageway of public roads. Where the route is located on private lands it is generally located within an existing laneway. The route traverses the Cross River which discharges to the River Shannon Callows SAC and Middle Shannon Callows SPA c. 5km of the crossing point.	Option G1 or Option G2
Land & Soil	No significant constraints identified. The route is located adjacent to mapped areas of 'Karstified Limestone bedrock at Surface' and passes through a short section of mapped 'Cutover Peat'.	No significant constraints identified; however, the route passes through mapped areas of 'Cutover Peat'.	Option G1 or Option G2
Water	The route traverses one natural watercourse, the Cross River. There are a number of turloughs located within the environs of the route. The Cross River discharges to the River Shannon Callows SAC and Middle Shannon Callows SPA c. 8.5km downstream of the crossing point.	The route traverses the Cross River and the Ballybay Stream. There are a number of turloughs located within the environs of the route. The Cross River discharges to the River Shannon Callows SAC and Middle Shannon Callows SPA c. 5km downstream of the crossing point; while the Ballybay Stream discharges to the Lough Ree SAC and Lough Ree SPA c. 2.5km downstream.	Option G1
Air & Climate	No likely significant constraints identified. Project would result in a positive overall effect.	No likely significant constraints identified. Project would result in a positive overall effect.	Option G1 or Option G2
Landscape	Landscape effects from electricity line is largely imperceptible due to nature of underground infrastructure and use of public roads	Landscape effects from electricity line is largely imperceptible due to nature of underground infrastructure and use of public roads	Option G1 or Option G2

Cultural Heritage	The route of the underground electricity line is located in close proximity (within 100m) to a number of cultural heritage features; however, there is no direct encroachment onto the footprint of any recorded feature.	The route of the underground electricity line is located in close proximity (within 100m) to a number of cultural heritage features; however, there is no direct encroachment onto the footprint of any recorded feature. It is noted that the number of features within 100m of the route is reduced in comparison to Option G1	Option G2
Noise & Vibration	Construction activities would take place in the immediate vicinity of dwellings along the route of the underground electricity line.	Construction activities would take place in the immediate vicinity of a greater number of dwellings along the route in comparison to Option G1.	Option G1
Material Assets (Transport & Access; Telecommunications)	Short-term, temporary effects likely on transport and access during construction due to requirement for temporary traffic management. No likelihood of significant effects on telecommunications.	Short-term, temporary effects likely on transport and access during construction due to requirement for temporary traffic management. The longer route (compared with Option G1) increases the extent and duration of disruption. No likelihood of significant effects on telecommunications.	Option G1

Table 2.2: Environmental Assessment of Alternative Electricity Line Options

Based on this appraisal, it was concluded that neither Option G1 nor G2 was likely to give rise to significant adverse environmental effects. Option G1 was, however, considered to be preferential in terms of environmental effects and was, therefore, selected as the preferred means of connecting the permitted Seven Hills Wind Farm to the proposed electricity substation.

Following the completion of preliminary technical evaluations of Option G1, however, it was identified that due to the presence of existing sub-surface utility services, it would not be possible to install the underground electricity line along this route. This is due to the requirement to adhere to strict separation distances between underground electrical infrastructure and utility services. Accordingly, a further alternative, Option G3, was identified (see **Annex 2.3**) and subject to environmental and technical assessment. It was subsequently concluded that Option G3 was an appropriate alternative and did not exhibit any overwhelming technical or environmental constraints.

2.3.5 Alternative Construction Material Delivery Routes

Electrical and associated equipment; such as underground electrical cabling and electrical apparatus to be installed at the substation; may be sourced from various suppliers through Ireland or internationally. Suppliers of such equipment will be selected, post-consent, through a competitive tendering process and, as such, it is not currently possible to confirm delivery routes. However, given the proximity of Option L2 to the national road network (N61), it is likely that deliveries will predominately utilise the national road network to access the identified location.

The construction phase of the project will require other materials; such as stone aggregates, concrete, tar and chips, etc.; to be imported to the project site from selected suppliers. A range of potential local suppliers have, therefore, been identified and the potential haul routes to the electricity substation site entrance are illustrated at **Annex 2.4**. Potential suppliers include:-

- Mannion Quarries, Castlesampson, Bealnamulla, Co. Roscommon;
- Kildea Concrete, Rooskagh, Bellanamullia, Co. Roscommon;
- Cam Quarry (Roadstone), Curry, Co. Roscommon;
- Ward Bros. Quarries, Lisnagirra, Athleague, Co. Roscommon;
- Lecarrow Quarries, Knockroghery, Roscommon; and,
- Spollen Concrete, Glassan, Athlone, Co. Westmeath.

As with the suppliers of electrical equipment, suppliers of construction materials will also be subject to a competitive tendering process prior to the commencement of development. Therefore, it is not currently possible to determine the precise material haul routes. While it is evaluated that there is no likelihood of significant adverse effects on either the road network or third party access as a result of the movement of construction related vehicles using any of the haul routes identified at **Annex 2.4**; in order to reduce any minor effects yet further, the chosen suppliers will be instructed to utilise motorway, national and regional roads, and avoid local roads, insofar as is possible and practicable. Thus, while the indicative haul routes presented at **Annex 2.4** do not necessarily represent the most direct route to the project site, they are deemed to be the most appropriate to ensure the protection of the road network in the region.

Further details related to the appropriate management of construction traffic will be set out in a Traffic Management Plan to be agreed with the Planning Authority prior to the commencement of development.

2.4 Conclusion

This chapter has provided a description of the reasonable alternatives, which are relevant to the project and its specific characteristics which have been assessed, evaluated and analysed, and an indication of the main reasons for selecting the preferred option, including a comparison of environmental effects. The 'Do Nothing' Alternative, Alternative Substation Locations, Alternative Substation Design & Layouts, Alternative Electricity Line Routes, and Alternative Haul Routes have all been discussed and analysed.

The objective of this process was to avoid any likely significant adverse effects on the environment through the selection of a location for the project which avoided inherent environmental sensitivities, in favour of a location which had fewer constraints and greater capacity to sustainably assimilate the project. Once the preferred location was identified, a series of alternative designs and layouts were evaluated through a recursive, iterative design process intended to resolve any likely significant environmental effects through an examination of localised constraints; including in the embedding of mitigation measures in the emerging preferred project design.

The final project assessed in this EIAR has therefore adopted the combination of design and layout options that strike the best balance between the avoidance of any likely significant environmental effects and achievement of the objectives of the project.

