

Consultation Document

Coire Mashie Substation and Earba Pumped Storage Hydro Scheme Grid Connection Project

September 2026

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GLOSSARY

Term	Definition
Air Insulated Switchgear (AIS)	An Air Insulated Switchgear (AIS) substation uses air insulation technology in a metal-clad system.
Alignment	A centre line of an overhead line or underground cable.
Alignment Option	A distinct alignment option through an identified proposed route.
Alignment (proposed)	An alignment taken forward to consent application following stakeholder consultation. It comprises a defined centre line for the overhead line or underground cable, also specifying access arrangements and any associated construction facilities.
Alignment Variant	An alternative section of an alignment where there are different ways to avoid a localised constraint(s).
Amenity	The natural environment, cultural heritage, landscape and visual quality. Also includes the impact of SSEN Transmission's works on communities, such as the effects of noise and disturbance from construction activities.
Ancient Woodland Inventory (AWI)	The Ancient Woodland Inventory (AWI) is a provisional guide to the location of Ancient Woodland. It contains three main categories of woodland: Ancient Woodland (1a and 2a); Long-established woodlands of plantation origin (LEPO) (1b and 2b); and other woodlands on 'Roy' woodland sites (3).
Biodiversity Net Gain (BNG)	A process intended to leave nature in a better state than it started using good practice principles established by the Business and Biodiversity Offset Programme (BBOP) and organisations including CIRIA, CIEEM and IEMA.
Cairngorms National Park (CNP)	A national park and statutory designation in north-east Scotland, established in 2003. The Cairngorms National Park stretches 4,528 km ² and includes the towns of Aviemore, Kingussie, Grantown-on-Spey and Ballater. The planning system within the park is managed by the Cairngorms National Park Authority.
Conductor	A metallic wire strung from structure to structure, to carry electric current.
Consultation	The dynamic process of dialogue between individuals or groups, based on a genuine exchange of views and, normally, with the objective of influencing decisions, policies or programmes of action.
Corridor	A linear area which allows a continuous connection between the defined connection points. The Corridor may vary in width along its length; in unconstrained areas it may be many kilometres wide.
ECU	Energy Consents Unit
Environmental Impact Assessment (EIA)	A formal process for identifying, assessing and reporting the likely significant environmental effects of a proposed development, undertaken in accordance with the relevant EIA Regulations. For this project, the relevant Regulations are The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
Gas Insulated Switchgear (GIS)	A Gas Insulated Switchgear (GIS) substation uses enclosed switchgear technology which allows electrical safety clearances and overall land requirements to be reduced compared to a conventional Air Insulated Switchgear (AIS) substation.
GWDTE	Groundwater Dependent Terrestrial Ecosystems
Habitat	Term most accurately meaning the place in which a species lives, but also used to describe plant communities or agglomerations of plant communities.
Kilovolt (kV)	One thousand volts.

Term	Definition
Listed Building	Building included on the list of buildings of special architectural or historic interest and afforded statutory protection under the 'Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997' and other planning legislation. Classified categories A – C(s).
LoD	Limits of Deviation
Micrositing	The process of positioning infrastructure to avoid localised environmental or technical constraints.
Mitigation	Term used to indicate avoidance, remediation, or alleviation of adverse impacts.
Overhead line (OHL)	An electric line installed above ground, usually supported by towers or poles.
Plantation Woodland	Woodland of any age that obviously originated from planting.
PSH	Pumped Storage Hydro
Route	A linear area of approximately 1 km width (although this may be narrower/wider in specific locations in response to identified pinch points / constraints), which provides a continuous connection between defined connection points.
Route (proposed)	A route taken forward following stakeholder consultation to the alignment selection stage of the overhead line routeing process.
Routeing	The work undertaken which leads to the selection of a proposed alignment, capable of being taken forward into the consenting process.
Scheduled Monument	A monument which has been scheduled by the Scottish Ministers as being of national importance under the terms of the 'Ancient Monuments and Archaeological Areas Act 1979'.
Sites of Special Scientific Interest (SSSI)	Areas of national importance. The aim of the SSSI network is to maintain an adequate representation of all natural and semi-natural habitats and native species across Britain.
Span	The section of overhead line between two structures.
Special Area of Conservation (SAC)	An area designated under the EC Habitats Directive to ensure that rare, endangered, or vulnerable habitats or species of community interest are either maintained at or restored to a favourable conservation status.
Special Landscape Area (SLA)	Landscapes designated by The Highland Council which are considered to be of regional/local importance for their scenic qualities.
Special Protection Area (SPA)	An area designated under the Wild Birds Directive (Directive 2009/147/EC) to protect important bird habitats.
Stakeholders	Organisations or individuals who can affect or be affected by the works.
Substation	A node on the network to allow safe control of the electricity network. This could include convergence of multiple circuits, transformation of voltage or other functions to maintain and operate the electricity network.
Substation Site	Site identified as necessary to deliver all the substation infrastructure requirements e.g. platform, internal access, temporary construction area, drainage including sustainable drainage systems (SuDS) and landscaping.
Substation Platform	Area of the stone platform required for the HV infrastructure.
THC	The Highland Council
Underground Cable (UGC)	An electric cable installed below ground, protected by insulating layers and marked closer to the surface to prevent accidental damage through later earthworks.
Wayleave	An agreement entered into between SSEN Transmission and a landowner upon whose land an overhead line is to be constructed.

PREFACE

This Consultation Document has been prepared by ASH design+assessment Ltd. (ASH) on behalf of Scottish and Southern Electricity Networks Transmission (SSEN Transmission). SSEN Transmission, operating under licence held by Scottish Hydro Electric Transmission plc, owns, operates and develops the high voltage electricity transmission system in the north of Scotland and remote islands.

SSEN Transmission is proposing a new electricity connection to connect the consented Earba Pumped Storage Hydro (PSH) Scheme to the national electricity transmission network. The project comprises:

- a new 400 kV substation at Coire Mashie, referred to as Coire Mashie Substation;
- diversion of the existing Beaully-Denny 400 kV overhead line (OHL) to connect the substation into the transmission network; and
- a new 400 kV underground cable (UGC) between the Earba PSH Scheme and Coire Mashie Substation.

The proposed substation, UGC and associated OHL works are being developed together as a single project. The environmental effects of all elements will be assessed together through a coordinated Environmental Impact Assessment (EIA) process, although different statutory consents are required for different parts of the project.

The purpose of this Consultation Document is to:

- provide information on the proposed Coire Mashie Substation, including updates to the proposed technology solution and site location since previous consultation;
- provide information on the proposed diversion of the existing Beaully-Denny 400 kV overhead line required to connect Coire Mashie Substation into the transmission network;
- explain the alignment selection process undertaken for the Earba PSH Scheme Grid Connection; and
- seek comments on the UGC alignment options under consideration prior to the identification of a proposed alignment.

Comments are welcomed on all aspects of the project.

The Consultation Document is available online at the project website:

<https://www.ssen-transmission.co.uk/projects/project-map/new-coire-mashie-400kv-substation-and-earba-psh-connection/>

A Public Consultation event detailing the proposals described in this document will be held at the following date and location:

- 7th October 2026 at Laggan Community Hall, Laggan Bridge by Newtonmore, Inverness-shire, PH20 1AN, between 15:00 hours and 19:00 hours

Comments regarding this document should be sent to:

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All comments are requested to by **6th November 2026**.

EXECUTIVE SUMMARY

Scottish and Southern Electricity Networks Transmission (SSEN Transmission) operating under licence held by Scottish Hydro Electric Transmission plc, is proposing a new electricity connection to connect the consented Earba Pumped Storage Hydro (PSH) Scheme to the national electricity transmission network. The project comprises:

- a new 400 kV substation near Laggan in the Scottish Highlands (“Coire Mashie Substation”);
- diversion of the existing Beaulay-Denny 400 kV overhead line (OHL) to connect the substation into the transmission network; and
- a new 400 kV underground cable (UGC) between the Earba PSH Scheme and Coire Mashie Substation.

The Earba PSH Scheme itself is being developed by Gilkes Energy Ltd. The Section 36 application for the PSH scheme was submitted to the Energy Consents Unit of the Scottish Government in March 2024 (ECU reference number: ECU00005062),¹ and was consented in March 2025.

The proposed Coire Mashie Substation has previously been subject to public consultation and a site selection process.² Following further engineering and design development, SSEN Transmission is now proposing an indoor Gas Insulated Switchgear (GIS) solution utilising SF6-free technology, rather than an Air Insulated Switchgear solution as previously proposed. The adoption of this technology has reduced the required operational footprint of the substation and enabled refinement of the proposed substation location. As a result, the proposed substation site has been moved from the location presented during the 2025 consultation. The revised site benefits from a greater enclosure by existing forestry, providing improved natural screening from nearby roads and residential properties and reducing its visibility within the wider landscape.

This Consultation Document also presents the findings of the alignment selection process undertaken for the Earba PSH Grid Connection. Following completion of a route selection study in 2025²³, a Proposed Route was identified (see **Figure 1**) between the Earba PSH Scheme and Coire Mashie. Within this Proposed Route, a number of technically feasible and economically viable UGC alignment options have subsequently been developed and appraised.

The alignment options have been assessed against a range of environmental, engineering and cost considerations in order to identify a preferred alignment for the project. These include biodiversity, peatland, forestry, landscape and visual considerations, cultural heritage, engineering constraints, constructability and operational requirements.

The proposed Beaulay-Denny overhead line diversion is limited in extent and has been developed as a direct connection into the proposed substation. Consequently, alternative route or layout options were not identified for appraisal.

The proposed substation, UGC connection and overhead line works are being developed together as a single integrated project. The environmental effects of all elements will be assessed through a coordinated Environmental Impact Assessment (EIA) process and reported within a single EIA Report, although separate statutory consents will be required for different project components.

¹ ECU (2024) *Earba 1,800MW Pumped Storage Hydro Scheme*, [online] Available at: <https://www.energyconsents.scot/ApplicationDetails.aspx?cr=ECU00005062>.

² SSEN Transmission (2025), *Coire Mashie Substation: Consultation Document (Site Selection)*, [online] Available at: <https://www.ssen-transmission.co.uk/projects/project-map/new-coire-mashie-400kv-substation-and-earba-psh-connection/>.

³ SSEN Transmission (2025), *Coire Mashie Substation: Report on Consultation Document (Site Selection)*, [online] Available at: <https://www.ssen-transmission.co.uk/projects/project-map/new-coire-mashie-400kv-substation-and-earba-psh-connection/>.

Following consultation and review of the responses received, SSEN Transmission will identify a proposed UGC alignment and refine the design of the proposed Coire Mashie Substation and associated OHL works ahead of the EIA and consenting stage.

When providing comments and feedback on this Consultation Document, SSEN Transmission would be grateful for your consideration of the questions below:

- 1. Has the need for the project been clearly explained?**
- 2. Do you have any comments on the proposed Coire Mashie Substation, including the proposed technology solution and site location?**
- 3. Do you have any comments on the UGC alignment options presented?**
- 4. Do you have any comments on the proposed Beauuly-Denny reconfiguration?**
- 5. Are there any additional factors, or environmental features, that you consider important and should be brought to the attention of the project team?**
- 6. Do you have any suggestions that could help inform the ongoing design and development of the project?**
- 7. Do you have any community benefit opportunities or local initiatives that SSEN Transmission should consider supporting?**

1. INTRODUCTION

1.1 Purpose of Document

1.1.1 This Consultation Document has been prepared by ASH Design and Assessment Ltd. on behalf of Scottish and Southern Electricity Networks Transmission (SSEN Transmission). SSEN Transmission, operating under licence held by Scottish Hydro Electric Transmission plc, owns, operates and develops the high voltage electricity transmission system in the north of Scotland and remote islands.

1.1.2 SSEN Transmission is proposing to construct and operate the Coire Mashie Substation and Earba Pumped Storage Hydro Scheme Grid Connection Project (the Project). The Project is required to connect the consented Earba Pumped Storage Hydro (PSH) Scheme to the electricity transmission network and comprises:

- a new 400 kV substation near Laggan in the Scottish Highlands ("Coire Mashie Substation");
- diversion of the existing Beaully-Denny 400 kV overhead line (OHL) to connect the substation into the transmission network; and
- a new 400 kV underground cable (UGC) connecting the Earba PSH Scheme to Coire Mashie Substation.

1.1.3 The Project has been subject to a programme of design development and consultation. Previous consultation has been undertaken on the selection of a site for Coire Mashie Substation and the routeing of the Earba PSH Scheme Grid Connection.^{2,3} Following this work, a proposed substation site and a Proposed Route for the UGC connection were identified.

1.1.4 The purpose of this Consultation Document is to:

- provide information on the proposed Coire Mashie Substation, including updates to the proposed technology solution and site location since previous consultation;
- provide information on the proposed diversion of the existing Beaully-Denny 400 kV overhead line required to connect Coire Mashie Substation into the transmission network;
- explain the alignment selection process undertaken for the Earba PSH Scheme Grid Connection; and
- seek comments on the UGC alignment options under consideration prior to the identification of a proposed alignment.

1.1.5 The Project is being developed as a single integrated project. The environmental effects of the proposed substation, UGC connection and associated OHL works will be assessed together through a coordinated EIA process and presented within a single EIA Report. However, separate statutory consents will be required for different project components. Planning permission will be sought for the proposed substation, underground cable connection and ancillary works, whilst consent under Section 37 of the Electricity Act 1989 will be sought for the reconfiguration and connection of the existing Beaully-Denny 400 kV overhead line and associated electrical infrastructure. Despite the requirement for separate applications, the Project will be assessed as a single project for EIA purposes.

1.1.6 A principal objective of the current consultation is to seek stakeholder and community feedback on the UGC alignment options presented within this document before a proposed alignment is identified. Comments are also welcomed on the proposed Coire Mashie Substation and associated Beaully-Denny OHL diversion. This document, together with further information in relation to public consultation events, can be accessed on the project website.⁴

⁴ SSEN Transmission (2026), Coire Mashie and Earba PSH Connection [online] Available at: <https://www.ssen-transmission.co.uk/projects/project-map/new-coire-mashie-400kv-substation-and-earba-psh-connection/>

1.2 Document Structure

1.2.1 This report is comprised of the following sections:

1. Introduction – sets out the purpose of the Consultation Document and document structure;
2. Project Overview – describes the Project, explains the need for the development, outlines the proposed substation, UGC and OHL works, and summarises anticipated construction activities;
3. UGC Alignment Selection – sets out the process that has been applied in the appraisal of alignment options for the Earba PSH Scheme Grid Connection;
4. Site Selection – summarises the site selection process for Coire Mashie Substation and explains subsequent design development, including technology selection and refinement of the proposed site;
5. Description of Alignments – describes the alignment options that have been identified for Earba PSH Scheme Grid Connection;
6. Comparative Appraisal of UGC Alignment Options – appraises the alignment options against a series of environmental, engineering and cost considerations to arrive at a Preferred Alignment;
7. Summary of Comparative Appraisal – provides a summary of the key findings of the UGC alignment appraisal; and
8. Next Steps – outlines the next steps.

1.2.2 The main body of this document is supported by one appendix and a series of figures which are included at the end of this document.

2. PROJECT OVERVIEW

2.1 Need for the Project

- 2.1.1 SSEN Transmission has a statutory duty under Schedule 9 of the Electricity Act 1989 to develop and maintain an efficient, co-ordinated and economical system of electricity transmission. SSEN Transmission has obligations to offer non-discriminatory terms for connection to the transmission system.
- 2.1.2 The project is required to connect the consented Earba PSH Scheme to the electricity transmission network. The PSH Scheme is being developed by Gilkes Energy Ltd., and would operate by transferring water between a lower reservoir, Loch Earba and an upper reservoir, Loch a' Bhealaich Leamhain (Loch Leamhain). The Section 36 application for the PSH scheme was submitted to the Energy Consents Unit of the Scottish Government in March 2024 (ECU reference number: ECU00005062)⁵ and was consented in March 2025. The current proposed capacity of the Earba PSH Scheme is 1,800 MW.
- 2.1.3 A new substation, referred to as Coire Mashie substation, would also be required to facilitate the connection to the Beaulay - Denny 400 kV OHL to enable onward transmission of electricity. The proposed Coire Mashie substation has been subject to a separate site selection exercise, but the EIA and consenting stage for the Earba PSH Scheme Grid Connection and Coire Mashie Substation will be combined. A diversion and tie-in to the existing Beaulay-Denny overhead line (OHL) to facilitate the connection to the electricity transmission network will also be a part of the future application.

National Planning Policy

- 2.1.4 Scotland's fourth National Planning Framework (NPF4) was published by the Scottish Government on 13th February 2023⁶. NPF4 is a long-term strategy for Scotland (to 2045) that guides spatial development, sets out national planning policies, designates national developments and highlights regional spatial priorities. Alongside adopted local development plans, NPF4 now forms part of the statutory development plan for decision making in Scotland. In NPF4, transmission infrastructure is supported in both National Development ND3 'Strategic Renewable Electricity Generation and Transmission Infrastructure' and in Policy 11 Energy, however proposals are required to be assessed against all relevant development plan policies.
- 2.1.5 The Proposed Development would form a vital element to deliver network and grid infrastructure required to deliver the UK and Scottish Government's legally binding targets for net zero emissions and renewable energy generation and energy storage objectives.

2.2 Proposed Technology Solution – Substation

- 2.2.1 At the previous 2025 consultation event and in the Consultation Document (May 2025)², the proposed substation technology option was listed as Air-Insulated Switchgear (AIS), however this has since been reconsidered. It is now proposed that the new 400 kV Coire Mashie substation would comprise an indoor design utilising non-SF6 Gas Insulated Switchgear (GIS) technology (see **Section 4.3** for further discussion on this change). Additional 132 / 33 kV Grid Transformer and Static Compensator equipment would also be housed within the buildings.
- 2.2.2 Within a GIS substation, live electrical equipment typically uses a dense gas as the insulating medium, usually Sulphur Hexa-Fluoride (SF6). However, the proposed substation would use an alternative SF6 free technology solution in support of SSEN Transmission's commitments and responsibilities to the decarbonisation of the electricity network. GIS typically allows safe clearance distances between live conductors to be reduced. This results in a smaller footprint compared to the more traditional substations comprising AIS. High Voltage cable connections are proposed within the substation, increasing design flexibility and minimising the footprint.

⁵ ECU (2024) *Earba 1,800MW Pumped Storage Hydro Scheme*, [online] Available at: <https://www.energyconsents.scot/ApplicationDetails.aspx?cr=ECU00005062>.

