3. CONSIDERATION OF REASONABLE ALTERNATIVES

3.1 Introduction

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

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

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

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

The Commission Guidance (2017) states that the level of detail concerning the description of the environmental effects of the Alternatives may be less than for the chosen option. Nevertheless, the aim of the exercise is to provide a transparent and well justified comparison. Accordingly, the EIAR must contain:

- A description of the reasonable alternatives studied by the developer (which are relevant to the project and its specific characteristics);
- A comparison of the environmental effects of these reasonable alternatives and the chosen option, and
- An indication of the main reasons for the option chosen, taking into account the effects of the project on the environment.

The EIAR should explain how alternatives were identified for inclusion in the EIAR i.e., why they were reasonable, studied by the developer and relevant to the project and its specific characteristics. The Commission Guidance suggests some Alternatives:

- The nature of Proposed Development;
- Timeframes for construction or the lifespan of the Proposed Development;
- Process by which the Proposed Development is constructed (for e.g., alternatives to HDD were discussed);
- Equipment used either in the construction or running of the Proposed Development;
- Site layout (e.g., location of turbines, waste disposal, access roads);
- Operating conditions (e.g., working schedule, timing of emissions);
- Physical appearance and design of buildings, including the materials to be used;

- Means of access, including principal mode of transport to be used to gain access to the Proposed Development.

Hierarchy

EIA is concerned with projects. The Environmental Protection Agency's guidelines (EPA, 2022) state 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 which are examined by means of a Strategic Environmental Assessment, the higher tier form of environmental assessment.

Non-environmental Factors

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

Site-specific Issues

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

3.1.2 Methodology

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

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

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

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

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

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

- 'Do-Nothing' Alternative;
- Alternative Locations;
- Alternative Technologies;
- Alternative Turbine Layouts and Development Design; and,
- Alternative Mitigation Measures.

Each of these is addressed in the following sections.

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

While environmental considerations have been at the core of the decision-making process for all of the project processes and infrastructure components, it should be noted that the majority of alternative options considered under the headings listed above are unlikely to have had significantly, greater environmental effects than the chosen option.

3.2 'Do-Nothing' Alternative

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

An alternative land-use option to the development of a renewable energy project at the proposed development site would be to leave the site as it is, with no changes made to existing land-use practices. Commercial forestry operations would continue at the site.

In implementing the 'Do-Nothing' alternative, however, the opportunity to capture a significant part of the country's 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. Also, the proposed amenity walkways and associated carpark would not be constructed and therefore this recreational opportunity would be lost. On the basis of the positive environmental effects arising from the project, when compared to the do-nothing scenario, therefore the do–nothing scenario was not the chosen option.

The existing surrounding commercial forestry operations can and will continue in conjunction with this proposed use of the site.

A comparison of the potential environmental effects of the 'Do-Nothing' Alternative (wind farm is not developed) 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 (developing the proposed wind farm at this site)

Environmental Consideration	Do Nothing Alternative (existing land uses continue)
Population & Human Health (incl. Shadow Flicker)	No increase in local employment and no long-term financial contributions towards the local community. No potential for shadow flicker to affect sensitive receptors.
Biodiversity & Ornithology	No habitat loss
Land, Soils & Geology	No excavation of large volumes of peat and spoil
Geotechnical/Peat Stability	Neutral
Water (Hydrology & Hydrogeology)	Neutral
Air & Climate	Will not provide the opportunity for an overall increase in air quality or significant reduction of greenhouse gasses. Will not assist in achieving the renewable energy targets set out in the Climate Action Plan.
Noise & Vibration	No potential for noise impacts on nearby sensitive receptors.
Landscape & Visual	No potential for landscape and visual impacts.
Cultural Heritage & Archaeology	No potential for impacts on unrecorded, subsurface archaeology.
Material Assets	Large volume of construction traffic (over a short duration) avoided

3.3 Alternative Locations

3.3.1 Strategic Site Screening

SSE Renewables and FuturEnergy Ireland (FEI) undertook a detailed screening process, through Geographical Information Spatial software (GIS), using a number of criteria and stages to assess the potential of a large number of possible sites, on lands within Coillte's stewardship (c. 441,000 hectares), suitable to accommodate a wind energy development. The GIS database drew upon a wide array of key spatial datasets such as forestry data, ordnance survey land data, house location data, transport, existing wind energy and grid infrastructure data and environmental data such as ecological designations, landscape designations and wind energy strategy designations available at the time.

The following is a summary of the methodology used in the screening process. The screening process included the following phases:

- Phase 1 – Initial Screening
- Phase 2 - Grid Constraints
- Phase 3 - Screening

3.3.1.1 Phase 1 – Initial Screening

This initial stage in the selection process discounted lands that were not available for development under a number of criteria, as follows:

- Committed Lands for other developments
- Millennium Sites (This is a Coillte environmental designation – these sites were planted and managed for provision of a tree for every household in the country as part of the Millieneum tree planting project)
- Life Site (This is a Coillte environmental designation – these former forested sites were cleared and are managed for biodiversity)
- Wild Nephin Properties (This is a Coillte designation. Since 2014 these properties have been incorporated into National parks)
- Farm Partnerships and Leased Lands
- National Parks
- Natura 2000 and Nationally Designated Sites (SAC, SPA, NHA, pNHA)

The relevant local authority's County Development Plan (CDP) and/or Renewable Energy Strategy (RES) provisions were also reviewed, and further analysis did not proceed where the policy context was not supportive of wind farm development. In this regard, areas were not brought forward for further analysis if the majority of the area was not identified as being at least "open for consideration" for wind farm development.

Lands where the average wind speed at 80 metres above ground level is less than 7 m/s and, therefore, potentially not suitable for a commercially viable wind energy development were also discounted at this stage. In addition, sites with a contiguous area of less than 300 hectares were discounted.

3.3.1.2 Phase 2 – Proximity to National Grid

As part of the site selection process, it was necessary to consider the potential for grid connection, including in terms of distance to potential connection nodes, in the local area, to accommodate a connection to the national grid.

3.3.1.3 Phase 3 – Screening

As part of the next stage of screening, the following were considered when screening out lands from further analysis:

- Sensitive Amenity or Scenic Areas designation in CDPs (at the time of the screening process)
- Tourist areas/sites/trails
- Lands utilised for other wind farm developments
- Telecommunications masts and links
- Sensitive habitat/species of bird
- Land Ownership title Issues,
- Relatively high residential density in vicinity
- Unfavourable slopes and ground conditions

3.3.2 Results of the Screening Process

The application of the above criteria, to identify a site relevant to the project and its specific characteristics, resulted in the selection of a site known as Glenora, located on the southern slopes of Maumakeogh in Co. Mayo as a candidate site to be brought forward for more detailed analysis.

Sites that also emerged from the site selection process, outlined in Section 3.3.1 above, for which SSE and FEI have received planning permission, submitted or are in the process of preparing separate planning applications are:

- Sheskin South, Co. Mayo
- Gortyrahilly, Co. Cork
- Inchamore, Co. Cork
- Lenalea, Co. Donegal
- Drumnahough, Co. Donegal

SSE and FEI have brought forward some of these landholdings and intends to bring forward the remainder for wind energy development as all were considered to be viable sites for a wind energy project. Each are projects in their own right which will be, or already have been, subject to EIA. As such a description of the reasonable alternatives studied which are relevant to each project and its specific characteristics, together with an indication of the main reasons for selecting the chosen option with regards to their environmental impacts will be, or have been, provided in the EIAR accompanying the applications for same.

The alternative would be to bring forward a site that did not pass one or all of the above phases of the screening process. In that instance, there would be the potential for the construction and operation of a wind energy development to have an adverse effect on ecologically designated or sensitive areas and visually sensitive (scenic) or amenity areas. There would also be the potential for greater shadow flicker, noise and traffic impacts if the candidate site was located in an area with a higher number of residential dwellings. Numerous third-party land agreements would also be required to ensure a site of adequate size (i.e., a 300ha contiguous site area). In addition, a site with an average wind speed less than 7m/s (at 80m above ground level) and/or not located within practical proximity of existing grid infrastructure may not be economically viable.

3.3.3 Suitability of the Candidate Site

Glenora, as a candidate site, was further examined under the following headings in order to confirm its suitability for wind energy development.

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

3.3.3.1 Planning Policy

The Mayo County Development Plan 2022-2028 (the CDP) was formally adopted by Local Members at a special meeting on the 29th of June 2022. The Plan came into effect on the 10th of August 2022. A Ministerial Draft Direction was issued to the Planning Authority, however, there are no relevant policies to the Proposed Development affected by the Direction. The CDP provides the framework within which the decision on the planning application is made.

The policies and objectives set out within the CDP have maintained strong linkages with the key aims and themes set out within the previous development plan. Climate change is again emphasised as one of the greatest global challenges with Mayo County Council acknowledging that continual action is needed for Mayo to become a low carbon and climate resilient county. The significance of climate change and the need for continued support / investment within renewable energy generation as part of the county's broader decarbonisation strategy is captured within the strategic of the CDP's Climate Action and Renewable Energy Chapter:

"The strategic aim of this chapter is to transition to a low carbon and climate resilient county, with an emphasis on reduction in energy demand and greenhouse gas emissions, through a combination of effective mitigation and adaptation responses to climate change; in addition to ***maximising the opportunities to become a national leader in renewable energy generation****, whilst increasing the resilience of our Natural and Cultural Capital to climate change by planning and implementing appropriate adaptation measures".*

The Renewable Energy Strategy (RES) for County Mayo 2011-2020 (2011) sets out guidance designed to allow County Mayo to both contribute to meeting the national legally binding targets while also capitalising on those opportunities associated with the generation and harnessing of renewable energy in a sustainable manner. The RES was not revised as part of the CDP, however, Objective REO 7 clearly indicates that the review of the RES will commence within one year of adaptation of the new CDP.

