VOLUME 1: CHAPTER 2: THE ROUTEING PROCESS AND ALTERNATIVES

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There are no appendices associated with this Chapter.

2. THE ROUTEING PROCESS AND ALTERNATIVES

2.1 Introduction

2.1.1 This Chapter describes the routeing process and consideration of alternatives that have been undertaken for the Proposed Development.

2.1.2 The Proposed Development underwent a routeing appraisal process as described in **Section 2.4** below, to establish a proposed route[1] and alignment[2] that was determined to provide an optimum balance of environmental, technical and economic factors. This process included a programme of consultation at both routeing and alignment stage, as described in **Chapter 4 – Scope and Consultation** (see also **Appendix 4.1 - Public Consultation Report**), designed to engage with key stakeholders in order to invite feedback on the rationale for, and approach to, the selection of the final alignment and design solution of the Proposed Development. Further review of the Proposed Development during the EIA stage of the project has also led to further refinements to minimise potential environmental effects.

2.2 Design Considerations

2.2.1 SSEN Transmission has obligations under section 9 of the 1989 Act to 'develop and maintain an efficient, co-ordinated and economical system of electricity transmission'.

2.2.2 SSEN Transmission, under the 1989 Act, 'when formulating proposals to generate, transmit, distribute or supply electricity' is required, under Schedule 9 to:

- "*have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest*"; and
- "*do what* [it] *reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects*".

2.2.3 Furthermore, the requirements of the Construction (Design and Management) Regulations 2015[3] (CDM regulations) require that the project design aims to minimise hazards and reduces risks during construction.

2.2.4 Taking account of these obligations, SSEN Transmission has considered technical, economic and environmental factors in evaluating the reasonable alternatives to the Proposed Development, with the objective of identifying a proposed alignment and design solution which is 'technically feasible and economically viable' and 'which causes the least disturbance to the environment and to the people who live, work, visit and recreate within it'.

2.2.5 As such, the most cost-effective solution to develop an efficient, co-ordinated and economical system of electricity transmission is usually an OHL connection. In the case of the Proposed Development, SSEN Transmission are also contracted to develop the connection types stipulated by the Cloiche and Dell 2 wind farm developers, which were OHLs. The design solution utilised for the Proposed Development was of key importance throughout the routeing process as described throughout this Chapter.

2.2.6 Where OHL connections were deemed unfeasible on environmental, engineering or economic grounds, UGC connections, were explored. In the case of the Proposed Development, it was deemed that UGC is necessary on the plateau in the areas of the consented Cloiche Wind Farm and the proposed Dell 2 Wind Farm given

[1] A linear area of approximately 1 km width (although this may be narrower/wider in specific locations in response to identified constraints), which provides a continuous connection between defined connection points.
[2] A centre line of an overhead line or UGC.
[3] UK Government (2015), *Construction (Design and Management) Regulations 2015*, Online, available at: http://www.legislation.gov.uk/uksi/2015/51/contents/made [accessed 08/01/2024]

technical constraints presented by the proximity of existing and proposed renewable energy infrastructure and the resultant 'wake effect' that can result from proximity to turbines, which can lead to premature fatigue and failure of OHLs. UGC was also deemed necessary on the final approach to Melgarve substation to cross the existing Beauly – Denny OHL. Both OHL and UGC solutions were kept in consideration as design solutions for this project during both the route and alignment selection stages of the project. Design solutions are discussed further in **Section 2.7** of this chapter.

Overhead Line Design

2.2.7 Where OHL is deployed for the Proposed Development SSEN Transmission determined that a steel lattice tower is the preferred technological solution and would make use of this type of support structure for the OHL where possible. It is considered that steel lattice towers provide the lowest cost solution, are suitable to provide the required capacity of electricity export for this project and minimise environmental effects.

2.2.8 Early in the design process, SSEN Transmission's New Suite of Transmission Structures (NeSTS) monopoles were considered for use in parts of the connection. However, these were deemed a less viable option for this connection given increased costs potentially required for design and testing, and uncertainty over the conductor options available. Trident wood poles were discounted at an early stage due to the elevation of the site rendering them unsuitable for use. Trident steel poles were also an initial consideration for the project; however, these were at an early stage in the engineering design process which was expected to continue for a number of years so conflicted with the project connection dates. This option was re-considered when connection dates were altered (due to developer delays) however these were not considered viable for use as part of the Proposed Development, largely due to insufficient space being available between the existing and proposed wind farm turbines on the plateau.

2.2.9 Off the plateau, steel trident poles were not considered in detail for use as part of the Proposed Development as one steel trident pole OHL would have been required for the Cloiche connection and one steel trident pole OHL would have been required for the Dell 2 connection. These would have likely travelled parallel together south towards Melgarve substation. This was discounted at an early stage as it was deemed preferable to consolidate the two connections onto one steel lattice tower.

2.3 Project History

2.3.1 The Proposed Development is required to connect the consented Cloiche Wind Farm and the proposed Dell 2 Wind Farm to the national grid at Melgarve substation. Originally, the Melgarve Cluster Project also included the proposed connection for Glenshero Wind Farm into Melgarve substation by UGC (as per the connection agreement with that wind farm developer). This additional connection requirement would have also necessitated the extension to Melgarve substation.

2.3.2 However, in March 2022, following a public inquiry into the Glenshero Wind Farm project, Scottish Ministers refused the application on the grounds that it could have a significant visual impact, and thereby compromise the integrity of the nearby Cairngorms National Park. As the application for Glenshero Wind Farm was refused, the requirement for its grid connection was withdrawn, and the connection no longer formed an element of the Melgarve Cluster Project. Reference to the Glenshero Wind Farm connection is included within this chapter where it is relevant to the corridor or route selection stages given it was part of the overall project at this time.

2.4 Approach to Route and Alignment Selection

2.4.1 Guidelines for the routeing of new high voltage overhead transmission lines have been established within the electricity supply industry. These guidelines are known as the 'Holford Rules'[4] and have been widely used throughout the UK since the 1960s. The 'Holford Rules' set out a hierarchical approach to routeing which advocates avoiding areas of high amenity value, minimises changes in direction, takes advantage of topography and minimises visual interaction with other transmission infrastructure.

2.4.2 SSEN Transmission has developed its own guidance, based on the principles set out in the Holford Rules, but broadening the basis for routeing decisions to reflect contemporary practice, and providing a framework to ensure environmental, technical and economic considerations are identified and appraised at each stage of the routeing process.

2.4.3 The approach to route and alignment selection has therefore been informed by SSEN Transmission's guidance[5]. The guidance splits the routeing stage of a project into four principal stages, as follows:

- Stage 0: Routeing Strategy Development;[6]
- Stage 1: Corridor Selection;
- Stage 2: Route Selection; and
- Stage 3: Alignment Selection.

2.4.4 Each stage is an iterative process and involves an increasing level of detail and resolution, bringing cost, technical and environmental considerations together in a way which seeks to achieve the best balance at each stage. The stages that are carried out can vary depending on the type, nature of and size of a project and consultation is carried out at each stage of the process, where relevant. Each stage is described in further detail in the following sections.

2.5 Corridor Selection (Stage 1)

2.5.1 Corridor selection stage (Stage 1) identified an initial broad search area for the consideration and analysis of route options. The search area extended from the west of Fort Augustus, across the Great Glen and up onto the Monadhliath Mountain range and the boundary of the Cairngorms National Park, before heading south to the A86 at Kinloch Laggan.

2.5.2 From the initial broad search areas identified, two study corridors were established. These can be seen on **Figure 2.1**, and were as follows:

- Fort Augustus Study Corridor: extending between the on-site Dell 2 Wind Farm substation and Fort Augustus substation see **Plate 2.1**; and
- Melgarve Study Corridor: extending from Dell 2 Wind Farm, Cloiche Wind Farm and Glenshero Wind Farm on-site substations, to Melgarve substation see **Plate 2.2**.

2.5.3 The two Study Corridors were not appraised as specifically OHL or UGC, but were informed by environmental constraint considerations for the area. Desk-based research and a review of environmental constraints and opportunities was conducted in May 2021.