⁶ Scottish Government (2023) *National Planning Framework 4*, [online] Available at: <https://www.gov.scot/publications/national-planning-framework-4/>.

2.3 Proposed Technology Solution – OHL Reconfiguration

- 2.3.1 In order to connect Coire Mashie Substation to the electricity transmission network, approximately 0.7 km of the existing Beauldy-Denny 400 kV overhead line (OHL) would be reconfigured. This would include the installation of replacement towers, temporary towers, conductors and associated downleads connecting the proposed substation to the reconfigured OHL (see **Figure 1b**).
- 2.3.2 Two existing towers on the Beauldy-Denny 400 kV OHL, would be replaced by two newly positioned towers. The replacement towers are anticipated to be a similar height to the existing towers, between approximately 50 m and 60 m in height. New OHL conductors would be installed, and downleads would connect the terminal towers to the proposed Coire Mashie substation.
- 2.3.3 Temporary OHL infrastructure would be required during construction to maintain transmission of electricity along the Beauldy-Denny 400 kV OHL while the permanent works are installed. This would comprise a temporary diversion of the line supported by three temporary towers. The temporary towers are anticipated to be between 50 m and 60 m in height.

2.4 Proposed Technology Solution - UGC

- 2.4.1 The proposed technology solution for the connection between Earba PSH Scheme and Coire Mashie Substation would be approximately 16 km of 400 kV UGC.

2.5 Construction Overview

General Construction Activities – Substation

- 2.5.1 To facilitate construction of the substation, the main elements associated with the construction phase are anticipated to include:
- Enabling works and site clearance;
 - Establishment of a temporary construction compound;
 - Establishment of suitable laydown areas for materials;
 - Construction of necessary access to the substation site, including upgrades to the local road network as required;
 - Ground works to achieve a level area at the proposed substation site;
 - Construction of perimeter and site drainage, including SuDS, where required;
 - Delivery of components and materials to site;
 - Construction and installation of the substation components and control building;
 - Installation of electrical plant;
 - Erection of a palisade security fence up to a minimum of approximately 2.4 m in height;
 - Remedial works to reinstate the immediate vicinity; and
 - Inspections and commissioning.

General Construction Activities – OHL Reconfiguration

2.5.2 The proposed reconfiguration of the exiting Beauly – Denny OHL would involve the following tasks:

- Establishment of one or more temporary construction compounds;
- Establishment of suitable laydown areas for materials;
- Construction of necessary access tracks / access solutions as required;
- Construction of a working area at each tower site affected by the works (new and existing);
- Delivery of structures and materials to site;
- Excavation and construction works associated with foundations;
- Assembly and erection of the temporary OHL towers;
- Transfer of conductors and earthwire onto the temporary diversion towers;
- Assembly and erection of the permanent OHL towers;
- Vegetation removal as required;
- Stringing of conductors and earthwire onto the new towers using pullers and tensioners;
- Connection of OHL into new substation;
- Dismantling of existing towers no longer required;
- Adjustment of existing towers to suit approach to the new substation; and
- Remedial works to reinstate the immediate vicinity.

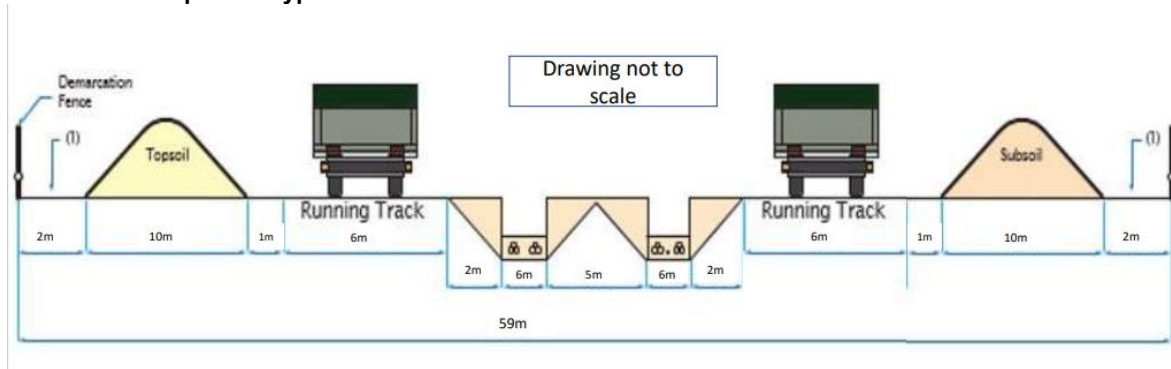
General Construction Activities – Underground Cable

2.5.3 To facilitate the UGC connection, the main elements associated with the construction phase are anticipated to include:

- Establish a working corridor (approximately 60 m wide) centred on the cable centreline;
- Installation of an access haul road and bridges where/if required;
- Excavate a trench up to 1.5 m in depth and 2 m wide, widening through benching and battering where stability and safety concerns arise;
- Clear out all materials likely to damage cable ducts, e.g. clods, rocks, stones and organic debris, and employ use of pumps to remove any water;
- Installation of ducting within the trench, surrounded by engineered backfill in suitable layers for protection, with protection tile and warning tape placed above the cable line, reinstatement to sub-soil level;
- Excavation and formation of power cable joint bays with above ground electrical link pillars and associated demarcation; reinstate excavated surface layers in reverse order;
- Transportation of and installation of power cable;
- Mobilisation of jointing containers and jointing of power cable;
- Reinstatement of joint bays and installation of fencing at link pillar locations; and
- Reinstatement excavated surface layers in reverse order.

2.5.4 **Plate 2.1** shows a diagram of a typical UGC construction corridor.

Plate 2.1: Example of a typical UGC construction corridor



Forestry Removal

- 2.5.5 Construction of the project may require the removal of sections of commercial forest, depending on the choice of the proposed UGC alignment. This would be undertaken in consultation with affected landowners, and the project would adhere to Scottish Government's Control of Woodland Removal Policy⁷.
- 2.5.6 Compensatory planting would comply with the UK Forestry Standard⁷ sustainable approach to forestry and associated guidelines which may apply, or any such replacement standard applied or proposed by the consenting authority. Planting would be supported by an approved replanting plan that would identify the following:
- The location to which replanting should be undertaken;
 - Species of tree to be replanted;
 - Woodland design plans;
 - Timing to which replanting should be undertaken;
 - Maintenance of replanted areas;
 - Monitoring methods of the replanted areas; and
 - Reporting standards to be met by the plan.
- 2.5.7 After felling, any timber removed that is commercially viable would be sold and the remaining forest materials such as arisings / brash would be mulched on site.
- 2.5.8 An Operational Corridor (OC) would be required through areas of woodland and commercial forestry to enable the safe operation and maintenance of the UGC and reconfigured OHL, including the temporary OHL works. The width of the OC would be variable depending on the nature of the woodland or forestry (based on species present) but is anticipated to be up to 90 m.

Access Strategy

- 2.5.9 Access would be taken via the A86. Currently there are a number of options being explored in relation to suitable access points along the A86. Upgrade works to junctions and tracks leading from the A86, as well as the establishment of new temporary and permanent access tracks to facilitate the construction and on-going maintenance of the Project, would be required.

Programme

- 2.5.10 It is anticipated that construction of the Project would take place over a 4-year construction period. Working hours are anticipated between approximately 07:00 to 19:00 on weekdays. Saturday working hours would be 07:00 to 13:00 with no working on Sundays anticipated at this stage. Working hours would be confirmed by the Principal Contractor and agreed with the Highland Council.

⁷ Forestry Commission Scotland (2009) Control of Woodland Removal Policy Available at: <https://www.forestry.gov.scot/publications/support-and-regulations/control-of-woodland-removal> [Accessed: May 2026]

2.6 Biodiversity Net gain

- 2.6.1 Biodiversity Net Gain (BNG) is an approach to development that aims to leave the natural environment in a measurably better state than it was pre-development. SSEN Transmission has developed a BNG toolkit based upon the Natural England metric⁸, which aims to quantify biodiversity based upon the value of habitats for nature. It is an efficient and effective method for demonstrating whether development projects have been able to maintain or increase the biodiversity value of a development site after construction works.
- 2.6.2 The BNG toolkit would be applied to the project to quantify the overall potential biodiversity impacts; this includes a biodiversity baseline assessment, analysis of habitat losses due to temporary works and permanent infrastructure, and analysis of biodiversity gains following reinstatement of habitats in areas of temporary construction work.

SSEN Transmission's Biodiversity Ambition

- 2.6.3 SSEN Transmission is committed to protecting and enhancing the environment by minimising the potential impacts from their construction and operational activities. As part of this approach, SSEN Transmission has made commitments within its Sustainability Strategy (2018)⁹, Sustainability Plan (2019)¹⁰ and RIIO-T2 Business Plan¹¹, for new infrastructure projects to:
- Ensure natural environment considerations are included in decision making at each stage of a project's development;
 - Utilise the mitigation hierarchy to avoid impacts by consideration of biodiversity in project design;
 - Positively contribute to the UN and Scottish Government Biodiversity strategies by achieving an overall 'No Net Loss' on new infrastructure projects gaining consent in 2020 onwards and achieving Net Gain on all new projects gaining consent in 2023 onwards; and
 - Work with their supply chain to gain the maximum benefit during asset replacement and upgrades.
- 2.6.4 The design and evolution of this grid connection project will be carried out in line with these commitments.

⁸ Natural England Biodiversity Metric 3.1 (2022) [online] Available at: <https://publications.naturalengland.org.uk/file/5450039124819968> [Accessed: August 2026].

⁹ Delivering a smart, sustainable energy future: The Scottish Hydro Electric Transmission Sustainability Strategy (2018) [online] Available at: <https://www.ssen-transmission.co.uk/media/2701/sustainability-strategy.pdf> [Accessed: August 2026].

¹⁰ Our Sustainability Plan: Turning Ambition into Action. (2019) SHE Transmission. [online] Available at: <https://www.ssen-transmission.co.uk/media/3215/our-sustainability-plan-consultation-report.pdf> [Accessed: August 2026].

¹¹ A Network for Net Zero - SSEN Transmission (2022) [online] Available at: <https://www.ssen-transmission.co.uk/information-centre/riio-t2-plan-and-uncertainty-mechanisms/> [Accessed: August 2026].

3. UGC ALIGNMENT SELECTION

3.1 UGC Alignment Selection Overview

- 3.1.1 The approach to alignment selection was informed by SSEN Transmission's guidance 'Procedures for Routeing Overhead Lines and Underground Cables of 132 kV and above'¹² which provides a framework to ensure environmental, technical and economic considerations are identified and appraised throughout the optioneering process.
- 3.1.2 The guidance splits the routeing stage of a project into four principal stages, as follows:
- Stage 0: Routeing strategy development;
 - Stage 1: Corridor Selection;
 - Stage 2: Route Selection; and
 - Stage 3: Alignment Selection.
- 3.1.3 Each stage is an iterative process and involves an increasing level of detail and resolution, bringing environmental, technical and cost considerations together in a way which seeks to achieve the best balance at each stage. The stages carried out can vary depending on the type, nature and size of a project and consultation is carried out at each stage of the process as appropriate.
- 3.1.4 The Earba PSH Scheme Grid Connection is currently at Stage 3: Alignment Selection, the objective of which is to identify a Proposed Alignment prior to commencing the EIA and consenting stage.

3.2 Stage 1: Corridor Selection

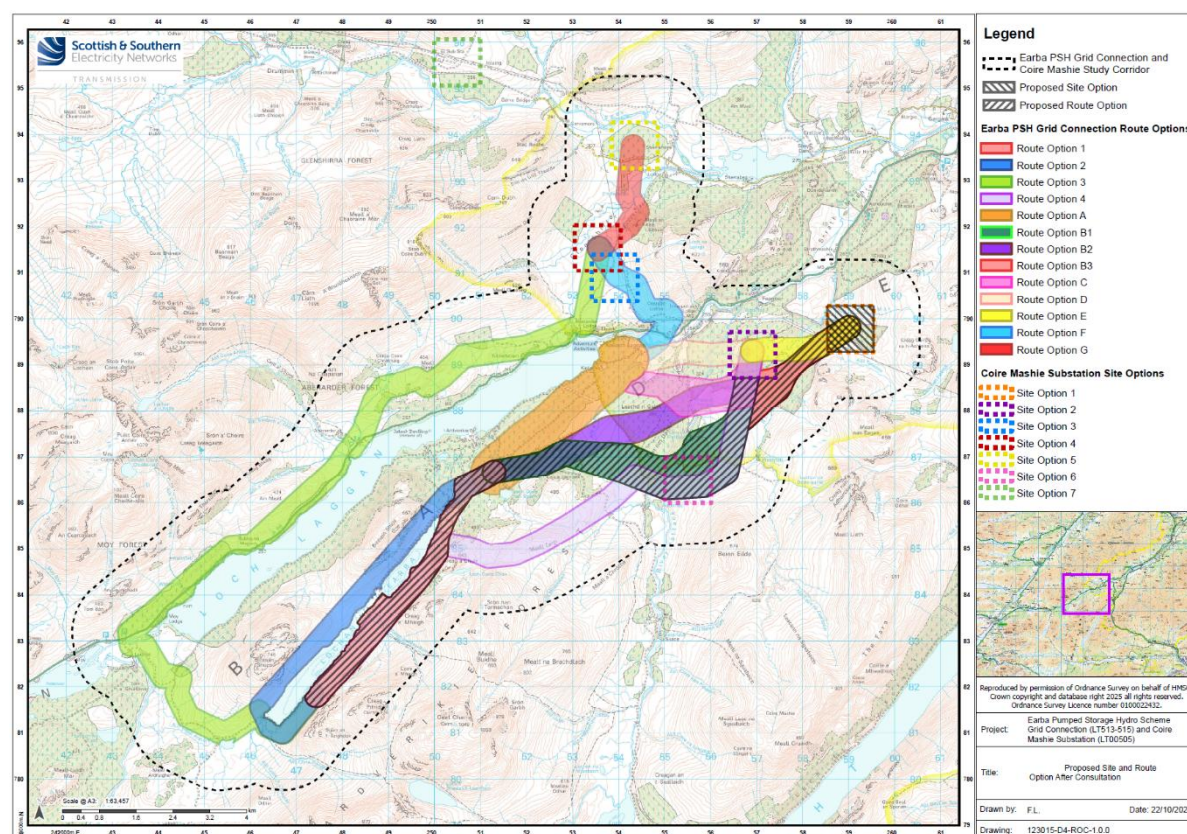
- 3.2.1 Multiple corridor options were not identified due to the distance and geography between the identified connection points (the Earba PSH scheme and the proposed Coire Mashie substation site options), which constrained any alternative corridor options.

3.3 Stage 2: Route Selection

- 3.3.1 The Route Selection process was carried out between May 2025 and December 2025. 13 route options up to 1 km in width were considered between the consented PSH scheme and site options identified as part of a separate site selection exercise for the proposed Coire Mashie substation. The Route Selection process concluded with the identification of a Proposed Route based on comparative route option appraisals and subsequent consultation with statutory consultees and other stakeholders. **Plate 3.1** below shows the route options considered and the Proposed Route that was concluded upon. The Proposed Route can also be seen on **Figure 1**.

¹² SSEN Transmission (2020). Procedures for Routeing Overhead Lines and Underground Cables of 132 kV and above, Revision 2.

Plate 3.1 – Route Options and Proposed Route



3.4 Stage 3: Alignment Selection

3.4.1 Feasible and economically viable alignment options which are likely to be the shortest connection while avoiding or minimising interaction with the environmental constraints have been identified within the Proposed Route based on the key environmental and engineering constraints identified during Stage 2: Route Selection. A total of seven alignment options have been established within the Proposed Route. All alignment options are shown on **Figure 1** and described further in **Section 5** of this document.

3.5 Appraisal Method

3.5.1 The appraisal of alignment options has involved systematic consideration of the environmental, engineering and cost topic areas set out within the SSEN Transmission guidance¹². These topic areas, listed below, have been used to identify and compare the relative opportunities and constraints associated with each alignment option.

Environmental Criteria

- Natural Heritage – designations, protected species, habitats, ornithology, and hydrology, geology & hydrogeology;
- Cultural Heritage – designations and cultural heritage assets;
- Landscape and visual – designations, landscape character and visual;
- Land Use – agriculture, forestry and recreation; and
- Planning – policy and proposals.

Engineering Criteria

- Infrastructure Crossings – major crossings (overhead lines, rail, river, navigable canal, gas or hydro pipeline) and road crossings;
- Environmental Design – elevation, contaminated land, pollution and flooding;
- Ground Conditions – terrain, rock and peat;
- Construction and Maintenance – access, angles of deviation, cable haul road;
- Proximity – clearance distance, windfarms, communication masts, urban environments, metallic pipes; and
- Design – reactive compensation, and joint bays and link box chambers.

Economic Criteria

- Capital – construction costs; and
- Operational – inspections and maintenance costs.

- 3.5.2 The appraisal of alignment options has been informed by a programme of environmental and engineering surveys and assessments. Walkover surveys were undertaken across the alignment options covering hydrology, soils and peat, ecology (including habitats and protected species), landscape and visual considerations, cultural heritage, forestry and engineering constraints. In addition, twelve months of ornithological vantage point surveys were undertaken between October 2024 and September 2025, together with breeding bird surveys undertaken between April and June 2025.
- 3.5.3 Alongside Loch Earba, the alignment is constrained by the loch shore, topography and other known environmental and engineering constraints, resulting in a single feasible alignment for approximately the first 5 km of the connection. This section, referred to as the Loch Earba PSH Alignment, is therefore described within this Consultation Document where relevant but is not subject to comparative appraisal as no reasonable alternative alignment options have been identified.
- 3.5.4 East of Loch Earba, a number of alternative alignment options have been identified and comparatively appraised. For the environmental and cost appraisal, three southern alignment options and three northern alignment options have been assessed within their respective north and south groups to identify a preferred alignment combination (see **Figure 1**).
- 3.5.5 The engineering appraisal adopted a different approach, with the southern and northern sections of each alignment combined and assessed as Alignment Option 1, Alignment Option 2 and Alignment Option 3 respectively. This reflects the way in which engineering constraints and constructability considerations apply across the full alignment rather than within the individual northern and southern sections.
- 3.5.6 The findings of the environmental, engineering and cost appraisals have subsequently been considered together to identify an overall preferred alignment for the Project.