Lands classified under the RES's tiered strategic wind energy strategy are considered '*the most appropriate for renewable energy developments'*. The definitions of the on-shore wind energy classifications, as per the Mayo Renewable Energy Strategy 2011-2020 are outlined below –

- **Priority Areas** are areas which have secured planning permission and where on shore wind farms can be developed immediately.
- **Tier 1 – Preferred (Large Wind Farms)** are areas in which the potential for large wind farms is greatest.
- **Tier 1 – Preferred (Cluster of Turbines)** are areas identified as being most suitable for smaller clusters of wind turbines (clusters of up to three to five turbines depending on site conditions and visual amenity).
- **Tier 2 – Open for Consideration** identifies areas which may be considered for wind farms or small clusters of wind turbines but where the visual impact on sensitive or vulnerable landscapes, listed highly scenic routes, scenic routes, scenic viewing points and scenic routes will be the principal consideration. The Tier 2 classification will be reviewed by the Council following a determination by EirGrid of grid infrastructure for the County.

The Glenora Wind farm project site is designated by the RES as a strategic wind energy region and predominantly comprises a mix of *Tier 1 – Preferred (Larger Wind Farms)* and *Tier 2 – Open for Consideration* designated lands through the central region of the site with unclassified lands contained to the northern and eastern boundary extents. The planning application has demonstrated that the project site can adequately accommodate the Proposed Development without significant adverse impacts to environmental amenities and sensitivities, and therefore, is fully in accordance with National, Regional and Local planning policy. The Environmental Impact Assessment Report, Natura Impact Statement and all supporting assessments provide a robust body of evidence demonstrating that the receiving environment has the capacity to support / co-exist with the proposed wind farm without significant adverse effects. This documentation is intended to provide the consenting authority with sufficient comfort and robust appropriate conclusions to facilitate a positive decision.

There are a range of other provisions within the CDP that support the provision of renewable energy, including the objectives listed in Section 2.4.3 of Chapter 2 of this EIAR.

3.3.3.2 Existing Grid Infrastructure

The Glenora site is located within relatively close proximity (c. 25km) of 2 no. existing electricity substations and therefore a wind energy development at this location has multiple options for connection to the national electricity grid. The 110kV Tawghnamore substation is located approximately 14km southeast of the candidate site boundary at its closest point. The 110kV Bellacorick substation is located approximately 13km southwest of the Glenora candidate site boundary.

3.3.3.3 Designated Sites

There are no Natura 2000 or nationally designated sites located within the Glenora candidate site boundary.

The nearest Natura 2000 site, i.e., Special Area of Conservation (SAC) or Special Protection Area (SPA), to the candidate site is Glenamoy Bog Complex SAC, located approximately 250m north of the candidate site boundary. The nearest SPA is the Killala Bay/Moy Estuary SPA, located approximately 10.2km east of the candidate site.

Inagh Bog Natural Heritage Area (NHA) and Ummerantarry Bog NHA are located immediately adjacent to the eastern and southern candidate site boundary, respectively.

3.3.3.4 Average Wind Speeds

The Irish Wind Atlas produced by Sustainable Energy Authority of Ireland (SEAI) shows average wind speeds for the country. With the upland nature of the landscape, the Wind Atlas shows that wind speeds on the proposed development site range from 8.75m/s to 11m/s at a 100m elevation. Such wind speeds indicate that this site is viable for commercial wind energy development.

3.3.3.5 Population Density

As described above, the Applicant sought to identify an area with a relatively low population density. Having reviewed the settlement patterns in the vicinity, the study area has emerged as suitable to accommodate the proposal. The population density of the Beal Deirg Mór, Ballycastle, Kilfian West Electoral Divisions, within which the candidate site is located, is just 5.6 persons per square kilometre. This is a fraction of the average rural area population density of 27 persons per square kilometre and the average national population density of 73.6 persons per square kilometre.

3.3.3.6 Summary

The Glenora site is located within an existing commercial forestry property which allows the site to take advantage of existing access roads. This, when combined with the relatively close proximity of two existing 110kV substations and associated electricity transmission infrastructure, further highlights the suitability of the site as it can make further sustainable use of these established items of infrastructure.

The Glenora site does not overlap with any environmental designations and is also located in an area with a very low population density, relative to the national average, with viable annual wind speeds.

The purpose of the site screening exercise outlined in Section 3.3.1, above, was to identify areas within Coillte's nationwide portfolio, that would be capable of accommodating a wind farm development while minimising the potential for adverse impact on the environment. In order to satisfy this requirement, significant landholdings that would yield a sufficient viable area for the siting of each element of the proposed development was required (i.e., sites with a contiguous area of more than 300 hectares as described in Stage 1 of the screening process).

While the outcome of the site screening process has identified the site of the current proposal as a suitable location for a wind farm development of the nature proposed, it does not preclude other sites within Coillte's portfolio being brought forward for consideration in the future.

3.4 Alternative Renewable Energy Technologies

Although the screening exercise was based on identifying lands for wind development; a reasonable alternative source of renewable electricity generation, namely solar, was considered based on the scale and current land-use of the Glenora site that emerged.

Commercial solar energy production is the harnessing and conversion of sunlight into electricity using photovoltaic arrays (panels). To achieve the same maximum electricity output, as is expected from the proposed wind energy development (c.198MW), from solar energy would require a significantly larger development footprint. In this instance, the proposed wind energy development requires approximately 117 hectares of commercial forestry to be permanently felled. A solar PV array of the scale necessary to provide the same electricity output would require the permanent felling of between approximately 317 hectares and 396 hectares of commercial forestry. In addition, a solar development, of this scale, would have a higher potential environmental effect on Hydrology and Hydrogeology, Traffic and Transport (construction phase) and Biodiversity and Birds (habitat loss, glint and glare) at the site.

For the reasons set out above, the proposal for a wind energy development at this site is considered to be the most efficient method of electricity production 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 wind farm 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 Consideration	Solar PV Array (with a 198MW output)
Population & Human Health (incl. Shadow Flicker)	Neutral shadow flicker impact. Potential for glint and glare impacts on local road users and residential receptors.
Biodiversity & Ornithology	Larger development footprint would result in greater habitat loss. Potential for glint and glare impacts on birds, but no potential collision risk.
Land, Soils & Geology	Larger development footprint would result in greater volumes of peat and spoil to be excavated.
Geotechnical/Peat Stability	Shallower excavations involved in solar PV array developments would decrease the potential for peat instability.
Hydrology & Hydrogeology	A solar PV array development would require a significantly larger area of forestry to be felled therefore increasing the potential for silt laden runoff to enter receiving watercourses.
Air & Climate	Reduced capacity factor of solar PV array technology would result in a longer carbon payback period.
Noise & Vibration	Less potential for noise impacts on nearby sensitive receptors.
Landscape & Visual	Potentially less visible from surrounding area due to screening from forestry and topography.
Cultural Heritage & Archaeology	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.
Material Assets	Potential for greater traffic volumes during construction phase due to the number of solar panels required to achieve the same output.

3.4.1 Alternative Turbine Numbers and Turbine Models

The proposed wind turbines, for the purpose of the assessments within this EIAR, will each have a potential power output in the 6 to 9 megawatt (MW) range. It is proposed to install 22 turbines at the site which could achieve a minimum output of 132 MW and a maximum output of 198 MW. Such a wind farm could also be achieved on the proposed site by using smaller turbine technology (for example 2.5 MW machines). However, this would necessitate the installation of between 53 and 79 turbines to achieve a similar output range. Furthermore, the use of smaller turbines would not make efficient use of the wind resource available having regard to the nature of the site.

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

the potential for negative environmental impacts to occur on biodiversity, hydrology and traffic and transportation.

The use of alternative smaller turbines at this site would not be appropriate as they would fail to make the most efficient use of the wind resource passing over the site. Furthermore, the increased use of materials, excavation and movement of peat and increase in visual impact associated with a larger number of smaller turbines would result in a higher level of negative environmental effects than the chosen option.

The proposed wind turbines to be installed on the site will have a ground-to-blade tip height of 180m, a hub height of 99m and a rotor diameter of 162m (blade length of 81m).

The proposed ground-to-blade tip height of 180m was determined following a preliminary landscape and visual appraisal of the site, carried out by MKO in order to confirm the maximum capacity of the Glenora site in terms of the number of turbines and also the maximum potential ground-to-blade tip height.

