Planning and Environmental Consultants

Environmental Impact Assessment Report (EIAR)

Seskin Renewables Wind Farm

Chapter 3 – Consideration of Reasonable Alternatives

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3. SITE SELECTION AND REASONABLE ALTERNATIVES

3.1 Introduction

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

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

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

As detailed in Section 1.1.1 in Chapter 1, for the purposes of this EIAR, the various project components are described using the following references: the 'Proposed Development', the 'Proposed Wind Farm', the 'Proposed Grid Connection', the 'Site'. This section of the EIAR contains a description of the reasonable alternatives that were studied by the developer, which are relevant to the Proposed Development and its specific characteristics, in terms of site location and other renewable energy technologies as well as site layout incorporating size and scale of the Proposed Development, connection to the national grid and transport route options to the Site. This section also outlines the design considerations in relation to the Proposed Wind Farm and Proposed Grid Connection. It provides an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects. The consideration of alternatives is an effective means of avoiding environmental impacts. As set out in the Environmental Protection Agency (EPA) '*Guidelines on The Information to be Contained in Environmental Impact Assessment Reports, 2022' (EPA, 2022),* the presentation and consideration of reasonable alternatives investigated is an important part of the overall EIA process.

Hierarchy

EIA is concerned with projects. EPA, 2022 states that in some instances neither the applicant nor the competent authority can be realistically expected to examine options that have already been previously determined by a higher authority, such as a national plan or regional programme for infrastructure.

Non-environmental Factors

EIA is confined to the 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 policy.

Site-specific Issues

EPA, 2022 states that the consideration of alternatives also needs to be set within the parameters of the availability of the land, i.e., the site may be the only suitable land available to the developer, or the need for the project to accommodate demands or opportunities that are site-specific. Such considerations should be on the basis of alternatives within a site, for example design and layout.

3.2 Consideration of Reasonable Alternatives

3.2.1 Methodology

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

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

There is limited European and National guidance on what constitutes a 'reasonable alternative' however EU, 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".*

EPA, 2022 states that "*It is generally sufficient to provide a broad description of each main alternative, and the key issues associated with each, showing how environmental considerations were taken into account is deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required."*

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

- 'Do Nothing' Alternative
- Alternative Site Locations
- Alternative Renewable Energy Technologies
- Alternative Proposed Wind Farm Design Options:
  - Alternative Turbine Numbers and Model
  - Alternative Turbine Layout and Development Design
  - Alternative Road Layout
  - Alternative Construction Compound Option
  - Alternative Borrow Pit Option
  - Alternative Turbine Component Delivery Option
    - Alternative Port of Entry
    - Alternative Component Delivery Route
  - Alternative Design of Ancillary Structures
    - Alternative Meteorological Mast Location
- Alternative Proposed Grid Connection Design Options
  - Alternative Substation Location
  - Alternative Grid Connection Cabling Route Options
- Alternative Mitigation Measures

Each of these is addressed in the following sections. When considering the Proposed Wind Farm, given the intrinsic link between layout and design, the two will be considered together in this chapter.

3.2.2 'Do Nothing' Alternative

Annex IV, Part 3 of the EIA Directive states that the description of reasonable alternatives studied by the developer should include *"an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge."* This is referred to as the "do nothing" alternative. EU, 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 developing a renewable energy project at the Site would be to leave the Site as it is, with no changes made to the current land-use practices. Pastoral agriculture and public road corridor (approx. 2.2km for the Proposed Grid Connection underground cabling route) would continue. In doing so, the environmental effects in terms of emissions are likely to be neutral.

By implementing this 'Do-Nothing' alternative, however, the opportunity to capture the available renewable energy resource 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.

As such, on the basis of the positive environmental effects arising from the project when compared to the 'Do-Nothing' scenario, the Do-Nothing' scenario was not the chosen option. The existing land uses can and will continue in conjunction with the Proposed Development. 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.

Environmental Consideration	Do-Nothing Alternative	Chosen Option of developing a renewable energy project
Population & Human Health	No increase in local employment and no long-term financial contributions towards the local community. No potential for shadow flicker and noise to affect sensitive receptors. No potential for effects on visual amenity due to the construction and operation of turbines. No potential for positive effects on air quality and climate change targets.	Approximately 100 jobs could be created during the construction, operation, and maintenance phases of the Proposed Development. Based on the assessment and mitigation proposals detailed in Chapter 5 Population & Human Health, there will be no significant effects related to shadow flicker during the operational phase. As detailed in Chapter 12, residual effects from Noise and Vibration are predominantly not significant for the short-term construction and decommissioning phases. For the Operational Phase, the residual effects range from not significant to imperceptible on sensitive receptors.

Environmental Consideration	Do-Nothing Alternative	Chosen Option of developing a renewable energy project
	No potential to supply an estimated 32,037 homes with clean renewable electricity	As detailed in Chapter 14, there will be no significant residual Landscape & Visual effects. The proposed turbine locations adhere to the recommended 4 times tip height set-back distance (for non-involved sensitive receptors) set out in the draft Guidelines for the purpose of protecting visual amenity. As detailed in the assessment in Chapter 10, the overall impact will be a Long-term Moderate Positive Impact on air quality.
Biodiversity (including Birds)	No habitat loss. No potential for collision risk for birds and bats No potential biodiversity enhancement measures would be put in place.	As detailed in Chapter 6 Biodiversity, the development has been designed to avoid or mitigate impacts on biodiversity including bats and downstream aquatic receptors. The Proposed Development includes for a biodiversity net gain proposal providing a local boost to biodiversity. Please see Appendix 6-4 for details. With the implementation of the mitigation measures described in Chapter 7 Ornithology, the residual effects for collision risk are not significant.
Land, Soils & Geology	Neutral	As detailed in the assessment in Chapter 8, there is no net loss of topsoil or subsoil as a result of the Proposed Development. Topsoil and subsoil will be relocated within the Site. Geotechnical investigations followed by careful design will lead to no significant environmental impacts.
Water	Neutral	As detailed in the assessment in Chapter 9, no significant effects on surface water or groundwater quality will occur.
Air Quality	Neutral. Will not provide the opportunity for an overall increase in air quality or reduction of greenhouse gasses.	As detailed in Chapter 10, there will be no significant effects on air quality during the construction, and decommissioning phases. There will be a Long-term Moderate Positive Impact on air quality during the operational phase

Environmental Consideration	Do-Nothing Alternative	Chosen Option of developing a renewable energy project
Climate	Neutral. Will not provide the opportunity for a contribution to the reduction of greenhouse gases. No potential to assist in achieving the renewable energy targets set out in the Climate Action Plan 2025.	As detailed in the assessment in Chapter 11 Climate, over the proposed 35-year lifetime of the Proposed Wind Farm, 30,934 tonnes of carbon dioxide per annum will be displaced from traditional carbon-based electricity generation. Over the proposed 35-year lifetime of the development, therefore, 1,082,690 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation. The addition of an estimated 48MW clean energy to the national grid will be a positive contribution to the States renewable energy targets set out in the Climate Action Plan 2025.
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 Development during the construction and operational phase
Archaeological, Architectural & Cultural Heritage	No potential for impacts on unrecorded, subsurface archaeology.	As detailed in Chapter 13, there will be no significant direct or indirect effects on known or unknown archaeology and cultural heritage during the construction, and decommissioning phases. During the operational phase, following an assessment of over 240 no. archaeological, architectural and cultural heritage sites, significant indirect effects are only expected to occur at two sites located within the Proposed Wind Farm site.
Landscape & Visual	Neutral. No potential for effects on visual amenity due to the construction and operation of turbines.	As detailed in the assessment in Chapter 14, overall, the Proposed Development adheres to good siting and design according to best practice wind energy development guidelines, being appropriately scaled for the landscape type and sited in a landscape of low sensitivity, with no potential for significant residual effects on key landscape and visual sensitivities. Significant residual effects

Environmental Consideration	Do-Nothing Alternative	Chosen Option of developing a renewable energy project
		on residential visual amenity are localised to a very small number of residential receptors.
Material Assets	Neutral	As detailed in Chapter 15 Material Assets, there will be no significant adverse effects on traffic and transport during the construction, operational or decommissioning phases of the Proposed Development. A detailed Traffic Management Plan incorporating all the mitigation measures will be agreed with the roads authority prior to construction works commencing on site.

3.2.3 Alternative Site Locations

To ensure that the Levelised Costs of building each Megawatt of electricity-generating capacity on a wind farm is controlled efficiently, it is incumbent on the design team to ensure that the most suitable site for development of a wind farm development is chosen. The process of identifying a suitable wind farm site is influenced by a number of factors, while wind speeds, the area of suitable or available land, proximity to a grid connection point and planning policy are all very important, a wind farm project must be commercially viable/competitive, as otherwise it will never attract the necessary project finance required to build it.

The Site has been identified as having potential for a wind energy development as a result of a nationwide search of suitable lands. The site selection process has been constraints and facilitators led. Facilitators are factors that give an advantage to a Proposed Development, while constraints are restrictions that inform the location and design of a project by highlighting sensitivities. A nationwide constraints analysis was undertaken and included avoidance of environmental designations (Natura 2000 sites), review of national, regional and local policies and objectives, suitable wind speeds, adequate setbacks from sensitive receptors, proximity to national grid nodes, avoidance of direct impacts on known cultural heritage assets, access and constructability.

3.2.3.1 Strategic Site Selection

As the cost of building each megawatt of electricity generating capacity in a wind farm is in the region of €1.5 million, it is critical that the most suitable site for the Proposed Development is chosen.

As set out in Section 1.3 of this EIAR, the Applicant company, Seskin Renewable Energy Ltd is a subsidiary of Atlantic Infrastructure Renewables Ltd. (AIR). which is an Irish-owned Limerick-based company. AIR invests in infrastructure projects across Ireland. AIP projects help deliver high-quality infrastructure assets that are essential to society and the communities where they are located. AIR helps bridge funding, capacity and delivery gaps and provides critical infrastructure ahead of when others might have been able to so.

Site selection for the development of a wind farm must be suitable for consideration under a number of criteria, such as:

- **Environmental Sensitivities**: Located outside of EU Natura 2000 sites; locations outside of National designations; located outside of Article 17 Annex I Habitats;
- **Grid Connection**: Access to the national electricity grid possible within a viable distance;
- **Sensitive Receptors**: Capable of complying with required setbacks from sensitive receptors;
- **Site Scale:** Sufficient area of unconstrained land that could potentially accommodate a wind farm development and turbine spacing requirements.

The criteria above will be explained further below in so far as they influenced the site selection exercise undertaken.

3.2.3.1.1 Environmental Sensitivities

The Proposed Wind Farm is not located within any area designated for ecological protection. The Proposed Grid Connection underground cabling route crosses the River Nore SPA, and the River Barrow and River Nore SAC in the townland of Moatpark, Co Kilkenny. At this location, the proposed underground cabling route will cross the river via horizontal direction drilling, with the drilling commencing within the public road corridor, and finishing in agricultural land, outside of the European designated sites. The Proposed Grid Connection underground cabling route also crosses the River Nore/Abbeyleix Woods Complex proposed Natural Heritage Area (pNHA) at this location. One of the drilling pits required for directional drilling is located within the boundary of the pNHA, although it is located within agricultural grassland.

The nearest Natura 2000 site to the Proposed Wind Farm site, i.e. Special Area of Conservation (SAC) or Special Protection Area (SPA) is the River Nore SPA, which is located approximately 0.36km to the west of the Proposed Development site at its nearest point. River Barrow and River Nore SAC has many qualifying interests relating to both freshwater and terrestrial habitats and species.

The next nearest national designated site, i.e. Natural Heritage Area (NHA) or proposed Natural Heritage Area (pNHA), is River Nore/Abbeyleix Woods Complex pNHA, which is located approximately 0.33km west of the Proposed Development site at its nearest point.

The Proposed Wind Farm site is located primarily on agri-pastoral lands, of low ecological value, within a rural setting.

3.2.3.1.2 Article 17 Annex I Habitat

In addition to the above, there is no Article 17 Annex I habitat recorded within or adjacent to the application site. Comprehensive multi season site surveys have confirmed that there is no Annex I habitat within the Site. Habitats within the Site are predominantly improved agricultural grassland and are of a low ecological value. Please see Chapter 6 Biodiversity for further details regarding habitats within the Site.

3.2.3.1.3 Grid Connection

The Proposed Development intends to connect to the national grid via 38kV underground electrical cabling predominantly along the N77 national secondary road from the Proposed Wind Farm to the existing Ballyragget 110kV substation, in the townland of Moatpark, near Ballyragget, Co. Kilkenny. Details regarding potential alternative grid connection options are considered and presented in Section 3.2.6.