Rating of Alignment Options

- 3.5.7 At Stage 2, a RAG rating methodology was applied to each topic area to indicate the relative level of potential constraint to development. At Stage 3, a more detailed appraisal is required to distinguish between the alignment options and understand the specific opportunities and constraints associated with each. Accordingly, a descriptive appraisal approach has been adopted, enabling environmental, engineering and cost considerations to be compared in greater detail. Further guidance on topic-specific considerations is provided in Annex 10 of SSSEN Transmission's Procedures for Routeing Overhead Lines and Underground Cables of 132 kV and above¹².

Identification of a Preferred Alignment

- 3.5.8 Following review of the potential alignment options, the above environmental, engineering and cost topics have been considered in combination to arrive at a Preferred Alignment which is outlined in **Section 6.2**. The overall objective throughout the appraisal of the alignment options has been to take full consideration of all factors to minimise any potential adverse impacts on the environment.

4. SUBSTATION SITE SELECTION AND DESIGN DEVELOPMENT

4.1 Overview

- 4.1.1 The new substation, referred to in this document as Coire Mashie Substation, is required to be located in close proximity to the existing Beaully-Denny 400 kV Overhead Line (OHL) to facilitate connection to the electricity transmission network. A site selection exercise was undertaken in 2025 to identify and appraise potential substation site options. This process was separate from the route and alignment selection process undertaken for the Earba PSH Scheme Grid Connection. However, the findings of both processes were presented together within the 2025 Consultation Document² and 2025 Report on Consultation³.

4.2 Previous Consultation and Site Selection

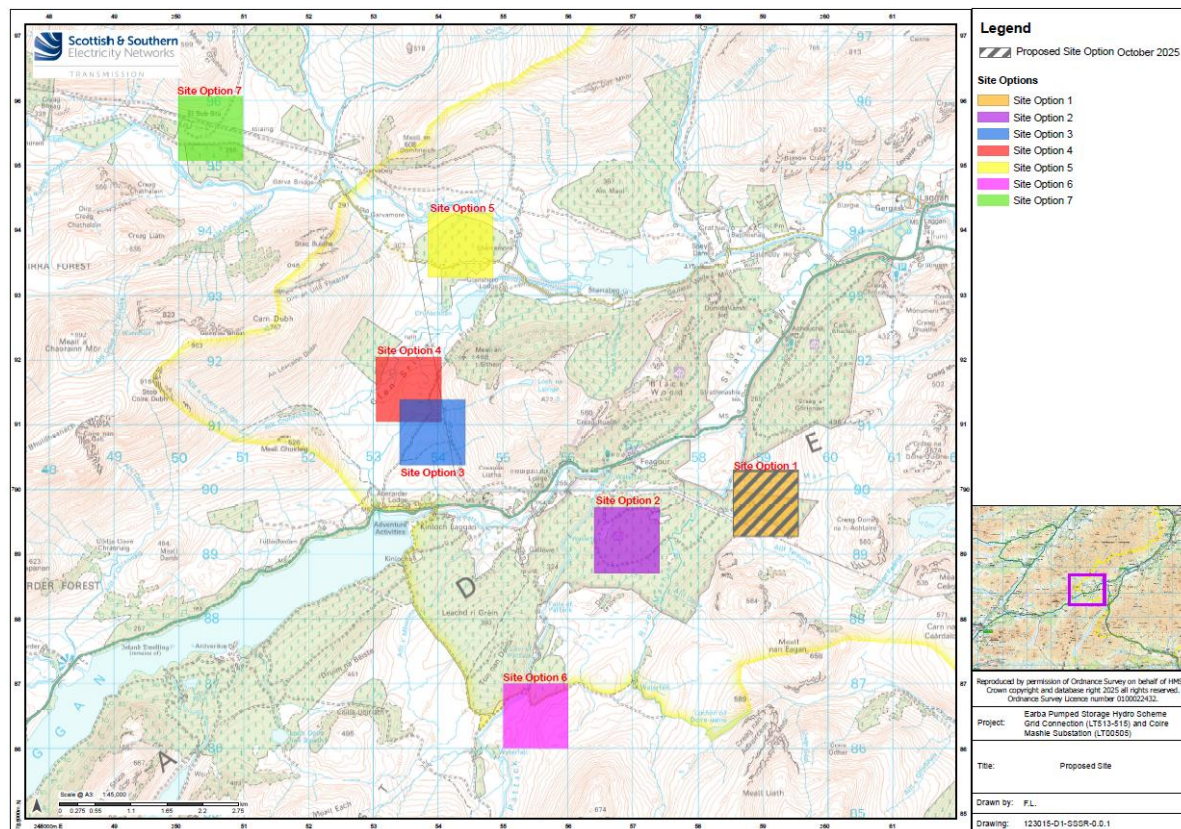
- 4.2.1 The Consultation Document (May 2025)² set out the approach to the selection, consideration and appraisal of substation site options, in line with SSEN Transmission's guidance 'Substation Site Selection Guidelines for Voltages at or above 132kV'¹³. The guidance provides a framework to ensure environmental, technical and economic considerations are identified and appraised at each stage of the site selection process.
- 4.2.2 The guidance splits the site selection process into stages, as follows:
- Stage 0: Pre-Site Selection Activities – Strategic Connections Options Appraisal;
 - Stage 1: Initial Site Screening;
 - Stage 2: Detailed Site Selection; and
 - Post Site Selection Activities – Consenting Process.
- 4.2.3 Each stage is an iterative process and involves an increasing level of detail and resolution, bringing environmental, technical and cost considerations together in a way which seeks to achieve the best balance at each stage. The stages carried out can vary depending on the type, nature and size of a project and consultation is carried out at each stage of the process as appropriate.
- 4.2.4 Coire Mashie substation is currently at the final stage, "Post Site Selection Activities – Consenting Process". The Report on Consultation (October 2025)³ described the key responses received in relation to the site options and how statutory, non-statutory and public feedback informed the identification of a proposed site to be taken forwards.
- 4.2.5 A total of five site options were originally identified, appraised and presented in the May 2025 Consultation. Following consultation feedback and upon the suggestion of members of the public, a further two site options were appraised. The location of these additional site options and the findings of their appraisals were documented in environmental¹⁴ and engineering appraisals¹⁵, both available on the project website. All of the site options considered can be seen on **Plate 4.1** below.
- 4.2.6 Following consideration of the appraisal findings and consultation feedback, Site Option 1 was identified as the proposed site option in the October 2025 Report on Consultation³, having provided the most appropriate balance of environmental, technical and economic considerations. Site Option 1 is also shown on **Plate 4.1**.

¹³ SSEN Transmission (2022) Substation Site Selection Guidelines for Voltages at or above 132kV.

¹⁴ SSEN Transmission (2025), *Addendum to Consultation Document (Site Selection): Environmental Appraisal of Additional Site Options*. Online, available at: <https://www.ssen-transmission.co.uk/projects/project-map/new-coire-mashie-400kv-substation-and-earba-psh-connection/>.

¹⁵ SSEN Transmission (2025), *Coire Mashie Site Screening - Additional Site Options 6 and 7 (Engineering)*. Online, available at: <https://www.ssen-transmission.co.uk/projects/project-map/new-coire-mashie-400kv-substation-and-earba-psh-connection/>.

Plate 4.1 – Site Options and Proposed Site Option



4.3 What Has Changed Since the Previous Consultation in 2025

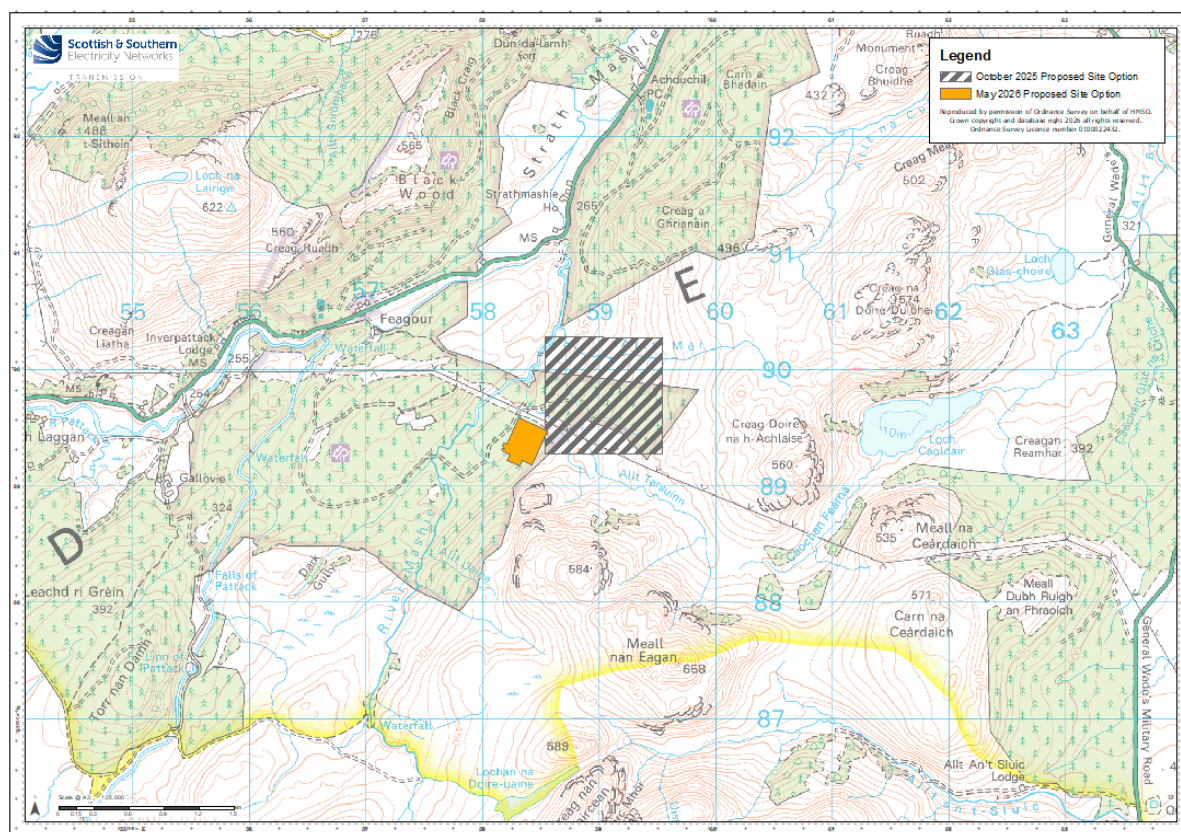
4.3.1 Following on from the 2025 consultation process for Coire Mashie substation, the post site selection activities commenced. One of the key considerations was the technology to be used, primarily between the following:

- Gas-Insulated Switchgear (GIS), located indoor within a building, with an outdoor compound for some AIS equipment; and
- Air-Insulated Switchgear (AIS), where all equipment is located outdoors.

4.3.2 Factors such as indoor / outdoor requirements, land-take of the substation footprint, consenting, carbon footprint, costs, SF6-free technology readiness, programme, operations / maintenance, operability, and futureproofing were reviewed by the project engineers. Following this multi-criteria assessment, a GIS solution was identified as the preferred technology option for Coire Mashie Substation. As GIS technology requires a smaller operational footprint than an equivalent AIS substation, opportunities arose to review the proposed site layout and location and consider potential environmental and design benefits.

4.3.3 As part of ongoing design development, the proposed substation site identified in the October 2025 Report on Consultation³ has been refined and moved into forestry land immediately to the south-west, on the opposite side of the River Mashie and the existing Beauldy-Denny OHL. **Plate 4.2** shows the October 2025 proposed site and the revised May 2026 proposed site, noting that the October 2025 area shown also included an area for earthworks and temporary construction. The revised GIS-based design would require an operational platform of approximately 370 m × 270 m, with associated earthworks required to create a suitable level development area. The revised location allows the smaller GIS footprint to be accommodated within a more enclosed area of commercial forestry and is expected to provide increased natural screening from the A86 and nearby residential properties. The revised location has also allowed further consideration of environmental constraints identified through consultation and post-site-selection design development, including local hydrological features, peat and habitat considerations. The revised site is proposed to be taken forward into the EIA and consenting process.

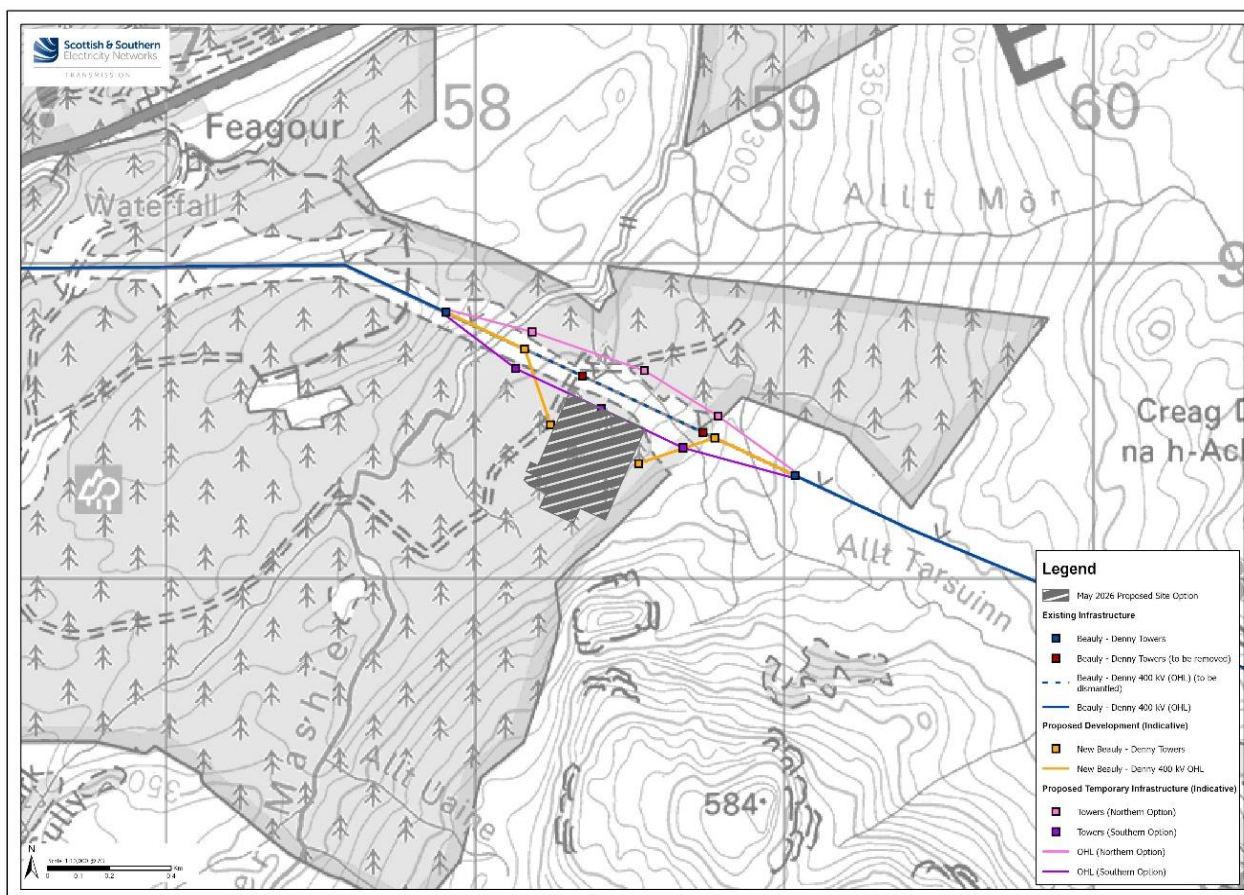
Plate 4.2 – October 2025 Proposed Site Option and May 2026 Proposed Site Option



4.4 Beaulieu – Denny OHL Reconfiguration

- 4.4.1 As noted in **Section 2.1**, Coire Mashie substation is required to facilitate the connection to the Beaulieu-Denny 400 kV OHL to enable onward transmission of electricity. A diversion and tie-in of the existing Beaulieu-Denny 400 kV OHL will therefore be required and will form part of the Project.
- 4.4.2 As noted in **Section 2.2**, two existing towers on the Beaulieu-Denny 400 kV OHL, would be replaced by two newly positioned towers, with downloads connecting the terminal towers to the proposed Coire Mashie substation.
- 4.4.3 Temporary OHL infrastructure would be required during construction to maintain transmission of electricity along the Beaulieu-Denny 400 kV OHL while the permanent works are undertaken.
- 4.4.4 The proposed Beaulieu-Denny OHL reconfiguration is limited in extent and has been designed to provide a direct connection between the existing OHL and Coire Mashie substation. Consequently, no materially different route or layout alternatives have been identified, with the design process instead focusing on the most direct and technically feasible engineering solution. This approach also minimises the extent of additional OHL infrastructure required and maintains the connection as close as practicable to the existing Beaulieu-Denny OHL.
- 4.4.5 Two minor variants are currently under consideration for the temporary OHL works, comprising a northern option and a southern option. These options are located in close proximity to one another and are not anticipated to result in materially different environmental effects. Consequently, the preferred option will be selected during the detailed design stage based on engineering, constructability and operational requirements. The location of the temporary OHL variants is shown on **Plate 4.3** below.

Plate 4.3 – Beauldy-Denny OHL Reconfiguration



5. DESCRIPTION OF UGC ALIGNMENT OPTIONS

5.1 Overview

- 5.1.1 A total of seven UGC alignment options have been identified within the Proposed Route. These comprise the Loch Earba PSH Alignment, three southern alignment options and three northern alignment options. The alignment options are described below and shown on **Figure 1**.
- 5.1.2 The alignment options are described from west to east, beginning at the Earba PSH Scheme connection point and ending at Coire Mashie Substation. The Loch Earba PSH Alignment forms a common section of route, after which the southern and northern alignment options diverge.
- 5.1.3 The alignment options have been appraised from environmental, engineering and cost perspectives. For environmental and cost topics, the southern and northern sections have been assessed separately, whereas the engineering appraisal considers each alignment as a complete end-to-end connection. Further details are provided in **Sections 6** and **7**.

5.2 Loch Earba PSH Alignment

- 5.2.1 The Loch Earba PSH Alignment is approximately 5 km in length and commences from the consented Loch Earba PSH onsite substation, where it would travel northeast along the eastern edge of Loch Earba. It is proposed that it would run across the sloped ground alongside the access track that would be built for the PSH scheme. It would then cross the burn Allt a' Mhaigh and terminate approximately 300 m east of the northern tip of Loch Earba. No alternative alignment options have been identified within this section of the connection due to the constraints presented by Loch Earba, surrounding topography and other environmental and engineering considerations.