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

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

Environmental Consideration	Larger number of smaller turbine models
Population & Human Health (incl. Shadow Flicker)	Neutral
Biodiversity & Ornithology	Larger development footprint would result in greater habitat loss and potential for displacement.
Land, Soils & Geology	Larger development footprint would result in greater volumes of peat and spoil to be excavated and managed.
Geotechnical/Peat Stability	Neutral
Water (Hydrology and Hydrogeology)	Larger development footprint, therefore, increasing the potential for silt laden runoff to enter receiving watercourses.
Air & Climate	Increased potential for vehicle emissions and dust emissions due to an increased volume of construction material and turbine component deliveries to the site.
Noise & Vibration	Potential for increased noise levels at nearby sensitive receptors due to reduced separation distance between residential dwellings and turbine locations.
Landscape & Visual	A larger number of turbines would have a greater landscape and visual impact.
Cultural Heritage & Archaeology	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.
Material Assets	Potential for greater traffic volumes during construction phase due to larger development footprint and requirement for more construction materials and turbine components.

3.5 Alternative Turbine Layout and Development Design

The design of the proposed development has been an informed and collaborative process from the outset, involving the designers, developers, engineers, environmental, hydrological and geotechnical, archaeological specialists and traffic consultants. The design process has also taken account of the recommendations and comments of the relevant statutory and non-statutory organisations, near neighbours / the local community and local authorities as detailed in Sections 2.6 and 2.7 of Chapter 2.

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

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

3.5.1 Detailed Constraints Mapping

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

The 'Wind Energy Development Guidelines for Planning Authorities' (DoEHLG, 2006) were subject to a targeted review 2013. Currently, the proposed changes to the development management standards associated with onshore wind energy developments are outlined in the Draft Revised Wind Energy Development Guidelines, December 2019 (Draft WEGs 2019).

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

- Residential dwellings plus a minimum 720 metre buffer (meeting the requirement of 4 x tip height separation distance as required by the Draft WEGs 2019) (Refer to Chapter 5 of EIAR);
- Designated sites plus 100 metre buffer (Refer to Chapter 6 of EIAR);
- Rivers and streams plus 50 metre buffer (Refer to Chapter 9 of EIAR);
- Recorded Archaeological Sites and Monuments/Protected Structures plus 50 metre buffer (Refer to Chapter 13 of the EIAR);
- Geotechnical Construction Buffer Zones (Refer to Appendix 8-1 of this EIAR);
- Western Way walking route plus 180m buffer;
- Visual Impact Exclusion Zone (elevations above 230m OD) (Refer to Chapter 14 of this EIAR).

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

- Available lands for development;
- Separation distance from neighbouring landowners;
- Good wind resource;
- Existing access points and general accessibility of all areas of the site due to existing road infrastructure; and

- Limited extent of constraints.

For clarity, the constraints map is presented in two parts. Environmental constraints are presented in Figure 3-1a, and the physical (telecommunications and other infrastructure) and residential constraints are presented in Figure 3-1b. The inclusion of the detailed, combined constraints on a map of the EIAR Site Boundary allows for a viable area to be identified as shown in Figure 3-1c.

Telecommunications operators were contacted as part of the constraints mapping process to determine whether or not any telecommunications link(s) traversed the site. No links were located within the vicinity of the Proposed Development site. Refer to Chapter 15, Section 15.2 for further details in relation to telecommunications.

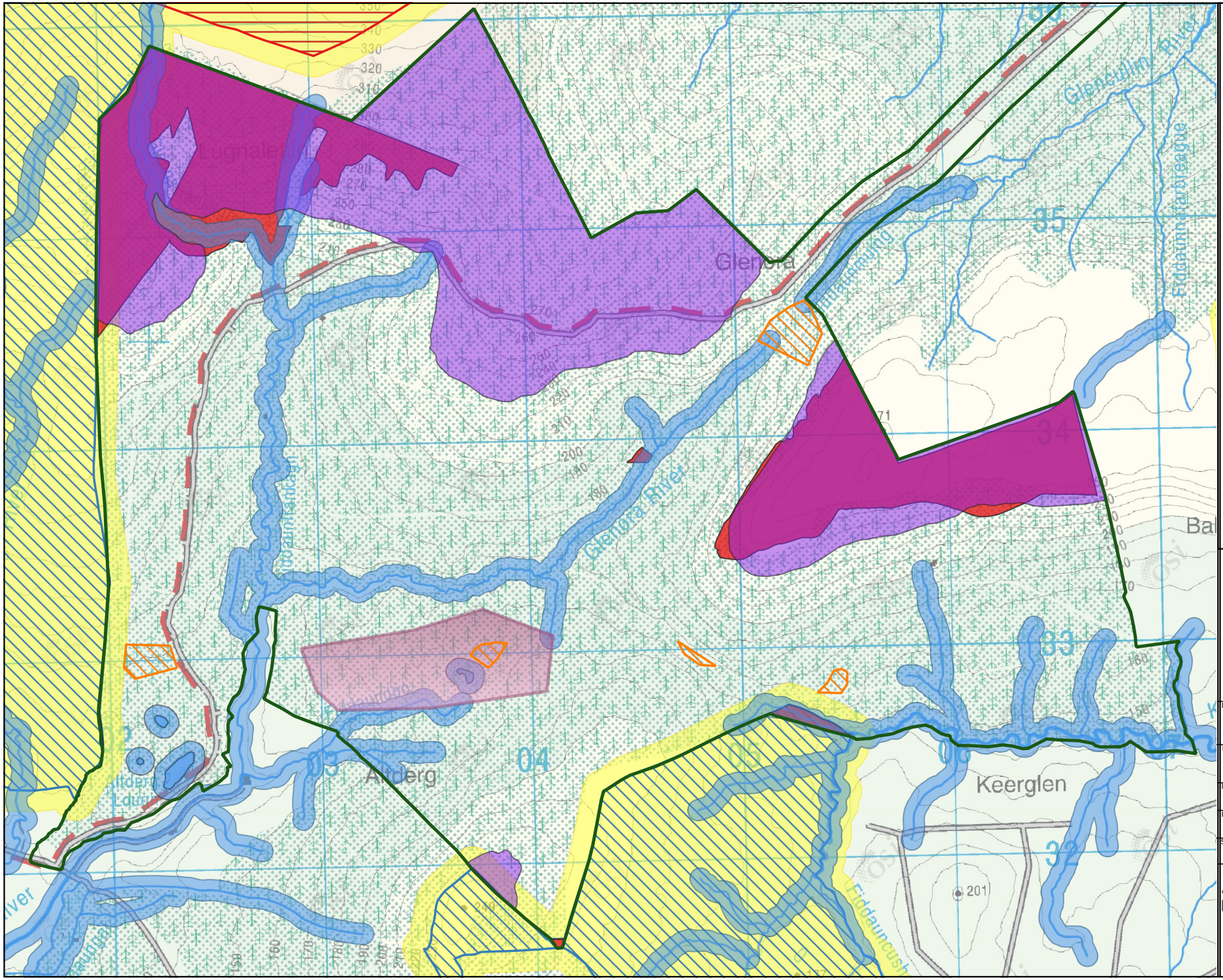
A turbine layout was then developed to take account of all the constraints mentioned above including their associated buffer zones and the separation distance required between them.

Following the mapping of all known constraints described above, detailed site investigations were carried out by the project team. The ecological assessment of the site encompassed habitat mapping and extensive surveying of birds and other fauna. These assessments, as described in Chapters 6 and 7 of this EIAR, informed the decision on the siting of turbines and the carrying out of any development works, such as the construction of roads. The hydrological and geotechnical investigations of the site examined the proposed locations for turbines, roads and other components of the Proposed Development, such as the substation and the construction compound. Where specific areas were deemed as being unsuitable (e.g., due to sensitive habitat, unmapped watercourse, poor ground conditions) for the siting of turbines or roads, etc., alternative infrastructure locations within the Glenora site were proposed and assessed, taking into account the areas that were already ruled out of consideration. The turbine layout for the proposed wind farm was also informed by wind data and the results of noise assessments as they became available.

3.5.2 Turbine Layout

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 a combination of the results of all site investigations and surveys that have been carried out during the EIAR process, the community engagement process that began in 2021 (Refer to Appendix 2-3 of this EIAR) and the scoping with statutory and non-statutory consultees (refer to Section 2.6 of this EIAR). As information regarding the site of the proposed development was compiled and assessed, the proposed layout has been revised and amended to take account of the physical constraints of the site and the requirement for buffer zones and availability of land as well as cumulative impacts.