[4] Scottish Hydro Electric Transmission Limited (SHETL) (October 2004), *The Holford Rules: Guidelines for the Routeing of New High Voltage Overhead Transmission Lines with NGC 1992 and SHETL 2003 Notes; Revision 1.01*

[5] SSEN Transmission (September 2020), Procedures for Routeing Overhead Lines and Underground Cables of 132 kV and above

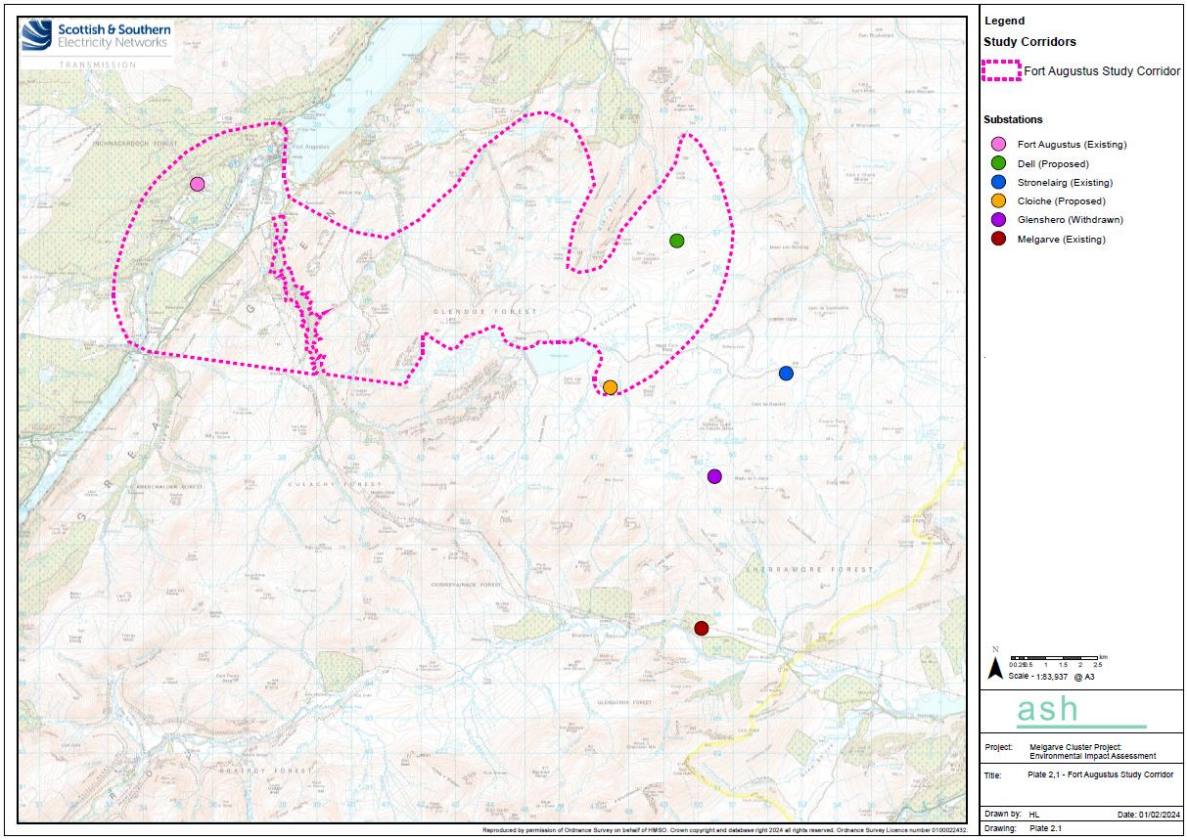
[6] Setting out the proposed strategy for the routeing stage of a particular project.

Fort Augustus Study Corridor

2.5.4 The Fort Augustus study corridor was explored in relation to the potential Dell 2 Wind Farm connection to Fort Augustus substation. The boundary of the Fort Augustus study corridor was defined by a number of environmental and topographical constraints, see **Plate 2.1**. The environmental and technical constraints associated with the Fort Augustus Corridor included:

- Natural Heritage Designations: The proximity of the Loch Knockie and nearby Lochs Special Protection Area (SPA) / Glendoe Lochans Special Site of Special Scientific Interest (SSSI) to the southern edge of the Fort Augustus study corridor, containing a variety of breeding water bird species. The Glen Tarff Special SSSI and the Ness Woods Special Area of Conservation (SAC) creates a further constraint to development, as it cuts through the Fort Augustus study corridor from the south.
- Landscape and visual: The northern edge of the Fort Augustus study corridor would be constrained by the Loch Ness and Duntelchaig Special Landscape Area (SLA) around Loch Ness and the steeply incised Glen Brein river valley. The village of Fort Augustus itself would also pose a constraint to the development of an OHL in relation to visual receptors.
- Ecology, Habitats and Ornithology: a number of sensitive habitats, largely comprising upland heath and blanket bog on the plateau, although much is in a degraded condition. Water vole were found to be abundant throughout the area as well as otter. Within the Tarff valley and elsewhere in the lower areas of the corridor, native woodland and other sensitive habitats are present.
- Geology, soils and peat: a matrix of peatland classifications, with a large proportion of vegetation cover considered to be peatland habitat on the plateau. There were found to be areas of steep ground on the plateau where peat slide is a potential risk to development.
- Cultural heritage: The village of Fort Augustus is a Conservation Area and contains a number of listed buildings, and the Caledonian Canal Scheduled Monument extends from Loch Ness in a south westerly direction is also a considerable barrier to development.
- Land use and recreation: upland moorland managed for sporting activities. A long distance hill track extends along the Corrieyairack Pass in close proximity to the Beauly Denny 400 Kv OHL, and Core Path (referred to as the Monadhliath Trail) which extends across the area following the Glendoe Hydroelectric Scheme access track, through both Glendoe and Garrogie Estates.
- Technical Constraints: A number of technical constraints are present within the Fort Augustus Corridor, including the challenging topography in combination with other environmental constraints described above. These constraints would require any OHL to take considerable deviations around the areas of constraint in order to avoid them. Along the southern boundary the Glendoe Hydroelectric Scheme reservoir creates a barrier for development.

Plate 2.1: Fort Augustus Study Corridor



Melgarve Study Corridor

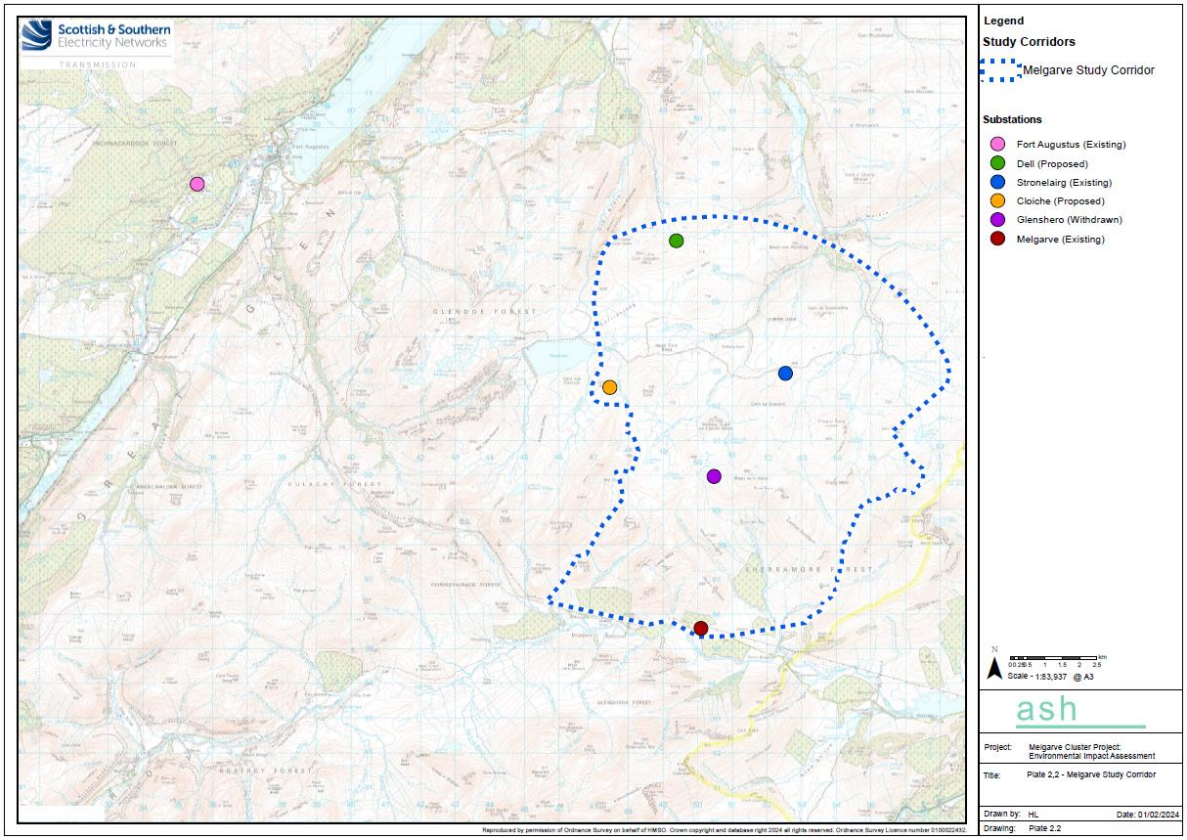
2.5.5 The Melgarve Study Corridor was explored in relation to the potential Dell, Cloiche and Glenshero Wind Farm connections to Melgarve substation.

2.5.6 The boundary of the Melgarve Study Corridor was defined by a number of environmental and topographical constraints, see **Plate 2.2**. The environmental and technical constraints associated with the Fort Augustus Corridor included primarily:

- Natural Heritage Designations: the River Spey SAC would define the southern limit to development in this area and the proximity of the Loch Knockie and nearby Lochs SPA / Glendoe Lochans SSSI to the north western edge as per the Fort Augustus Study Corridor.
- Landscape and visual: the proximity of the Cairngorns National Park, and Wild Land Area (as defined by NatureScot) provide constraints for the Study Corridor.
- Ecology, Habitats and Ornithology: generally as per the Fort Augustus Study Corridor, though no interaction with the Tarff valley.
- Geology, soils and peat: generally as per the Fort Augustus Study Corridor.
- Cultural heritage: There would be significantly less cultural heritage constraints in relation to the Melgarve Study Corridor as it would not pass into the village of Fort Augustus.
- Land use and recreation: generally as per the Fort Augustus Study Corridor, though the Melgarve Corridor comprises a vast area of upland moorland which is managed for sporting activities (mainly grouse shooting and deer stalking), as well as some trout fishing.
- Technical Constraints: A number of technical constraints are present within the Melgarve Corridor, including the 100 MW Glendoe Hydroelectric Scheme, proposed and also operational turbines and associated cable routes which severely limited opportunities for the construction of an OHL. To the south, the edge of the corridor is defined by the Beauly to Denny 400kV OHL and Melgarve substation.