Southern Alignment Options

5.3 Alignment Option 1 South

- 5.3.1 Alignment Option 1 South is the central alignment of the three southern alignment options. It is approximately 7 km in length and would commence where Loch Earba PSH Alignment terminates. It would travel in a north-easterly direction for approximately 1.5 km crossing existing access tracks, passing to the north of Loch Doire nan Sgiath and passing over tributaries of the Allt Labhrach watercourse. Upon reaching forestry at Coille Doir-ath, Alignment Option 1 South would travel in a northern curve to pass over the Allt a' Mhuilinn before looping south again to reach the border of the CNP which it would follow travelling south then east before crossing the River Pattack and a small edge of the CNP. Alignment Option 1 South would then have the potential to connect with any of the northern alignment options.

5.4 Alignment Option 2 South

- 5.4.1 Alignment Option 2 South is the northernmost of the three southern alignment options and is approximately 7.3 km in length. It generally follows Alignment Option 1 South but remains further north as it crosses the area around Allt a' Mhuilinn before curving south along the western edge of Torr nan Damh forest. The alignment then crosses the River Pattack and a small section of the CNP before connecting with the northern alignment options.

5.5 Alignment Option 3 South

- 5.5.1 Alignment Option 3 South is the southernmost of the three southern alignment options and is approximately 6.5 km in length. It generally follows Alignment Option 1 South but adopts a shallower northern curve, remaining further south and passing through a larger area of open moorland before crossing the River Pattack. The alignment then connects with the northern alignment options.

Northern Alignment Options**5.6 Alignment Option 1 North**

- 5.6.1 Alignment Option 1 North is the southernmost of the northern alignment options at its western extent, before becoming the central alignment towards the eastern end of the alignment. It is approximately 4.3 km in length and commences from the south of Torr nan Damh forest where the southern alignment options would terminate. The alignment enters the CNP after approximately 400 m and remains within the CNP for the remainder of its length. It extends northeast across open moorland towards commercial forestry managed by Forestry Land Scotland (FLS). Within the forest area, the alignment option crosses the River Mashie and an existing forestry access track.

5.7 Alignment Option 2 North

- 5.7.1 Alignment Option 2 North is the northernmost of the northern alignment options and is approximately 4.4 km in length. The alignment extends from south of Torr nan Damh, where the southern alignment options would terminate, to the proposed Coire Mashie Substation. The alignment enters the CNP after approximately 400 m and remains within the CNP for the rest of its length. It initially extends northwards for approximately 1 km towards Dark Gully and the Falls of Pattack before curving northeast towards commercial forestry managed by FLS. Within the forest area, the alignment crosses the River Mashie and an existing forestry access track.

5.8 Alignment Option 3 North

- 5.8.1 Alignment Option 3 North occupies a central position within the northern alignment options at its western extent, before becoming the southernmost option towards the east of the alignment. The alignment is approximately 4.3 km in length and extends from south of Torr nan Damh, where the southern alignment options terminate, to the proposed Coire Mashie Substation. The alignment option enters the CNP after approximately 400 m and remains within the CNP for the remainder of its length. The alignment then curves north through open moorland before entering commercial forestry and continuing northeast towards Coire Mashie substation. Within the forest area, the alignment crosses the River Mashie and an existing forestry access track.

6. COMPARATIVE APPRAISAL OF UGC ALIGNMENT OPTIONS

6.1 Overview

6.1.1 This section summarises the findings of the environmental, engineering and cost appraisal undertaken for the UGC alignment options. The appraisal has been used to identify the relative opportunities and constraints associated with each option and to inform the identification of a preferred alignment. The summary tables presented within this section provide an overview of the key findings. Reference should also be made to **Figures 2 to 11** and **Appendix 1**, which provide supporting information and more detailed comparative appraisal findings.

6.2 Environmental Topic Areas

6.2.1 For environmental appraisal purposes, the UGC options have been grouped into three sections, as listed below and shown on **Plate 6.1**:

- Environmental Section 1 – Loch Earba PSH Alignment;
- Environmental Section 2 – Southern Alignment Options (Alignment Option 1 South, Alignment Option 2 South, Alignment Option 3 South) – **Table 6.1** below; and
- Environmental Section 3 – Northern Alignment Options (Alignment Option 1 North, Alignment Option 2 North, Alignment Option 3 North) – **Table 6.2** below.

6.2.2 The Loch Earba PSH Alignment is constrained by the loch shore, topography and other environmental and engineering considerations, resulting in a single feasible alignment within this section of the connection. As no alternative alignment options have been identified, comparative appraisal has not been undertaken for this section.

Plate 6.1 – Comparative Appraisal Sections for Environmental Topic Areas

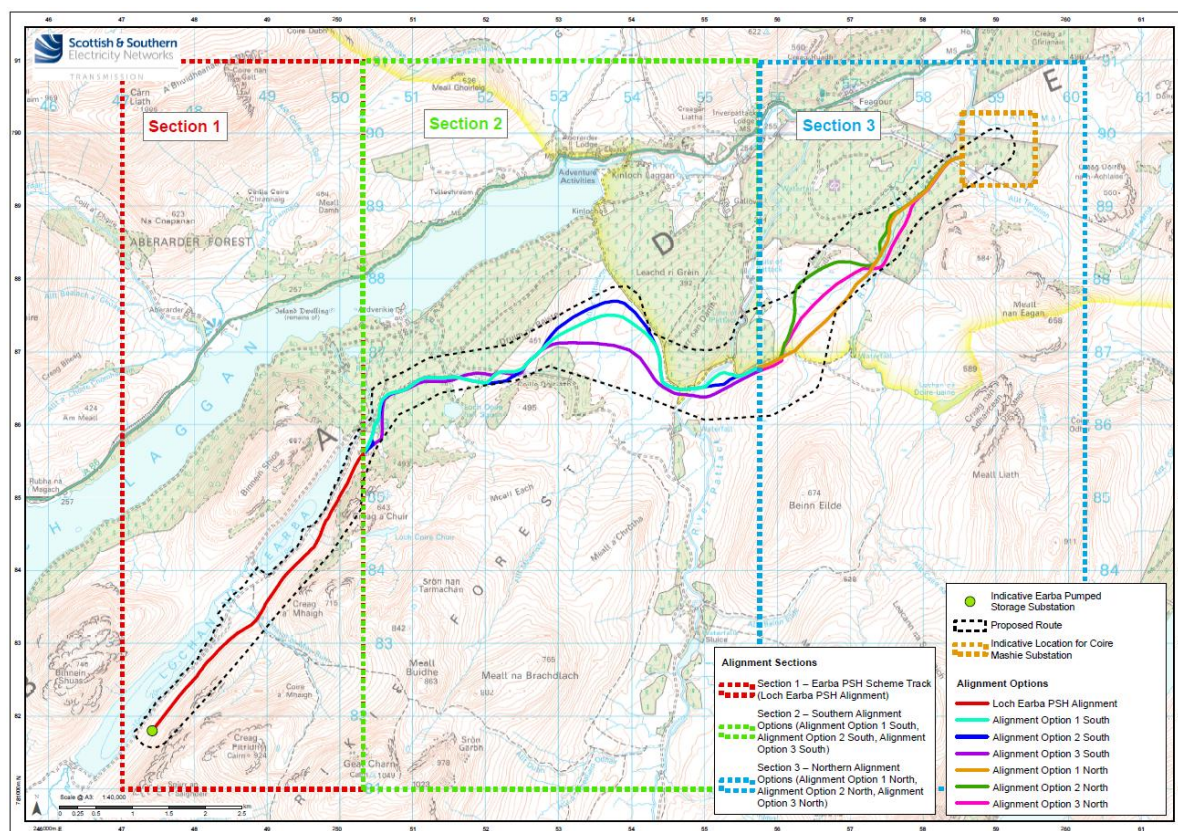


Table 6.1: Section 2 - Southern Alignment Options (Alignment Option 1 – 3 South) Comparative Appraisal (Environmental)¹⁶

Category	Sub-Topic	Opportunities and Constraints for Alignment Options	Alignment Preference
Natural Heritage	Designations	The southern alignment options do not pass directly through any sites designated for natural heritage (see Figure 2). All three southern alignment options are situated within 5 km of the sites listed below. However, the absence of ecological and/or hydrological connectivity and lack of identifiable impact pathways mean that these designations are not considered to represent a material constraint to alignment selection: • Creag Meagaidh Special Area of Conservation (SAC), National Nature Reserve (NNR), Site of Special Scientific Interest (SSSI), and Special Protection Area (SPA); • Ben Alder and Aonach Beag SAC and SSSI; • Ben Alder SPA; and • Kinlochlaggan Boulder Beds SSSI. No southern alignment option directly intersects with ancient woodland. The closest approach occurs along the southern section of Alignment Option 2 South, which passes within 80 m of the Coillee Doir-ath ancient pinewoods (Wood ID: 16812).	No preference
	Protected Species	Suitable habitat for a range of protected and notable species is present across all three southern alignment options (see Figure 3), including bats, badger, otter, water vole, pine marten, red squirrel, wildcat, amphibians, reptiles and notable invertebrates. Woodland, moorland and watercourse habitats provide broadly comparable opportunities for these species across the southern alignment options. Any potential effects would be further assessed through detailed survey, alignment refinement and mitigation. Consequently, protected species considerations do not result in a preference of alignment option.	No preference
	Habitats	For the southern alignment options, wet heath is the dominant habitat and principal potential Groundwater Dependent Terrestrial Ecosystem (GWDTE). While impacts on wet heath are largely unavoidable due to its extensive distribution and the priority given to avoiding Annex I blanket bog, effects can be minimised through careful alignment design, micro-siting, habitat condition assessments and detailed National Vegetation Classification (NVC) surveys. Localised high-sensitivity GWDTEs, including acid and basic flushes associated with heath and mire habitats, are expected to be largely avoided through detailed surveys and alignment refinement. Potential GWDTE woodland habitats, including areas of ancient upland birchwood, are also expected to be almost entirely avoided through considerate design. In terms of Annex I habitats, Northern Atlantic wet heath and blanket bog are the key constraints, with wet heath being widespread across all southern options and therefore difficult to avoid. Blanket bog cover varies between the options, with Alignment Option 3 South intersecting the greatest extent, followed by Alignment Option 1 South, while Alignment Option 2 South has the lowest level of blanket bog interaction. Although complete avoidance of blanket bog impacts is not considered achievable for any southern option, Alignment Option 2 South avoids the largest areas of blanket bog and offers the greatest opportunity to minimise residual impacts through micro-siting and best-practice construction measures.	Alignment Option 2 South

¹⁶ **Appendix 1** provides more detailed comparative appraisal findings per sub-topic heading.

Category	Sub-Topic	Opportunities and Constraints for Alignment Options	Alignment Preference
	Ornithology	Four ornithological designations occur within 10 km of the southern alignment options; however, no direct or indirect effects on the qualifying interests of these sites are anticipated. The alignment options pass through a mixture of open moorland and woodland habitats which provide suitable habitat for a range of upland and woodland bird species. All three southern alignment options avoid known Black Grouse lek sites and are considered broadly comparable from an ornithological perspective.	No preference
	Hydrology Hydrogeology and Geology	Peat depth surveys (see Figure 4a/b) indicate that Alignment Option 1 South and Alignment Option 2 South largely avoid the deepest peat deposits, only intersecting the margins of areas where peat depths are generally recorded at 1.5 – 2 m, whereas Alignment Option 3 South passes directly through an area of deeper peat, with depths of 3 – 4 m, making it less favourable. Peatland classification mapping shows that all southern options intersect similar areas of Class 1, 2, 3 and 5 peatland. All southern options require multiple watercourse crossings within the River Spean catchment; however, Alignment Option 2 South requires the fewest watercourse crossings, while Alignment Option 3 South requires the greatest number. All southern alignment options also cross the River Pattack floodplain, with Alignment Option 1 South intersecting the largest area of floodplain and Alignment Option 3 South the smallest (see Figure 5). In relation to private water supplies, no supplies are recorded within 500 m of Alignment Option 1 South or Alignment Option 3 South. Alignment Option 2 South, however, has a PWS recorded within 500 m, which is shown to be associated with a stream abstraction for Ardverrick Estate off the Allt a' Mhuilinn. On balance, Alignment Option 2 South is preferred because it avoids the deepest peat deposits and has the lowest number of watercourse crossings, while Alignment Option 3 South is considered the least favourable option due to its direct interaction with deep peat and its higher number of watercourse crossings.	Alignment Option 2 South
Cultural Heritage	Designations	No designated cultural heritage assets are located within or immediately adjacent to the southern alignment options (see Figure 6). No direct effects on designated assets are anticipated and the alignment options are not considered materially different in cultural heritage terms.	No preference
	Cultural Heritage Assets	Alignment Option 3 South would intersect the River Pattack Enclosure (MHG 27128), whereas Alignment Option 1 and 2 would pass just to the north and would miss this feature. While Alignment Option 1 and 2 South are preferable in terms of avoiding any direct impact on the feature, the potential impacts of Alignment Option 3 South would be minor and limited to a short section of the enclosure dyke. Consequently, no clear preference emerges between the southern options on cultural heritage grounds.	Alignment Option 1 South or Alignment Option 2 South
Landscape and Visual	Designations	The southern sections of Alignment Options 1, 2 and 3 South are all located within the Ben Alder, Laggan and Glen Bancher Special Landscape Area (SLA), and are considered broadly comparable in terms of their potential landscape effects (see Figure 7).	No preference
	Landscape Character	Landscape character types can be seen on Figure 8 . Alignment Option 1, 2 and 3 South would all result in some loss of woodland at the southern end to establish a wayleave, although some of this could potentially be accommodated within the felling patterns. However, limiting the loss of native trees or other trees which form clear	Alignment Option 2 South

Category	Sub-Topic	Opportunities and Constraints for Alignment Options	Alignment Preference
		landscape features as far as possible would be preferred. All three alignment options would cross some areas of open moorland, which may be difficult to reinstate without permanent effect. Alignment Option 2 South would be preferable within this area, as it runs alongside the existing Pattack hydro pipeline and crosses fewer areas of undisturbed open moorland. Alignment Option 1, 2 and 3 South would also cross the River Pattack, where it is important to find an alignment which minimises the loss of habitats which may be more difficult to restore. Alignment Option 1 and 2 South would be preferred over Alignment Option 3 within this area, as it would cross the River Pattack slightly further south, where more trees are present, and crosses an area of more open moorland to the east of the river, characterised by a more complex landform.	
	Visual	All three southern alignment options would interact with recreation routes including the East Highland Way and Scottish Hill Track 155b (see Figure 7), resulting in temporary construction effects. Permanent visual effects are expected to be limited following reinstatement, with any residual effects largely associated with forestry wayleaves and habitat restoration. The alignment options are broadly comparable in visual terms and no clear preference is identified.	No preference
Land Use	Forestry	An OC of 90 m would be required through any areas of commercial woodland and an OC of 70 m would be required through areas native woodland. In relation to the southern alignment options Alignment Option 1 South and Alignment Option 2 South are the preferred because they would result in less woodland clearance and fragmentation. Alignment Option 1 South also runs along the southern edge of an existing forest road (see Figure 9a/b).	Alignment Option 1 South or Alignment Option 2 South
	Agriculture	Agricultural constraints are low across all southern alignment options (see Figure 10). The alignments predominantly pass through Class 6.2 and 6.3 land, with only minor differences between the options. Agriculture is not considered a key differentiator in alignment selection.	No preference
	Recreation	The southern alignment options pass through an area used for walking and outdoor recreation and would intersect the East Highland Way and Scottish Hill Track 155b (see Figure 11), resulting in potential temporary construction disruption. No long-term effects on recreational access are anticipated following reinstatement and the differences between the options are limited.	No preference
Planning	Policy	The principal planning considerations across the alignment options relate to landscape and visual interests associated with the Ben Alder, Laggan and Glen Banchor SLA, the CNP, areas of sensitive habitat including blanket bog and ancient woodland, and the protection of protected species and cultural heritage assets. Whilst these constraints vary between the alignment options, none are considered to represent an overriding policy constraint at this stage. The planning appraisal therefore broadly reflects the relative environmental constraints identified elsewhere in this report.	No preference
	Proposals	There are currently no known planning applications or development proposals that would impact the three southern alignment options.	No preference

Table 6.2: Section 3 - Northern Alignment Options (Alignment Option 1 – 3 North) Comparative Appraisal (Environmental)¹⁶

Category	Sub-Topic	Opportunities and Constraints for Alignment Options	Alignment Preference
Natural Heritage	Designations	The northern alignment options do not pass directly through any sites designated for natural heritage (see Figure 2). All three northern alignment options are situated within 5 km of the following: • Creag Meagaidh SAC, NNR, SSSI and SPA; • Ben Alder and Aonach Beag SAC and SSSI; • Ben Alder SPA; and • Kinlochlaggan Boulder Beds SSSI. In relation to the River Spey SSSI/SAC Alignment Options 1-3 North all intersect the River Mashie, a tributary of the River Spey and itself partially designated within the River Spey SAC specifically. As such, hydrological connectivity is present between these designated sites and Alignment Options 1-3 North. However, an impassable artificial barrier is present downstream of the alignment options, restricting passage of qualifying fish species and freshwater pearl mussel into the upper reaches of the River Mashie. All northern alignment options require crossings of the River Mashie and therefore present potential pathways for direct and indirect impacts associated with in-channel/near-channel works relating to water quality, habitat loss, and species associated with the SSSI/SAC are present. Alignment Option 3 North is the only option to directly intersect a parcel of ancient woodland on the AWI, which directly connects to two further ancient woodland parcels. Therefore, when ancient woodland is considered, Alignment Option 3 North is the least preferred of the northern alignment options due to its direct intersection with an AWI parcel and the associated requirement for unavoidable woodland clearance.	Alignment Option 1 North or Alignment Option 2 North
	Protected Species	Suitable habitat for a range of protected and notable species is present across all northern alignment options (see Figure 3), including pine marten, red squirrel, wildcat, badger, bats, otter, water vole, amphibians, reptiles and notable invertebrates. Commercial forestry, moorland, heathland and watercourse habitats provide broadly comparable opportunities for these species across the northern options. Any potential effects would be addressed through detailed survey, alignment refinement and species-specific mitigation. Consequently, protected species considerations do not result in a preferred northern alignment option.	No preference
	Habitats	For the northern alignment options, habitat constraints are dominated by extensive areas of wet heath, blanket bog, and smaller areas of Annex I European dry heath, with wet heath representing the principal potential GWDTE across the two large expanses of open moorland east of Druim na Beiste and between the Rivers Pattack, Mashie and Dark Gully Burn north of Beinn Eilde. Impacts on wet heath are considered largely unavoidable across all northern alignment options due to its widespread distribution and the prioritisation of avoiding Annex I blanket bog; however, effects could be reduced through careful design, habitat surveys and micro-siting. Potential GWDTEs also include riparian wet woodland associated with the River Mashie, although these woodlands are thought to rely primarily on surface water rather than groundwater and can generally be avoided through alignment refinement, with the notable exception of Alignment Option 3 North, which directly intersects an area of ancient riparian woodland. Annex I blanket bog is a key ecological constraint throughout the	Alignment Option 1 North or Alignment Option 2 North