3.2.3.1.4 Sensitive Receptors

The Applicant sought to identify an area with a relatively low population density to allow for appropriate setback distances from residential dwellings. Having reviewed the settlement patterns in the vicinity, the study area has emerged as suitable to accommodate the Proposed Development. The population density of the Population Study Area as described in the Population and Human Health section of this EIAR is 33.32 persons per square kilometre, as described in Chapter 5 of this EIAR. This is significantly lower than the average national population density of 73.27 persons per square kilometre. The proposed turbine positions achieve the recommended setbacks in both the Guidelines (500m) and the draft Guidelines (4 x the proposed turbine tip height). The nearest settlement to the proposed turbines is the town of Durrow, Co. Laois located approximately 2.4km north of T01.

3.2.3.1.5 Site Scale

The Site, covering a total of 302 hectares, comprises a mix of agri-pastural land public road corridor and has an elevation range of 81m AOD to 202m AOD. Land-use in the wider vicinity of the Site comprises a mix of agriculture, low density residential, renewable energy and industrial and commercial. The Proposed Wind Farm site benefits from existing farm tracks (approx. 4,460m). The Proposed Wind Farm site is easily accessible via an existing agricultural access off the L58333 local road, which in turn is accessed off the N77in the townland of Ballynalsee. As discussed above, the Site comprises habitats of low ecological value and the recommended setback distance to sensitive receptors is achieved.

As such, with its proximity to grid, accessibility, low ecological value habitats and achievable setbacks from sensitive receptors, the Site affords a largescale area that is sufficiently unconstrained to accommodate an 8-no. turbine wind farm development. The constraints and facilitators mapping process is outlined in Section 3.2.5.2.1.

3.2.3.1.6 Summary

From the review of the criteria set out above, the Site is considered a suitable location for the provision of a renewable energy development of the scale proposed. The Proposed Wind Farm is located on agricultural land which allows the site to take advantage of the existing access roads (some of which will be upgraded) and highlights the suitability of the Proposed Wind Farm as it can make sustainable use of established items of infrastructure.

The Proposed Wind Farm site is not located within or adjacent to EU or National protected areas, nor does it contain any EU designated Annex I Habitat. The Proposed Wind Farm site is located primarily on agri-pastoral lands, of low ecological value, within a rural setting. Required setbacks from sensitive receptors, as set out above are achievable. The Proposed Grid Connection underground cabling route crosses the River Nore SPA, and the River Barrow and River Nore SAC in Ballyragget. At this location, the proposed underground cabling route will cross the river via horizontal direction drilling, with the drilling commencing within the public road corridor, and finishing in agricultural land, outside of the SAC.

From the review of the criteria set out above, the Proposed Grid Connection was identified for the provision of a connection of the Proposed Wind Farm to the national grid. The 38kV underground electrical cabling route is located primarily within the public road corridor and does not directly interact with any environmental designations. The 38kV underground electrical cabling route overlaps with the River Nore SPA, and the River Barrow and River Nore SAC when crossing the River Nore. However, there are no instream works proposed as part of the Proposed Grid Connection underground cabling route construction, so no significant impacts have been identified.

Factoring all required environmental constraints into the project design, a site of considerable scale, with an estimated installed capacity of 48MW, and potential to power approximately 32,037 Irish

households with renewable energy and displace 30,934 tonnes of carbon dioxide per annum (1,082,690 tonnes over the 35-year operational life), the Site is considered appropriate for wind energy development and represents a positive contribution to National and EU climate action targets.

3.2.4 Alternative Renewable Energy Technologies

The Proposed Development will be located in a site where agricultural practices will continue to be carried out around the footprint of the Proposed Wind Farm.

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% of our electricity from renewable energy by 2030. It is not a case of 'either' 'or'. The Climate Action Plan has set out the following targets for electricity generation:

Share of electricity demand generated from renewable sources to up to 80% where achievable and cost effective, without compromising security of electricity supply;

- Onshore Wind Capacity: up to 9GW
- Offshore Wind Capacity: 5GW (minimum)
- Solar PV Capacity: 8GW

When considering other renewable energy technologies in the area, the Applicant considered offshore wind and commercial solar energy production as an alternative on the Proposed Wind Farm.

3.2.4.1 Offshore Wind

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

However, it is considered that due to delays with the regulatory process for offshore development, a combination of both onshore and offshore wind farm development will continue to be required to deliver on the ambitious renewable energy targets set under the Climate Action Plan 2025 which include focusing on onshore wind energy developments to reach the 2030 renewable energy targets. As such, Seskin Renewable Energy Ltd's primary focus is onshore wind farms and delivering suitable sites onshore such as the Proposed Development.

The Applicant is committed to playing a key role in helping the State achieve its CAP25 objective, as such, the option of an offshore project is not considered to be a reasonable alternative at this time.

3.2.4.2 Solar Energy

The Proposed Development will be located on a site where agriculture practices will continue to be carried out around the footprint of the Proposed Wind Farm. Commercial solar energy production is the harnessing and conversion of sunlight into electricity using photovoltaic (PV) arrays (panels). To achieve the same maximum estimated electricity output from solar energy as is expected from the Proposed Wind Farm (c. 48MW), a larger development footprint would be required. As detailed in Section 1.1.1 in Chapter 1, the EIAR Site Boundary encompasses an area of approximately 302ha and the permanent footprint of the Proposed Development measures approximately 7.6ha, which represents approximately 2.5% of the Site. A solar PV array of the scale necessary to provide the same electricity output would require a footprint of approx. 76.8 hectares[1] or 25% of the overall Site. In addition, a solar

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

development of this scale, would have a higher potential environmental effect on Traffic and Transport (construction phase), Air Quality (construction phase) and Biodiversity and Ornithology (habitat loss), a greater potential for direct impacts on unknown subsurface archaeology (construction phase) and glint and glare at the Site (operational phase). Taking into account the factors outlined above, and considering the farming practices in the area, it has been determined that wind energy is the most suitable renewable energy technology for the Site with the lesser potential for significant, adverse environmental effects.

A comparison of the potential environmental effects of the development of a solar PV array when compared against the chosen option of developing the Proposed Development at this Site are presented in Table 3-2 below.

Table 3-2 Comparison of environmental effects when compared against the chosen option (wind turbines)

Environmental	Solar PV Array (with up to 48MW Output)	Chosen Option
Population & Human Health (incl. Shadow Flicker)	Relatively lower long-term financial contributions towards the local community (i.e., community benefit fund) on a per MWh basis. Lower potential for noise and vibration effects. Lower potential for visual obstructions in the skyline due to solar farms being low lying structures. No potential for shadow flicker to affect sensitive receptors. Potential for glint and glare impacts on local receptors.	Higher long-term financial contributions towards the local community (i.e., community benefit fund) on a per MWh basis. 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 Development. Greater potential for noise and vibration during construction, operational and decommissioning phases. Greater potential for visual effects during operational phase. No material difference between the two options during construction and decommissioning. No potential for glint and glare impacts on sensitive receptors.
Biodiversity (including Birds)	Larger development footprint would result in greater potential habitat loss. No potential for collision risk for birds.	Smaller development footprint would result in a smaller habitat loss. As detailed in Chapter 6 Biodiversity, the development has been designed to avoid or mitigate impacts on biodiversity including bats and downstream aquatic receptors. With the implementation of the mitigation measures described in Chapter 7 Ornithology, the residual effects for collision risk are not significant.
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, there is no loss of topsoil or subsoil as a result of the Proposed Development. Topsoil and subsoil will be relocated within the Site. No significant effects on soils and subsoils will occur.
Water	Shallower excavations involved in solar PV array developments would result in reduced volume	Project design specific drainage design removes the potential for significant environmental effects. As detailed in

	of spoil to be excavated, therefore reducing the potential for silt-laden runoff to enter receiving waterbodies.	the assessment in Chapter 9, no significant effects on surface water or groundwater quality will occur.
Air Quality	Increased potential for dust and other noxious emissions due to larger volume of transport movements to and from site and larger volume of plant and ground works on site due to the larger footprint.	Reduced potential for dust and other noxious emissions due to smaller volume of plant and ground works on site due to a smaller footprint.
Climate	Reduced capacity factor of solar PV array technology would result in less carbon offset	Greater capacity factor resulting in a shorter carbon payback period. As detailed in the assessment in Chapter 11 Air and Climate, over the proposed 35-year lifetime of the Proposed Wind Farm, 1,082,690 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation. The addition of an estimated 48MW clean energy to the national grid will be a positive contribution to the States renewable energy targets set out in the Climate Action Plan 2025.
Noise & Vibration	Potential for short term noise impacts on nearby sensitive receptors during the construction phase. Larger traffic movements and increased plant on site due to the larger footprint could lead to larger noise and vibration output during the construction phase.	Based on the assessment detailed in Chapter 12 and the mitigation measures proposed, there will be no significant effects on sensitive receptors due to an increase in noise levels from the Proposed Development during the construction and operational phase.
Archaeological, Architectural & Cultural Heritage	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.	Smaller development footprint would decrease the potential for impacts on unrecorded, subsurface archaeology. As detailed in Chapter 13, there will be no significant direct or indirect effects on known or unknown archaeology and cultural heritage during the construction, operation and decommissioning phases. Archaeological monitoring under licence of the smaller footprint will be implemented during the construction phase.

Landscape & Visual	Panelling potentially less visible from surrounding area due to the screening by vegetation and topography.	Greater visibility due to the vertical scale of the proposed turbines. As detailed in the assessment in Chapter 14, the landscape value of the Proposed Wind Farm is deemed to be of 'Low' sensitivity 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 the number of solar panels required to achieve the same output. Greater potential for impacts on waste management due to increased plant on site giving rise to increase in hazardous waste materials. No material difference for impacts on gas, water, aviation. No potential for impacts on telecommunications.	No material difference for impacts on gas, water, aviation. Buffers implemented on telecommunication links. As detailed in Chapter 15, there will be short term negative imperceptible to slight impact on traffic volumes during the construction phase of the Proposed Development. A detailed Traffic Management Plan incorporating all the mitigation measures will be agreed with the roads authority prior to construction works commencing on site. There will be a positive effect on electricity supply with the provision of an estimated 48MW to the national grid and powering of 32,037 Irish households with renewable electricity per year.

For the reasons set out above, the proposal for a wind energy development at the Proposed Wind Farm was considered to be the most efficient method of electricity production with the lesser potential for significant environmental effects.

3.2.5 Alternative Project Design Options

3.2.5.1 Alternative Turbine Numbers and Model

Modern wind turbines have a potential power output in the 4.5 – 7 megawatt (MW) range. It is proposed to install 8 no. 6MW turbines at the Proposed Wind Farm which will have an estimated installed capacity of 48 MW. Such a wind farm could also be achieved on the Proposed Wind Farm site by using smaller turbines (for example 2.5 MW machines). However, this would necessitate the installation of over 19 turbines to achieve a similar output. A larger number of smaller turbines would result in the wind farm occupying a greater footprint within the Proposed Wind Farm site, with a larger amount of supporting infrastructure being required (i.e., roads etc) and increasing the potential for environmental impacts to occur. The proposed number of turbines takes account of all site constraints and the distances to be maintained between turbines and features such as roads and houses, while maximising the wind energy potential of the Proposed Wind Farm. The 8-turbine layout selected for the Proposed Development 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 turbine model to be installed on the Proposed Wind Farm will have an overall ground to blade tip height of 175m; a rotor diameter 150m; and a hub height of 100 metres. The use of alternative smaller turbines at the Proposed Wind Farm would not be appropriate as they would fail to make the most efficient use of the wind resource passing over the Proposed Wind Farm and would potentially require a larger development footprint. This alternative would potentially lead to additional environmental effects.

A comparison of the potential environmental effects of the installation of a larger number of smaller wind turbines when compared against the chosen option of installing a smaller number of larger wind turbines on the Proposed Wind Farm is presented in Table 3-3 below.