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



Map Legend

- EIAR Site Boundary
- Elevation Exceeding 230m AOD
- Deep Peat Locations
- Annex 1 Habitats
- Geotechnical Construction Buffer Zone
- Rivers/Streams
- Lakes
- Waterbodies 50m Buffer

Designated Areas

- Natural Heritage Area (NHA)
- Special Area of Conservation (SAC)
- 100m Natura 2000/ Designated Site Buffer

Drawing Title: Environmental Constraints

Project Title: Glenora Wind Farm

Drawn By	Checked By
ER	EMC
Project No.	Drawing No.
201120	Figure 3-1a
Scale	Date
1:40,000	05.12.23

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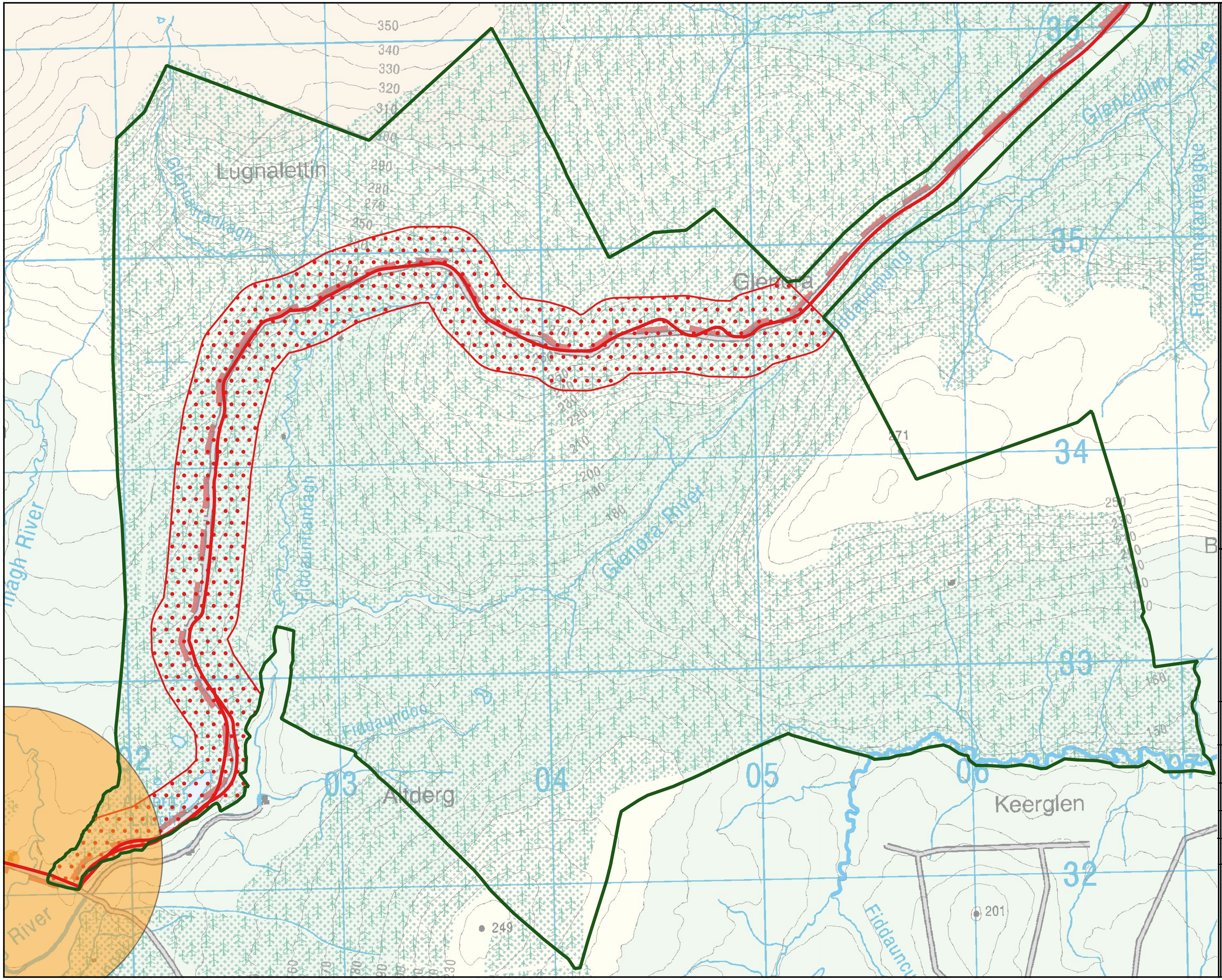

Map Legend

- EIAR Site Boundary
- Western Way Mayo
- Western Way Mayo Buffer 180m
- Dwelling Location
- 720m Dwelling Buffer

Drawing Title	Residential and Physical Constraints
Project Title	Glenora Wind Farm
Drawn By: ER	Checked By: EMC
Project No.: 201120	Drawing No.: Figure 3-1b
Scale: 1:40,000	Date: 05.12.23

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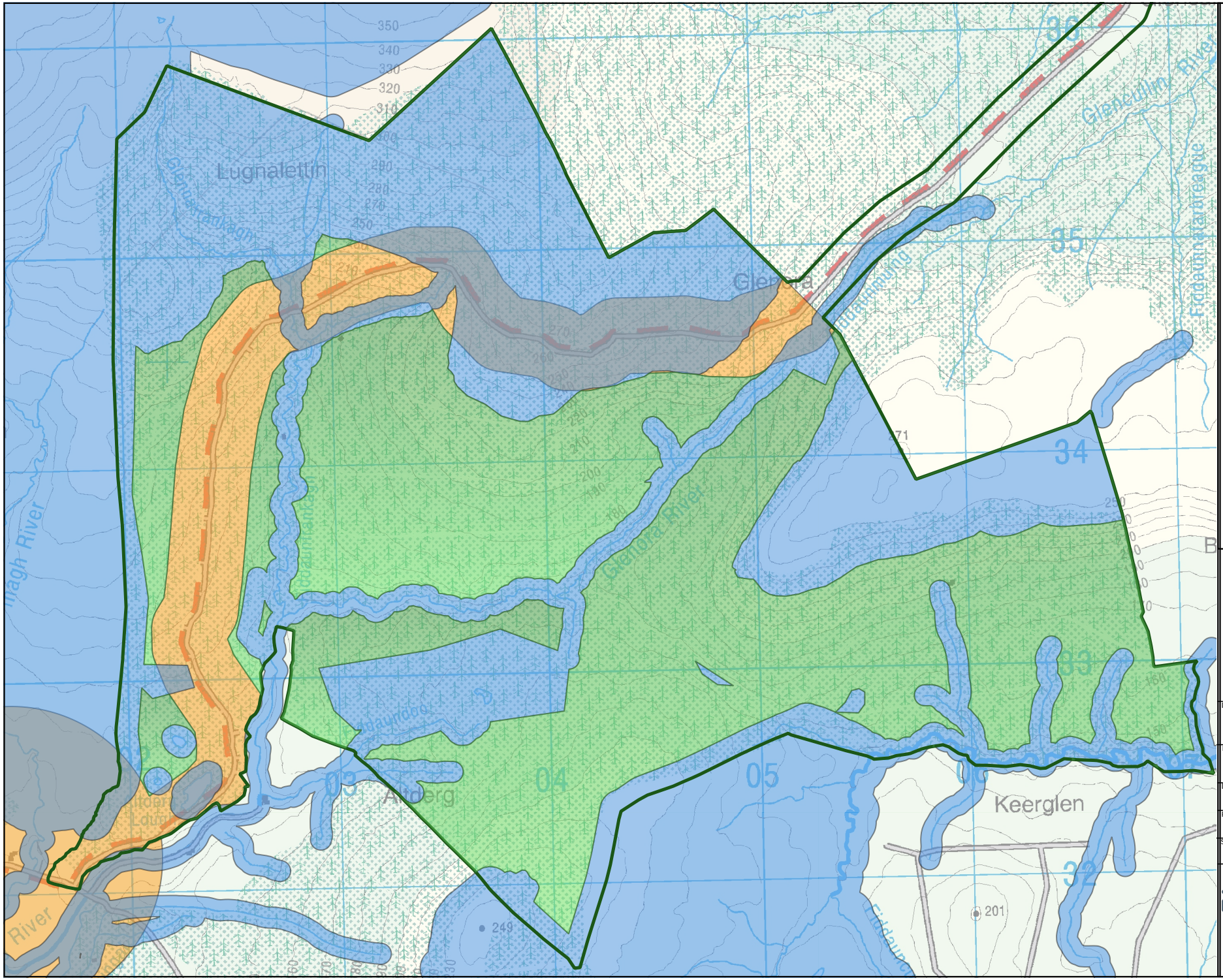

Map Legend

- EIAR Site Boundary
- Combined Environmental Constraints Buffers
- Combined Residential and Physical Constraints Buffers
- Viable Area

Drawing Title
Combined Constraints and Viable Area

Project Title
Glenora Wind Farm

Drawn By	Checked By
ER	EMC
Project No.	Drawing No.
201120	Figure 3-1c
Scale	Date
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Initial Turbine Layout

There were a number of reviews of the specific locations of the various turbines during the optimisation of the site layout. The initial constraints study identified a significant viable area within the overall study area. The total site was considered potentially suitable for approximately 14 no. turbines. This initial turbine layout, shown in Figure 3-2, occupied the viable area within the wider study area, however the proposed turbine layout was refined following feedback from the project team. The chosen turbine layout is considered optimal as this initial turbine layout did not maximise the potential wind resource of the site. The opportunity to further reduce the country's dependence on fossil fuels would have been missed.