Category	Sub-Topic	Opportunities and Constraints for Alignment Options	Alignment Preference
		northern options, with Alignment Option 3 North intersecting the greatest extent of blanket bog, particularly across the large moorland areas, followed by Alignment Option 2 North, while Alignment Option 1 North has the lowest level of interaction, although the difference between Options 1 and 2 is minimal. Complete avoidance of blanket bog impacts is not considered possible for any northern option due to its extensive coverage. All northern options also intersect localised areas of Annex I European dry heath, particularly around Dark Gully Burn, with Option 2 North affecting the greatest extent; however, as dry heath is considered more readily reinstated following construction and impacts can be mitigated through good design and construction practices, it is not regarded as a key differentiator between alignment options. Overall, Alignment Options 1 North and 2 North are considered broadly comparable from a habitat perspective, whereas Alignment Option 3 North is the least favourable option due to its greater interaction with Annex I blanket bog and its direct crossing of ancient riparian wet woodland associated with the River Mashie.	
	Ornithology	Four ornithological designations occur within 10 km of the northern alignment options; however, no direct or indirect effects on qualifying interests are anticipated. The alignment options pass through a combination of moorland and woodland habitats suitable for a range of upland and woodland bird species. Although all three northern options pass within 500 m of a known Black Grouse lek, no clear distinction is identified between the alignment options from an ornithological perspective.	No preference.
	Hydrology Hydrogeology and Geology	Peat probing identified extensive areas of deeper peat across the northern alignment options (see Figure 4a/b). Alignment Options 1 North and 2 North both traverse areas of deep peat, but Alignment Option 3 North crosses an area where peat may exceed 5 m in depth, making it the least favourable option from a peat disturbance, management and construction perspective. Peatland classification mapping indicates that all northern options intersect similar areas of Class 3 and Class 5 peatland, with no clear preference between the options based on peatland classification alone. The northern options are located within both the River Spean and River Spey catchments and all require numerous watercourse crossings (see Figure 5). Alignment Option 2 North would require the fewest watercourse crossings, while Alignment Option 3 North would require the greatest number, increasing the potential for hydrological impacts and engineering complexity. No private water supplies or licensed abstractions are recorded within 500 m of the northern alignment options. Overall, the key differentiators between the northern alignment options are peat depth and the number of watercourse crossings. Alignment Options 1 North and 2 North are the preferred options, while Alignment Option 3 North is the least favourable due to its interaction with potentially very deep peat and its higher number of watercourse crossings.	Alignment Option 1 North or Alignment Option 2 North
Cultural Heritage	Designations	No designated cultural heritage assets are located within or immediately adjacent to the northern alignment options (see Figure 6). No direct effects on designated assets are anticipated and the alignment options are not considered materially different in cultural heritage terms.	No preference
	Cultural Heritage Assets	A small number of non-designated cultural heritage assets occur within the vicinity of the northern alignment options. While the specific assets affected vary between the options, potential effects are expected to be limited and opportunities for avoidance through detailed design and micro-siting.	No preference

Category	Sub-Topic	Opportunities and Constraints for Alignment Options	Alignment Preference
		Consequently, no clear preference is identified in the northern alignment options.	
Landscape and Visual	Designations	The majority of all three northern alignment options are located within the Cairngorms National Park and a short section near the substation lies within the Ben Alder, Laggan and Glen Banchor Special Landscape Area (see Figure 7). The options are broadly comparable from a landscape designation perspective and no clear preference is identified.	No preference
	Landscape Character	Landscape character types can be seen on Figure 8 . The northern alignment options would pass through landscape character types with medium to medium-high sensitivity, including Smooth Rounded Hills, Small Craggy Knolls and Hills, and Upland Glen landscapes within the Ardverikie Estate: Pattack Glen / Strath Mashie Landscape Character Area of the CNP. All three northern options pass through areas heavily influenced by commercial conifer forestry and recent clear-felling, where landscape sensitivity is relatively low and any woodland removal required for the UGC could largely be accommodated within existing forestry management and replanting patterns. However, all three alignment options also cross open moorland, which is more sensitive to development as habitat reinstatement may be difficult and could result in permanent landscape effects. As a result, UGC design should seek to avoid the steepest slopes and the most sensitive moorland habitats wherever possible. Overall, the northern alignment options are broadly comparable from a landscape character perspective, with no clear preference identified.	No preference
	Visual	For the northern alignment options, visual and amenity effects are expected to be limited and broadly similar across Alignment Options 1 North, 2 North and 3 North due to the relatively small number of nearby visual receptors (see Figure 7). The closest residential properties are located at Feagour, approximately 1.4 km from alignment options, and views towards the alignment options are largely screened by existing forestry. All three northern options would interact with local estate and forestry tracks, which could result in some temporary disturbance during construction; however, following reinstatement, visual effects are expected to be minimal. Any permanent effects would primarily relate to wayleave corridors within forestry or changes to vegetation in areas that are more difficult to restore, although these are not anticipated to result in notable visual impacts. Overall, the magnitude of visual effects is considered low, and there is no clear preference between the alignment options from a visual and amenity perspective.	No preference
Land Use	Forestry	An OC of 90 m would be required through any areas of commercial woodland and an OC of 70 m would be required through areas native woodland. Alignment Option 1 North is considered the preferred northern alignment as it would pass predominantly through recently felled or replanted commercial woodland, resulting in lower sensitivity and fewer long-term ecological constraints (see Figure 9a/b). Impacts on commercial woodland are generally more manageable where stands are rotational, recently felled, or scheduled for restructuring, and where proposals can be integrated with existing forest plans to minimise loss of productive area and maintain future crop viability. It also would not pass through the area of AWI that Alignment Option 3 North has the potential to interact with.	Alignment Option 1 North
	Agriculture	Agricultural constraints are low across all northern alignment options (see Figure 10). The routes predominantly pass through Class 6.2 and 6.3 land and differences between the	No preference

Category	Sub-Topic	Opportunities and Constraints for Alignment Options	Alignment Preference
		options are limited. Agriculture does not identify a preferred alignment option.	
	Recreation	Recreational effects associated with the northern alignment options are expected to be minimal (see Figure 11). Whilst local estate and forestry tracks may experience temporary disruption during construction, there is little to distinguish between the northern alignment options from a recreation perspective.	No preference
Planning	Policy	The principal planning considerations across the alignment options relate to landscape and visual interests associated with the Ben Alder, Laggan and Glen Banchor SLA, the CNP, areas of sensitive habitat including blanket bog and ancient woodland, and the protection of protected species and cultural heritage assets. Whilst these constraints vary between the alignment options, none are considered to represent an overriding policy constraint at this stage. The planning appraisal therefore broadly reflects the relative environmental constraints identified elsewhere in this report.	No preference
	Proposals	In vicinity of the three northern alignment options, there is an existing forestry track where Forestry Land Scotland (FLS) proposes to install a bridge over a collapsed culvert (REF:24/03607/PNO). ¹⁷ This received approval in August 2024. This proposal is not considered to materially constrain the northern alignment options. No other known planning proposals have been identified that would influence alignment selection.	No preference

6.3 Engineering Appraisal

6.3.1 The engineering appraisal adopted a different methodology to the environmental appraisal, assessing the southern and northern sections as complete end-to-end alignments referred to as Alignment Option 1, Alignment Option 2 and Alignment Option 3.

6.3.2 The key engineering constraints identified for the Loch Earba PSH Alignment are summarised in the below two bullet points, with the remaining engineering considerations presented in **Table 6.3** overleaf.

- Waterfall crossing – The crossing at approximate grid reference NN 48837 83315 is considered one of the most constrained areas within the connection. It consists of crossing a deep ravine whilst located on a side slope. The side slopes add a level of constraint as enabling works would be required to ensure there is a safe working platform. The Loch Earba PSH Alignment is the only alignment option through this area.
- Side slopes – Due to the topography of Loch Earba and the mountains bounding it, there are steep side slopes. The constraint would be increased, due to the expected increase in water level of Loch Earba due to the consented PSH, pushing the alignment further up the slopes. The Loch Earba PSH Alignment is the only alignment option through this area.

6.3.3 As described above, **Table 6.3** overleaf summarises the constraints associated with the engineering topic areas for the alignment options that commence subsequently out of Loch Earba PSH Alignment.

¹⁷ THC Planning Portal (2025) 24/03607/PNO: *Installation of bridge to replace collapsed culvert*, online resource available at: <https://wam.highland.gov.uk/wam/applicationDetails.do?activeTab=summary&keyVal=SIMHNRHML00>, [Accessed: September 2026].

Table 6.3: Engineering Alignment Option 1 – 3 Comparative Appraisal¹⁶

Category	Sub-Topic	Opportunities and Constraints for Alignment Options	Alignment Preference
Infrastructure Crossings	Major Crossings ¹⁸	All alignment options require crossings of the River Pattack, River Mashie and Pattack Hydro Pipeline. As these constraints apply across all alignments, no clear preference is identified.	No preference
	Road Crossings	No road crossings are required for any alignment option and therefore this topic does not differentiate between the options.	No preference
Environmental Design	Elevation	All alignment options are located at elevations above 200 m AOD for the majority of their length. Consequently, elevation does not result in a preference between the options.	No preference
	Atmospheric Pollution	Based on the data gathered, there is not deemed to be a significant risk posed by atmospheric pollution by any of the alignment options.	No preference
	Contaminated Land	No contaminated land constraints have been identified for any alignment option.	No preference
	Flooding	All alignment options include sections within areas of fluvial flood risk, principally associated with rivers and watercourses. Alignment Option 1 remains closest to the River Pattack for the greatest distance, whilst Alignment Option 3 includes an area of increased surface water flood risk east of the River Mashie. Overall, flood risk is broadly comparable across the options and does not identify a preferred alignment.	No preference
Ground Conditions	Terrain	Steep slopes, side slopes and localised pinch points occur across all alignment options and are expected to require engineering mitigation in places. The area east of the River Pattack represents the principal terrain constraint. No clear preference emerges between the alignment options.	No preference
	Rock	Potential surface rock is present along all alignment options and is considered a common engineering constraint. No clear preference is identified.	No preference
	Peat	For all alignment options there is considered to be high potential for the development to be constrained by peat. This is because all alignment options have more than 10% of their length within peat covering >50% of them. Utilising the BGS peat data and peat depth data, to the south, Alignment Option 2 is considered the most preferred alignment option from a peat interaction perspective in the Druim na Beiste area. Alignment Option 1 is the most preferred alignment option from a peat interaction perspective in the more northern River Pattack and River Mashie areas.	South – Alignment Option 2 North – Alignment Option 1
Construction / Maintenance	Access	All alignment options are located within reasonable proximity to existing roads and estate access tracks. Access therefore does not materially differentiate between the options.	No preference
	Angles of Deviation	Alignment Option 3 has the fewest angles of deviation, followed by Alignment Option 1.	Alignment Option 1

¹⁸ Major infrastructure crossings include high voltage transmission lines, rail lines, wide rivers (greater than 200 m), navigable canals, gas pipelines, and hydro pipelines.

Category	Sub-Topic	Opportunities and Constraints for Alignment Options	Alignment Preference
		Alignment Option 2 contains the greatest number of deviations and is therefore the most constrained from this perspective. Alignment Option 1 and Alignment Option 3 are preferred.	or Alignment Option 3
	Cable haul road	All alignment options present similar haul road challenges associated with peat, rock and localised steep gradients. No clear preference is identified.	No preference
Proximity	Clearance Distance	No nearby residential properties materially constrain any alignment option.	No preference
	Proximity to Wind Farms	No wind farms occur within 1 km of the alignment options.	No preference
	Communication Masts	There are no communication masts within 1 km of any alignment options.	No preference
	Urban Environments	None of the alignment options pass through urban areas.	No preference
	Metallic pipes	The only pipeline highlighted within the alignment options is the Pattack Hydro Pipeline, and it has been confirmed that the material for this pipeline is Glass Fibre Reinforced Plastic. Therefore, no metallic pipelines have been confirmed to interact with any of the alignment options.	No preference
Design	Reactive Compensation	As all of the alignment options are of similar overall length and would utilise the same cable specification, the total reactive power generated is expected to be broadly equivalent across all alignment options.	No preference
	Joint Bays and Link Box Chambers	Due to the fact that all alignment options face the challenges outlined above, all are considered constrained for joint bays and link box chambers. The highest constraint to consider when assessing a joint bay's potential positioning is peat. This is as joint bays require a solid base to be placed upon for the support required. If alternative positioning cannot be achieved and a joint bay is required to be placed within peat, the peat must be fully excavated and ground must be rebuilt to ensure the joint bay has a stable support. As Alignment Option 3 is routed directly through peat it would therefore be considered the most constrained for this topic area.	Alignment Option 1 or Alignment Option 2

6.4 Capital Cost

- 6.4.1 Minor differences in capital cost are anticipated between the alignment options due to variations in length, construction complexity and ground conditions. However, these differences are not considered significant enough to materially influence alignment selection.

6.5 Operational Cost

- 6.5.1 Operational and maintenance requirements are anticipated to be broadly comparable across the alignment options. Consequently, operational cost considerations do not materially differentiate between the options.

7. SUMMARY OF COMPARATIVE APPRAISAL

7.1 Overview

- 7.1.1 This section summarises the key findings of the environmental, engineering and cost appraisal and identifies the preferred alignment for the project.

7.2 Environmental Preference

- 7.2.1 The Loch Earba PSH Alignment is constrained by the shore of Loch Earba, topography and other environmental and engineering considerations, resulting in a single feasible alignment for this section of the connection. Consequently, no alternative alignment options have been identified for comparative appraisal.
- 7.2.2 Within the southern alignment option group, Alignment Option 2 South is considered the environmentally preferred option. It demonstrates the lowest interaction with Annex I blanket bog, avoids the deepest peat deposits, requires the fewest watercourse crossings and performs favourably in landscape and forestry terms.
- 7.2.3 Within the northern alignment option group, Alignment Options 1 North and 2 North perform similarly across many environmental topics. However, Alignment Option 1 North is preferred overall due to its lower forestry constraints and avoidance of Ancient Woodland Inventory woodland, whilst Alignment Option 3 North is the least preferred option due to its greater interaction with blanket bog, deep peat and ancient woodland.
- 7.2.4 Based on the findings of this appraisal, the environmentally preferred alignment comprises the Loch Earba PSH Alignment and Alignment Option 2 South, together with Alignment Option 1 North.

7.3 Engineering Preference

- 7.3.1 From an engineering perspective, there is little to distinguish between the alignment options across many topic areas, with the principal differentiator being peat interaction. Alignment Option 2 performs most favourably within the southern section by avoiding the deepest peat deposits in the Druim na Beiste area, whilst Alignment Option 1 performs most favourably in the northern section between the River Pattack and River Mashie. Alignment Option 3 contains the greatest interaction with deep peat and is also the most constrained in relation to the construction of joint bays and link box chambers.
- 7.3.2 Based on the findings of the engineering appraisal, the preferred alignment comprises the Loch Earba PSH Alignment, Alignment Option 2 South and Alignment Option 1 North.

7.4 Cost Preference

- 7.4.1 Minor differences in capital cost are anticipated between the alignment options due to variations in length, construction complexity and ground conditions. However, these differences are not considered sufficient to materially influence alignment selection. Operational and maintenance requirements are also expected to be broadly comparable across the alignment options. Consequently, no cost preference is identified.

7.5 Overall Alignment Preference

- 7.5.1 The principal factors influencing alignment selection are peatland, sensitive habitats, forestry, landscape considerations and engineering constraints associated with peat and joint bay construction. Taking account of the environmental, engineering and cost appraisal findings, the preferred alignment comprises the **Loch Earba PSH Alignment** and **Alignment Option 2 South**, together with **Alignment Option 1 North**.

8. CONSULTATION AND NEXT STEPS

8.1 Overview

8.1.1 This consultation forms part of the ongoing development of the Coire Mashie Substation and Earba PSH Scheme Grid Connection Project. Stakeholder and community feedback on the proposed substation, Beauldy-Denny OHL reconfiguration and UGC alignment options will be reviewed and considered before a proposed alignment and refined project design are identified.

8.1.2 The Consultation Document is available online at the project website: <https://www.ssen-transmission.co.uk/projects/project-map/new-coire-mashie-400kv-substation-and-earba-psh-connection/>

8.1.3 A Public Consultation event detailing the proposals described in this document will be held at the following date and location:

- 7th October 2026 at Laggan Community Hall, Laggan Bridge by Newtonmore, Inverness-shire, PH20 1AN, between 15:00 hours and 19:00 hours

8.1.4 Comments should be sent to:

Lisa Marchi
Community Liaison Manager

SSEN Transmission
10 Henderson Road
Inverness
IV1 1SN

T: +44 (0)1738 355 105

M: +44 (0)7721 462 330

Email: lisa.marchi@sse.com

8.1.5 All comments received by **6th November 2026** will be reviewed and considered by the project team. A Report on Consultation will then be prepared, summarising the responses received and explaining how they have informed project development, and in the case of the UGC, the identification of a proposed alignment.

8.1.6 The project will then progress to the EIA and consenting stage. The proposed substation, UGC connection and Beauldy-Denny OHL reconfiguration will be assessed as a single project for EIA purposes and reported within a single EIA Report. Separate consent applications will subsequently be submitted for the different project components. Consenting applications are currently anticipated to be submitted in 2027.

APPENDIX 1 - COMPARATIVE APPRAISAL OF UNDERGROUND CABLE ALIGNMENT OPTIONS

1.1 Overview

- 1.1.1 This appendix provides supporting information for the comparative appraisal presented in **Section 6** of the Coire Mashie Substation and Earba Pumped Storage Hydro (PSH) Scheme Grid Connection Project Consultation Document.
- 1.1.2 The detailed appraisal set out below explains the environmental, engineering and cost considerations that informed the comparative appraisal and the identification of the preferred alignment when considering the alignment options for the Earba PSH Scheme Grid Connection Project. Reference should also be made to **Figures 2 to 11**. The seven underground cable (UGC) alignment options are described in **Section 5** of the Consultation Document.