Table 3-3 Comparison of environmental effects when compared to the chosen option (8 no. wind turbines, higher MW output)

Environmental Considerations	Larger number of smaller turbines	Chosen option of a 8-turbine layout
Population & Human Health (incl. Shadow Flicker)	Greater potential for shadow flicker and noise impacts on nearby sensitive receptors due to the increased number of turbines. However, these can be curtailed to meet threshold criteria. Smaller turbines would be less visually obstructive in the skyline; however, the larger development footprint would spread further across the landscape potentially occupying a larger portion of a viewpoint.	Decreased potential for shadow flicker due to greater setbacks from houses, greater separation between turbines thus reducing aggregated shadow flicker time. There is no potential for significant noise and vibration effects from the proposed turbines. Furthermore, noise emissions can be curtailed to meet threshold criteria. Fewer turbines may occupy a smaller portion of a viewpoint. Based on the assessment detailed in Chapter 5 and the mitigation measures proposed, there will be no significant effects on population and human health from shadow flicker, noise and vibration during the construction, operation and decommissioning phases of the Proposed Development.
Biodiversity (including Birds)	Larger development footprint would result in greater potential for habitat loss.	As detailed in Chapter 6 Biodiversity, the development has been designed to avoid or mitigate impacts on biodiversity including bats and downstream aquatic receptors. As per Chapter 6 of this EIAR, following the implementation of the prescribed mitigation measures, there are no significant long-term negative effects expected on biodiversity receptors. With the implementation of the mitigation measures described in

Environmental Considerations	Larger number of smaller turbines	Chosen option of a 8-turbine layout
		Chapter 7 Ornithology, the residual effects for collision risk are not significant.
Land, Soils, & Geology	Larger development footprint would result in greater volume of spoil to be generated, excavated and sorted.	Smaller footprint would result in smaller volume of soils to be excavated and managed. As detailed in Chapter 4 and 8, the Proposed Wind Farm has been designed to utilise the existing roads to minimise ground disturbance where possible. The spoil management proposals discussed in Chapter 4 sets out the optimal treatment for spoil generated on site without creating significant impacts for biodiversity, hydrology, land use etc. As detailed in the assessment in Chapter 8, no significant effects on soils and subsoils will occur.
Water	Project design specific drainage design removes the potential for significant environmental effects. Larger development footprint, therefore, increasing the potential for silt-laden runoff to enter receiving waterbodies.	Project design specific drainage design removes the potential for significant environmental effects. Smaller footprint would result in less potential for silt laden run-off to enter a waterbody. As detailed in the assessment in Chapter 9, no significant effects on surface water or groundwater quality will occur.
Air Quality	Increased potential for vehicle and construction dust emissions due to an increased volume of construction material and turbine component deliveries to the site, giving rise to a reduced air quality locally for the construction phase.	Decreased potential for vehicle emissions and dust emissions due to a decreased volume of construction material and turbine component deliveries to the site. As detailed in Chapter 10, there will be no significant effects on air quality during the construction, and decommissioning phases. There will be a Long-term Moderate Positive Impact on air quality by during the operational phase.
Climate	There would be an increased potential for vehicle emissions and dust emissions due to an increased volume of construction material and	Decreased potential for vehicle emissions and dust emissions due to a decreased volume of construction

Environmental Considerations	Larger number of smaller turbines	Chosen option of a 8-turbine layout
	turbine component deliveries to the Site.	material and turbine component deliveries to the Site. As detailed in the assessment in Chapter 11 Climate, over the proposed 35-year lifetime of the Proposed Wind Farm, 1,082,690 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation. The addition of an estimated 48MW clean energy to the national grid will be a positive contribution to the States renewable energy targets set out in the Climate Action Plan 2025.
Noise & Vibration	Potential for increased noise impacts on nearby sensitive receptors due to reduced separation distance between sensitive receptors and turbine locations and additional turbine generators.	Potential for decreased noise levels at nearby sensitive receptors due to increased separation distance between sensitive receptors and turbine locations. Based on the assessment detailed in Chapter 12, there will be no significant effects on sensitive receptors during the construction operational and decommissioning phases from the Proposed Development.
Archaeological, Architectural & Cultural Heritage	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology. No material difference between the two options for indirect effects on monuments.	Smaller development footprint would decrease the potential for impacts on unrecorded, subsurface archaeology. No material difference between the two options for indirect effects on monuments. As detailed in Chapter 13, there will be no significant direct or indirect eff
Landscape & Visual	Smaller turbines may be less visually intrusive on the landscape. Equally, a larger number of smaller turbines would be spread over a wider area, taking up a greater portion of a viewpoint	Fewer but larger turbine models would be more visually obstructive in the skyline but may occupy a narrower portion of the viewpoint.
Material Assets – Traffic and Transport	Potential for greater traffic volumes during construction phase due to larger development footprint and requirement for more construction materials and turbine components.	Potential for smaller traffic volumes during the construction phase due to a smaller development footprint and requirement for fewer construction materials and turbine components.

Environmental Considerations	Larger number of smaller turbines	Chosen option of a 8 turbine layout
		As detailed in Chapter 15, there will be short term negative imperceptible to slight impact on traffic volumes during the construction phase of the Proposed Development. A detailed Traffic Management Plan incorporating all the mitigation measures will be agreed with the roads authority prior to construction works commencing on site.
Material Assets- Utilities, Waste Management, Telecommunications and Aviation	No material difference between the two options for gas, water, waste management, telecommunications and aviation.	No material difference between the two options for gas, water, waste management, telecommunications and aviation.

3.2.5.2 Alternative Turbine Layout and Development Design

The design of the Proposed Wind Farm has been an informed and collaborative process from the outset, involving the designers, developers, engineers, landowners, environmental, hydrological and geotechnical, archaeological specialists and traffic consultants. The aim being to reduce potential for environmental effects while designing a project capable of being constructed and viable.

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

3.2.5.2.1 *Constraints and Facilitators Mapping*

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

The Guidelines were the subject of a targeted review. The proposed changes to the assessment of impacts associated with onshore wind energy developments were outlined in the draft Guidelines. A consultation process in relation to the draft Guidelines closed on 19th February 2020. The proposed changes presented in the draft Guidelines give certain focus on the setback distance from residential properties (four times the proposed maximum tip height), along with shadow flicker and noise requirements relative to sensitive receptors. At time of writing, the draft Guidelines have not yet been adopted and the commitment within the Climate Action Plan 2025 is to publish the final version of the guidelines. The relevant guidelines for the purposes of section 28 of the Act, remain those issued in 2006, the Guidelines.

The constraints mapping process involves the placing of buffers around different types of constraints so as to clearly identify the areas within which no development works will take place. The size of the buffer zone for each constraint has been assigned using guidance presented in the Guidelines. Should the draft Guidelines be adopted in advance of a decision being made on this planning application, the Proposed Development will be capable of achieving the requirements of the draft Guidelines as currently proposed.

The constraints map for the Proposed Wind Farm, as shown in Figure 3-1, was produced following a desk study of all site constraints. Figure 3-1 encompasses the following constraints and associated buffers:

- **Sensitive Receptors:** a minimum 700-metre setback from third party sensitive receptors (achieving the 4 x tip height separation distance from third party sensitive receptors in line with the draft Guidelines).
- **Designated Sites/Natura 2000:** a minimum 100-metre setback from Special Areas of Conservation, Special Protected Areas and Proposed Natural Heritage Areas.
- **Telecommunications**: Setback buffers determined following detailed assessment of telecommunication links that traverse the site. Refer to Appendix 15-3.
- **Transport:** a setback of 192.5m from National roads (Tip Height + 10%) and 82.5m from local roads (Blade length + 10%)
- **Hydrology:** Watercourses plus 50-metre buffer.
- **Archaeology:** Archaeological Sites or Monuments: 50-metre buffer, plus 'Zone of Notification' as required by the National Monuments Service (ROI) There are two recorded monuments within the EIAR Site Boundary.

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

- Available lands for development;
- Acceptable wind resource;
- Opportunity to win construction materials on site, minimising the potential for additional traffic (and associated environmental impacts) and cost generation by acquiring all materials offsite;
- Existing access points and general accessibility of all areas of the site due to existing road infrastructure; and
- Limited extent of constraints.

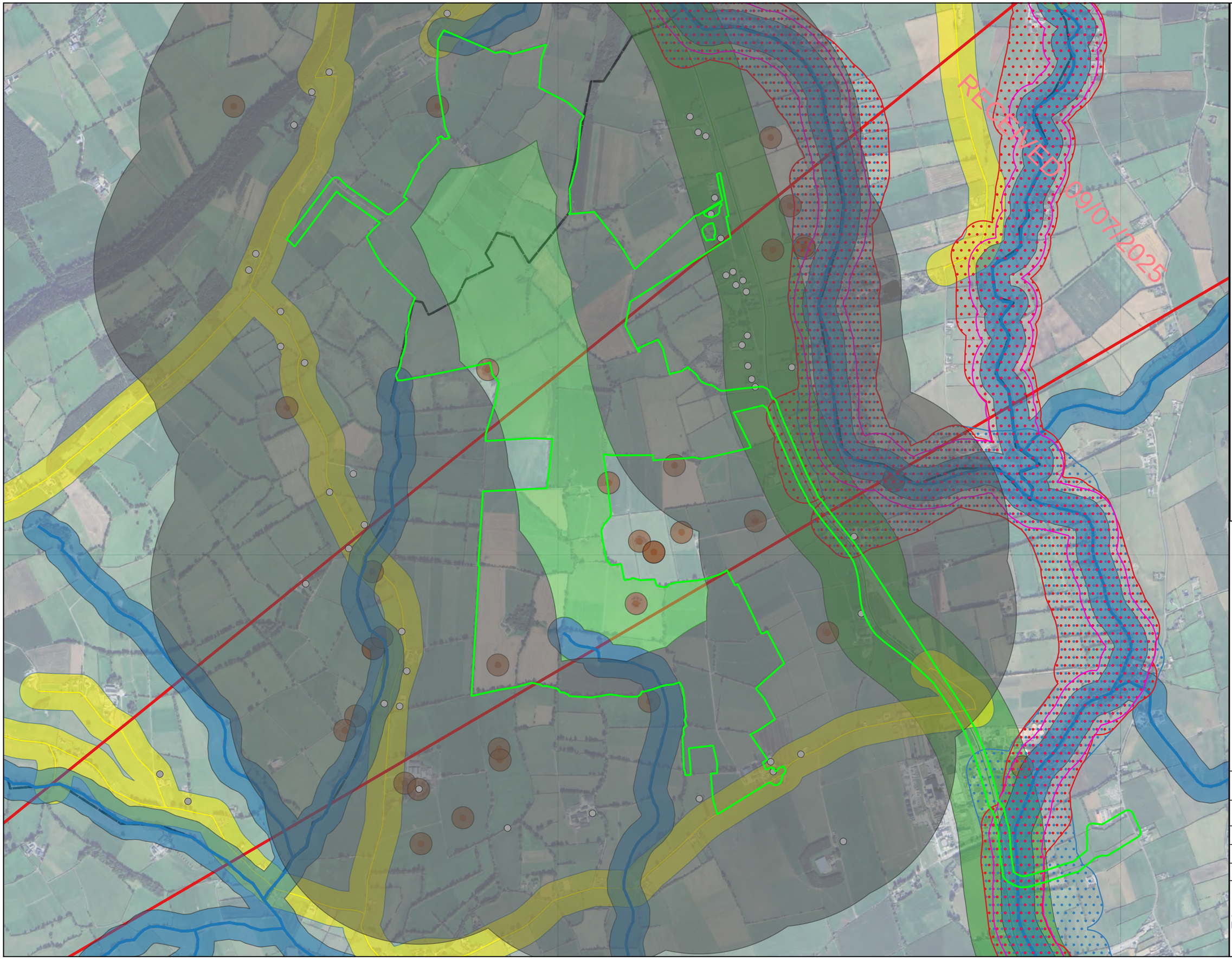
The inclusion of the constraints on a map of the Proposed Wind Farm site allows for a viable area to be identified. An initial turbine layout is then developed to take account of all the constraints mentioned above and their associated buffer zones and the separation distance required between the turbines. Following the mapping of all known constraints, detailed site investigations were carried out by the project team.

The ecological assessment of the Proposed Wind Farm site encompassed habitat mapping and extensive surveying of birds and other fauna. This assessment, as described in Chapters 6 and 7 of this EIAR on Biodiversity and Ornithology, optimised the decision on the siting of turbines and the carrying out of any development works, such as the construction of roads.

The hydrological and geotechnical investigations of the Proposed Wind Farm site examined the proposed locations for turbines, roads and other components of the Proposed Development, such as the construction compound. Where specific areas were deemed as being unsuitable for the siting of turbines or roads, etc., alternative locations were proposed and assessed, taking into account the areas that were already ruled out by constraints.

The turbine layout for the Proposed Wind Farm has also been informed by the results of noise assessments, landscape and visual and the separation distance to be maintained between turbines. Thus, the baseline environmental assessment of the Proposed Wind Farm site and wind farm design was an

iterative process, where findings at each stage of the assessment were used to further refine the design, always with the intention of minimising the potential for environmental impacts.