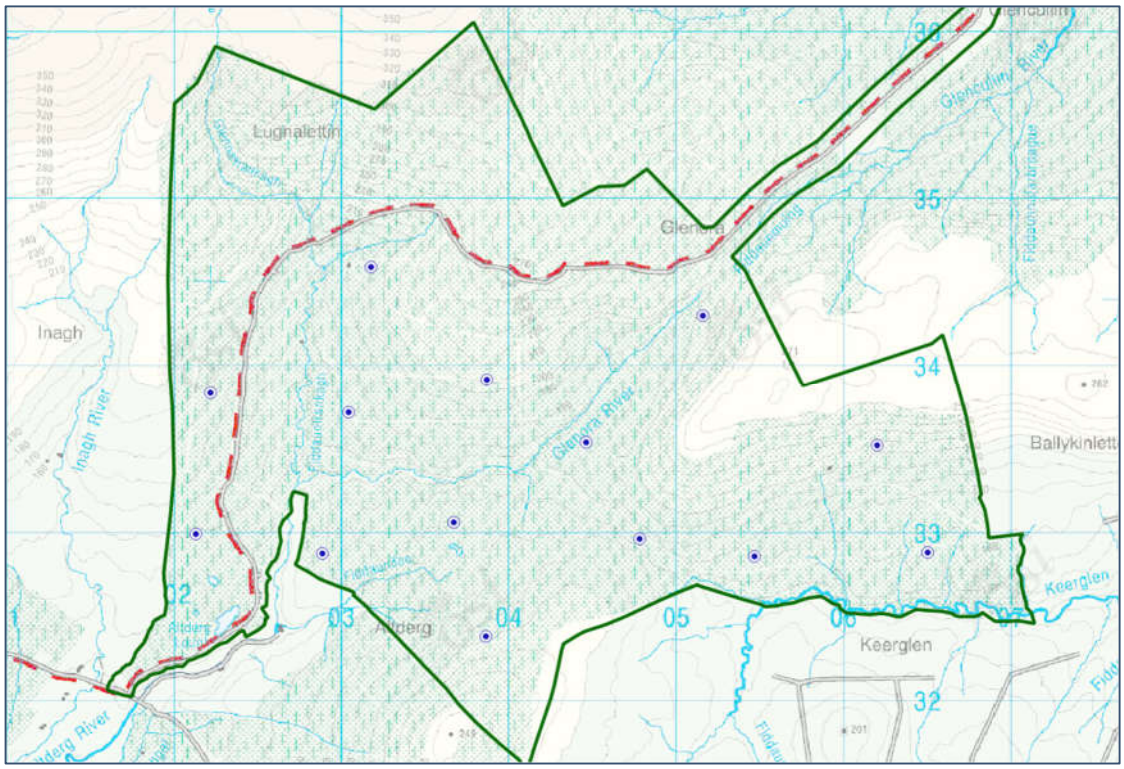


Figure 3-2 Initial Turbine Layout (14 no. turbines)

Second and Final Version of the Turbine Layout

The second version of the turbine layout, shown in Figure 3-3, involved the addition of 8 no. turbines which provided a total of 22 no. turbines following a review of the viable area and separation distances required between the proposed turbine locations. This layout maximised the efficient use of the wind resource and potential power output of the site while maintaining the necessary setbacks from residential dwellings, watercourses, designated sites and neighbouring wind energy developments. A maximum turbine base elevation of 220m OD was also maintained in order to reduce landscape and visual effects on the ridgeline to the northwest.

This third and final iteration of the turbine layout also involved some micro-siting of turbine locations based on the rigorous assessment of local ground conditions (geotechnical, hydrological, ecological) until the final turbine locations were finalised for the planning application. The final turbine layout that is the subject of this planning applications is shown in Figure 3-4 below.

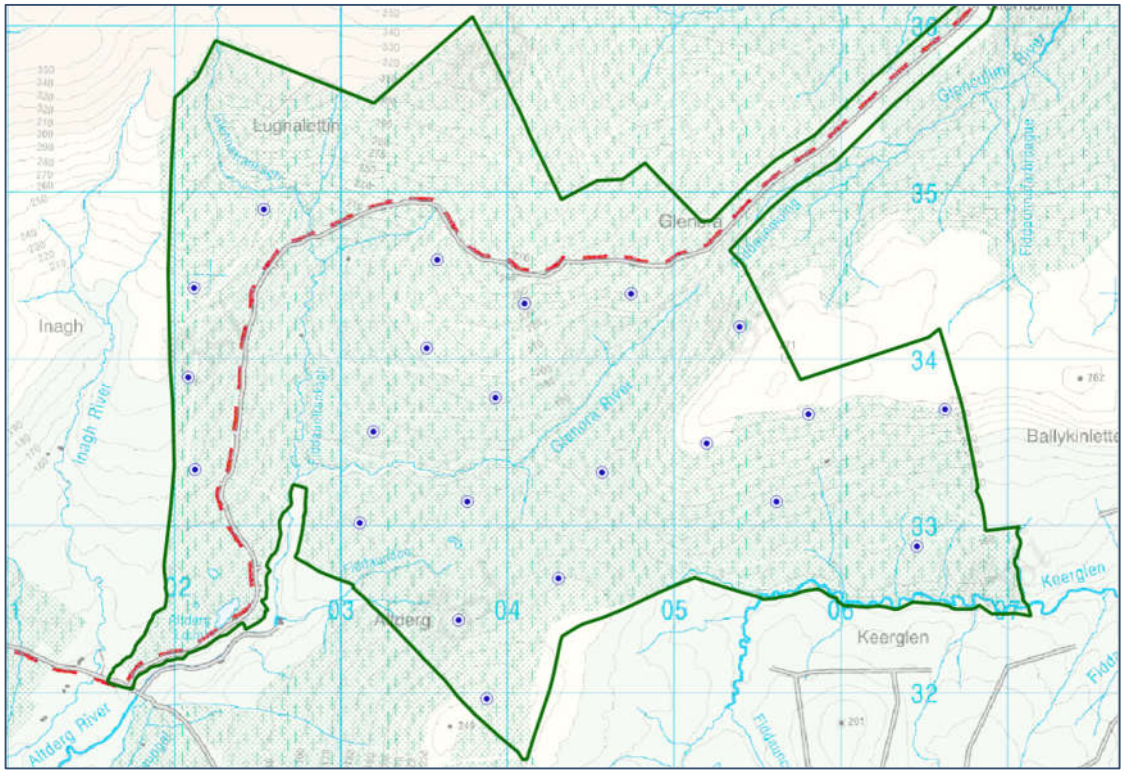


Figure 3-3 Second Version of the Turbine Layout (22 no. turbines)

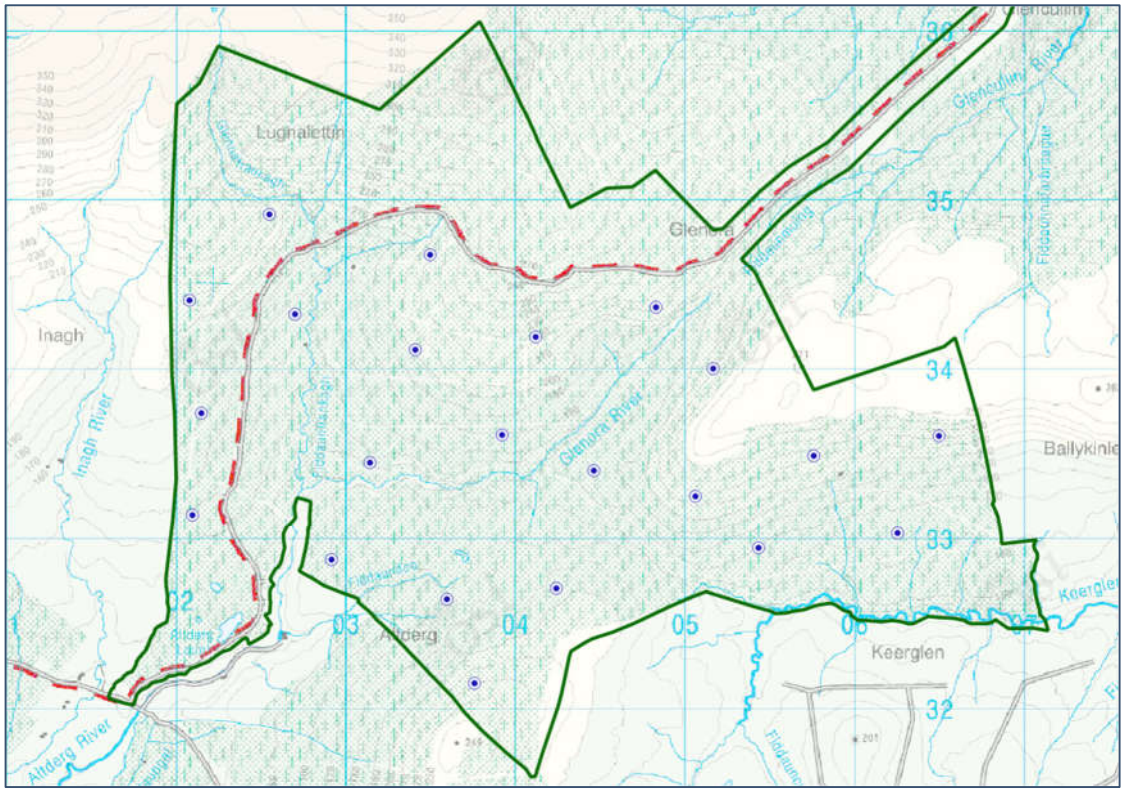


Figure 3-4 Final Version of the Turbine Layout (22 no. turbines)

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

Table 3-4 Comparison of environmental effects when compared against the chosen option (final turbine layout 22 no. turbines.)

Environmental Consideration	Initial Layout (14 no. turbines)
Population & Human Health (incl. Shadow Flicker)	No material environmental difference for population or human health.
Biodiversity & Ornithology	No significant environmental difference for either biodiversity or birds. Smaller development footprint with less overall habitat (commercial forestry) loss.
Land, Soils & Geology	Smaller development footprint would have meant a smaller volume of peat and spoil volumes to be excavated or crushed stone to be extracted for construction.
Geotechnical/Peat Stability	This layout was amended following more detailed geotechnical investigations to reduce risk of peat instability.
Water (Hydrology and Hydrogeology)	Neutral
Air & Climate	This layout does not maximise the potential wind resource of the site. The opportunity to further reduce the country's dependence on fossil fuels would have been missed.