1.2 Environmental Topic Areas

Natural Heritage

Natural Heritage Designations

- 1.2.1 Neither the Loch Earba PSH Alignment nor the six alignment options are located within designated sites for nature conservation (see **Figure 2**). Designated sites located within 5 km of the alignment options, but where there is no notable direct ecological connectivity present between the designated sites and the alignment options are as follows:
- Creag Meagaidh Special Area of Conservation (SAC), National Nature Reserve (NNR), and Site of Special Scientific Interest (SSSI) - All designated for a diverse upland habitat assemblage, inclusive of nationally-scarce montane habitats and component species, as well as associated faunal species, in particular, breeding bird assemblage.
 - Creag Meagaidh Special Protection Area (SPA) - Designated for breeding Dotterel (*Charadrius morinellus*).
 - Ben Alder and Aonach Beag SAC and SSSI - Both designated for a diverse upland habitat assemblage, inclusive of nationally-scarce montane habitats and component species, as well as associated faunal species, in particular breeding bird assemblage.
 - Ben Alder SPA - Designated for breeding Dotterel (*Charadrius morinellus*).
 - Kinlochlaggan Boulder Beds SSSI - Designated for Dalradian geological features.
- 1.2.2 The absence of significant ecological and/or hydrological connectivity and lack of identifiable impact pathways means that these designations are not considered to represent a material constraint to the alignment selection.
- 1.2.3 As can be seen on **Figure 2**, the River Spey SAC and SSSI are located to the north. Both are designated for Atlantic salmon (*Salmo salar*), freshwater pearl mussel (*Margaritifera margaritifera*), otter (*Lutra lutra*), and sea lamprey (*Petromyzon marinus*). Alignment Options 1-3 North are situated within 5 km of these sites, with all three intersecting the River Mashie, a tributary of the River Spey and itself partially designated within the River Spey SAC specifically. As such, hydrological connectivity is present between these designated sites and Alignment Options 1-3 North. However, an impassable artificial barrier is present downstream of the alignment options, restricting passage of qualifying fish species and freshwater pearl mussel into the upper reaches of the River Mashie. All northern alignment options require crossings of the River Mashie and therefore present potential pathways for direct and indirect impacts associated with in-channel/near-channel works relating to water quality, habitat loss, and species associated with the SSSI/SAC are present.

- 1.2.4 Although hydrological connectivity exists between the River Spey SSSI/SAC and Alignment Options 1-3 North, it is considered that potential effects on the qualifying interests or notified features could be avoided or reduced through detailed design, implementation of good practice construction methods, pollution prevention measures, water quality control measures and any additional mitigation measures informed by targeted further survey.
- 1.2.5 In addition to statutory nature conservation designations, Alignment Option 3 North is the only option to directly intersect a parcel of ancient woodland on the Ancient Woodland Inventory (AWI), which directly connects to two further ancient woodland parcels (Wood ID: 16800 / 16801 / 16802). As such, targeted ancient woodland clearance would be required along this alignment option to facilitate the development and whilst habitat loss and wider impacts could be minimised through considerate site design and micro-siting, these impacts are considered to be unavoidable.
- 1.2.6 No other alignment options directly intersect ancient woodlands. The closest approach occurs along the southern section of Alignment Option 2 South, which passes within 80 m of the Coillee Doir-ath ancient pinewoods (Wood ID: 16812), and the northern section of Alignment Option 1 North, which passes approximately 180 m north of an AWI parcel (Wood ID: 16800).
- 1.2.7 Whilst statutory nature conservation designations do not distinguish between the alignment options, ancient woodland considerations do. Alignment Option 3 North is the least preferred northern alignment due to its direct intersection with an AWI parcel and the associated requirement for unavoidable woodland clearance. Alignment Options 1 North and 2 North are therefore preferred from a woodland designation perspective.

Protected Species

- 1.2.8 A protected species desk study was undertaken for each alignment option, collating records from within 2 km over the past 20 years. Records were obtained from NBN Atlas, and included mammals, birds, amphibians, reptiles, invertebrates, lichens and bryophytes, as well as invasive/non-native species. The desk study results provide an indication of species known from the wider area, but do not confirm current presence or absence along the alignment options.
- 1.2.9 Protected species considerations are broadly equivalent for the Loch Earba PSH Alignment and all other alignment options at this stage. However, variations in the habitat suitability for arboreal and semi-aquatic mammals are present in specific alignment options, relating to coverage of suitable habitat. Although woodland-dependent species such as pine marten, red squirrel and wildcat may be more closely associated with some alignment sections, opportunities exist to avoid or reduce impacts through alignment refinement, micro-siting and species-specific mitigation. These differences are therefore not considered sufficient to materially influence alignment selection.
- 1.2.10 Potential effects on protected species would be further informed by targeted surveys and can be managed through application of the mitigation hierarchy. Careful micro-siting would enable the avoidance of sensitive habitats and species locations where possible, while species-specific mitigation and pre-construction surveys would be implemented where required. Although there are localised differences in habitat suitability between the alignment options, these are not considered sufficient to materially differentiate the options at the alignment selection stage. Consequently, protected species considerations do not indicate a clear preference between the alignment options.

Habitats – Groundwater Dependent Terrestrial Ecosystems (GWDTE)

- 1.2.11 Wet heathland is the primary potential Groundwater Dependent Terrestrial Ecosystems (GWDTE) present across the alignment options, with particular concentrations across the southern portion of Loch Earba PSH Alignment, as well as the two larger expanses of open moorland through which all northern alignment options extend. Given the extensive coverage of this habitat and the prioritisation of minimising losses of Annex I blanket bog, direct losses and further impacts on wet heath habitat would be unavoidable within all alignment options.

- 1.2.12 Potentially high sensitivity GWDTEs include acid and basic flushes associated with heath and mire habitats within the Loch Earba PSH Alignment. Given their localised extent, it is anticipated that these features could largely be avoided through detailed habitat surveys and micro-siting.
- 1.2.13 In addition to these moorland-associated GWDTEs, high altitude stands of ancient upland birchwood characterise the slopes of Creag a' Mhaigh and Creag a' Chuir within the Loch Earba PSH Alignment, with further wet woodlands (including ancient components) extending along the riparian zone of the River Mashie at the northern extents of Alignment Options 1-3 North. Both these woodland types represent potential GWDTEs; however, based on the close association with significant surface water flow pathways, dependence on groundwater emergences is unlikely but will be confirmed through further surveys. Regarding both woodland types, considerate site design and associated micro-siting should allow for the near total avoidance of these woodlands across all alignment options, with the exception of Alignment Option 3 North, which directly crosses the ancient woodland component of the River Mashie's riparian wet woodlands.

Habitats – Annex 1

- 1.2.14 An overview of sensitive habitats was obtained during walkover surveys, and these are displayed on **Figure 3**. Habitats such as H8110 Siliceous Scree (UKHab Code: s1a5) and H91C0 Caledonian Forest (UKHab Code: w2a5) are within the wider proposed route corridor but not crossed by the alignment options.
- 1.2.15 Annex 1 habitats across all alignment options include the following (in order of coverage from greatest to lowest):
- Northern Atlantic wet heaths with *Erica tetralix* (H4010);
 - Blanket bog (H7130);
 - European dry heaths (H4030); and
 - Alpine pioneer formations of the *Caricion bicoloris-atrofuscae* (H7240) – classification and coverage to be confirmed through further targeted surveys.
- 1.2.16 Northern Atlantic wet heath is the most widespread Annex I habitat and is extensive in several sections of all alignment options. Given its prevalence, it is unlikely that any alignment option would avoid impacts on this habitat, particularly due to the prioritisation of Annex I blanket bog avoidance and the close association of these two habitat types.
- 1.2.17 Annex I blanket bog is the secondary component of the moorland assemblage that characterises all alignment options, with coverage being the most minimal within the Loch Earba PSH Alignment adjacent to Loch Earba. Given the localised, but occasionally extensive coverage of blanket bog within the southern alignment options, completed avoidance of direct losses and wider impacts on this Annex I habitat is not considered possible; however within Alignment Option 2 South, as this option already avoids the larger extents of blanket bog, through additional considerate site design (inclusive of micro-siting) and implementation of best practice construction measures, impacts can be minimised and/or avoided.
- 1.2.18 Within the northern alignment options, Alignment Option 3 North intersects the greatest coverage of Annex I blanket bog overall, specifically across the two expanses of open moorland to the east of Druim na Beiste and further east between the rivers Pattack, Mashie and Dark Gully Burn to the north of Beinn Eilde; followed by Alignment Option 2 North, and then Alignment Option 1 North with the lowest coverage (and direct intersection) of blanket bog habitat. The difference in blanket bog coverage within Alignment Options 1 and 2 North is, however, minimal, with a difference of only 0.38 ha. Given the localised, but extensive, coverage of blanket bog, avoidance of direct losses and wider impacts on this Annex I habitat is not considered possible within any of the northern alignment options.
- 1.2.19 All northern alignment options intersect parcels of Annex I European dry heaths; however, this habitat is absent from the Alignment Options 1-3 South.

- 1.2.1 Overall, habitat constraints are broadly comparable across the alignment options, with extensive areas of wet heath and blanket bog present throughout much of the study area. Within the southern alignment options, Alignment Option 2 South is considered the preferred option due to its lower interaction with Annex I blanket bog, whilst Alignment Option 3 South is the least preferred. Within the northern option group, Alignment Options 1 and 2 North are broadly comparable from a habitat perspective, although Alignment Option 3 North is less favourable due to its greater interaction with blanket bog habitats and its direct intersection with riparian wet woodland associated with an AWI parcel.

Ornithology

- 1.2.2 Four ornithological designations are found within 10 km of the alignment options. These are:
- Ben Alder SPA, designated for Dotterel (*Charadrius morinellus*) which lies approximately 4 km south of the alignment options;
 - Ben Alder & Aonach Beag SSSI, designated for upland breeding bird assemblage which includes Black-throated Diver (*Gavia arctica*) which lies approximately 4 km south of the alignment options;
 - Creag Meagaidh SPA, designated for Dotterel which lies approximately 5 km north-west of the alignment options; and
 - Creag Meagaidh SSSI, designated for breeding bird assemblage which lies approximately 4 km to the north-west of the alignment options.
- 1.2.3 None of the species from these designations would be directly or indirectly impacted by any of the alignment options from an ornithological perspective.
- 1.2.4 The Loch Earba PSH Alignment incorporates open moorland habitat alongside Loch Earba. Black-throated Diver (*Gavia arctica*) use the loch during the breeding season, although do not nest there, and the adjacent crags offer nesting opportunities to Annex 1 and Schedule 1 protected species like Golden Eagle (*Aquila chrysaetos*) and Peregrine (*Falco peregrinus*), and foraging opportunities for Hen Harrier (*Circus cyaneus*) and Merlin (*Falco columbarius*). Open moorland habitats provide opportunities for breeding and foraging Wheatear (*Oenanthe oenanthe*), Snipe (*Gallinago gallinago*) and Common Sandpiper (*Actitis hypoleucos*).
- 1.2.5 All other alignment options run through open moorland habitat and both mixed woodland and coniferous plantation woodland habitats. The woodland habitats provide suitable habitat for nesting Schedule 1 species such as Goshawk (*Accipiter gentilis*) and Crossbill (*Loxia* spp.), and in addition, several woodland or woodland edge species including Black Grouse (*Lyrurus tetrix*), Song Thrush (*Turdus philomelos*), Spotted Flycatcher (*Muscicapa striata*), Tree Pipit (*Anthus trivialis*), Bullfinch (*Pyrrhula pyrrhula*), Redpoll (*Acanthis flammea cabaret*) and Mistle Thrush (*Turdus viscivorus*) are present within woodland habitats. The open moorland offers foraging opportunities for Golden Eagle, Hen Harrier and Merlin, as well as nesting opportunities for Snipe and Common Sandpiper in the wetter areas.
- 1.2.6 In general, the woodland habitats contain a higher density of birds than the open moorland, and all woodland habitats are expected to suffer small-scale habitat loss which could lead to disturbance and/or displacement to woodland species through the construction phase.
- 1.2.7 Alignment Options 1, 2 and 3 South avoid known Black Grouse lek sites. Alignment Options 1, 2 and 3 North though would pass within 500 m of a known lek site.
- 1.2.8 A full suite of breeding bird surveys and Vantage Point (VP) watches was conducted October 2024 to September 2025, and it is considered that following recommended pre-construction surveys and/or appropriate mitigation measures (regarding timing of works and any required micro-siting to avoid the Black Grouse leks), any risk to birds would be eliminated or minimised, and no ornithological constraints to the UGC are expected.

- 1.2.9 Considering the various proposed alignment options, there is no preferred alignment from an ornithological perspective, as all alignment options are likely to lead to low levels of impact on all bird species. As above, no adverse effects on the bird life of the area are expected once suitable surveys and mitigation measures have been implemented.

Geology, Hydrology and Hydrogeology

- 1.2.10 The alignment options have been reviewed with regard to peatland, hydrology, hydrogeology and private water supplies. Relevant peatland classification and peat depths are mapped on **Figures 4a/b** and **Figure 5** shows the local hydrology.
- 1.2.11 With the exception of peat, the superficial deposits (glacial till with small areas of hummocky glacial, peat, glaciofluvial, alluvium, alluvium fan and river terrace deposits) and bedrock geology (metamorphic and igneous rocks) beneath the alignment options, is common regionally and is not afforded protection. The superficial and bedrock geology does not generally contain large quantities of groundwater and does not form significant or regionally important aquifers.¹ It is considered, therefore that groundwater does not pose a development constraint, and subject to best practice construction techniques to ensure any shallow groundwater is not impaired, geology is not considered to pose a development constraint for any alignment option. Some shallow groundwater may be present nearer larger watercourses and where alluvium and river terrace deposits are recorded.
- 1.2.12 Peatland classification mapping highlights that the southern alignment options (Alignment Option 1 South, Alignment Option 2 South and Alignment Option 3 South) would cross areas of potential Class 1 and Class 2 peatland as well as areas of Class 3 and Class 5 peatland (see **Figure 4a**). The Loch Earba PSH Alignment and the northern alignment options (Alignment Option 1 North, Alignment Option 2 North and Alignment Option 3 North) would also cross areas of potential Class 3 and Class 5 peatland. The mapping indicates that the alignment options would intersect similar classifications of peatland.
- 1.2.13 Phase 1 peat probing has been completed as part of the route selection phase of the project and in support of the Earba PSH Scheme planning application (see **Figure 4b**). Peat depth surveys indicate a number of areas of deeper peat around the middle of the southern alignments, and towards the start of the northern alignments. Within the southern alignments, Alignment Options 1 and 2 South traverse the northern edge of the deeper peat, with the deepest area of peat recorded at 1.5-2 m in depth. In contrast, Alignment Option 3 South would cross directly through a deeper area of peat, recorded at 3-4 m in depth. Therefore, Alignment Options 1 and 2 South would be preferred over Alignment Option 3 South. To the north, Alignment Options 1 and 2 North both traverse a large area of deeper peat to the south and north respectively. Alignment Option 3 North passes over an area of peat that is potentially deeper than 5 m, and therefore there is a preference to Alignment Options 1 and 2 North over Alignment Option 3 North. Additional peat probing will be required to inform the alignment design and to show that disturbance of peat has been avoided where possible, as required by NPF4. The peat depth and condition data can also be used to develop a peat management plan and peat landslide hazard risk assessment which may be required as part of any future application.
- 1.2.14 All alignment options are either entirely or partially located within the River Spean surface water catchment (see **Figure 5**). The northern alignment options are also partially located within the River Spey catchment. None of the catchments that drain any of the alignment options have been designated as a Drinking Water Protected Area (DWPA).
- 1.2.15 All alignment options would require several watercourse crossings (see **Figure 5**). Within the southern alignment options, Alignment Option 3 South would require the highest number of watercourse crossings, whilst Alignment Option 2 South would require the fewest. Among the northern alignment options, Alignment Option 3 North would require the greatest number of watercourse crossings, whilst Alignment Option 2 North would require the fewest.

¹ BGS maps portal [online] Available at: <https://www.bgs.ac.uk/information-hub/bgs-maps-portal/>

- 1.2.16 The southern alignment options would also have to cross the River Pattack floodplain. SEPA flood mapping indicates that Alignment Option 1 South would intersect the largest area within the River Pattack floodplain whilst Alignment Option 3 South would intersect the smallest area within the River Pattack floodplain.
- 1.2.17 Review of the Highland Council private water supply database indicates that no PWS sources are recorded within 500 m of Alignment Option 1 South or Alignment Option 3 South. Alignment Option 2 South though, has a PWS is recorded within 500 m. One PWS source, shown to be associated with a stream abstraction for Ardverikie Estate off the Allt a' Mhuilinn, is noted downstream of all three southern alignment options. Further studies would be required to confirm the location of this supply. No licenced abstractions are noted within 500 m of any of the alignment options.
- 1.2.18 Overall, the principal differentiators between the options relate to peat depth and the number of watercourse crossings. Within the southern option group, Alignment Option 2 South is preferred due to it having the lowest expected interaction with areas of deep peat, whilst Alignment Option 3 South is the least preferred owing to its direct interaction with deeper peat and the greater number of watercourse crossings.
- 1.2.19 Within the northern option group, Alignment Options 1 and 2 North are preferred, with Alignment Option 3 North being the least preferred due to its interaction with areas of potentially very deep peat and the higher number of watercourse crossings.

Cultural Heritage

Cultural Heritage Designations

- 1.2.20 There are no designated sites within or immediately adjacent to any of the alignment options and therefore no direct impacts on designated assets are predicted. No long terms indirect, visual impacts would occur on designated assets given the alignment options are UGC. A very minor temporary visual impact during construction may occur on one designated asset, the scheduled monument, Dun da Lamh fort, SM4361. However, given its distance of approximately 4 - 5 km from the alignment options, any such impact would be negligible.