Map Legend

- EIAR Site Boundary
- Viable Area
- Kilkenny/Laois County Border

Sensitive Receptors

- Sensitive Receptors
- 700m Sensitive Receptors Buffer

Designated Sites/Natura 2000

- Special Areas of Conservation (SACs) 100m Buffer
- Special Protected Areas (SPAs) 100m Buffer
- Proposed Natural Heritage Areas (pNHAs) 100m Buffers

Hydrology & Hydrogeology

- Watercourse
- Watercourse 75m Buffer

Telecommunications

- Telecommunication Links

Archaeological Sites/Monuments

- National Monuments
- National Monuments 50m Buffer

Transport

- Local Roads
- Local Roads 82.5m Buffer
- N77 National Secondary Road
- N77 National Secondary Road 192.5m Buffer

Drawing Title
Environmental Constraints

Project Title
Seskin Renewables Wind Farm

Drawn By	Checked By
ER	EM
Project No.	Drawing No.
231103	Figure 3-1
Scale	Date
1:15,000	2025-06-29

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3.2.5.2.2 *Alternative Turbine Layout Iterations*

The final proposed turbine layout takes account of all site constraints and the distances to be maintained between turbines and from houses, roads, etc. The layout is based on the results of all site investigations that have been carried out during the EIAR process and the EIA scoping process with statutory and non-statutory consultees. As information regarding the Proposed Wind Farm was compiled and assessed, the number of turbines and the proposed layout have been revised and amended to take account of the physical constraints of the Proposed Wind Farm and the requirement for buffer zones and other areas in which no turbines could be located. The selection of the turbine number and layout has also had regard to wind-take and the separation distance to be maintained between turbines, as well as landscape and visual, noise and shadow flicker impacts. The EIAR and Proposed Wind Farm design process was an iterative process, where findings at each stage of the assessment were used to further refine the design, always with the intention of minimising the potential for environmental impacts.

The development of the final Proposed Wind Farm site layout has resulted following feedback from the various studies and assessments carried out as well as ongoing negotiations and discussions with landowners and the local community.

There were a number of reviews by the wind farm design team of the specific locations of turbines during the optimisation of the Proposed Wind Farm site layout. The initial constraints study identified a significant viable area within the overall study area of the Proposed Wind Farm site. Please refer to Figure 3-2, Figure 3-3 and Figure 3-4 to see the evolution of the turbine layout for the Proposed Wind Farm.

Proposed Layout Iteration No. 1

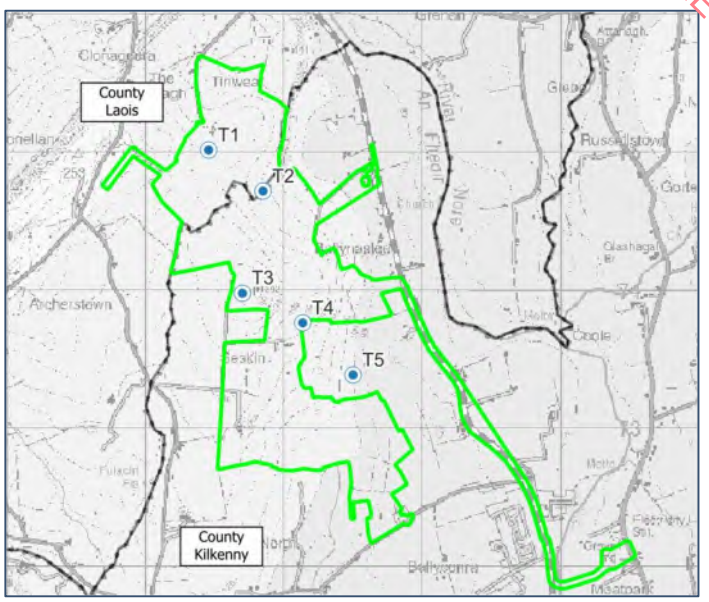


Figure 3-2 Proposed Layout Iteration No. 1

Iteration No. 1 which is presented in Figure 3-2 is the initial turbine layout which was based on a preliminary constraints mapping exercise and identification of a viable area for turbine siting. The initial desk-top constraints study, based on available lands within the study area at that time, identified a viable area sufficient to accommodate 5 no. turbines. A turbine blade-tip height of 185m was considered at this early stage in the design process.

Proposed Layout Iteration No. 2

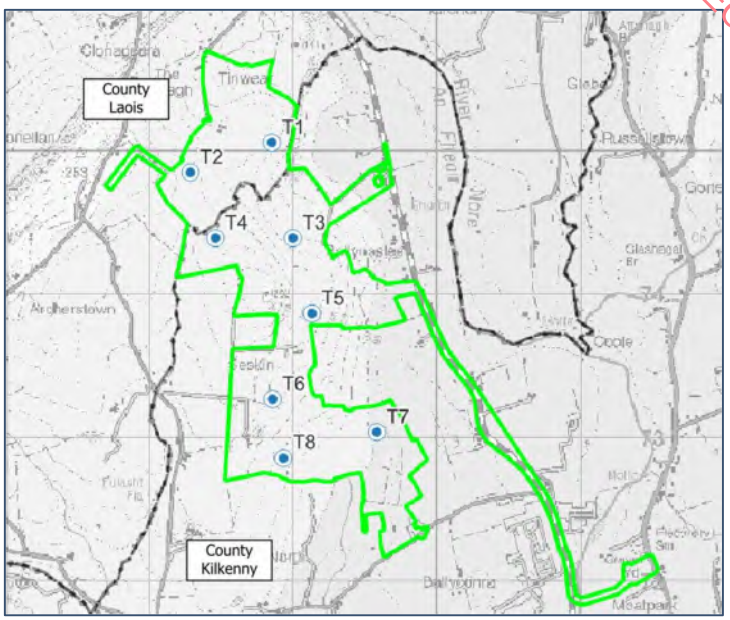


Figure 3-3 Proposed Layout Iteration No. 2

Iteration No. 2 which is presented in Figure 3-3 above. Following continued discussions with landowners located within the site boundary, additional lands became available. With the availability of new land it was decided to improve the economic viability of the project whilst having regard to the physical and environmental constraints previously identified. A tip height of 185m was originally considered, however, it was decided to reduce the tip height by 10m to 175m. Iteration No. 2, comprised of 8 no. turbines, is a refined turbine layout which was based on updated designs, following desktop review by the design team.

Layout Iteration No. 2 was presented to the project team for detailed investigations and assessment. These investigations included detailed habitat mapping, ecological surveying, hydrological and geotechnical investigations of the Proposed Wind Farm.

Proposed Layout Iteration No. 3 - Final Proposed Wind Farm Site Layout

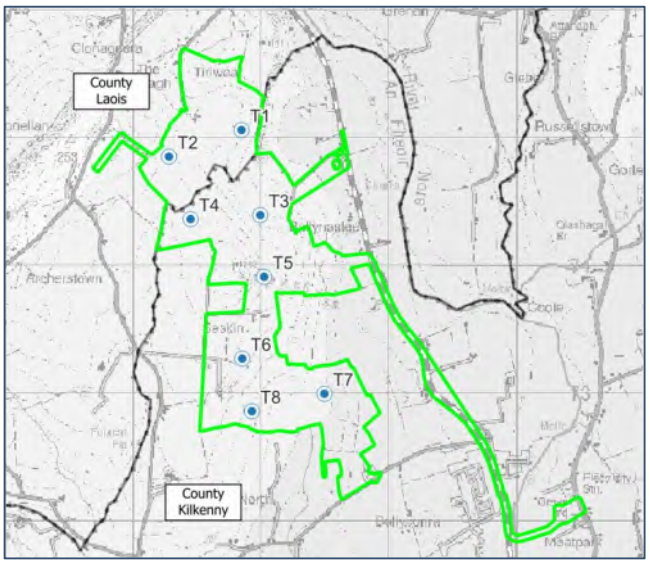


Figure 3-4 Proposed Layout Iteration No. 3 - Final Proposed Wind Farm Site Layout

Iteration No. 3, as presented in Figure 3-4, comprises 8 no. turbines with a maximum overall ground-to-blade tip height of 175 metres, rotor diameter of 150 metres, hub height of 100 metres.

As part of the final design iteration, enhancement and replanting measures were developed in order to ensure that the Proposed Development had a positive effect on local biodiversity. Measures such as hedgerow replanting and enhancement have been proposed as part of the Proposed Wind Farm, with further details being available in Appendix 6-4 Biodiversity Management and Enhancement Plan

Turbines T04, T05 and T07 were relocated from their previous positions to reduce the overall length of hedgerow required to be removed as part of the construction of the Proposed Wind Farm.

The revisions to the layout were found to have a positive effect on the environmental and ecological elements of the Site when compared to the other options considered.

The final proposed turbine layout as presented in Figure 3-4 takes account of all site constraints (e.g. ecology, hydrology, archaeology, etc) and design constraints (e.g. setback distances from houses and distances between turbines on site etc). The layout also takes account of the results of all site investigations and baseline assessments that have been carried out during the EIAR process.

As part of this iteration, hedgerow enhancement, replanting and translocation measures were developed in order to ensure that the Proposed Development had a positive effect on local biodiversity. Further detail is available in Appendix 6-4 Biodiversity Management and Enhancement Plan.

The final chosen turbine layout is considered the optimal layout given it has the least potential for environmental effects.

A comparison of the potential environmental effects of initial iterations of the turbine layout as compared against the final turbine layout are presented in Table 3-4 below.

Table 3-4 - Comparison of environmental effects of the turbine layout when compared to the chosen option

Environmental Consideration	Proposed Layout Iteration No. 1	Proposed Layout Iteration No. 2	Chosen Option of the Final 8 Turbine Layout and all associated infrastructure
Population & Human Health (incl Shadow Flicker)	Greater potential for shadow flicker and noise impacts on nearby sensitive receptors due to larger turbines but on a smaller number of sensitive receptors due to smaller development footprint. However, these can be curtailed to meet threshold criteria.	Potential for shadow flicker and noise impacts on a larger number of sensitive receptors due to increased number of turbines compared to Option 1.	Based on the assessment detailed in Chapter 5 and the mitigation measures proposed, there will be no significant effects on population and human health from shadow flicker, noise and vibration during the construction, operation and decommissioning phases of the Proposed Development. Significant residential visual amenity effects are predicted for a very small number of residential receptors.
Biodiversity & Ornithology	Less potential for impact on identified sensitive ecological receptors due to smaller number of proposed turbines and development footprint.	Greater potential impact on identified sensitive ecological receptors due to larger development footprint.	As detailed in Chapter 6 Biodiversity, the development has been designed to avoid or mitigate impacts on biodiversity including bats and downstream aquatic receptors. With the implementation of the mitigation measures described in Chapter 7 Ornithology, the residual effects for collision risk are not significant.
Land, Soils & Geology	Smaller development footprint would result in lower volume of spoil to be generated, excavated and sorted. Less potential for impacts on identified soils and subsoils due to smaller to development footprint.	Larger development footprint would result in greater volume of spoil to be generated, excavated and sorted. Greater potential impact on	As detailed in the assessment in Chapter 8, no significant effects on soils and subsoils will occur during the construction, operation or decommissioning phases. Geotechnical investigations followed by careful design would

Environmental Consideration	Proposed Layout Iteration No. 1	Proposed Layout Iteration No. 2	Chosen Option of the Final 8 Turbine Layout and all associated infrastructure
		identified soils and subsoils due to larger development footprint compared to Iteration No. 1.	lead to no significant environmental impacts.
Water	Lower potential for impacts on groundwater schemes due to Smaller development footprint. Project design specific drainage design removes the potential for significant environmental effects.	Increased potential for impacts on groundwater schemes due larger development footprint compared to Iteration No. 1. Project design specific drainage design removes the potential for significant environmental effects.	Project design specific drainage design removes the potential for significant environmental effects. Groundwater loggers were also placed onsite for a period in excess of twelve months in order to determine the characteristics of the groundwater levels and flow in the area surrounding the Site.
Air Quality	Smaller development footprint would mean a decreased potential for vehicle and construction dust emissions compared to Iteration No. 2 and the chosen option. This is due to a lower volume of construction material and turbine component deliveries to the site.	Larger development footprint, compared to Iteration No. 1, would lead to an increased potential for vehicle and construction dust emissions due to an increased volume of construction material and turbine component deliveries to the site. Mitigation measures implemented would ensure that no significant effects on air quality would arise.	Larger development footprint, compared to Iteration No. 1, would lead to an increased potential for vehicle and construction dust emissions due to an increased volume of construction material and turbine component deliveries to the site. As detailed in Chapter 10, there will be no significant effects on air quality during the construction, and decommissioning phases. There will be a Long-term Moderate Positive Impact on air quality by during the operational phase.
Climate	Decreased potential for vehicle emissions due to a decreased volume of construction material and turbine component	There would be an increased potential for vehicle emissions due to an increased volume	Increased potential for vehicle emissions due to a increased volume of construction material and turbine component