Environmental Consideration	Initial Layout (14 no. turbines)
Noise & Vibration	Neutral
Landscape & Visual	This layout will have a similar horizontal visual extent as separation distances between turbines are greater.
Cultural Heritage & Archaeology	No material environmental difference for cultural heritage
Material Assets	No material environmental difference for material assets.

3.5.3 Road Layout

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

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

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

A comparison of the potential environmental effects of constructing an entirely new road network when compared against maximising the use of the existing road network is presented in Table 3-5 below.

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

Environmental Consideration	Entirely New Road Network
Population & Human Health (incl. Shadow Flicker)	Neutral
Biodiversity & Ornithology	Larger, new development footprint would result in greater habitat loss.
Land, Soils & Geology	Larger, new development footprint would result in greater volumes of peat and spoil to be excavated and stored. Larger volume of stone required from on-site borrow pit and off-site quarries for road construction.
Geotechnical/Peat Stability	Neutral
Water (Hydrology and Hydrogeology)	Larger, new development footprint and increased number of new watercourse crossings, therefore, increasing the potential for silt laden runoff to enter receiving watercourses.
Air & Climate	Potential for greater dust emissions due to the requirement of an increased volume of stone from the on-site borrow pit and off-site quarries. Potential for greater vehicular emissions due to and increased volume of construction traffic.
Noise & Vibration	Potential for increased noise impacts on nearby sensitive receptors during the construction of the new roads.
Landscape & Visual	Potential for greater visual and landscape impacts due to the construction of an entirely new network of roads.
Cultural Heritage & Archaeology	Larger, new development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.
Material Assets	Potential for greater traffic volumes during construction phase due to larger, new development footprint and requirement for more construction materials.

3.5.4 Location of Ancillary Structures

The ancillary infrastructure required for the construction and operation of the proposed development include temporary construction compounds, an electricity substation and associated grid connection and borrow pits.

3.5.4.1 Construction Compounds

The 5 no. proposed construction compounds will be used for staff facilities the storage of all construction materials, plant and some turbine components. The use of multiple temporary construction compounds was deemed preferable to the alternative of a single large compound at the site for a number of reasons. Principally, it will facilitate more efficient construction practices and will result in shorter distances for traffic movements within the site during construction. As a result, vehicle emissions and the potential for dust arising will be reduced.

A comparison of the potential environmental effects of constructing a single, large construction compound when compared against constructing multiple, smaller compounds is presented in Table 3-6 below.

Table 3-6 Comparison of environmental effects when compared against the chosen option (multiple construction compounds)

Environmental Consideration	Single Large Construction Compound
Population & Human Health (incl. Shadow Flicker)	Potential for increased vehicular and dust emissions from longer distance of traffic movements within the site which could have adverse health effects.
Biodiversity & Ornithology	Neutral
Land, Soils & Geology	Neutral
Geotechnical/ Peat Stability	Neutral
Water (Hydrology & Hydrogeology)	Neutral
Air & Climate	Potential for increased vehicular and dust emissions from longer distance of traffic movements within the site
Noise & Vibration	Potential for increased noise impacts on nearby sensitive receptors due to longer distance of traffic movements within the site.
Landscape & Visual	Neutral
Cultural Heritage & Archaeology	Neutral
Material Assets	Less efficient construction practices due to longer movements of construction vehicles, plant and materials within the site.

3.5.4.2 Electricity Substation

The selection of the location of the on-site substation has had regard to the constraints of the site, outlined in Section 3.5.1 above. Ease of access and ensuring a suitable setback from turbine locations was also taken into consideration. It should also be noted that while the operational lifespan of the proposed turbines is expected to be 35 years (following which they may be replaced subject to a future permission or decommissioned as proposed in this planning application) the electricity substation and associated infrastructure will become an Eirgrid asset and will be a permanent feature of the proposal as it will continue to form part of the electrical infrastructure of the area in the event of the remainder of the site being decommissioned.

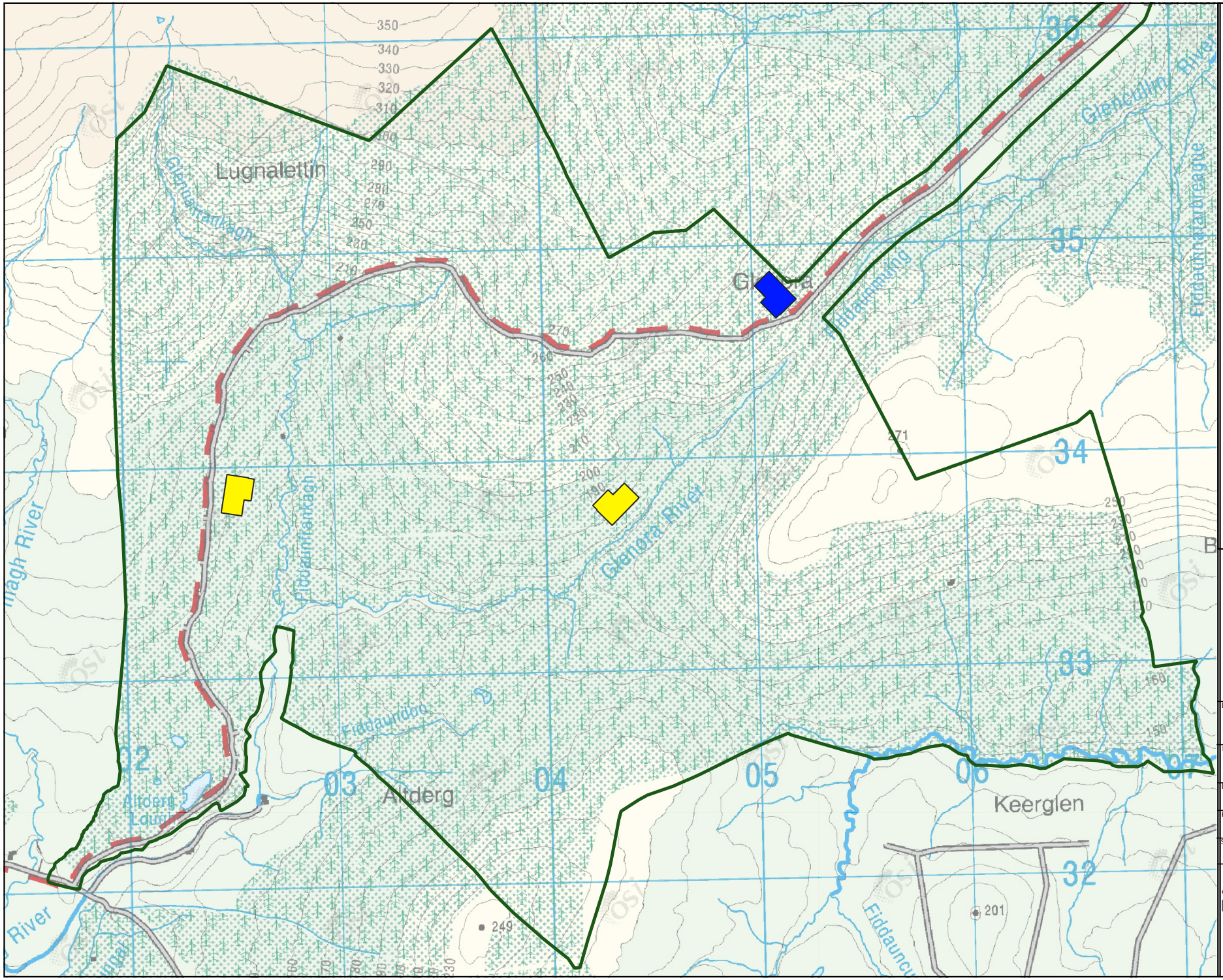
2 no. alternative substation locations were considered at a very early stage of the design of the Proposed Development, as shown in Figure 3-5. These potential substation compounds were located approximately 335m northwest of Turbine 5 and 358m northeast of Turbine 3, respectively. Along with their positioning further from the site entrance, thus increasing the length of internal caballing required, these two alternative substation locations were also within Eirgrid's minimum clearance distance of twice the falling distance from a turbine.

Therefore, the chosen on-site substation location was preferred given its more location adjacent to the site entrance and outside of the twice falling distance of a turbine requirement as set by Eirgrid.

A comparison of the potential environmental effects of the alternative location when compared against chosen location is presented in Table 3-7 below.

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

Environmental Consideration	Alternative Substation Locations
Population & Human Health (incl. Shadow Flicker)	Potential for slight increase vehicular and dust emissions from increased traffic movements within the site, due to requirement for a longer grid connection route.
Biodiversity & Ornithology	Neutral
Land, Soils & Geology	Potential for increase in volume of peat and spoil to be excavated due to deeper peat depths.
Geotechnical	Neutral
Water	Increased potential for silt laden runoff to enter watercourses due to requirement for longer grid connection route and additional watercourse crossings.
Air & Climate	Potential for slight increase vehicular and dust emissions from increased traffic movements within the site, due to requirement for a longer grid connection route.
Noise & Vibration	Neutral
Landscape & Visual	Neutral
Cultural Heritage & Archaeology	Neutral



Map Legend

- EIAR Site Boundary
- Glenora Onsite Substation Location Option A (Chosen Option)
- Glenora Onsite Substation Location Option B and C

Drawing Title: Onsite Substation Location Options

Project Title: Glenora Wind Farm

Drawn By	Checked By
ER	EMC
Project No.	Drawing No.
201120	Figure 3-5
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Environmental Consideration	Alternative Substation Locations
Material Assets	Potential for slight increase traffic volumes during construction phase due to requirement for a longer grid connection route.