To the west, the corridor is defined by topographical constraints such as the steep Glen Tarff gorge. The north of the corridor is limited by the extent of the Dell 2 Wind Farm substation and the steeply incised Allt Odhar river valley.

Plate 2.2: Melgarve Study Corridor



Conclusions of Corridor Selection Stage

2.5.7 The two corridors were discussed at a workshop on 17th May 2021, attended by SSEN Transmission and Environmental Lead Consultants ASH, as well as OHL engineers and other technical specialists.

2.5.8 It was concluded that the Fort Augustus study corridor was not preferred. Natural heritage designations and landscape and visual constraints, including Fort Augustus itself, would have been particular constraints within the study corridor if it had been selected. Native woodland and other sensitive habitats present in the Tarff valley could be avoided by selecting the Melgarve study corridor. Also, although a number of technical constraints are present within the Melgarve study corridor which could limit an OHL, the challenging topography in combination with other environmental constraints in the Fort Augustus study corridor would have required any OHL to take considerable deviations.

2.5.9 Melgarve substation as the connection point was also the closer of the two for both wind farms. The consented Cloiche Wind Farm is approximately 8 km from Melgarve substation, while it would have been approximately 13 km from Fort Augustus substation. Dell 2 Wind Farm is approximately 11 km from Melgarve substation, while it would have been approximately 14 km from Fort Augustus substation.

2.5.10 As a result, the Fort Augustus Corridor was discounted.

2.5.11 The Melgarve study corridor was adopted as the proposed corridor for further consideration at Route Selection Stage (Stage 2).

2.6 Route Selection (Stage 2): Overview

2.6.1 The route selection stage (Stage 2) of the project involved the identification of route options, and an appraisal of environmental, technical and economic constraints of the route options, prior to arriving at a preferred route for the purposes of consultation and a proposed route to take forward to the alignment selection stage (Stage 3). For the Proposed Development, the route selection process was carried out between September 2021 and May 2022.

2.6.2 Route options were initially identified following desk-based review and site walkovers, giving due consideration to the principles set out in the Holford Rules and SSEN Transmission guidance, as described in **Section 2.4** of this Chapter. In accordance with the steps outlined in the Holford Rules and SSEN Transmission guidance, the following principles were taken into account during the route stages (where practicable) and the alignment stages of the project:

- Avoid if possible major areas of highest amenity value (including those covered by national and international designations and other sensitive landscapes);
- Avoid by deviation, smaller areas of high amenity value;
- Try to avoid sharp changes of direction and reduce the number of larger angle pole structures required;
- Avoid skylining the route in key views and where necessary, cross ridges obliquely where a dip in the ridge provides an opportunity;
- Target the route towards open valleys and woods where the scale of poles or towers will be reduced and views broken by trees (avoid slicing through landscape types and try to keep to edges and landscape transitions);
- Consider the appearance of other lines in the landscape to avoid a dominating or confusing wirescape effect; and
- Approach urban areas through industrial zones and consider the use of undergrounding in residential and valued recreational areas.

2.7 Route Selection (Stage 2): The Route Options

2.7.1 The route options were identified within the corridor as identified at Stage 1, as described in **Section 2.3** of this Chapter. Although the requirement for the Glenshero Wind Farm connection has since been withdrawn, it was still active at the routeing stage and was therefore included.

2.7.2 Appraisal of route options involved systematic consideration against the topic areas noted below:

- Environmental:
  - Natural Heritage;
  - Cultural Heritage;
  - Proximity to Dwellings;
  - Landscape and Visual;
  - Land Use; and
  - Planning.
- Technical:
  - Infrastructure Crossings;
  - Environmental Design;
  - Ground Conditions;
  - Construction and Maintenance; and

- Proximity.
- Cost
  - Capital; and
  - Operational.

2.7.3 A Red-Amber-Green (RAG) rating was applied to each topic area for each route option, indicating potential constraint to development (red indicating high potential for the development to be constrained, amber intermediate potential and green low potential).

2.7.4 The route options were identified at varying widths, departing from the standard 1 km width of typical route options, in order to take account of physical and development constraints identified during the corridor workshop as described in **Section 2.5** of this Chapter, namely the site topography and the operational and proposed wind turbines across the site. Route widths were increased, up to approximately 4 km in places, to allow for subsequent identification of alignments through the wind farms during the alignment selection stage. In places, route widths were also narrowed below 1 km, down to approximately 0.5 km, where steep topography was considered to preclude installation of any connection type.

2.7.5 The route options were not appraised as specifically OHL or UGC, but considerations for either / both were reported on.

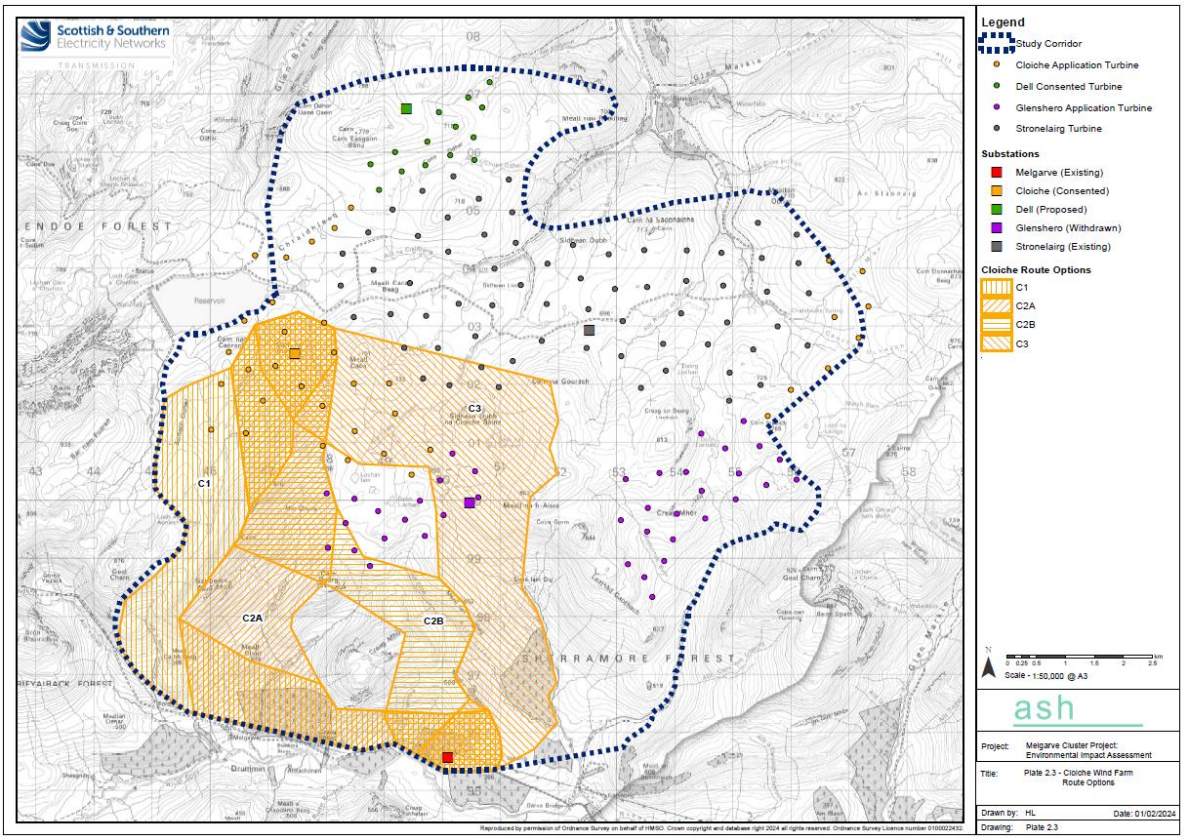
2.7.6 All of the route options identified and appraised during the route options stage are described below and shown on **Figure 2.2.** The route options identified were split into three sections relevant to the wind farm from which they originated. Therefore, the three sections of route options were the Cloiche Wind Farm route options, the Dell 2 Wind Farm route options and the Glenshero Wind Farm route options.

Cloiche Wind Farm Route Options

2.7.7 As can be seen on **Figure 2.2**, the Cloiche Wind Farm route options comprised of four options. These are listed below and can be seen on **Plate 2.3**:

- **Route Option C1**, represented the most western route option of those considered for the Cloiche connection.
- **Route Option C2A**, represented a central, more 'direct' route option of those considered for the Cloiche connection.
- **Route Option C2B**, represented a variation to Route Option C2A.
- **Route Option C3**, represented the most eastern route option of those considered for the Cloiche connection.