Environmental Consideration	Proposed Layout Iteration No. 1	Proposed Layout Iteration No. 2	Chosen Option of the Final 8 Turbine Layout and all associated infrastructure
	deliveries to the Site. However, there would be less carbon dioxide displaced due to the lower export capacity and a lower contribution to the State's renewable energy targets set out in the Climate Action Plan 2025.	of construction material and turbine component deliveries to the Site. There would be a greater volume of carbon dioxide displaced due to a greater export capacity compared to Iteration No. 1 and therefore, a greater contribution to the State's renewable energy targets.	deliveries to the Site compared to Iteration No. 1. As detailed in the assessment in Chapter 11 Climate, over the proposed 35-year lifetime of the Proposed Wind Farm, 1,082,690 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation. The addition of an estimated 48MW clean energy to the national grid will be a positive contribution to the States renewable energy targets set out in the Climate Action Plan 2025.
Noise & Vibration	Slightly lower potential for increased noise impacts from larger turbines on nearby sensitive receptors due to lower number of turbines and a slightly greater separation distance between sensitive receptors and turbine locations compared to Iterations No. 2 and No. 3.	Potential for increased noise impacts on nearby sensitive receptors due to greater number of turbines. The separation distance still complies with the requirements within the draft Guideline.	Potential for increased noise levels at nearby sensitive receptors due to greater number of turbines compared to Iteration No. 1. The separation distance still complies with the requirements within the draft Guideline. Based on the assessment detailed in Chapter 12, there will be no significant effects on sensitive receptors during the construction, operational and decommissioning phases from the Proposed Development.
Landscape & Visual	The smaller number of turbines would have a lower potential for significant landscape and visual effects. The initial layout adhered to the	A larger number of turbines would be spread over a wider area, taking up a greater portion of a viewpoint, with a	As detailed in the assessment in Chapter 14, overall, the Proposed Development adheres to good siting and design according to best

Environmental Consideration	Proposed Layout Iteration No. 1	Proposed Layout Iteration No. 2	Chosen Option of the Final 8 Turbine Layout and all associated infrastructure
	relevant setback from dwellings as set out in the draft Guidelines (740m) for the protection of residential visual amenity.	turbine located closer, and thus appearing more visually prominent. However, this layout adhered to the relevant setback from dwellings as set out in the draft Guidelines (700m) for the protection of residential visual amenity.	practice wind energy development guidelines, being appropriately scaled for the landscape type and sited in a landscape of low sensitivity, with no potential for significant residual effects on key landscape and visual sensitivities. Significant residual effects on residential visual amenity are localised to a very small number of residential receptors. However, this layout adhered adhered to the relevant setback from dwellings as set out in the draft Guidelines (700m) for the protection of residential visual amenity.
Archaeological, Architectural & Cultural Heritage	Smaller development footprint would reduce the potential for impacts on unrecorded, subsurface archaeology.	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology Potential views of additional turbines increases the potential for indirect effects on the setting of monuments, as it is more likely that greater numbers of turbines will be	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology Potential views of additional turbines increases the potential for indirect effects on the setting of monuments, as it is more likely that greater numbers of turbines will be seen from monuments. As detailed in Chapter 13 of the EIAR, archaeological testing will be carried out prior to the construction phase

Environmental Consideration	Proposed Layout Iteration No. 1	Proposed Layout Iteration No. 2	Chosen Option of the Final 8 Turbine Layout and all associated infrastructure
		seen from monuments.	and monitoring of all groundworks will be undertaken during the construction phase.
Material Assets	Potential for smaller traffic volumes during the construction phase due to a smaller development footprint and requirement for fewer construction materials and turbine components. No material difference between the three options for gas, water, waste management, telecommunications and aviation.	Potential for greater traffic volumes during construction phase due to larger development footprint and requirement for more construction materials and turbine components. No material difference between the three options for gas, water, waste management, telecommunications and aviation.	As detailed in Chapter 15, there will be short term negative imperceptible to slight impact on traffic volumes during the construction phase of the Proposed Development. A detailed Traffic Management Plan incorporating all the mitigation measures will be agreed with the roads authority prior to construction works commencing on site. No material difference between the three options for gas, water, waste management, telecommunications and aviation.
Vulnerability to Major Accidents Natural Disasters	No material difference between the two options	No material difference between the two options	No material difference between the two options

3.2.5.3 Alternative Road Layout

Access tracks are required onsite in order to enable transport of infrastructure and construction materials within the Proposed Wind Farm. Such tracks must be of a gradient and width sufficient to allow safe movement of equipment and vehicles. Approximately 4.9km of new internal tracks are required for the Proposed Development along with approximately 1.5km of existing farm tracks, which is currently used by the landowners in their daily farming activities. These tracks will be utilised where possible; however, some require upgrading/widening to facilitate the movement of abnormal loads through the Proposed Wind Farm site.

As the turbine layout was finalised, the most suitable routes between each component of the Proposed Development were identified, taking into account the shortest routes and existing farm tracks and filtering out the physical and environmental constraints of the Proposed Wind Farm site and the associated buffers, and utilising the most direct route between turbines in order to minimise the footprint. Additionally, turning areas were designed and sited for minimum environmental effect along internal roads.

An alternative option to making maximum use of the existing road network within the Proposed Wind Farm would be to construct a new road network, having no regard to existing roads or tracks. This approach was not favoured, as it would require unnecessary disturbance to the Site and create the potential for additional cut and fill material to be used in the construction of new road networks. Please see Table 3-5 for a comparison of environmental effects when compared against the chosen option.

Table 3-5 Comparison of environmental effects when compared against the chosen option (maximising the use of the existing road network)

Environmental Consideration	New Road Network	Use and Upgrade/Resurface of Existing Site Tracks/Local Roads
Population & Human Health	Potential for increased impacts on residential amenity due to increased disturbance during the construction stage.	The road upgrades will have potentially less of an impact on population and human health.
Biodiversity & Ornithology	Larger development footprint would result in greater habitat loss compared to the chosen option.	Smaller development footprint will result in a smaller habitat loss.
Land, Soils & Geology	Larger development footprint would result in greater volumes of spoil to be excavated and stored. Larger volume of stone required for road construction.	Smaller development footprint which leads to a reduction in spoil volumes to be excavated.
Water	Larger new development footprint would result in greater volumes of spoil to be excavated and greater potential for silt-laden runoff from works area.	Smaller new development footprint would result in smaller volumes of spoil to be excavated and lower potential for silt-laden runoff from works area.
Air Quality	More ground disturbance, potential for greater emissions due to more plant on site and longer construction phase would result in increased dust and other emissions.	Less ground disturbance therefore potential for fewer emissions due to fewer plant on site and shorter construction phase.
Climate	Larger development footprint requires more construction materials leading to increased vehicle movements and associated vehicular emissions.	Smaller development footprint requires less construction materials leading to decreased vehicle movements and associated vehicular emissions.
Noise & Vibration	Potential for increased noise impacts on nearby sensitive receptors during the construction of the new roads.	Potential for less noise impacts on nearby sensitive receptors during the construction of the road upgrades.

Environmental Consideration	New Road Network	Use and Upgrade/Resurface of Existing Site Tracks/Local Roads
Archaeological, Architectural & Cultural Heritage	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.	Smaller development footprint would decrease the potential for impacts on unrecorded, subsurface archaeology.
Landscape & Visual	There is potential for increased temporary visual impacts for sensitive receptors due to the presence of additional plant on site during the construction phase to excavate and construct a new road layout.	There will be a slight reduction in potential for visual impacts during the construction phase due to the decreased presence of plant on site.
Material Assets	Potential for greater traffic movements on site during construction phase due to larger development footprint. No material difference between the two options in potential for impact on gas, water, telecommunications aviation assets.	Smaller development footprint results in a reduced construction traffic movements on site due to smaller development footprint. No material difference between the two options in potential for impact on gas, water, telecommunications aviation assets.
Vulnerability to Major Accidents Natural Disasters	No material difference between the two options.	No material difference between the two options.

3.2.5.4 Alternative Borrow Pit Option

The use of an onsite borrow pit represents an efficient use of existing onsite resources and reduces the need to transport large volumes of construction stone materials along the local public road network to the Site. The use of an onsite resource, that would only be developed for the Proposed Wind Farm, reduces the use of off-site existing quarry material assets.

A review of potential construction phase borrow pit locations was carried out by hydrological and geotechnical experts, Hydro Environmental Services and Ground Investigation Ireland. Site surveys were undertaken and existing GIS data and environmental constraints were also considered, namely aerial photography, soil and subsoil cover, biodiversity (habitats), on site drainage, proximity to the existing and proposed internal road network, and proximity to sensitive receptors.

Arising from this process, 2 no. test pit locations were selected near at the north of Site (northeast of T04) and to the east (south of T03). Trial pits were undertaken at these locations to determine a potential suitable location for a borrow pit. The findings of the geological site investigations concluded in the identification of 1 no. borrow pit within the Site, south of T03, measuring approximately 15,226m^2 with a potential of providing the majority of construction stone material for the Proposed Development. The location of the proposed borrow pit is shown on Figure 4-1 and cross section details are shown on Figure 4-12. The extraction of material from the borrow pit will be during the construction phase of the Proposed Development only and will be a temporary operation carried out over a short period of time. Rock breaking will be used for extracting material from the borrow pit. Processing and crushing of stone material will also be required at the borrow pit to achieve the grading requirements for use in construction. The final volumes to be removed from the borrow pit will be

confirmed at the time of construction and following detailed pre-construction site investigation works. In addition to the material to be extracted from the borrow pit, it is anticipated that engineering fill and higher quality, surfacing granular fill and sand will be sourced from local, authorised quarries (approx. 20,000m^3). Licenced quarries located within 20 km of the Site which could provide some construction material for the construction of the Proposed Development are shown in Chapter, Figure 4-20, of this EIAR.

An alternative to using an on-site borrow pit was the option of sourcing all stone and 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 an 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 pit.

A comparison of the potential environmental effects when comparing the sourcing of all stone from local, off-site quarries against the chosen option (majority from on-site borrow pit) is presented in Table 3-6 below.

Table 3-6 Comparison of environmental effects of sourcing all materials off site when compared against the chosen option – onsite borrow pit and offsite quarries.

Environmental Consideration	Sourcing all stone from local, off-site quarries	Use of onsite borrow pit along with offsite quarries
Population & Human Health	Potential for increased vehicular, noise and dust emissions from increased traffic movements, along construction haul routes 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 dust and noise emissions, and traffic volumes along construction haul routes due to reduced requirement for daily HGV presence on site during the construction phase. Temporary dust and noise emissions related to borrow pit extraction however, due to vegetation screening and distance from sensitive receptors, the residual effects are not significant.
Biodiversity & Ornithology	Reduced habitat loss and ground disturbance for flora, fauna and birds.	Increase in habitat loss due to borrow pit footprint however, as assessed in the Biodiversity chapter, this is habitat of low ecological value which is comprises the majoring of the site and surrounding landscape. Furthermore, the borrow pit will be reinstated with excavated spoil and will be reseeded post construction.
Land, Soils & Geology	Slight reduction in spoil to be excavated, however, dedicated, large spoil placement areas would be required as an on-site borrow pit would not be available for the placement of excavated spoil. .	Increased capacity for the placement of excavated spoil.

Environmental Consideration	Sourcing all stone from local, off-site quarries	Use of onsite borrow pit along with offsite quarries
Water	Less potential for effects on groundwater quality.	Greater potential for effects on ground water quality due to extraction of bedrock from borrow pit area.
Air Quality	Potential for increased vehicular and dust emissions from increased traffic movements to and from the Site, due to the volume of rock to be imported.	More ground disturbance due to onsite borrow pit which can give rise to dust emissions however, lower traffic volumes arriving and departing site per day and reduced onsite traffic volumes therefore reducing dust and noxious emissions overall.
Climate	No material difference between the two options.	No material difference between the two options.
Noise & Vibration	Increased potential for noise and vibration effects on local sensitive receptors along construction haul routes due to arrival and departure of heavy goods vehicles during the construction phase and reduced potential for noise and vibration effects on local sensitive receptors due to no breaking or crushing of materials won from onsite borrow pit.	Potential for increased noise and vibration effects on some residential receptors due to the extraction of bedrock from the borrow pit area. Mitigation measures presented in Chapter 12 of this EIAR will ensure that no significant effects occur.
Archaeological, Architectural & Cultural Heritage	Slightly smaller development footprint would reduce the potential for impacts on unrecorded, subsurface archaeology.	Slightly larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.
Landscape & Visual	Potentially reduced landscape and visual effects temporarily as no open rock face would be visible from certain viewpoints during the construction phase.	Potential for increased landscape and visual effects temporarily due to open rock face which may be visible from certain viewpoints during the construction phase. However, excavated soil and subsoil will be used to reinstate the borrow pit area at the end of the construction phase.
Material Assets	Significantly higher HGV traffic volumes on the public road network during construction phase due to the volume of crushed stone required to be transported to the site and empty HGVs leaving the site. No material difference between the two options in potential for impact on waste management,	Reduced volume of HGVs traffic volumes on the public road network during construction as a considerable portion of materials will be won on site. Decreased potential for noise, dust and emissions due to the reduced volumes of HGV traffic on the roads. No material difference between the two options in potential for impact on waste

Environmental Consideration	Sourcing all stone from local, off-site quarries	Use of onsite borrow pit along with offsite quarries
	telecoms, aviation, electricity, water or gas.	management, telecoms, aviation, electricity, water or gas.
Vulnerability to Major Accidents Natural Disasters	No material difference between the two options.	No material difference between the two options.