Non-Designated Cultural Heritage Assets

- 1.2.21 With the exception of Allt a' Mhaigh; shielings, stalkers path, cairn at NN 48832 83519 which was found during a targeted archaeological survey in July 2023² (see **Figure 6**) which is considered to be of Regional significance, all non-designated cultural heritage assets located within the vicinity of the alignment options are of Local significance. As such, they are of relatively low sensitivity to direct impacts, and any such effects would likely be considered minor. Nevertheless, avoidance through design and micro-siting would be prioritised where practicable.
- 1.2.22 Loch Earba PSH Alignment passes the Allt a' Mhaigh site and MHG 22756 Ardverikie House - Power Station, however, they are likely to be within the area of inundation of Loch Earba PSH Scheme, in which case Loch Earba PSH Alignment would be aligned to the east and would not itself cause any direct damage.
- 1.2.23 Alignment Option 3 South would intersect the River Pattack Enclosure (MHG 27128), whereas Alignment Option 1 and 2 would pass just to the north and would miss this feature. While Alignment Option 1 and 2 South avoid any direct impact on the feature, the potential impacts of Alignment Option 3 South would be minor and limited to a short section of the enclosure dyke. Consequently, no clear preference emerges between the southern options on cultural heritage grounds.
- 1.2.24 Alignment Option 2 North, the most westerly of the three northern options, passes close to the Dark Gully where there are cultural heritage features, including The Cramlets (MHG 32735/ MHG 49125) and a cairn (MHG 49208). The cairn in particular is likely to be placed prominently on the highest point of the ridge and

² Not recorded on Historic Environment Records (HER).

above bedrock. Given the nature of the features and the opportunity for micro-siting at the design stage, it is considered likely that direct effects could be avoided. However, should damage be unavoidable, these features have been defined as being of Local significance and the magnitude of this damage would be minor.

- 1.2.25 Alignment Options 1 and 2 North, running west of the River Mashie, both have the potential to impact on two cultural heritage assets: a stone dyke (MHG 49126) and a building (MHG 49130). These features would be avoided by Alignment Option 3 North. The stone dyke (MHG 49126) is a long linear feature of which only a section would require to be removed and while the given location of the building (MHG 49130), is imprecise, it is probable that this could be protected from direct damage through mitigation.
- 1.2.26 To the east of the River Mashie, before Alignment Option 1 and 2 North combine with Alignment Option 3 North, one further cultural heritage asset is recorded, a turf dyke (MHG 49140). Alignment Option 3 North, running east of the River Mashie, crosses one cultural heritage feature, a turf dyke (MHG 49165). These assets are both long linear features of Local significance but low sensitivity to direct impacts.
- 1.2.27 All three northern alignment options have the potential to impact on one further cultural heritage site (MHG 49165). This site is recorded as consisting of two buildings, 70 m apart, the precise location of each building is unknown, so the likelihood of direct impact cannot be evaluated but it is probable that damage to both features would be avoidable through mitigation.
- 1.2.28 Whilst Alignment Options 1 South and 2 South are marginally preferable due to avoidance of direct interaction with the River Pattack Enclosure (MHG 27128), the limited scale of potential effects, the relatively low sensitivity of affected assets and the availability of micro-siting mean that cultural heritage considerations do not materially influence alignment selection.

Landscape and Visual

Landscape Designations

- 1.2.29 Relevant landscape and visual constraints are mapped on **Figure 7**. The Loch Earba PSH Alignment and the southern section of Alignment Option 1 South, Alignment Option 2 South and Alignment Option 3 South are located within the Ben Alder, Laggan and Glen Banchor Special Landscape Area (SLA), which is a regional level designation identified and designated by The Highland Council in its document 'Assessment of Highland Special Landscape Areas'.
- 1.2.30 The Loch Earba PSH Alignment passes through an area of notable scenic quality which is considered to form an important component part of the SLA. Whilst the character would be somewhat altered by the construction of Earba Pumped Storage Scheme, the establishment of a wayleave and construction corridor for a UGC connection would necessitate the loss of areas of trees and woodland which strongly contribute to the character of this area and may affect the integrity of mitigation planting proposed for the pumped storage scheme. The alignment traverses relatively steep slopes, and construction works and reinstatement would be likely to be difficult to achieve without resulting in long term impacts. A section of Alignment Option 1, 2 and 3 South would also pass through the SLA, with the potential to impact the SLA particularly at the southern end. These three alignment options would be comparable in terms of their potential impacts on the SLA. Micro-siting is recommended to limit loss of native trees or other trees which form landscape features.
- 1.2.31 Whilst a short section of Alignment Option 1, 2 and 3 North, where these options tie into the substation, is situated within the SLA, this part comprises an area influenced by forestry and OHL infrastructure, and an UGC in this area is unlikely to affect the special landscape qualities of the SLA.
- 1.2.32 The Loch Earba PSH Alignment also passes through the Rannoch – Nevis – Mamores – Alder Wild Land Area (WLA 14). Although not strictly a designation, WLAs have been defined by NatureScot as those areas comprising the greatest and most extensive areas of wild characteristics within Scotland and are given protection within the planning system through NPF4. Although this would also be affected to some degree by

the pumped storage scheme, the presence of a wayleave and construction corridor may reduce the presence of wild land characteristics to some degree and potentially affect the integrity of this area as part of the WLA.

- 1.2.33 The majority of Alignment Option 1, 2 and 3 North are also situated within the Cairngorms National Park (CNP). National Park is a national, statutory designation allocated to landscapes of substantially high quality in which the primary objective is the conservation and enhancement of natural and cultural heritage.
- 1.2.34 All three northern alignment options would pass through coniferous forest plantation or recent clear felling at the northern end. While a UGC connection would require some felling to accommodate a construction corridor and wayleave, it is likely that this could be accommodated within the wider patterns of felling and replanting. However, the more open sections through moorland, which all of these options pass through, would be more sensitive to this type of development as some of the moorland habitats may be difficult to reinstate without resulting in permanent effects. Micrositing may be required to find a sensitive alignment which avoids steeper slopes and more sensitive habitat types.

Landscape Character

- 1.2.35 Landscape character types can be seen on **Figure 8**. The alignment options pass through three Landscape Character Types (LCTs), as classified in the updated NatureScot (formerly Scottish Natural Heritage) Landscape Character Types published in 2019:³
- LCT 86: Smooth Rounded Hills – Badenoch & Strathspey;
 - LCT 87: Small Craggy Knolls and Hills; and
 - LCT 126: Upland Glen – Cairngorms.
- 1.2.36 Other LCTs exist in the surrounding area.
- 1.2.37 In addition, the Cairngorm National Park Authority (CNPA) has undertaken its own review of landscape character within the CNP and identified Landscape Character Areas (LCAs) at a higher level of detail for upland areas and straths and glens. These LCAs are all situated within LCT 126 (Upland Glen – Cairngorms). The alignment options would pass through the Ardverikie: Pattack Glen / Strath Mashie LCA. LCT Sensitivity is summarised in **Table 6.1: Landscape Character Types**.

Table 6.1: Landscape Character Type Sensitivity

LCT	Sensitivity
LCT 86: Smooth Rounded Hills – Badenoch & Strathspey	Medium
LCT 87: Small Craggy Knolls and Hills	Medium
LCT 126: Upland Glen – Cairngorms	Medium – High

- 1.2.38 At Loch Earba the character of the landscape would be somewhat altered by the construction of the pumped storage scheme, which would raise the water level and remove some trees. However, the establishment of a wayleave and construction corridor for the UGC connection would lead to the further loss of areas of trees and woodland which strongly contribute to the character and would also affect the integrity of mitigation planting proposed for the pumped storage scheme.
- 1.2.39 The Loch Earba PSH Alignment traverses relatively steep slopes east of the loch and construction works and reinstatement would be likely to be difficult to achieve without resulting in long term impacts, such as loss of distinctive woodland, particularly at the northern end where the alignment is constrained by surrounding woodland.

³ NatureScot. (2019). Scottish Landscape Character Types Map and Descriptions [online] Available at: <https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions> [Accessed: May 2026]

- 1.2.40 Alignment Option 1, 2 and 3 South would all result in some loss of woodland at the southern end to establish a wayleave, although some of this could potentially be accommodated within the felling patterns. However, limiting the loss of native trees or other trees which form identifiable landscape features as far as possible would be preferred. All three alignment options would cross some areas of open moorland, which may be difficult to reinstate without permanent effect. Alignment Option 2 South would be preferable within this area, as it runs alongside the existing Pattack hydro pipeline and crosses fewer areas of undisturbed open moorland.
- 1.2.41 Alignment Option 1, 2 and 3 South would also cross the River Pattack, where it is important to find an alignment which minimises the loss of habitats which may be more difficult to restore. Alignment Option 1 and 2 South would be preferred over Alignment Option 3 within this area, as it would cross the River Pattack slightly further south, where more trees are present, and crosses an area of more open moorland to the east of the river, characterised by a more complex landform.
- 1.2.42 At the northern end, Alignment Option 1, 2 and 3 North would all pass through an area which is heavily influenced by coniferous forestry plantation, and therefore of lower sensitivity. While a UGC connection would require some felling to accommodate a construction corridor and wayleave, it is likely that this could be accommodated within the wider patterns of felling and replanting. However, some of the sections of open moorland would be more sensitive to this type of development as some of the moorland habitats may be difficult to reinstate without permanent effect. Generally, an alignment would be preferred which avoids steeper slopes and more sensitive habitat types. Whilst landscape considerations alone do not identify a clear distinction between Alignment Options 1 North and 2 North, Alignment Option 3 North is considered less favourable due to its greater interaction with blanket bog and ancient woodland. Environmental considerations taken together therefore support Alignment Option 1 North and Alignment Option 2 North as the preferred northern alignments.

Visual

- 1.2.43 There would be views of the Loch Earba PSH Alignment from the track alongside Loch Earba, which would be reconstructed at a higher level following inundation by the pumped storage scheme, particularly during construction. While these views are expected to become limited to a wayleave corridor through the trees once reinstatement has taken place, this may affect the integrity of mitigation planting proposed for the pumped storage scheme. The alignment traverses relatively steep slopes, and construction works and reinstatement would be likely to be difficult to achieve without long term impacts.
- 1.2.44 Alignment Option 1, 2 and 3 South would all run alongside the East Highland Way for approximately 1 km, although Alignment Option 3 South would run slightly further from this route. These alignment options would all cross Scottish Hill Track 155b - Loch Rannoch to Kinloch Laggan adjacent to the Pattack River, with the potential for some disturbance during construction. They would also interact with some of the tracks and paths within Ardverikie Estate which may be used for recreation. Visual effects are expected to be limited once reinstatement has occurred, although there may be some visual effects relating to wayleaves within the forested sections at the southern end, and possible changes in vegetation types that may occur on more difficult to reinstate habitats. However, these changes would unlikely lead to any notable visual effects.
- 1.2.45 The nearest residential receptors for Alignment Option 1, 2 and 3 South would be located at Ardverikie Estate, approximately 700 m away. However, intervening forestry is likely to screen views. Potential visual effects for all three southern alignment options would be comparable.
- 1.2.46 Potential visual effects for Alignment Option 1, 2 and 3 North are likely to be minimal as there are only a limited numbers of visual receptors nearby. The nearest residential receptors are located at Feagour, approximately 1.4 km away, with views towards these properties screened by forestry. While these alignment options would all interact with some local estate/forestry tracks, visual effects are expected to be limited once reinstatement has occurred. Potential visual effects would be comparable for the three northern alignment options.

Land Use

Forestry

- 1.2.47 Ancient woodland and planting schemes are mapped on **Figure 9a** and native woodland can be seen on **Figure 9b**. The Aberarder Planting Scheme (consented) and the Lower Pattack Wood Forestry Grant Scheme (FGS) (proposed) do not come to within 1.5 km of any alignment option.
- 1.2.48 The Loch Earba PSH Alignment passes through areas of Native Woodland, identified on the Native Woodland Survey of Scotland (NWSS). The woodland within this section is characterised primarily by open-grown mature upland birch woodland, interspersed with Scots pine. A small, localised area of non-native conifer species is also present within the wider woodland matrix. An Operational Corridor (OC) of 70 m would be required through this section as it passes through native woodland.
- 1.2.49 An OC of 90 m would be required through any areas of commercial woodland and an OC of 70 m would be required through areas native woodland as described in the above paragraph.
- 1.2.50 In relation to the southern alignment options, Alignment Option 1 South and Alignment Option 2 South are the preferred because they would result in less woodland clearance and fragmentation. Alignment Option 1 South also runs along the southern edge of an existing forest road.
- 1.2.51 Alignment Option 1 North is considered the preferred northern alignment as it would pass predominantly through recently felled or replanted commercial woodland, resulting in lower sensitivity and fewer long-term ecological constraints. Impacts on commercial woodland are generally more manageable where stands are rotational, recently felled, or scheduled for restructuring, and where proposals can be integrated with existing forest plans to minimise loss of productive area and maintain future crop viability. It would also avoid the area of AWI that Alignment Option 3 North has the potential to interact with.
- 1.2.52 A review of the woodland resource along the alignment options indicates that Alignment Options 1 and 2 South and Alignment Options 1 North present the least overall impact on native woodland, as identified within the NWSS. These options avoid the most sensitive native pinewood blocks where possible, make greater use of existing forest infrastructure, and reduce the extent of new woodland fragmentation. As a result, they are considered the preferred alignments from a woodland impact perspective.

Agriculture

- 1.2.53 The Loch Earba PSH Alignment and all southern and northern alignment options are located within Class 6.2 and Class 6.3 Land Capability for Agriculture, as shown on **Figure 10: Land Use - Agriculture**. These land classes are capable only of rough grazing due to physical limitations and are therefore considered to be of relatively low agricultural value. Other land classes exist in the surrounding area.
- 1.2.54 Differences between the alignment options are limited. The southern and northern options all pass through a combination of Class 6.2 and Class 6.3 land, with Alignment Options 3 South and 3 North intersecting a slightly greater proportion of Class 6.3 land, which is generally of lower grazing value.
- 1.2.55 Overall, agricultural constraints are low across all alignment options and do not provide a strong basis for distinguishing between the alternatives. Whilst Alignment Options 3 South and 3 North are marginally preferable due to their slightly lower interaction with moderate-value grazing land, the differences between the alignment options are limited and agriculture is not considered a key differentiator in alignment selection.

Recreation

- 1.2.56 Recreational assets can be seen on **Figure 11**. The Loch Earba PSH Alignment and the southern alignment options pass through an area popular for walkers, mountain climbers, fishers and other tourists staying in holiday homes. The southern alignment options would intersect the East Highland Way and Scottish Hill Track 155b (Loch Rannoch to Kinloch Laggan), resulting in the potential for temporary disruption during construction. Following reinstatement, no notable long-term constraints on recreational access or amenity are anticipated.
- 1.2.57 The southern alignment options are broadly comparable in recreational terms. Alignment Option 3 South has a slightly shorter interaction with the CNP boundary and is marginally shorter in length; however, the differences between the options are limited and recreation is not considered a key differentiator in alignment selection.
- 1.2.58 Recreational effects associated with the northern alignment options are expected to be minimal. Whilst local estate and forestry tracks may experience temporary disruption during construction, there is little to distinguish between the northern alignment options from a recreation perspective.

Planning

Policy

- 1.2.59 The alignment options have been reviewed against relevant national, regional and local planning policy considerations, including those relating to nature conservation, biodiversity, landscape character, peatland, woodland and cultural heritage. Compliance with planning policy will depend largely on the ability to avoid or minimise environmental effects through alignment selection, detailed design and mitigation.
- 1.2.60 The principal planning considerations across the alignment options relate to landscape and visual interests associated with the Ben Alder, Laggan and Glen Banchor SLA, the CNP, areas of sensitive habitat including blanket bog and ancient woodland, and the protection of protected species and cultural heritage assets. Whilst these constraints vary between the alignment options, none are considered to represent an overriding policy constraint at this stage. The planning appraisal therefore broadly reflects the relative environmental constraints identified elsewhere in this report.

Proposals

- 1.2.61 The Loch Earba PSH Alignment is intrinsically linked to the consented Earba Pumped Storage Hydro Scheme and would interact with infrastructure associated with that development, including access arrangements and the proposed reservoir. Ongoing coordination between SSEN Transmission and the PSH developer will be important to ensure compatibility of design and construction activities.
- 1.2.62 There are currently no known planning applications or development proposals that would impact the three southern alignment options.
- 1.2.63 In vicinity of the three northern alignment options, there is an existing forestry track where Forestry Land Scotland (FLS) proposes to install a bridge over a collapsed culvert (REF:24/03607/PNO)⁴. This received approval in August 2024. This proposal is not considered to materially constrain the northern alignment options.
- 1.2.64 No planning proposals have been identified that materially differentiate between the alignment options. Consequently, planning considerations do not identify a preferred alignment in their own right and broadly reflect the environmental constraints identified elsewhere in this report.

⁴ THC Planning Portal (2025) 24/03607/PNO: *Installation of bridge to replace collapsed culvert*, online resource available at: <https://wam.highland.gov.uk/wam/applicationDetails.do?activeTab=summary&keyVal=SIMHNRHML00>, [Accessed: September 2026].

1.3 Engineering Topic Areas

1.3.1 The engineering appraisal adopted a different approach to the environmental appraisal. Rather than assessing the southern and northern sections separately, the alignment options were considered as complete end-to-end connections referred to as Alignment Option 1, Alignment Option 2 and Alignment Option 3. This reflects the way in which engineering constraints and constructability considerations apply across the full alignment rather than within individual northern and southern sections.

1.3.2 As described in **Section 3.5** of the Consultation Document, the section of alignment adjacent to Loch Earba is constrained by the loch shore, topography and other known environmental and engineering considerations, resulting in a single feasible alignment for approximately the first 5 km of the connection. Whilst no alternative alignment options have been identified within this section, a number of notable engineering constraints remain and are summarised below.

- Waterfall crossing – The crossing at approximate grid reference NN 48837 83315 is considered one of the most constrained sections of the connection, comprising a crossing of a deep ravine on steep side slopes that would require enabling works to establish a safe working platform. The Loch Earba PSH Alignment is the only alignment option through this area.
- Side slopes – Due to the topography of Loch Earba and the mountains bounding it, there are steep side slopes. The constraint would be increased, due to the expected increase in water level of Loch Earba due to the consented PSH, pushing the alignment further up the slopes. The Loch Earba PSH Alignment is the only alignment option through this area.

1.3.3 The remaining alignment options beyond Loch Earba are technically appraised in the following sections.

Infrastructure Crossings

Major Crossings

1.3.4 Major infrastructure crossings⁵ can present many obstacles when designing and constructing an UGC and therefore it is advantageous to avoid multiple crossings if possible.

1.3.5 For all alignment options, there is considered to be high potential for the development to be constrained in relation to major crossings, as all have three major crossings, which are the River Pattack, the River Mashie and Pattack Hydro Pipeline. All alignment options also cross Horizontal Directional Drilling (HDD) twice. There is no preference between the alignment options in relation to major crossings and they are all equally constrained.

Road Crossings

1.3.6 Road crossings can constrain an UGC as they often require additional trench support due to the excessive loading caused by road use. As well as this, they can require sections of the road to be closed during the installation phase, causing an impact to the local population.