Plate 2.3: Cloiche Wind Farm Route Options

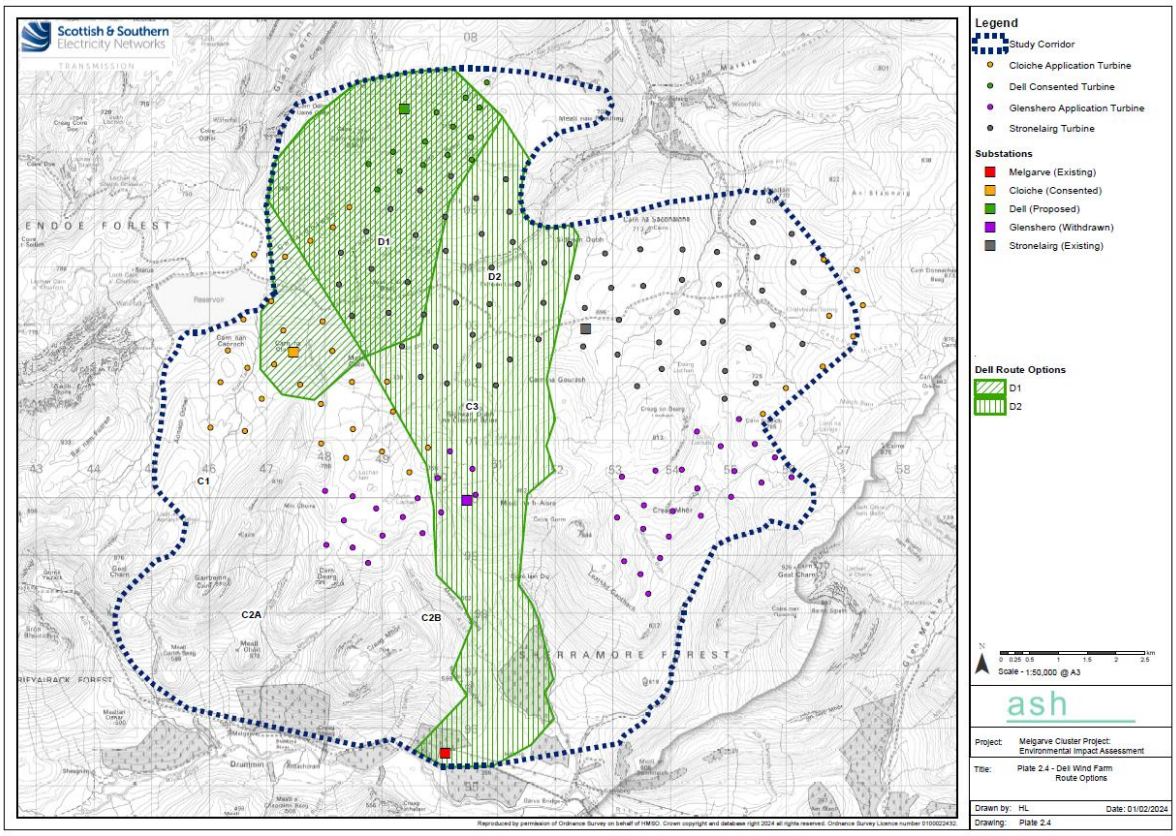


Dell 2 Wind Farm route options

2.7.8 As can be seen on **Figure 2.2**, the Dell 2 Wind Farm route options comprised of two options. These are listed below and can be seen on **Plate 2.4**:

- **Route Option D1**, represented the more western route option of the two considered for the Dell connection. Route Option D1 was proposed to connect into Cloiche Wind Farm substation. From this point, both the Dell connection and Cloiche connection would have proceeded to Melgarve substation as part of the same single-rated connection via the preferred route for the Cloiche connection.
- **Route Option D2**, represented the more eastern route option of the two considered for the Dell connection. It would have overlapped Route Option C3 (described above) and follow the same route Melgarve substation.

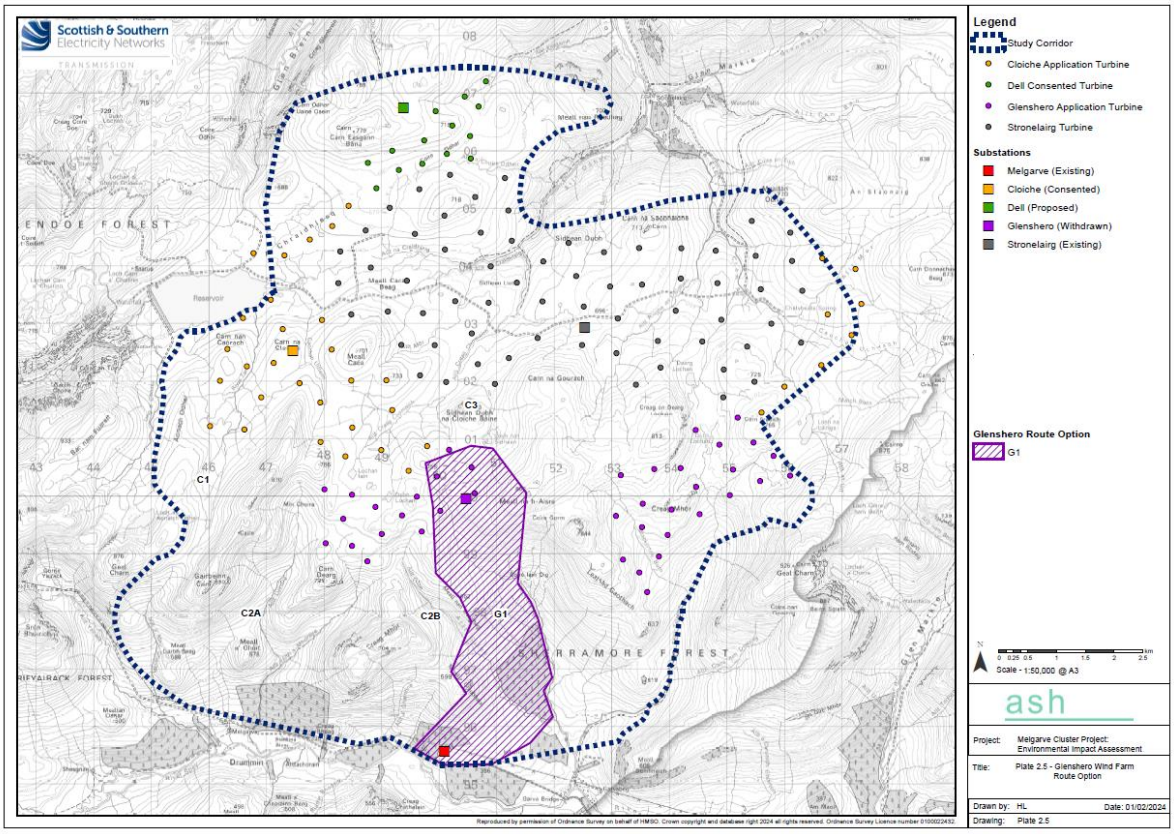
Plate 2.4: Dell 2 Wind Farm Route Options



Glenshero Wind Farm route options

2.7.9 As can be seen on **Figure 2.2**, the Glenshero Wind Farm route options comprised of Route Option G1 only. As can be seen and can be seen on **Plate 2.5**, **Route Option G1** extended south, away from the proposed Glenshero Wind Farm substation and then south to reach Melgarve substation.

Plate 2.5: Glenshero Wind Farm Route Option



Preferred Route Option

2.7.10 The route option put forward from the above was **Route Option C3**, **Route Option D1** and **Route Option G1** as it was considered to provide an optimum balance of environmental, technical and cost factors. Further breakdown of the preference across environmental, technical and cost factors is in the following paragraphs.

Cloiche Wind Farm Connection

2.7.11 As outlined in the route stage Consultation Document[7], published in October 2021, for Cloiche Wind Farm Connection, **Route Option C3** was identified as a part of the preferred route as:

- From an environmental perspective:
  - Route Option C3 was the most favoured from a landscape character standpoint; and
  - Although Route Option C3 was not the most favoured from a habitats perspective, the differences in potential impacts on landscape character between route options were more pronounced than those of habitats, which could be controlled through appropriate selection of alignments and micrositing away from higher sensitivity areas.
- From a technical perspective:
  - in relation to terrain, Route Option C3 would pass through less severe terrain, and there are very few pinch points along Route Option C3 making it preferable;
  - in relation to access, the existing Stronelairg-Melgarve cable route connection includes a cable haul track which services a substantial amount of Route Option C3;
  - in relation to angle towers, although similar in length to route options C1, C2A and C2B, the directness of Route Option C3, with its low gradient terrain, was estimated to require the least amount of angle towers; and

[7] Melgarve Cluster Consultation Document: Route Options (October 2021), produced by SSEN Transmission

- No communication masts were identified to be inside of Route Option C3, while a communication mast was identified to be located within route options C1, C2A and C2B.

- From a cost perspective route options C3 was in the preferred group of options on the basis of both capital and operational costs.

2.7.12 Taking the various constraints and route preferences into account, the preferred route was thus considered to be **Route Option C3**.