3.5.4.3 Grid Connection

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

The output of the wind farm is such that it needs to connect to a 110kV substation. There are 2 no. existing 110kV electricity substations located within 25km of the proposed development site (at its closest point), namely:

- Tawnghnamore 110kV Electricity Substation
- Bellacorick 110kV Electricity Substation

Therefore, underground grid connection cabling routes to each of these existing substations was considered and assessed in order to determine which route would be brought forward as the grid connection route to be assessed as part of the overall Glenora Wind Farm project within the EIAR. The two routes considered are shown in Figure 3-6 and are detailed below.

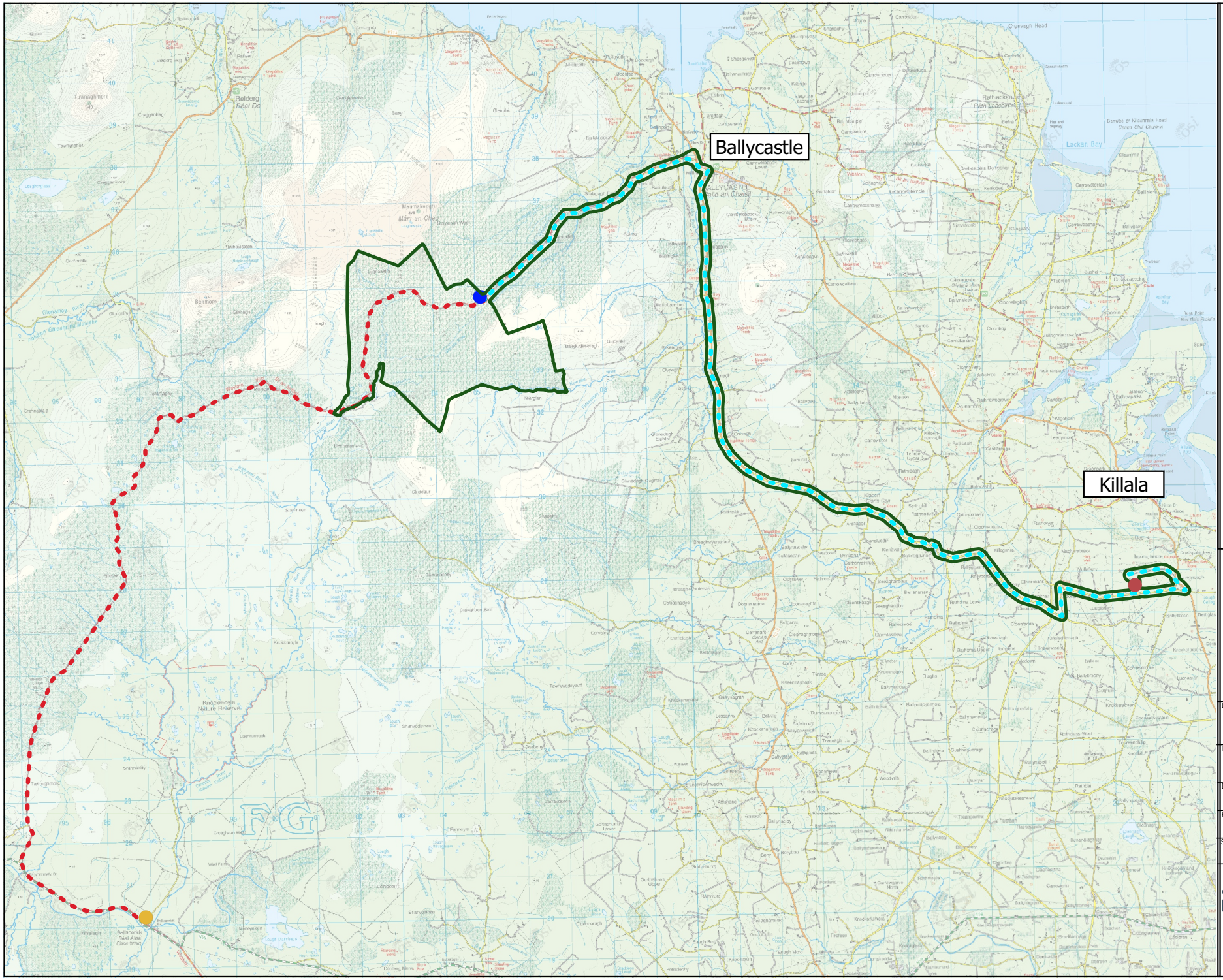
Option A is an underground cabling route connecting the Glenora Wind Farm onsite substation to the existing Tawghnamore substation. The Tawghnamore substation is located approximately 16.8km southeast of the onsite substation. The grid connection cabling route runs entirely along a combination of forestry and public roads. The cabling route measures approximately 26km in length.

Option B is an underground grid connection cabling route, connecting the Glenora Wind Farm onsite electricity substation to the existing Bellacorick substation. The Bellacorick substation is located approximately 16.7km southwest of the proposed onsite substation. This grid connection cabling route runs along approximately 18km of forestry roads and private tracks, 4km of public roads and includes 4km off road section over which a new access road would need to be constructed. This option would also require the construction of 2 no. new watercourse crossings. In total, the cabling route measures approximately 27km in length.

Grid Connection Option A runs along existing roads and/or tracks for its entire length. Grid Connection Option B includes 4km of a currently off-road section which would require an access road to be constructed resulting in an increased development footprint, an increase in volumes of peat and spoil to be excavated and manged and greater habitat loss.

Option A passes by more residential dwellings than Options B and therefore has the potential to cause greater, short-term nuisance to local residents in terms of access, traffic volumes, noise and dust emissions during the construction phase.

Option B has the potential to cause greater, long-term habitat loss, and also requires the construction of 2 no. new watercourse crossings which would increase the potential for silt-laden water to enter natural watercourses.



Map Legend

EIAR Site Boundary

Grid

Glenora Underground Grid Connection Route Option A (Chosen)

Glenora Underground Grid Connection Route Option B

Substations

Glenora Onsite Substation Location (Chosen Option)

Existing Tawnaghmore Substation

Existing Bellacorrick Substation

Drawing Title

Underground Grid Connection Route Options

Project Title

Glenora Wind Farm

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201120	Figure 3-6
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Based on the environmental considerations outlined above, Grid Connection Option A was the most favoured option of the two options.

A comparison of the potential environmental effects of the alternative grid connection cabling routes when compared against the chosen option (Option A) is presented in Table 3-8 below.

Table 3-8 Comparison of environmental effects when compared against the chosen option (Option A)

Environmental Consideration	Option B
Population & Human Health (incl. Shadow Flicker)	The route passes by fewer residential dwellings and therefore, there is less potential for nuisances for local residents to occur in relation to dust emissions from vehicle movements and excavations which could have adverse health effects.
Biodiversity & Ornithology	Increased habitat loss due to the requirement to construct new lengths of roads where the cable route is proposed 'off-road'.
Land, Soils & Geology	Increased volume of peat, spoil and tar to be excavated due to longer route and the requirement for new roads along certain sections of the route.
Geotechnical	Neutral
Water	Requires the construction of 2 no. new watercourse crossings which increases the potential for silt-laden runoff and hydrocarbons to enter receiving watercourses.
Air & Climate	Potential for increased vehicular and dust emissions traffic movements along the cable route due to the greater length of the route and the requirement for the construction of new access road.
Noise & Vibration	Greater potential for increased noise and vibration nuisances during construction phase on sensitive receptors (residential dwellings) located along the public road sections of the cable route.
Landscape & Visual	Neutral
Cultural Heritage & Archaeology	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.
Material Assets	Potential for greater traffic volumes during construction phase due to larger development footprint and requirement for more construction materials.

3.5.4.4 Borrow Pit

The majority of material required for the construction of access roads and turbine bases will be obtained from the 3 no. proposed borrow pit onsite which will be located approximately 315m northwest of T7, 290m south of T20, and 2,325m northeast of T15, along the proposed site entrance

route. The use of onsite borrow pits represents an efficient use of existing onsite resources. It eliminates the need to transport large volumes of construction materials along the local public road network to the site. The locations for the borrow pits was identified taking into account the site characteristics, including topography, ground conditions, habitat type and surface water features.

An alternative to using on-site borrow pits was the option of sourcing all stone and hardcore materials from a licensed quarry or quarries in the vicinity of the site. The movement of the volume of material required for the construction of 22 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 stone from local, off-site quarries against the chosen option (on-site borrow pits) is presented in Table 3-8 below.

Table 3-8 Comparison of environmental effects when compared against the chosen option.