3.2.5.5 Alternative Turbine Component Delivery Option

With regard to the selection of a transport or haul route to the Site, alternatives were considered in relation to ports of entry, turbine components, general construction-related traffic, and site access locations.

3.2.5.5.1 *Alternative Ports of Entry*

The ports considered for the port of entry of wind turbine components into Ireland for the Proposed Wind Farm include Belview Port, County Waterford, Dublin Port, Shannon-Foynes Port, County Limerick, Cork and the Port of Galway. All of the aforementioned ports have been used for the importing of turbine components. As stated, all ports mentioned above have a proven track record in the handling and subsequent transport of large turbine components. The final selection will be driven by commercial, availability and scheduling considerations. There are clear access routes for all five ports utilising the motorway network to the proposed haul route to the site. Regardless of which port is chosen, the components will approach the Site via the M7 to the north. The delivery of turbine from the M7 to the Site has been assessed in detail in Chapter 15 of this EIAR.

3.2.5.5.2 *Alternative Component Delivery Route*

The Site is located approx. 21.1km south of the M7/N77 junction (Junction 17) and, as such, delivery of turbine components from this direction were considered as part of the iterative design process for the Proposed Development.

The alternative delivery route considered, exited Junction 8 on the M9, following the N10 northwest for 6.3km, before turning right onto the N77 on the eastern outskirts of Kilkenny city. The route continued north along the N77 for 22.1km, passing through the town of Tullaroan. In the townland of Ballynaslee, Co. Kilkenny the turbine component delivery vehicles would turn on to the L58333 local road from the existing junction on the N77 and continue north on this local road for approximately 700m to the Proposed Wind Farm site entrance. After review by the Traffic Consultant and subsequent autotrack assessment, it was concluded that this route would require substantial accommodating works along the route, to facilitate the delivery of abnormal loads to the Site. In particular, it was determined that it would be difficult facilitate the delivery of turbine components through the town of Ballyragget without considerable accommodation works in the town centre.

Therefore, the optimal delivery route is considered as the one that utilises the M7, N77 and L58333 which has been subject to autotracks assessment and shows that limited accommodation works are required along the delivery route itself.

All construction traffic will use designated haul routes only, as agreed with the local authority. An alternative to this would be to allow for more direct access to the Site using multiple approach routes; however, this is more likely to give rise to additional traffic and road impacts.

The delivery of turbine components including blades, tower sections and nacelles is a specialist operation owing to the oversized loads involved. As detailed in Section 15.1 of this EIAR, turbine

blades will be delivered to site using a Super Wing Carrier. When considering turbines transport routes, alternative modes of transport were also considered. Depending on the selected turbine delivery route and the turbine manufacturer, a blade adapter or blade transporter may also be used, if deemed appropriate, for delivery of turbines to the Proposed Wind Farm.

It should be noted that all component deliveries (abnormal loads) will be undertaken as described in the Traffic Management Plan which will be submitted and agreed with the local authorities and roads authorities upon consent of this application. All component deliveries will be subject to garda escort. All manoeuvres around junctions and into site entrances will be supervised by a qualified team of turbine delivery experts. The abnormal load entrance will be temporary in nature, over a short period of the construction phase only. The abnormal load entrance will be reinstated after all abnormal loads have been delivered to site. However, should replacement components be required, this entrance will be temporarily reopened to facilitate such works. Please see Section 15.1 Material Assets- Traffic and Transport for further details.

3.2.5.6 Alternative Design of Ancillary Structures

The ancillary structures required for the Proposed Development include underground electrical cabling and an on-site meteorological mast.

3.2.5.6.1 *Alternative Internal Site Cabling Route*

The internal 33kV underground cabling route will follow the internal road network throughout the Site, connecting all 8 no. turbines to the onsite 38kV substation. While this means that a longer cabling route will be needed, it was considered the more environmentally prudent option. The alternative to this would be to lay the cables 'as the crow flies' between the turbines and the onsite 38kV substation, however, this would lead to a greater environmental disturbance and a greater volume of spoil created.

3.2.6 Alternative Grid Connection Design Options

3.2.6.1 Alternative Substation Location

The proposed onsite 38kV substation is located in the middle of the eastern side of the Proposed Wind Farm site and is sited within an agricultural grassland field. This grassland is of low ecological value. Given its location relative to the proposed turbines and the centre of the Proposed Wind Farm site, the proposed substation location is in a suitable position for the collection of the internal electrical cabling from the turbines. The proposed substation is located an appropriate distance from the nearest proposed turbine (greater than 175m) and is located close to the public road network along which the Proposed Grid Connection underground cabling route will run for 2.2km.

This location was deemed to be suitable due to the habitats it is located on, its position within the overall Proposed Wind Farm site and relative to the public road network.

3.2.6.2 Alternative Grid Connection Cabling Route Options

The Proposed Wind Farm will connect to the national grid via underground electrical cabling, located primarily within the public road corridor, with some small sections passing through private agricultural land. Underground electrical cables will transmit the power output from each wind turbine to the proposed onsite 38kV substation, and from there to the existing Ballyragget 110kV substation, via an underground electrical cabling route, measuring approximately 3.4km in length.

A key consideration in determining the grid connection method for a proposed wind energy development is whether the cabling is underground or run as an overhead line. An alternative to the approximately 3.4km underground cabling route would be to construct an overhead line from the

proposed onsite substation to the existing 110kV Ballyragget substation following a similar route to that of the Proposed Grid Connection. While overhead lines are less expensive and allow for easier repairs when required, underground cabling will have no visual impact. For this reason, it was considered that underground cabling would be a preferable alternative to overhead lines. The Guidelines also indicate that underground cables are the preferred option for connection of a wind energy development to the national grid. The underground electrical cabling will follow the route of existing public road insofar as possible in order to minimise the amount of ground disturbance required.

An entirely, off-road grid connection route was considered at an early stage of the design process, however, this was discounted due to requirement to construct significant lengths of access and maintenance tracks to access joint bays along the route, increasing the potential for environmental effects compared to a route that predominantly follows existing roads. In addition, the requirement for a significant number of landowner agreements along the length of the route would have significantly increased the time required to confirm the final proposed, design of the Proposed Development and driven up the overall costs associated with the project.

Existing substations located within 5km of the Proposed Wind Farm site include the 110kV Ballyragget substation and a 38kV substation located within the Tirlán facility in the townland of Ballyconra, Co. Kilkenny.

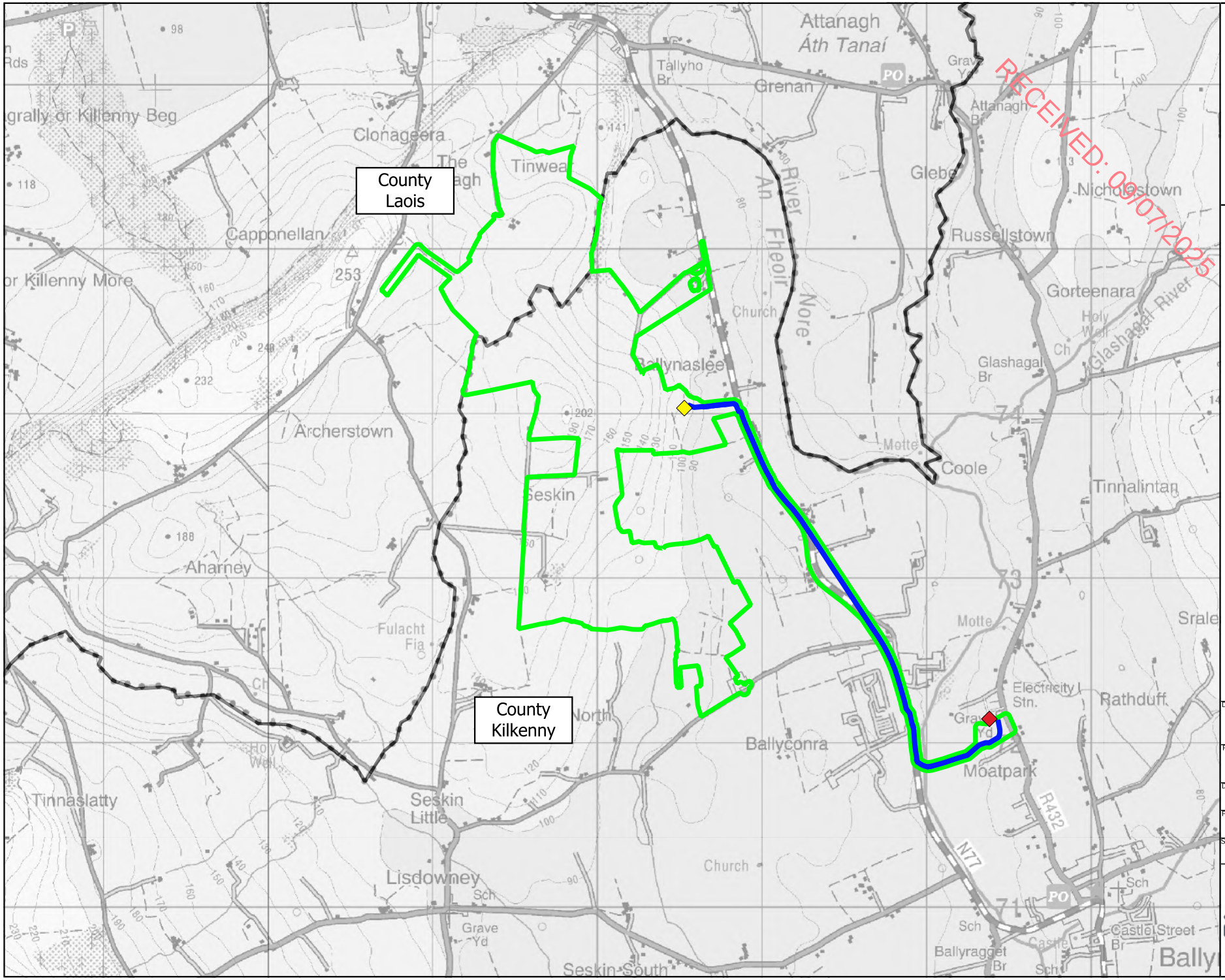
Initial grid studies, undertaken by the Applicant, identified Ballyragget 110kV substation as the optimum connection node for the Proposed Development. An underground grid connection cabling route to Ballyragget 110kV Substation was considered and assessed to identify whether it was a viable option. This assessment outlines a number of routes from the Proposed Wind Farm to Ballyragget 110kV substation, which were considered during the iterative design process.

The Proposed Grid Connection to Ballyragget 110kV substation and the proposed underground electrical cabling route has been revised and refined to take account of the findings of the site investigations and baseline assessments, which have informed the proposed grid connection design as presented in Figure 3-5. The alternative options considered are shown Figures 3-6 to Figure 3-8.

3.2.6.2.1 *Proposed Grid Connection Underground Cabling Route Option 1*

This option, as presented in Figure 3-5, examined the connection of the Proposed Wind Farm to Ballyragget 110kV substation from the west, measuring approximately 3.4km in length. The Proposed Grid Connection underground cabling route will originate at the proposed onsite substation, in the townland of Ballynaslee, Co. Kilkenny, and run east for 335 metres through agricultural pastoral land. The underground cabling route will then emerge on to the N77 National Secondary Road and run south for 2.2km before turning east into agricultural pastoral land in the townland of Ballyconra, Co. Kilkenny. The underground cabling will then cross beneath the River Nore via horizontal direction drilling (refer to Section 4.8.2.6.1, of Chapter 4 of this EIAR) and continue east through agricultural land, for approximately 560m before reaching the Ballyragget 110kV substation in the townland of Moatpark, Co. Kilkenny.

This was considered to be the most environmentally prudent and practical option for a grid connection as it was a considerably shorter route (2.3km shorter than underground cabling route option 2), would have less of an impact on local road users and avoided the potential cultural heritage receptors identified within Ballyragget.