Dell 2 Wind Farm Connection

2.7.13 As outlined in the route stage Consultation Document[7], for Dell 2 Wind Farm Connection, **Route Option D1** was identified as a part of the preferred route as:

- From an environmental perspective:
  - in relation to habitats Route Option D1 was estimated to have less potential for impacts on sensitive habitats making it a preference; and
  - Route Option D1 would link up with Route Option C3 which was confirmed as the environmentally preferred route option for the Cloiche Wind Farm connection.
- From a technical perspective Route Option D2 was the preference rather than Route Option D1. This was as:
  - in relation to angle towers, Route Option D2 was estimated to require fewer angle towers. This was due to the reduced overhead line length but also the directness of the route option. There was also anticipated to be fewer 'pinch points' due to the favourable terrain.
- From a cost perspective both route options scored the same for both capital and operational costs.

2.7.14 While the engineering appraisal identified a slight preference for Route Option D2 on the basis of likely number of OHL angle towers, it was considered that, taking account of numerous other factors which could influence an alignment through the Dell route options (e.g. proximity to both operational and planned wind turbines, habitats, ground conditions, presence of any protected species, etc.), it was too early in the process to state confidently whether Route Option D1 would necessarily require more angle towers than Route Option D2.

2.7.15 Route Option D1 would allow the Applicant to consider options to rationalise the infrastructure required, such as Cloiche and Dell sharing OHL structures, which could reduce overall cost as well as minimise technical challenges and potential for adverse environmental effects. The choice of structure, to enable a double circuit to be supported, was required to be a key consideration.

2.7.16 These factors were considered to present justification for selection of Route Option D1 over Route Option D2 for the Dell connection, particularly given that, by review of all RAG appraisal outcomes, there was only a slight preference for the latter. Consequently, the proposed route was considered to be **Route Option D1**,

Glenshero Wind Farm Connection

2.7.17 For Glenshero Wind Farm Connection, the only option appraised (**Route Option G1)** was identified as a part of the proposed route as it represented the more preferable option in terms of all considerations.

2.8 Route Selection (Stage 2): Reporting and Consultation

2.8.1 The route selection stage reporting and consultation process is described in **Appendix 4.1 - Public Consultation Report.**

Route Stage Consultation Responses

2.8.2 At route selection stage, the consultation responses for the Proposed Development largely related to the design evolution of the connections. It was outlined that the development proposals must demonstrate sensitivity and respect towards the local distinctiveness of the landscape. Other topics of importance raised included:

- The natural heritage of the area, in particular the River Spey Special Area of Conservation (SAC), protected for salmon, freshwater pearl mussel, sea lamprey and otter;
- The need for supporting landscape and visual assessment material, consideration of the Special Landscape Qualities of the Cairngorms National Park and Wild Land Area 19 - Braeroy - Glenshirra - Creag Meagaidh and Wild Land Area 20 – Monadhliath;
- The likely presence of Annex 1 habitat types including blanket bog and alpine heath;
- Potential impacts to wider countryside birds; and
- Transport and access.

2.8.3 Community consultation responses raised a number of comments querying the rationale behind the potential use of OHL rather than UGC for the Cloiche and Dell 2 connections due to Glenshero and Stronelairg wind farms opting for an UGC connection. Concern for the potential for adverse effects on the operation of existing and proposed wind farms in the areas was also raised in comments from the surrounding wind farm developers. The comments suggested a need to revisit the rationale regarding OHL preference or the rationalisation of the connections as far as possible. Also raised by consultees was the need to consider the use of single circuit lattice towers against the use of double circuit lattice towers in more detail.

2.8.4 Concerns were raised in relation to potential disruption of the community and tourism in the area as a result of the project. This related to the local community's sensitivity to transport disruption. Potential impacts on sporting activities within the Stronelairg estate (namely shooting) were mentioned, as well as potential impacts on long distance walking routes.

The Applicant Response to Route Stage Consultation Responses

2.8.5 **Appendix 4.1 – Public Consultation Report** associated with **Chapter 4 – Scope and Consultation** provides the SSEN Transmission project responses to the consultation responses received at route stage, along with confirmation of the action to be taken, where relevant.

2.8.6 To address the consultation responses, the following actions were undertaken:

- The reasons for a preferred use of OHL rather than UGC were set out in SSEN Transmission's May 2022 Route Stage Report on Consultation (see also sections 2.11.8 and 2.11.9 for details).[8] However, the design of the proposals was still progressing at route stage and alternative options, including use of UGC connections, were explored further as the project design progressed through to the alignment stage.

- Rationalisation of the two separate OHL connections into a single lattice tower solution was a key element of the design development moving forwards, and opportunities to consolidate connections to minimise development footprint were explored alongside further technical and environmental studies.

- Moving forwards, the OHL or UGC alignment would be intended to be designed and positioned so as not to interfere with the operation or output of any wind farm or the Glendoe Hydro Scheme. At route stage, SSEN Transmission discussed the development design further with developers and

[8] Melgarve Cluster Project: Report on Consultation (Route Stage) (May 2022), produced by SSEN Transmission

landowners to arrive at a design solution which best accommodates all parties while making best use of existing infrastructure and already disturbed ground;

- It was confirmed that a LVIA would be carried out as part of the EIA and supporting information, including ZTV figures and visualisations, would be included with the EIA Report. Landscape and visual impacts were considered further as part of the alignment selection stage (see Section 2.9 and 2.10);

- Further consideration of potential impacts on designated natural heritage sites and their qualifying interests, woodland areas, sensitive terrestrial and bird species and sensitive habitats, including peatland habitats would be undertaken during the alignment selection and EIA stages of the project. Consideration of other matters such as land use and recreational interests, and transport during the construction phase will also be considered further during the alignment selection and EIA stages of the project; and

- Further consultation would be undertaken at the alignment selection stage of the project.

2.8.7 The reporting on the consultation process concluded with the confirmation that the preferred route identified within the route stage Consultation Document[7] would be taken forward to the alignment selection stage as the proposed route. The route option put forward as the proposed route is therefore **Route Option C3**, **Route Option D1** and **Route Option G1** as it was considered to provide an optimum balance of environmental, technical and cost factors. The proposed route can be seen on **Figure 2.3.**

2.8.8 All comments and considerations at route stage were taken forward into the alignment stage. This process remained inclusive, seeking further consultation where appropriate.

2.9 Alignment Selection (Stage 3): Overview

2.9.1 The alignment selection stage of the project sought to determine an alignment, subject to a Limit of Deviation (LoD) of approximately 100 m within the proposed route identified during the route options stage of the project (described above).

2.9.2 For the Proposed Development, the alignment selection process was carried out between May 2022 and June 2023. The requirement for the Glenshero Wind Farm connection was withdrawn by the alignment selection stage, so it was not included.

2.9.3 When establishing the alignment options for Stage 3, the constraints of the area had to be accounted for. Most significantly, throughout the proposed route, were the existing Stronelairg Wind Farm wind turbines and the existing 132 kV UGC connecting Stronelairg Wind Farm to Melgarve substation, as well as the consented wind turbines of Cloiche Wind Farm and of the proposed Dell 2 Wind Farm. Ultimately, progressing with an UGC solution through the existing (Stronelairg), the proposed (Dell 2) and the consented (Cloiche) wind farms was deemed required. This was dictated by technical requirements given it is not possible to achieve an OHL alignment through these areas due to the proximity to wind turbines and the resultant 'wake effect' that can lead to premature fatigue and failure of the OHL.

2.9.4 Further to this, the land is undulating with some steep sections. Peat is also present, including peat hags, wet ground and lochans. In considering the potential environmental constraints, the following tasks were undertaken:

- Desk-based review and targeted site survey by project landscape architects, ecologists, ornithologists, archaeologists, geologists and hydrologists to review alignment options;
- Targeted Phase 1 / National Vegetation Classification (NVC) habitat surveys and protected species surveys to supplement existing data;

- Review of ornithological survey data and records for the area, including requests for data held by RSPB, and targeted bird surveys to supplement existing survey data;
- Review of comments received from stakeholders, including landowners during the route option selection stage;
- Workshops to discuss alignment options prior to the identification of a preferred alignment and design solution; and
- Site reconnaissance visits by the SSEN Transmission engineering team and environmental consultants to review alignment options.

2.10 Alignment Selection (Stage 3): The Alignment Options

2.10.1 The alignment options were established to account for the known constraints, some as OHL, some as UGC and some utilising a mix of the two technologies. A total of 20 alignment options were included at the alignment consultation stage and summarised in the alignment stage Consultation Document[9], with differing start and end points as described in **Appendix 4.1 - Public Consultation Report** associated with **Chapter 4 – Scope and Consultation**.

2.10.2 As can be seen in **Figure 2.3**, to aid with distinguishing the alignment options from one another, 3 'junction points' were identified, and the alignment options were further split down into four key sections. The junction points were Junction A, Junction B and Junction C, and the alignment sections were Section 1A, Section 1B, Section 2 and Section 3. The junction points and all alignment options are displayed on **Figure 2.3** and are described further in the below paragraphs.