Environmental Consideration	Sourcing all stone from local, off-site quarries
Population & Human Health (incl. Shadow Flicker)	Potential for increased vehicular, noise and dust emissions from increased traffic movements, due to the volume of rock to be transported to the site along the public road network, which could be a nuisance to local residents along the haul route.
Biodiversity & Ornithology	Potential increase in habitat loss as there would be no on-site borrow pit and, therefore, additional peat repository areas would be required within the site.
Land, Soils & Geology	Slight reduction in peat and spoil to be excavated, however, additional peat placement areas would be required as an on-site borrow pit would not be available for the placement of excavated peat and spoil.
Geotechnical	Increased potential for peat instability as additional peat repository areas would be required for the placement of excavated peat and spoil.
Water	Increased potential for silt laden runoff to enter watercourses due to additional peat repository areas being required within the site.
Air & Climate	Potential for increased vehicular and dust emissions from increased traffic movements within the site, due to the volume of rock to be excavated.
Noise & Vibration	Reduced potential for noise and vibration effects on local sensitive receptors as no large-scale rock breaking or blasting required within the site. Increased potential for noise and vibration effects on sensitive receptors along haul routes due to volume of traffic required to transport the volume of crushed stone needed for the construction of the proposed development.
Landscape & Visual	Reduced landscape and visual effects as no open rock face would be visible from certain viewpoints.
Cultural Heritage & Archaeology	Slightly smaller development footprint would reduce the potential for impacts on unrecorded, subsurface archaeology.

Material Assets	Significantly higher traffic volumes on the public road network during construction phase due to the volume of crushed stone required to be transported to the site.

3.6 Turbine Delivery

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

3.6.1 Port of Entry

The ports of entry considered for the wind turbines of the Proposed Development include Galway Harbour in Galway City and Killybegs Harbour in Co. Donegal due to their proximity to the site. Both harbours offer roll-on roll-off procedures to facilitate import of wind turbines. Both ports have been considered for this project given that they are the closest commercial ports to the site of the proposed development, however, others in the State (including Dublin, Waterford, Cork and Shannon-Foynes), offer potential for the importing of turbine components and therefore are also viable alternatives.

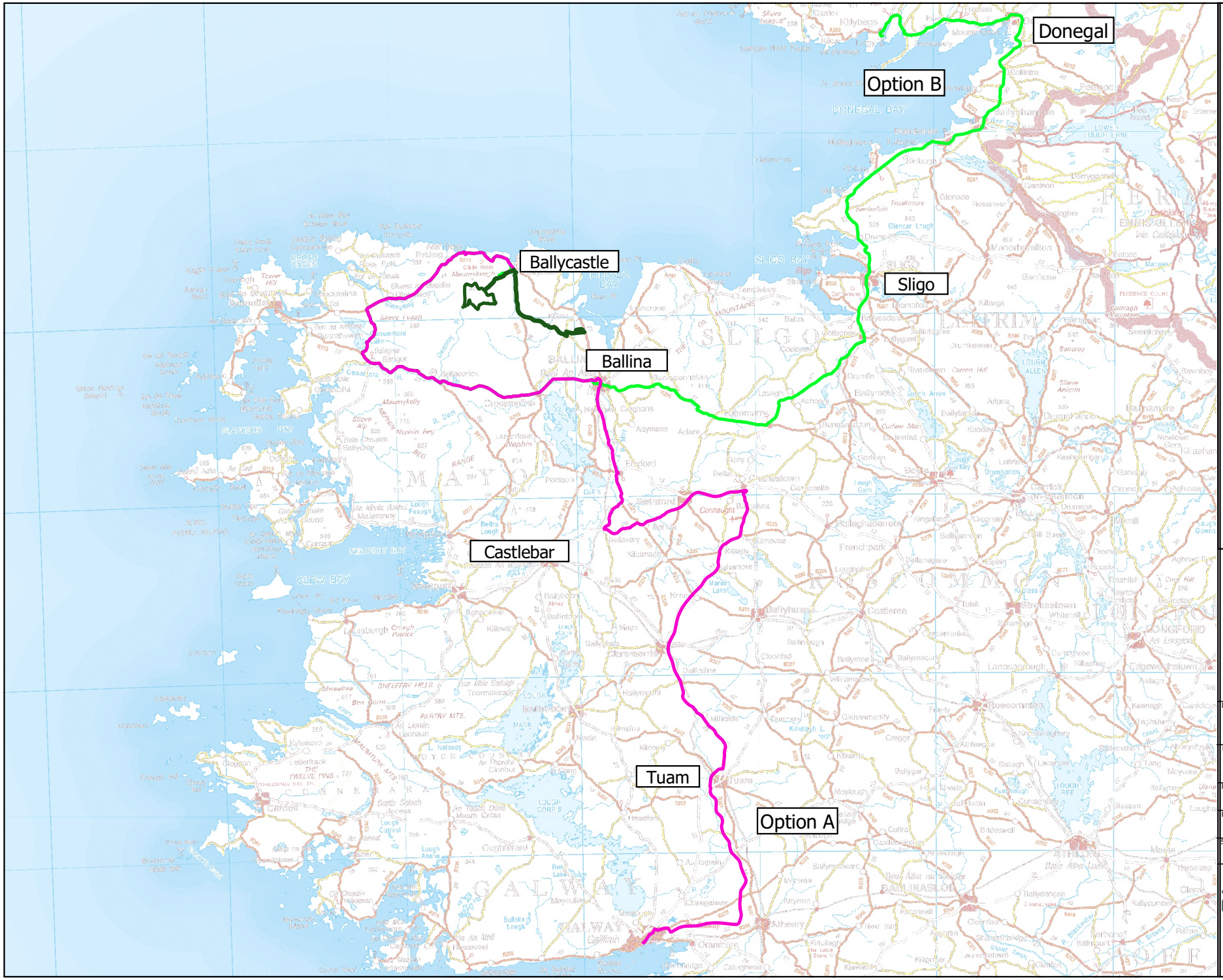
3.6.2 Turbine Delivery Route

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

Turbine Delivery Route Option A comprises the delivery of turbine components to the site from Galway Harbour via the Lough Atlaia Road, R339 and R336 Regional Roads to the N6/N83 junction. From here the vehicles will continue on the N6 National Primary Road and the M6 Motorway to the M6/M17 intersection. From the intersection the route continues north on the M17 Motorway and N17 National Primary Road to the junction with the N5 Primary Road. The vehicles will continue west on the N5 and then north on the N58 National Secondary Road to Foxford and the N26 National Secondary Road to Ballina. The vehicles will then head west on the N59 National Secondary Road to Bangor Erris, merging onto the R313 and shortly turning north onto the L1204 local road that connects to the R314 Regional Road. The vehicles then continue northeast along the R314, turning south onto an unnamed local road before reaching Ballycastle, and connecting to the site entrance track road to the west. The total length of the delivery route is approximately 235 kilometres.

Turbine Delivery Route Option B comprises the delivery of turbine components to the site from Killybegs Harbour via the R263 Regional Road and the N63 National Secondary Road to Donegal Town, the N15 National Primary Road from Donegal Town to Sligo Town, the N4 and N15 National Primary Roads to Tobercurry, the R294 Regional Road to Ballina and the N59 National Secondary Road to Bangor Erris, merging onto the R313 and shortly turning north onto the L1204 local road that connects to the R314 Regional Road. The vehicles then continue northeast along the R314, turning south onto an unnamed local road before reaching Ballycastle, and connecting to the site entrance track road to the west. The total length of the delivery route is approximately 250 kilometres.

The turbine delivery route options are shown on Figure 3-7.



Map Legend

- EIAR Site Boundary
- Proposed Transport Delivery Route
- Alternative Transport Delivery Route

Drawing Title: Turbine Delivery Route Options

Project Title: Glenora Wind Farm

Drawn By	Checked By
ER	EMC
Project No.	Drawing No.
201120	Figure 3-7
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Both turbine delivery route options would require some accommodation works and road widening along the L1204 and the junction between the R314 and L1204.

Option A was selected as the preferred turbine delivery route as there were less potential pinch points, where widening may be required, along the route compared to Option B. Option A predominantly comprises Motorways, National Primary and Secondary Roads and avoids long sections of narrower Regional Roads.

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

Environmental Consideration	Option B
Population & Human Health (incl. Shadow Flicker)	Neutral
Biodiversity & Ornithology	Potential increase in habitat loss due to more potential pinch points requiring widening works.
Land, Soils & Geology	Neutral
Geotechnical	Neutral
Water	Neutral
Air & Climate	Neutral
Noise & Vibration	Neutral
Landscape & Visual	Neutral
Cultural Heritage & Archaeology	Neutral
Material Assets	Potential increase in traffic impacts due to requirement for more widening works along route.

It should be noted that while large turbine components and other abnormal loads deliveries will be via the Option A delivery route exclusively and accessing the site along the unnamed local road west of the R314, other general construction material deliveries may be delivered via other major routes (national primary, national secondary and regional routes) in the wider area and travel towards the site from Belmullet to the west, Castlebar to the south, or Ballina to the southeast. The assessment of traffic volumes associated with the construction and operation of the proposed development is included in Chapter 15: Material Assets, Section 15.1 of this EIAR.

3.6.3 Alternative Mitigation Measures

Mitigation by avoidance (buffer zones/separation distances as per Section 3.5.1 above) has been a key aspect of the Proposed Development's evolution through the selection and design process. Avoidance of the most ecologically sensitive areas of the site limits the potential for environmental effects. As noted above, the site layout aims to avoid environmentally sensitive areas. Where loss of habitat occurs within the site, this has been mitigated by proposing enhancement lands as described in Chapter 6 of this EIAR. The alternative to this approach is to encroach on the environmentally sensitive areas of the site and accept the potential adverse environmental effects associated with this.

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.