Map Legend

- 38kV Onsite Substation Location
- Ballyragget 110kV Substation Location
- Potential Grid Route
- EIAR Site Boundary

Drawing Title: Proposed Grid Connection Option 1

Project Title: Seskin Renewables Wind Farm

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ER	EM
Project No.	Drawing No.
231103	Figure 3-5
Scale	Date
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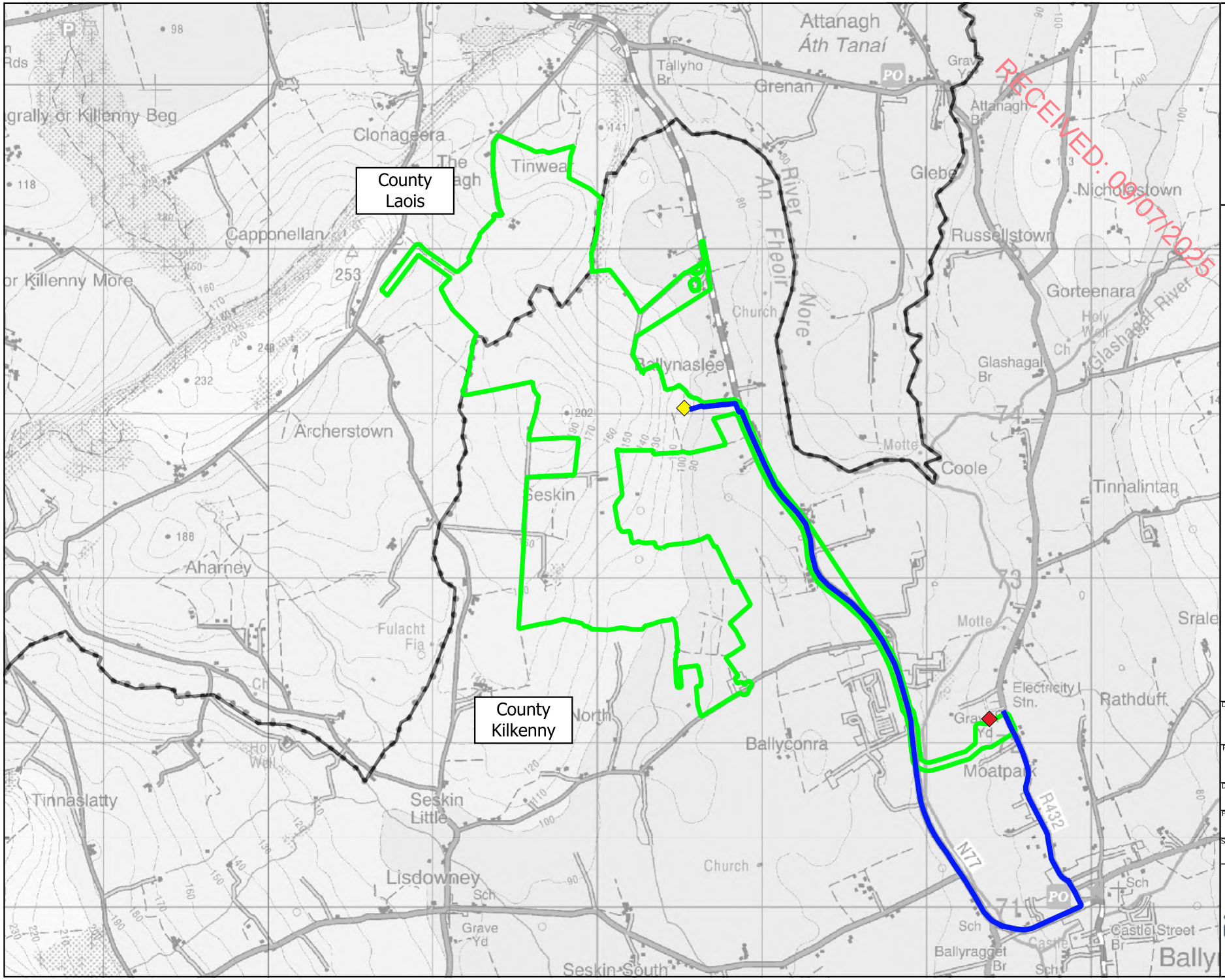
3.2.6.2.2 *Proposed Grid Connection Underground Cabling Route Option 2*

A second option, as presented in Figure 3-6, examined the connection of the Proposed Wind Farm to Ballyragget 110kV substation from the south, primarily following public roads, as shown in Figure 3-5 above. This route was approximately 5.7km in length (2.3km longer than the final chosen grid route option) and involved the crossing of 1 no. mapped watercourse within the public road corridor. The Option 2 underground cabling route originates at the proposed onsite substation, in the townland of Ballynaslee, Co. Kilkenny, and runs east for 335 metres through agricultural pastoral land. The underground cabling route will then emerge on to the N77 National Secondary Road and run south for 4.1km crossing the bridge on the N77, over the River Nore into Ballyragget. The grid will then travel north along the R432, through Ballyragget, for approximately 1.3km stretch before reaching the Ballyragget 110kV substation.

This option was not the preferred option due to the longer extent of this route, the greater potential for effects on local road users, residents within the town of Ballyragget and the technical difficulties relating to crossing the bridge over the River Nore on the N77.



Map Legend

- 38kV Onsite Substation Location
- Ballyragget 110kV Substation Location
- Potential Grid Route
- EIAR Site Boundary

Drawing Title
Proposed Grid Connection Option 2

Project Title
Seskin Renewables Wind Farm

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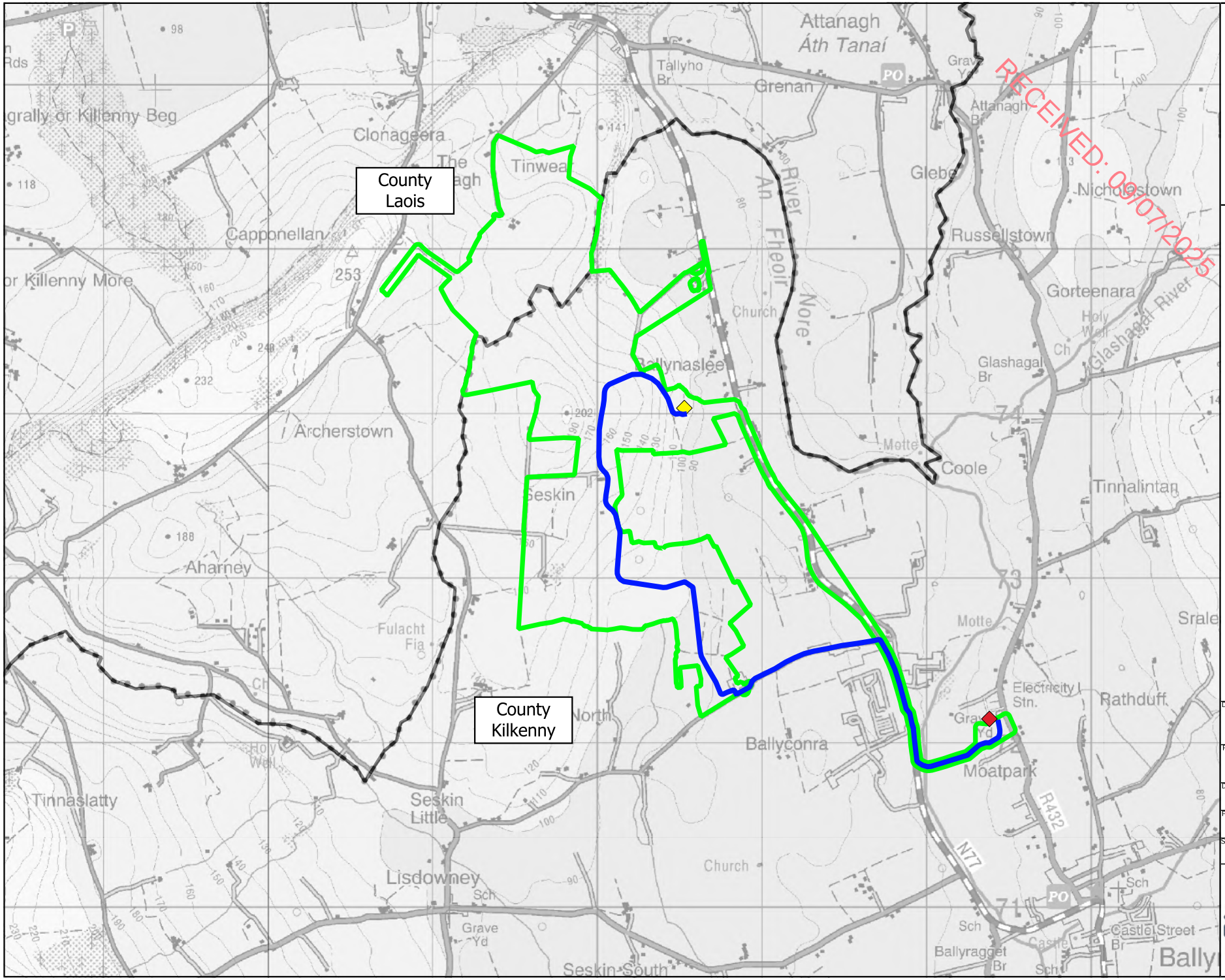
3.2.6.2.3 *Proposed Grid Connection Underground Cabling Route Option 3*

A third option, as presented in Figure 3-7, again examined the connection of the Proposed Wind Farm to the Ballyragget 110kV substation though the southern portion of the Proposed Wind Farm site, as shown in Figure 3-5 above. This route measures approximately 5.5km in length (2.1km longer than the final chosen grid route option) and involved the crossing of 1 no. mapped watercourse. The Option 3 underground cabling route originates at the proposed onsite substation, in the townland of Ballynaslee, Co. Kilkenny, and runs south within a proposed new wind farm site road to Turbine 7. The underground cabling route will then continue south on an existing agricultural track (not proposed to be upgraded) for approximately 780m before emerging on to the L5733 local road. The cable will travel east for approximately 950m before joining the N77 National Secondary Road and run south for approximately 490m before turning east into agricultural pastoral land in the townland of Ballyconra, Co. Kilkenny. The underground cabling will then cross beneath the River Nore via horizontal direction drilling (refer to Section 4.8.2.6.1, of Chapter 4 of this EIAR) and continue east through agricultural land, for approximately 560m before reaching the Ballyragget 110kV substation in the townland of Moatpark, Co. Kilkenny.

This option was not the chosen option due to the unavailability of the agricultural track south of T7, the potential for traffic, dust and noise effects on a slightly greater number of sensitive receptors, located along the L5733 local road. It is considered that road closures would be required along the local road during the construction of the grid connection. This option is also longer than the chosen option which would lead to higher construction costs.



Map Legend

- 38kV Onsite Substation Location
- Ballyragget 110kV Substation Location
- Potential Grid Route
- EIAR Site Boundary

Drawing Title: Proposed Grid Connection Option 3

Project Title: Seskin Renewables Wind Farm

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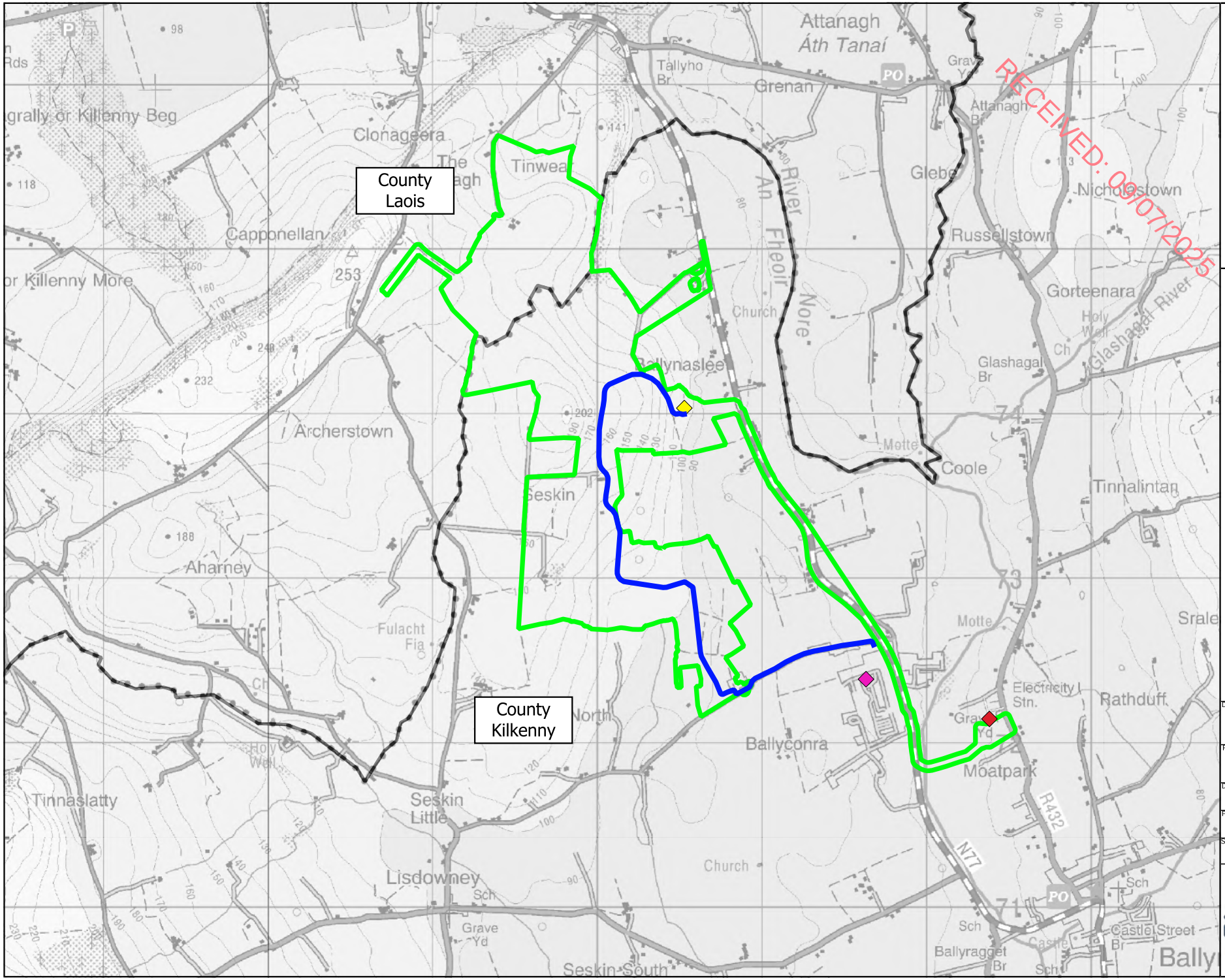
3.2.6.2.4 *Proposed Grid Connection Underground Cabling Route Option 4*

A fourth and final alternative option, as presented in Figure 3-8, examined the connection of the Proposed Wind Farm to the existing 38kV substation located within the Tirlán facility based in the townland of Ballyconra, Co. Kilkenny. The grid connection follow primarily the same route as Option 3 above. Once the grid connection emerges on to the L5733 local road the cable will travel east for approximately 900m before turning south into the Tirlán facility and reaching the existing 38kV substation. This route was approximately 4km in length (0.6km longer than the final chosen grid route option).