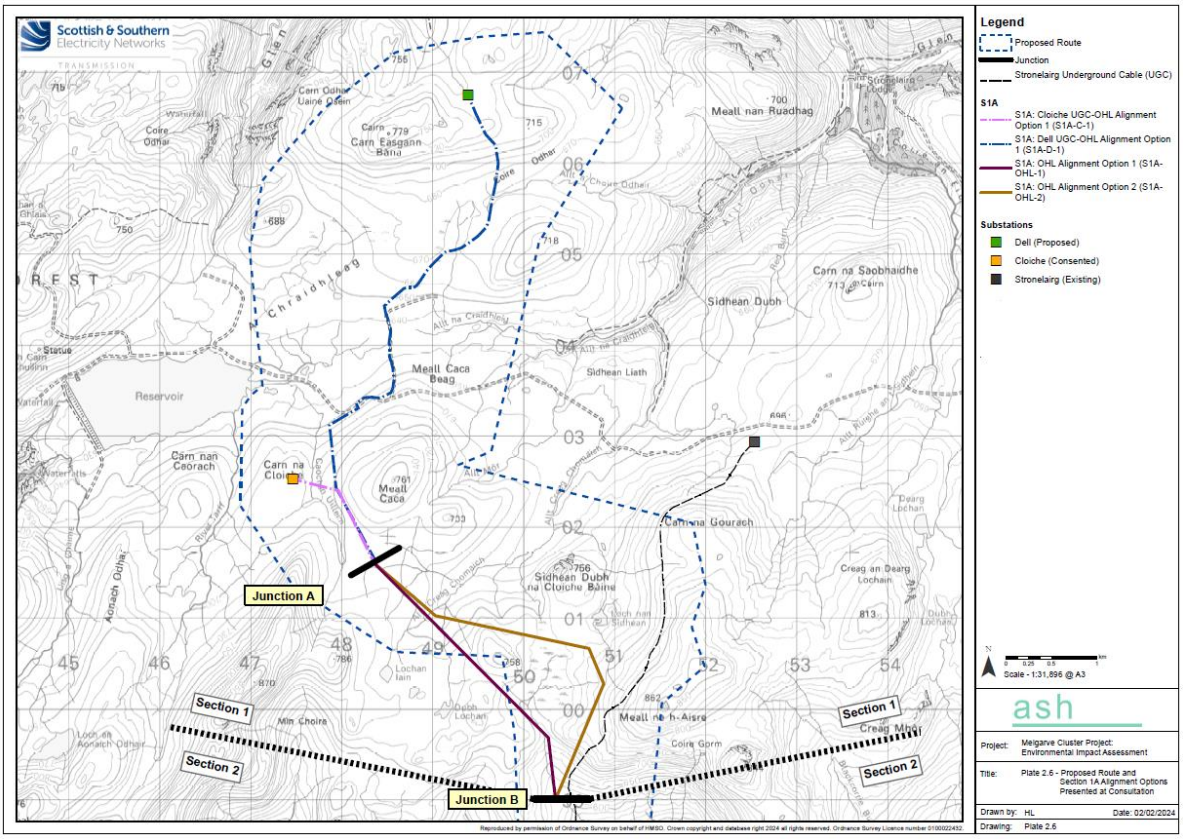
Section 1A: On-site wind farm substations to edge of plateau (Junction B) via Junction A

2.10.3 As can be seen on **Plate 2.6**, there were four alignment options presented at alignment stage consultation as a part of Section 1A. These were:

- S1A Cloiche UGC-OHL Alignment Option 1 (S1A-C-1). Proposed to be UGC.
- S1A Dell UGC-OHL Alignment Option 1 (S1A-D-1). Proposed to be UGC.
- S1A OHL Alignment Option 1 (S1A-OHL-1). Proposed to be OHL.
- S1A OHL Alignment Option 2 (S1A-OHL-2). Proposed to be OHL.

[9] Melgarve Cluster Project: Consultation Document: Alignment Options (January 2023), produced by SSEN Transmission

Plate 2.6: Section 1A Alignment Options

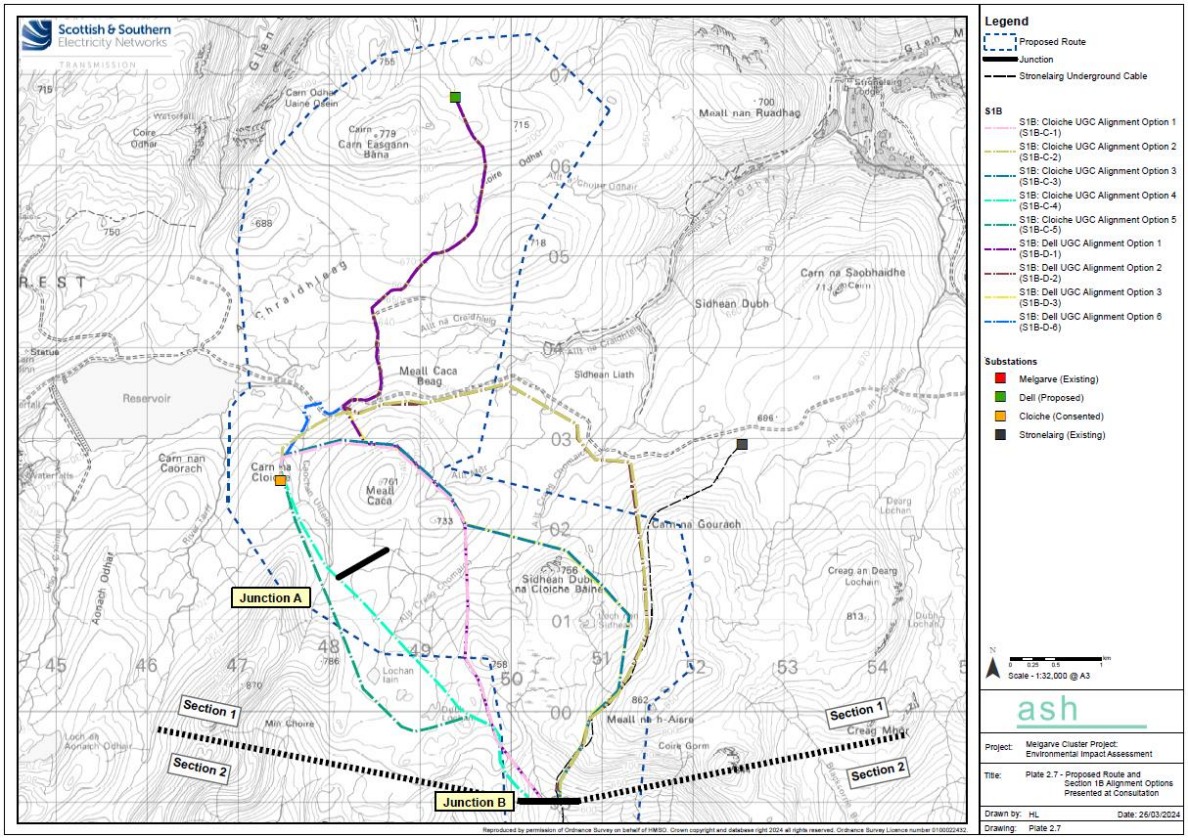


Section 1B: On-site wind farm substations to edge of plateau directly to Junction B

2.10.4 As can be seen on **Plate 2.7**, there were nine alignment options presented at alignment stage consultation as a part of Section 1B. These were:

- S1B Cloiche UGC Alignment Option 1 (S1B-C-1). Proposed to be UGC.
- S1B Cloiche UGC Alignment Option 2 (S1B-C-2). Proposed to be UGC.
- S1B Cloiche UGC Alignment Option 3 (S1B-C-3). Proposed to be UGC.
- S1B Cloiche UGC Alignment Option 4 (S1B-C-4). Proposed to be UGC.
- S1B Cloiche UGC Alignment Option 5 (S1B-C-5). Proposed to be UGC.
- S1B Dell UGC Alignment Option 1 (S1B-D-1). Proposed to be UGC.
- S1B Dell UGC Alignment Option 2 (S1B-D-2). Proposed to be UGC.
- S1B Dell UGC Alignment Option 3 (S1B-D-3). Proposed to be UGC.
- S1B Dell UGC Alignment Option 6 (S1B-D-6). Proposed to be UGC.

Plate 2.7: Section 1B Alignment Options



Section 2: Junction B to Junction C

2.10.5 As can be seen on **Plate 2.8**, there were three alignment options presented at alignment stage consultation as a part of Section 2. These were:

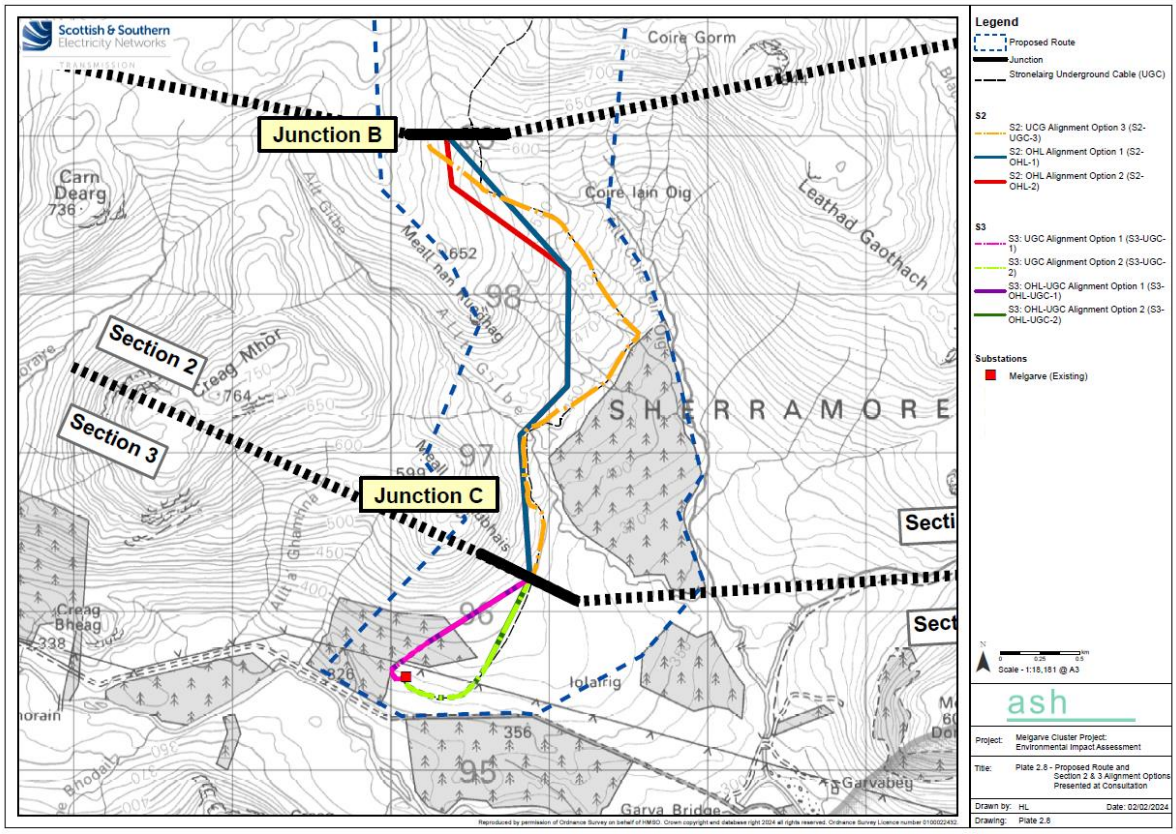
- S2 UCG Alignment Option 3 (S2-UGC-3). Proposed to be UGC.
- S2 OHL Alignment Option 1 (S2-OHL-1). Proposed to be OHL.
- S2 OHL Alignment Option 2 (S2-OHL-2). Proposed to be OHL.

Section 3: Junction C to Melgarve substation

2.10.6 As can be seen on **Plate 2.8**, there were four alignment options presented at alignment stage consultation as a part of Section 3. These were:

- S3 UGC Alignment Option 1 (S3-UGC-1). Proposed to be UGC.
- S3 UGC Alignment Option 2 (S3-UGC-2). Proposed to be UGC.
- S3 OHL-UGC Alignment Option 1 (S3-OHL-UGC-1). Proposed to be a combination of both OHL and UGC.
- S3 OHL-UGC Alignment Option 2 (S3-OHL-UGC-2). Proposed to be a combination of both OHL and UGC.

Plate 2.8: Section 2 and Section 3 Alignment Options



Preferred Alignment Option and Design Solution

2.10.7 The preferred alignment and design solution put forward from the above was **S1A-OHL-1** combined with **S1A-C-1** and **S1A-D-1**, followed by **S2-OHL-2** and **S3-OHL-UGC-2**. This included the design solution of a combined OHL and UGC. It was considered to provide an optimum balance of environmental, technical and cost factors. Further breakdown of the preference across environmental, technical and cost factors is included in the following paragraphs.

2.10.8 From an environmental perspective, the key topics of consideration in the alignment selection process were:

- in relation to protected species, OHL alignment options would allow infrastructure to span watercourses and adjacent suitable habitat. Therefore, there was considered to be a preference for utilising OHL options where possible.
- in relation to habitats, all alignment options included an unavoidable impact on peatland habitats. All alignment options predominantly would affect blanket bog habitat, albeit much of this is degraded and actively eroding. Generally, OHL alignment options were considered preferable for habitats as the area impacted is less than a UGC corridor, as were alignment options that followed existing infrastructure and/or previously disturbed ground.
- in relation to ornithology, there was no real preference, although the UGC alignments could have less of a potential impact overall compared with a OHL. Of the two OHL options in Section 1A (S1A-OHL-1 and S1A-OHL-2), the preferred from an ornithological perspective was S1A-OHL-1 as this alignment option would be further away from the ridgeline between Carn na Gourach and Meall na h-Aisre, where raptor species were regularly recorded;

- in relation to cultural heritage assets, S1A-OHL-2 and S1B-C-5 were the least preferred, due to them crossing a linear feature representing an estate boundary at least twice and running over or closely by it for up to approximately 1 km; and
- in relation to landscape and visual, the UGC options were preferrable as effects would be more temporary in nature.

2.10.9 From a technical perspective, the key areas of consideration in the alignment selection process were:

- In relation to angle towers, S1A-OHL-1 was considered to be preferrable. As such S1A-OHL-1 combined with S1A-C-1 and S1A-D-1 was considered the preference within Section 1A and Section 1B.
- S2-OHL-2 was the preferred engineering OHL alignment within Section 2, as it better complements the alignment of the OHL as it transitions from Section 1 and there would be no requirement of an angle tower at Junction B.
- Alignment options S3-OHL-UGC-2 and S3-UGC-2 were preferred from an engineering perspective as they would follow the existing access track and Stronelairg UGC into Melgarve substation. These options would also benefit from favourable slope gradients.

2.10.10 Costs were not assessed in detail as part of the alignment selection process but were considered during development design meetings in which the alignment options were discussed. Given the nature and extent of the Proposed Development, it was felt unnecessary to assess the differentials between each option for all of the criteria for elements such as Public Road Improvements, Land Assembly, Consent Mitigations and Operational requirements as these would be negligible. The following provides an overview of the main considerations relating to costs and reflects the differential in construction costs, felling and replanting cost, Biodiversity Net Gain costs and diversions of existing utilities for each section:

- For Section 1A, S1A-OHL-1 represented the overall preference as it would have the least anticipated cost, followed by S1A-OHL-2 with S1A-D-2 and S1A-C.
- For Section 1B, S1B-C-4 represented the overall preference in terms of costs to connect to Cloiche Wind Farm on-site substation. Assuming it would connect into S1B-C-4 at Cloiche Wind Farm on-site substation, alignment option S1B-D-6 was the preference to connect to Dell 2 Wind Farm on-site substation from a costs perspective.
- For Section 2, S2-OHL-1 represented the preference from a cost perspective, followed by S2-OHL-2.
- For Section 3, S3-OHL-UGC-2 represented the preference from a cost perspective, followed by S3-OHL-UGC-1.

2.10.11 Given the somewhat conflicting preferences across environmental and engineering topic considerations the choice of a proposed alignment was not clear cut. While there were some slight preferences for particular alignments from an environmental perspective, the differences between the options were subtle. Whereas there was often a clear engineering preference focused on the technical feasibility of constructing each of the options. This balance was taken into careful consideration when coming to an overall proposed alignment, whilst also considering SSEN Transmission's obligations to develop an efficient, co-ordinated and economical system of electricity transmission, and the contracted position between SSEN Transmission and the Cloiche and Dell 2 wind farm developers. As stated above, the preferred alignment taken forwards to alignment stage consultation was **S1A-OHL-1** combined with **S1A-C-1** and **S1A-D-1**, followed by **S2-OHL-2** and **S3-OHL-UGC-2**.

2.10.12 From an environmental perspective, while these alignment options may be considered slightly less preferable from an LVIA and ornithology standpoint, they would minimise potential disturbance to peatland habitats, protected species and watercourses. From a technical perspective, these alignment options were reasonable

options in terms of construction, and there was a clear preference for UGC at the higher elevations connecting into the on-site substations given the constraint posed by the wind turbine wake effect with preference for OHL due to terrain elsewhere. For all sections, from an economic perspective it is the case the OHL is a more cost-effective and reliable technology at this challenging elevation and topography (leading to reduced maintenance costs).

2.11 Alignment Selection (Stage 3): Reporting and Consultation

2.11.1 The alignment selection stage reporting and consultation is described in in **Appendix 4.1 - Public Consultation Report** associated with **Chapter 4 – Scope and Consultation**.

Alignment Stage Consultation Responses

2.11.2 At alignment stage, the consultation process for the Proposed Development raised a number of comments seeking further understanding and justification for the use of OHL rather than UGC for parts of the connection. Comments also sought clarification or set requirements for further assessment, particularly in relation to landscape and visual and ornithological constraints. These points included recommendations for continued consultation with stakeholders, and the importance of various surveys / assessments for landscape and visual considerations as the project progresses. The importance of the surrounding infrastructure as existing operational assets was also highlighted by stakeholders.

2.11.3 Some of the key themes discussed in person with members of the public at consultation events held at alignment selection stage related to technology types including the use of OHL and UGC, traffic concerns regarding the main access roads for construction and hours of HGV traffic, and timings on key project steps.

2.11.4 Peatland habitats and Policy 3 of the Fourth National Planning Framework (NPF4) was highlighted by statutory and non-statutory consultees as it would be particularly relevant when considering the implications of this proposal. The importance of Wild Land Areas (WLAs) was also highlighted given the project's proximity to WLAs and the potential for significant effects to arise.

2.11.5 A lot of the statutory and non-statutory consultees, referred to their previous comments on the Melgarve Cluster Project provided at route stage. They suggested that these comments remained valid.