The Proposed Wind Farm will have an estimated installed capacity of 48 MW, the initial grid capacity undertaken by the applicant confirmed that the Tirlán 38kV Substation does not have the available capacity to accommodate the electricity generated by the Proposed Wind Farm. This option was not the chosen option due to the reasons stated for Option 3 above. In addition, the existing 38kv substation located within the Tirlán facility does not have sufficient capacity to accommodate the 48MW that is proposed to be generated by the Proposed Wind Farm.



Map Legend

- 38kV Onsite Substation Location
- Ballyragget 110kV Substation Location
- Tirlán 38kV Substation Location
- Potential Grid Route
- EIAR Site Boundary

Drawing Title
Proposed Grid Connection Option 4

Project Title
Seskin Renewables Wind Farm

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Environmental Consideration	Option 1 – Ballyragget 110kV Substation via route option 1	Option 2 – Ballyragget 110kV Substation via route option 2	Option 3 – Ballyragget 110kV Substation via route option 3	Option 4 – Tirlán 38kV Substation via route option 4
Population & Human Health	Potential for temporary visual impact but over a shorter construction phase considering the shorter route, from presence of plant machinery onsite during the construction period. Potential for temporary noise and dust impacts but over a shorter construction phase considering the shorter route, from plant machinery onsite during construction phase. This route also passes the fewest sensitive receptors.	Potential for temporary visual impact over a longer construction phase considering the longer route, from presence of plant machinery onsite during the construction period. Greater potential for temporary noise and dust impacts for a longer construction phase considering the longer route, from plant machinery onsite during construction phase. This route passes by the greatest number of sensitive receptors given that it runs through the town of Ballyragget.	Potential for temporary visual impact for a longer construction phase considering the longer route, from presence of plant machinery onsite during the construction period. Potential for temporary noise and dust impacts for a longer construction phase considering the longer route, from plant machinery onsite during construction phase. This route passes by a greater number of sensitive receptors compared to Option 1 given that it runs along the L5733 which has a number of residential properties at its eastern end.	Potential for temporary visual impact for a longer construction phase considering the longer route, from presence of plant machinery onsite during the construction period. Potential for temporary noise and dust impacts for a longer construction phase considering the longer route, from plant machinery onsite during construction phase. This route passes by a greater number of sensitive receptors compared to Option 1 given that it runs along the L5733 which has a number of residential properties at its eastern end.
Biodiversity (including Birds)	Low potential for impact on sensitive ecological receptors during the	Low potential for impact on sensitive ecological receptors during the construction phase.	Low potential for impact on sensitive ecological receptors during the	Lowest potential for impact on sensitive ecological receptors

Environmental Consideration	Option 1 – Ballyragget 110kV Substation via route option 1	Option 2 – Ballyragget 110kV Substation via route option 2	Option 3 – Ballyragget 110kV Substation via route option 3	Option 4 – Tirlán 38kV Substation via route option 4
	construction phase. As detailed in Chapter 6, the Proposed Grid Connection underground cabling route passes through 1 no. mapped SAC (River Barrow and River Nore SAC) and 1 no. mapped SPA (River Nore SPA). However, no instream works are proposed as part of the crossing methodology for this SAC and SPA. Therefore, as detailed in the Natura Impact Statement no adverse impacts on the SAC are anticipated.	As detailed in Chapter 6, the Proposed Grid Connection underground cabling route passes through 1 no. mapped SAC (River Barrow and River Nore SAC) and 1 no. mapped SPA (River Nore SPA). However, no instream works would be proposed as part of the crossing methodology for this SAC and SPA.	construction phase. As detailed in Chapter 6, the Proposed Grid Connection underground cabling route passes through 1 no. mapped SAC (River Barrow and River Nore SAC) and 1 no. mapped SPA (River Nore SPA). However, no instream would be proposed as part of the crossing methodology for this SAC and SPA.	during the construction phase as this option does not include a watercourse crossing and is located within public roads and built surfaces for its entire length.
Land, Soils, & Geology	Lowest volume of earthworks required due to shorter route. The Proposed Grid Connection underground cabling route will be primarily located within the public road corridor, with approximately 1.2km passing through private	Greater volume of earthworks required due to longer route. This underground cabling route option is proposed to be located primarily within the public road corridor, with an approximately 335m stretch passing through private agricultural land and passing through the town of Ballyragget	Greater volume of earthworks required due to longer route. This underground cabling route option is proposed to be located primarily within the public road corridor, with an approximately 4km stretch passing through	Greater volume of earthworks required due to longer route. This underground cabling route option is proposed to be located primarily within the public road corridor, with an approximately 780m stretch passing through

Environmental Consideration	Option 1 – Ballyragget 110kV Substation via route option 1	Option 2 – Ballyragget 110kV Substation via route option 2	Option 3 – Ballyragget 110kV Substation via route option 3	Option 4 – Tirlán 38kV Substation via route option 4
	agricultural land. Of the 1.2km approximately 560m stretch through agricultural fields adjacent to Ballyragget substation. As detailed in the assessment in Chapter 8, no significant effects on land, soils or geology will occur.	before connecting with the Ballragget substation.	private agricultural land (mostly within existing tracks). Of the 4km approximately 560m stretch through agricultural fields adjacent to Ballyragget substation.	private agricultural land and passing along local road before connecting with the Tirlán substation.
Water	Option 1 has one EPA mapped watercourse crossing. There are no instream works proposed as part of the crossing methodologies for the watercourse crossing. As detailed in the assessment in Chapter 9, no significant effects on surface water or groundwater quality will occur.	Option 2 has one EPA mapped watercourse crossing. There would be no instream works proposed as part of the crossing methodologies for the watercourse crossing.	Option 3 has one EPA mapped watercourse crossing. There would be no instream works proposed as part of the crossing methodologies for the watercourse crossing.	Option 4 has no EPA mapped watercourse crossing. There are no instream works proposed as part of the crossing methodologies for the watercourse crossing. Therefore, this option would have the lowest potential for impacts on water quality.
Air Quality	As a result of the shorter route, this option has a lower potential for effects from dust, and vehicle emissions during construction compared to	As a result of the longer route, this option has a greater potential for effects from dust, and vehicle emissions during construction.	As a result of the longer route, this option has a greater potential for effects from dust, and vehicle emissions during construction.	As a result of the longer route, this option has a greater potential for effects from dust, and vehicle emissions during construction.

Environmental Consideration	Option 1 – Ballyragget 110kV Substation via route option 1	Option 2 – Ballyragget 110kV Substation via route option 2	Option 3 – Ballyragget 110kV Substation via route option 3	Option 4 – Tirlán 38kV Substation via route option 4
	Option 1. As detailed in Chapter 10, no significant effects on air quality will occur.			
Climate	This option would result in reduced vehicle emissions, compared to the other options during construction given the reduced length.	This option would result in increased vehicle emissions during construction given the longer route.	This option would result in increased vehicle emissions during construction given the longer route.	This option would result in increased vehicle emissions during construction given the longer route. Due to a lack of available capacity at the existing 38kV substation, the opportunity to maximise the output and carbon saving potential from the Proposed Wind Farm would be greatly reduced.
Noise & Vibration	All options would have similar noise and vibration emissions during construction. However, this option does not pass through any	All options would have similar noise and vibration emissions during construction. However, this option does pass through the town of Ballyragget and therefore would potentially	All options would have similar noise and vibration emissions during construction. However, this option does passes by a greater	All options would have similar noise and vibration emissions during construction. However, this option does pass by a greater

Environmental Consideration	Option 1 – Ballyragget 110kV Substation via route option 1	Option 2 – Ballyragget 110kV Substation via route option 2	Option 3 – Ballyragget 110kV Substation via route option 3	Option 4 – Tirlán 38kV Substation via route option 4
	villages or settlements and therefore would impact on fewer sensitive receptors.	impact a greater number of sensitive receptors when compared to Option 1.	number of sensitive receptors as it runs along the L6733 and therefore would potentially impact more sensitive receptors when compared to Option 1.	number of sensitive receptors as it runs along the L5733 and therefore would potentially impact more sensitive receptors when compared to Option 1.
Landscape and Visual	Neutral – once constructed, there is no material difference of environmental effect between all options considered.	Neutral – once constructed, there is no material difference of environmental effect between all options considered.	Neutral – once constructed, there is no material difference of environmental effect between all options considered.	Neutral – once constructed, there is no material difference of environmental effect between all options considered.
Archaeological, Architectural & Cultural Heritage	Greater potential for impacts on unrecorded, sub-surface archaeology given the length of this route that passes through agricultural land. As detailed in Chapter 13 of this EIAR, archaeological monitoring of all groundworks will take place during the construction phase.	Lowest potential for impacts on unrecorded, sub-surface archaeology given that this option is located almost exclusively within existing roads.	Lower potential for impacts on unrecorded, sub-surface archaeology given that this option comprises a shorter distance of cable route that is located off existing tracks or roads compared to Option 1.	Lower potential for impacts on unrecorded, sub-surface archaeology given that this option comprises a shorter distance of cable route that is located off existing tracks or roads compared to Option 1.

Environmental Consideration	Option 1 – Ballyragget 110kV Substation via route option 1	Option 2 – Ballyragget 110kV Substation via route option 2	Option 3 – Ballyragget 110kV Substation via route option 3	Option 4 – Tirlán 38kV Substation via route option 4
Material Assets	Grid Connection Route Option 1 measures approximately 3.4km in length, of which 2.2km is located within the public road corridor. No road closures are proposed during the construction of this grid connection route given the width of the N77 corridor. Therefore, it would result in less traffic impacts when compared to Option 1. All construction of the underground cable will be undertaken as described in the Traffic Management Plan which will be submitted and agreed with the local authorities and roads authorities upon consent of this application. As detailed in Chapter 15, no significant effects on traffic will occur.	Greater potential for traffic impacts given that this option passes through the town of Ballyragget and would likely require road closures along narrower section of public road corridor within Ballyragget and along the R432.	Greater potential for traffic impacts given that this option passes through the town of Ballyragget and would likely require road closures along the L5733 local road.	Greater potential for traffic impacts given that this option passes through the town of Ballyragget and would likely require road closures along the L5733 local road.

3.2.7 Alternative Mitigation Measures

Mitigation by avoidance has been a key aspect of the Proposed Development's evolution through the selection and design process. Avoidance of the environmental constraints within the site limits the potential for environmental effects. As noted above, the layout aims to avoid any environmentally sensitive areas. Where loss of habitat occurs in the Site, this has been mitigated with the proposal of habitat enhancement and improved habitat connectivity with hedgerow replanting on the Proposed Wind Farm.

It is proposed to replant approximately 2.1km of hedgerow within the Site in order to replace the hedgerow which is proposed to be removed in order to facilitate the Proposed Development. The replanting of hedgerow was deemed necessary in order to replace the habitat which is being lost, however additional enhancement measures have been put in place to ensure a net gain of biodiversity on the Site. It is proposed to enhance approximately 2.4km of hedgerow within the Site. These replanting and enhancement measures will have a long-term slight positive effect on biodiversity. Further detail on this biodiversity enhancement can be found in Chapter 6 of this EIAR.

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. The alternative is to either not propose these measures or propose measures which are not best practice and effective and neither of these options is sustainable.