The Applicant Response to Route Stage Consultation Responses

2.11.6 **Appendix 4.1 – Public Consultation Report** associated with **Chapter 4 – Scope and Consultation** provides the SSEN Transmission project responses to the consultation responses received at alignment stage consultation, along with confirmation of the action to be taken, where relevant.

2.11.7 The concerns of stakeholders in relation to the use of OHL rather than UGC for parts of the connection and the need for the protection of existing infrastructure were noted by SSEN Transmission, and justification for the use of OHL over UGC was set out in the June 2023 Alignment Stage Report on Consultation.[10] Ultimately, the decision to progress with an UGC solution through the existing (Stronelairg), the consented (Cloiche) and the proposed (Dell 2) wind farms was dictated by technical requirements given it is not possible to achieve an OHL alignment through these areas due to the proximity to wind turbines and the resultant 'wake effect' that can lead to premature fatigue and failure of the OHL. As a result, an UGC was deemed to be required on this project at higher elevations through the wind farms. SSEN Transmission has and will continue to liaise closely with each wind farm developer with respect to any potential interfaces with the UGC and wind farm infrastructure. A section of UGC would also be required for the final approach to Melgarve substation in order to cross under the Beauly-Denny 400 kV line.

[10] Melgarve Cluster Project: Report on Consultation – Alignment Options (June 2023), produced by SSEN Transmission

2.11.8 For the remainder of the Proposed Development, an OHL solution is stipulated. This is in line with SSEN Transmission's obligations to develop an efficient, co-ordinated and economical system of electricity transmission, and the contracted position between SSEN Transmission and the Cloiche and Dell 2 wind farm developers. In Environmental terms, it is also considered that the use of OHL has advantages over UGC in terms of its ability to span over and therefore reduce impacts on sensitive habitats, biodiversity and watercourses. This accords with the requirements of NPF4 (which was introduced between the routeing and alignment stages) which seeks to minimise impacts on Peat. In Engineering terms, there are clear cut advantages in using OHL over UGC, including in terms of traversing terrain, rock and water as well as in terms of maintenance.

2.11.9 Further justification for the use of OHL over UGC as set out in the June 2023 Alignment Stage Report on Consultation[10] included:

- Although land has already been disturbed in the area from Junction B down to Melgarve substation by the existing Stronelairg UGC, consideration was given to the interaction between the existing Stronelairg UGC and any potential future UGC circuits. UGC circuits generate heat, and the performance/rating of a cable is impacted by the temperature that it can safely be operated at. The inclusion of additional UGC circuits in proximity results in an increase in the heating of the surrounding soil mass and would therefore negatively impact the existing Stronelairg UGC circuit and the existing capacity for which it is designed. Furthermore, the heating effect of the existing Stronelairg UGC on any potential future UGC circuits for Cloiche and Dell 2 wind farms would result in the need of an easement width that well exceeds the width of previously disturbed ground. Issues of thermal interaction can be exacerbated in areas of deepening which are necessary to cross watercourses and other natural obstacles. As soil temperatures increase with depth, circuit spacing would have to increase further in these cases. An additional construction easement width of approximately 40 m over undisturbed ground would be envisaged to accommodate any new UGC for the potential Cloiche and Dell circuits where they run in proximity to the existing Stronelairg UGC. Given these technical constraints, and to minimise disturbance to habitats and watercourse, an OHL solution from Junction B to Melgarve substation was preferred.

- Resilience of an UGC circuit has also been considered. While reliability of UGC is generally good with relatively low failure rates, SSEN Transition must consider contingency scenarios should remedial works become necessary in order to maintain operation of the circuit or re-establish operation in the shortest possible timeframe. The size and weight of plant necessary for the excavation, retrieval and replacement of UGC and associated joints well exceeds that of an OHL and would be impractical to do so should that ever become a necessity in winter. Experience with the installation of the Stronelairg UGC has demonstrated these challenges and is another key factor in the technology selection.

- Maintenance of a line in the future has also been considered. In the event of a fault on a line, the fault can be detected and rectified in a matter of days with OHL. However, if a fault occurs in an UGC, the time needed to locate and rectifying the fault increases and could potentially take months to fix and cause ongoing disruption to the land.

- Undergrounding a line would result in increased impact to the surrounding ground, as well as the overall footprint of the project given the working corridor required to install an UGC. It is considered that this can increase potential to damage local environments during construction.

2.11.10 SSEN Transmission continued correspondence, and in some cases had follow-up meetings, with the following stakeholders to discuss comments and possible infrastructure interfaces further:

- SIMEC (Glenshero WF and Jahama Highland Estate);
- SSE Generation Limited as owner/operator of Glendoe hydro scheme;

- SSE Renewables (Cloiche WF); and
- Stonelairg Wind Farm (SWFL).

2.11.11 The continued correspondence often related to the surrounding infrastructure as existing operational assets and how the Proposed Development would exist in their context. Details of 'as built' infrastructure was utilised in the design of the Proposed Development to ensure there would be no significant impacts on any existing operational assets.

2.11.12 As set out in **Appendix 4.1 - Public Consultation Report** associated with **Chapter 4 – Scope and Consultation**, and in the June 2023 Alignment Stage Report on Consultation,[10] the alignment selection process involved consideration of the potential landscape and visual effects of the OHL. Further assessment has since been included in the EIA stage, and a landscape and visual impact assessment (LVIA) has been included in the EIA Report.

2.11.13 A Transport Assessment (TA) that sets out the main access roads for construction and hours of HGV traffic, and timings on key project steps for the Proposed Development, with justifications for the suitability of those routes has been included as an **Appendix 11.1 – Transport Assessment** of the EIA Report.

2.11.14 SSEN Transmission have continued to engage with consultees as the project has progressed in relation to peat depths, peat quality and habitat survey results. Potential effects on WLAs have been considered in developing the Proposed Development. The Proposed Development would not be situated within the WLA and would be seen only in the context of other similar developments including the Melgarve substation and Beauly–Denny 400 kV OHL from within a very small and peripheral part of it. It is therefore considered that Proposed Development would be unlikely to lead to any significant loss of wild land characteristics within the WLA and a WLA assessment has not been included in the EIA Report.

2.11.15 All comments and considerations raised through the alignment stage consultation, as well as those resulting from any further meetings and liaison with stakeholders were taken forwards to the EIA and consenting stage, through which assessments will be carried out for all relevant environmental aspects. The process remained inclusive, seeking further consultation where appropriate.

2.11.16 The reporting on the consultation[10] process concluded that the preferred alignment identified within the route stage consultation report[9] would be taken forward to the EIA and consenting stage as the proposed alignment option. The proposed alignment option was therefore **S1A-OHL-1** combined with **S1A-C-1** and **S1A-D-1**, followed by **S2-OHL-2** and **S3-OHL-UGC-2**, as it was considered to provide an optimum balance of environmental, technical and cost factors (see **Figure 2.3**).

2.12 Further Consideration of Alternatives during the EIA Process

2.12.1 The Proposed Development's response to scoping responses is described in detail in **Chapter 4 – Scope and Consultation** with a Scoping Matrix making up **Appendix 4.5 – Scoping Matrix**.

2.12.2 The work that was undertaken during the route and alignment stages of the Proposed Development enabled a rigorous consideration of reasonable alternatives with respect to route options, alignment selection and the consideration of design solutions available for the project. Further review of the proposed alignment during the EIA stage of the project by the engineering and environmental teams has resulted in greater utilisation of proposed wind farm access tracks and some minor adjustments to the alignment.

2.12.3 Most notably, SEPA raised some comments on 26th of December 2023 in relation to potential design changes to minimise impacts on peat and hydrology. The Applicant reviewed these comments and endeavoured to make these changes, , where practicable. These design changes are described in **Table 2.1** below.

Table 2.1: Summary of Further Consultee Engagement

SEPA Comment	Design Response
The northern (Dell 2 Wind Farm) UGC should follow disturbed areas/tracks as much as possible to avoid deep peat, and the alignment should also be revised to show that there is a buffer of least 50 m away from watercourses.	The northern (Dell 2 Wind Farm) UGC alignment was moved to the east to avoid watercourses and areas of deeper Peat.
Suggestion for slight change to UGC route adjacent to the Stronelairg access tracks to minimise peat disturbance.	This is restricted by the proximity to the existing Stronelairg access tracks, and existing cables which run alongside this (this was not clear from the plans submitted at this time).
Suggestion for slight alignment changes on the Cloiche Wind Farm UGC route to reduce peat disturbance.	UGC alignment moved where feasible, but it was not always possible due to the position of joint bays envisaged alongside the proposed Cloiche access track to reduce the amount of permanent tracks required.
Suggestion for Tower 4 to be moved further north to reduce Peat disturbance	This was assessed but due to the complex relationship between the tower loadings/spacings, topography and water courses this change was not taken forward.
Good to see some towers located in shallowed peat in the vicinity.	This was noted.
Suggest new track at least 50 m from watercourses (smaller buffer may be acceptable if justified)	The proposed track position represents a re-instatement of a former track so would minimise impact on undisturbed land.

2.12.4 The final alignment of the Proposed Development is discussed further in Chapter 3 - The Proposed Development and presented in Figure 3.1a-b.