1.3.7 All alignment options contain no road crossings and as such are not expected to be significantly constrained by this consideration. However, all alignment options contain five existing access track crossings. As the access tracks are either on Ardverikie Estate or FLS land though, they are not open to public use, therefore the crossing of the tracks would not be expected to affect the local population. However, discussions with the landowners are required to ensure the closing of the access tracks does not affect their use of the tracks. There is no preference between the alignment options in relation to major crossings and they are all equally constrained.

⁵ Major infrastructure crossings include high voltage transmission lines, rail lines, wide rivers (greater than 200 m), navigable canals, gas pipelines, and hydro pipelines.

*Environmental Design*Elevation

- 1.3.8 The elevation of an UGC has the potential to greatly constrain its feasibility. Although, the system design and routing are not affected by the elevation, higher elevations increase the difficulty for construction and maintenance to be carried out and the risk of more severe weather is greater.
- 1.3.9 For all alignment options, there is considered to be high potential for the development to be constrained in relation to elevation. This is as, the altitude along all of the alignment options would be greater than 200 m AOD for their full extents. Therefore, all options are similarly constrained and there is no preferred option.

Atmospheric Pollution

- 1.3.10 Desk based surveys have been conducted to confirm the level of atmospheric pollution using data gathered from the National Atmospheric Emission Inventory⁶ (NAEI). The NAEI provides information on the following pollutants:
- Carbon Dioxide;
 - Nitrogen Dioxide;
 - Nitrogen oxide;
 - Sulphur Dioxide; and
 - particulate matters (10 um, 2.5 um, 1 um, and 0.1 um).
- 1.3.11 Based on the data gathered, there is not deemed to be a significant risk posed by atmospheric pollution by any of the alignment options, and there is no preference.

Contaminated Land

- 1.3.12 Contaminated land poses a significant health risk to construction and maintenance operatives, and is potentially expensive to mitigate, dispose of or remediate. As such, the presence of contaminated land with proximity to an alignment would be a significant constraint. For assessment purposes, the presence of unexploded ordnance (UXO) is also considered in this section as it has similar implications
- 1.3.13 All alignment options contain no significant contaminated land. Although the alignments contain historical access track crossings as seen on the OS Six Inch 1830s – 1880s (county layers) map, this is not considered as significant. Additionally, a high-level UXO check carried out using Zetica UXO Maps has identified all alignments to fall within areas of low bomb risk. Therefore, this is not considered as a constraint and there is no preference.

Flooding

- 1.3.14 Areas vulnerable to flooding (coastal, surface and river flooding) pose a potential risk during construction, may prevent maintenance and can pose a physical risk to structures during flood events. As such, options with large areas vulnerable to flooding would have a high risk of constraint.
- 1.3.15 Potential for flood risk has been based on publicly available data from SEPA to determine the extent of each alignment option within the 1:200-year flood zone.⁷ All alignment options have greater than 5% of their route length within 1 in 200 year flood zones, therefore all are considered to have high potential for the development to be constrained. As the alignment options generally follow the same path, they have similar areas of flood risk, with the major areas of risk being in the vicinity of rivers and watercourses.

⁶ Ricardo National Atmospheric Emission Inventory [online] Available at: <https://naei.beis.gov.uk/emissionsapp/> [Accessed: August 2026]

⁷ Scottish Environmental Protection Agency. *SEPA Flood Maps* [online] Available at: <http://map.sepa.org.uk/floodmap/map.htm> [Accessed: August 2026]

- 1.3.16 Alignment Option 1 is particularly constrained to the east of the River Pattack, as it follows adjacent the river for a greater length. Alignment Option 2 follows a longer path to the north of the peatland located to the west of the River Pattack crossing, increasing flood risk compared to within the peatland area. Alignment Option 3 faces additional potential constraints, to the east of the River Mashie, where, according to SEPA flood maps, there is significantly more surface flood risk to the east, compared to the west. All alignment options are similarly constrained and there is no preferred option in terms of flooding.

Ground Conditions

Terrain

- 1.3.17 The terrain of an UGC is important as if the gradients within a section are too severe, certain installation techniques would not be feasible. Extensive ground works may be required within areas of severe gradients, in order to make them suitable for UGC installation.
- 1.3.18 All alignment options include sections with above 20° within their 60 m swathe and therefore are all considered highlight constrained by terrain. The terrain to the north of Loch Earba is generally flatter, with fewer side slopes. The most constrained area is directly to the east of the River Pattack as there are a number of mounds with localised valleys. The alignment options have been designed to avoid these mounds, however due to the lack of space within this section enabling works will likely be required to flatten the majority of this area to allow for a suitable haul road swathe.
- 1.3.19 Additionally, each alignment option also includes one pinch point. All pinch points are located within the vicinity of the River Mashie. All alignment options would require enabling works in order to increase the available working width and all are equally constrained with no clear preference in relation to terrain and for all there is considered to be high potential for the development to be constrained.

Rock

- 1.3.20 Surface rock coverage is considered to have potential for high constraint due to the challenges faced during the installation phases, requiring extensive groundworks to remove rock outcrops. As well as this, these areas can present unfavourable thermal conditions, constraining the design of the system.
- 1.3.21 For all alignment options there is considered to be high potential for the development to be constrained by rock as all have greater than 10% of their length within areas of potential surface rock. There is no preference between the options.

Peat

- 1.3.22 Construction in areas of peat can pose engineering challenges during both the design and construction stages of an UGC installation. In addition, peat has unfavourable thermal properties, leading to challenges with UGC system design.
- 1.3.1 For all alignment options there is considered to be high potential for the development to be constrained by peat. This is as, all alignment options have more than 10% of their length covered by peat. For the full assessment both NatureScot peat classifications⁸ and British Geological Survey (BGS) peat classification⁹ have been assessed. Utilising BGS peat classification, the most-significant peatland areas can be shown, prior to ground investigations being undertaken. The BGS data gives a greater insight into the higher risk areas.

⁸ NatureScot (2014) *Scotland's peatland: definitions and information resources*. NatureScot Commissioned Report No. 701. [online] Available at: <https://www.nature.scot/doc/naturescot-commissioned-report-701-scotlands-peatland-definitions-and-information-resources> [Accessed: August 2026].

⁹ British Geological Survey (n.d.) *BGS Rock Classification Scheme: Peat*. [online] Available at: https://webapps.bgs.ac.uk/bgsrscs/rcs_details.cfm?code=PEAT [Accessed: August 2026].

- 1.3.2 The most significant areas of peat within the BGS mapping aligns closely with what was seen during site visits. In the open area to the west of the River Pattack, there is a large open area of peatland. Although NatureScot mapping classifies the full area as Class 1 peat, the BGS viewer shows the localised areas. Both Alignment Option 1 and Alignment Option 2 are located to the north of the deposits on the BGS viewer. While, Alignment Option 3 takes the most direct route, although this is the shortest, it is located directly through peatland. In the Druim na Beiste area, Alignment Option 2 is the most northern and avoids the deepest areas of peat (see **Figure 4b**).
- 1.3.3 The other most significant peat deposits are located between the River Pattack and River Mashie. BGS peatland data shows a large peatland deposit located within a localised valley area, located on the northern side of the open moorland area. As Alignment Option 1 is located on the southern side of the moorland area, there is no interaction with peat. Alignment Option 2 travels to the north of the peatland area and has minor interactions. Similar to the previous area, Alignment Option 3 takes the most direct route and avoids the majority of the peatland area.
- 1.3.4 Utilising the BGS peat data and peat depth data, to the south, Alignment Option 2 is considered the most preferred alignment option from a peat interaction perspective in the Druim na Beiste area. Alignment Option 1 is the most preferred alignment option from a peat interaction perspective in the more northern River Pattack and River Mashie areas.
- 1.3.5 Overall, peat is considered the principal engineering differentiator between the alignment options. Within the southern section, Alignment Option 2 performs most favourably due to reduced interaction with the deepest peat deposits at Druim na Beiste. Within the northern section, Alignment Option 1 performs most favourably due to lower interaction with significant peat deposits between the Rivers Pattack and Mashie.

Construction / Maintenance

Access

- 1.3.6 During the UGC installation phase, access is required throughout the full route to install the cables. During operation and maintenance, access is required to all joint bays and link boxes to allow for testing and fixing of any potential faults. Alignment options with better access points to main roads are preferred, as more remote options would require additional project costs for access track construction.
- 1.3.7 All alignment options have the majority of their route length within 1 km of the existing road network. Additionally, throughout the alignment length there are existing Ardverikie Estate and FLS access tracks that can be used. For these reasons all alignment options are not thought likely to be constrained by this consideration.
- 1.3.8 There are two main areas of each alignment option that have no access tracks and would require the construction of a new one. The first of these is located within the peatland to the west of the River Pattack. Specifically, between the Ardverikie Estate access track bounded by deep, visible peat and the Ardverikie Estate access track adjacent the Pattack Hydro Pipeline. A new access track approximately at least 1.8 km in length is likely to be proposed to be constructed between these points in order to aid cable installation.
- 1.3.9 The second additional track likely to be required is within the peatland to the east of the River Pattack. Specifically, between the most eastern Ardverikie Estate access track and the FLS boundary, a distance of at least approximately 1.6 km, depending on the chosen alignment option. Similarly to the additional track noted above, this track is proposed to be permanently installed to aid cable installation.

Angles of Deviation

- 1.3.10 Angles of deviation typically cause issues within the design and installation of an UGC system. In a standard open-cut installation, the cables are required to be pulled through the ducts between joints. If a cable section has unfavourable angles of deviation throughout, it may cause the maximum allowable pulling tension or sidewall bearing pressure of the chosen cable to be exceeded.
- 1.3.11 Alignment Option 3 has the fewest number of bends above 10° with approximately 39 expected. Alignment Option 1 would be expected to have approximately 45 bends above 10°, and Alignment Option 2 would be expected to have approximately 55 bends above 10°. As Alignment Option 2 has 120% bends of the lowest scoring option, it would be considered the most constrained for this topic area.

Cable Haul Road

- 1.3.12 Cable Haul Roads are necessary for the construction and installation of the UGC. Options that are remote or have unsuitable terrain to install cable haul roads present a significant risk and have the potential to be constrained.
- 1.3.13 All alignment options have significant peat and rock risk throughout, therefore there is a risk that an enhanced haul road design may be required. The main risks noted are the extensive peat and surface rock coverage, for more details on location please refer to the individual sections. Additionally, each section includes small lengths greater than 20° gradient. All alignment options are therefore considered equally constrained due to poor ground conditions for a cable haul road.

Proximity

Clearance Distance

- 1.3.14 Assessment of the alignment options was undertaken to determine the clearance distances available between buildings and dwellings. All alignment options have no existing dispersed buildings within 500 m of them and have therefore been assigned considered to all have equally low potential for the development to be constrained.

Proximity to Wind Farms

- 1.3.15 Windfarms pose a risk to UGC due to the potential proximity to array cables, potentially impacting the ratings of the UGC. The array cables would need to be crossed in a similar way to other assets.
- 1.3.16 All alignment options have no windfarms or turbines within 1 km of them, and as such are all considered to have equally low potential for the development to be constrained in relation to proximity to wind farms.

Communication Masts

- 1.3.17 There are no communication masts within 1 km of any alignment options, therefore communication masts would not be a constraint to any alignment options.

Urban Environments

- 1.3.18 Urban areas represent a significant constraint that would often need to be routed around. No alignment options are situated within or in proximity to any urban environments.

Metallic pipes

- 1.3.19 Metallic pipelines can cause constraints during the installation of UGCs as they would require a specialist trench arrangement, should a crossing be necessary. Typically, all metallic pipelines would be avoided wherever possible and alignment options with fewer interactions are preferred.

- 1.3.20 The only pipeline highlighted within the alignment options is the Pattack Hydro Pipeline, and it has been confirmed that the material for this pipeline is Glass Fibre Reinforced Plastic. Therefore, no metallic pipelines have been confirmed to interact with any of the alignment options.

Design

Reactive Compensation

- 1.3.21 UGCs that have a significant length and operate at high voltages may require reactive compensation to cover the required high voltage cables reactive power demand. Cable system charging power is proportional to the length of an alignment and the alignment options with the longest length would require larger shunt reactors than shorter alignment options would.
- 1.3.22 Reactive power generation is a key consideration in the design and operation of UGC, as it directly affects network voltage stability and operational performance. As all of the alignment options are of similar overall length and would utilise the same cable specification, the total reactive power generated is expected to be broadly equivalent across all alignment options. Therefore, reactive performance does not differentiate one alignment option from another in technical terms, and all have some intermediate potential for the development to be constrained.

Joint Bays and Link Box Chambers

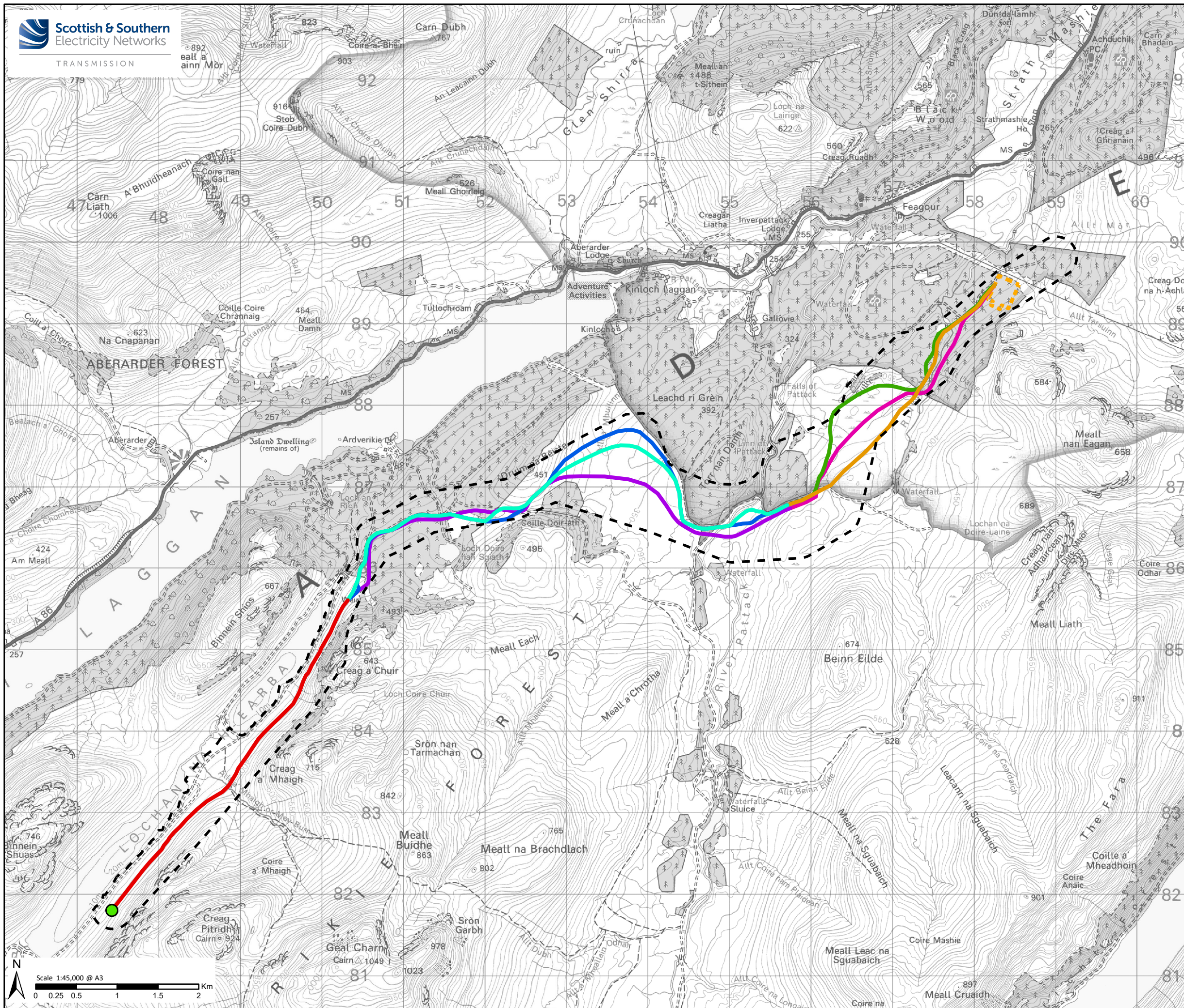
- 1.3.23 Areas with unfavourable ground conditions are not suitable for installation of a joint bay and may cause damage to a component. Each alignment traverses a combination of peaty and rocky terrain, with several sections of uneven ground and localised gradients that influence the suitability and spacing of joint bay and link box installations.
- 1.3.24 Due to the fact that all alignment options face the challenges outlined above, all are considered constrained for joint bays and link box chambers. The highest constraint to consider when assessing a joint bay's potential positioning is peat. This is as joint bays require a solid base to be placed upon for the support required. If alternative positioning cannot be achieved and a joint bay is required to be placed within peat, the peat must be fully excavated and ground must be rebuilt to ensure the joint bay has a stable support. As Alignment Option 3 is routed directly through peat it would therefore be considered the most constrained for this topic area.

1.4 Capital Cost

- 1.4.1 Minor differences in capital cost are anticipated between the alignment options due to variations in length, construction complexity and ground conditions. However, these differences are not considered significant enough to materially influence alignment selection.

1.5 Operational Cost

- 1.5.1 Operational and maintenance requirements are anticipated to be broadly comparable across the alignment options. Consequently, operational cost considerations do not materially differentiate between the options.

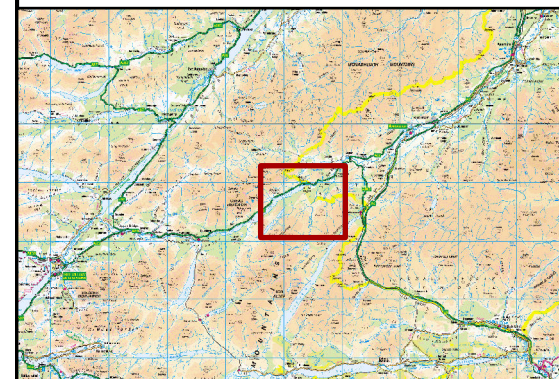


Legend

- Proposed Route
- Earba Pumped Storage Hydro (PSH) Substation
- Indicative Location for Coire Mashie Substation

Alignment Options

- Loch Earba PSH Alignment
- Alignment Option 1 South
- Alignment Option 2 South
- Alignment Option 3 South
- Alignment Option 1 North
- Alignment Option 2 North
- Alignment Option 3 North



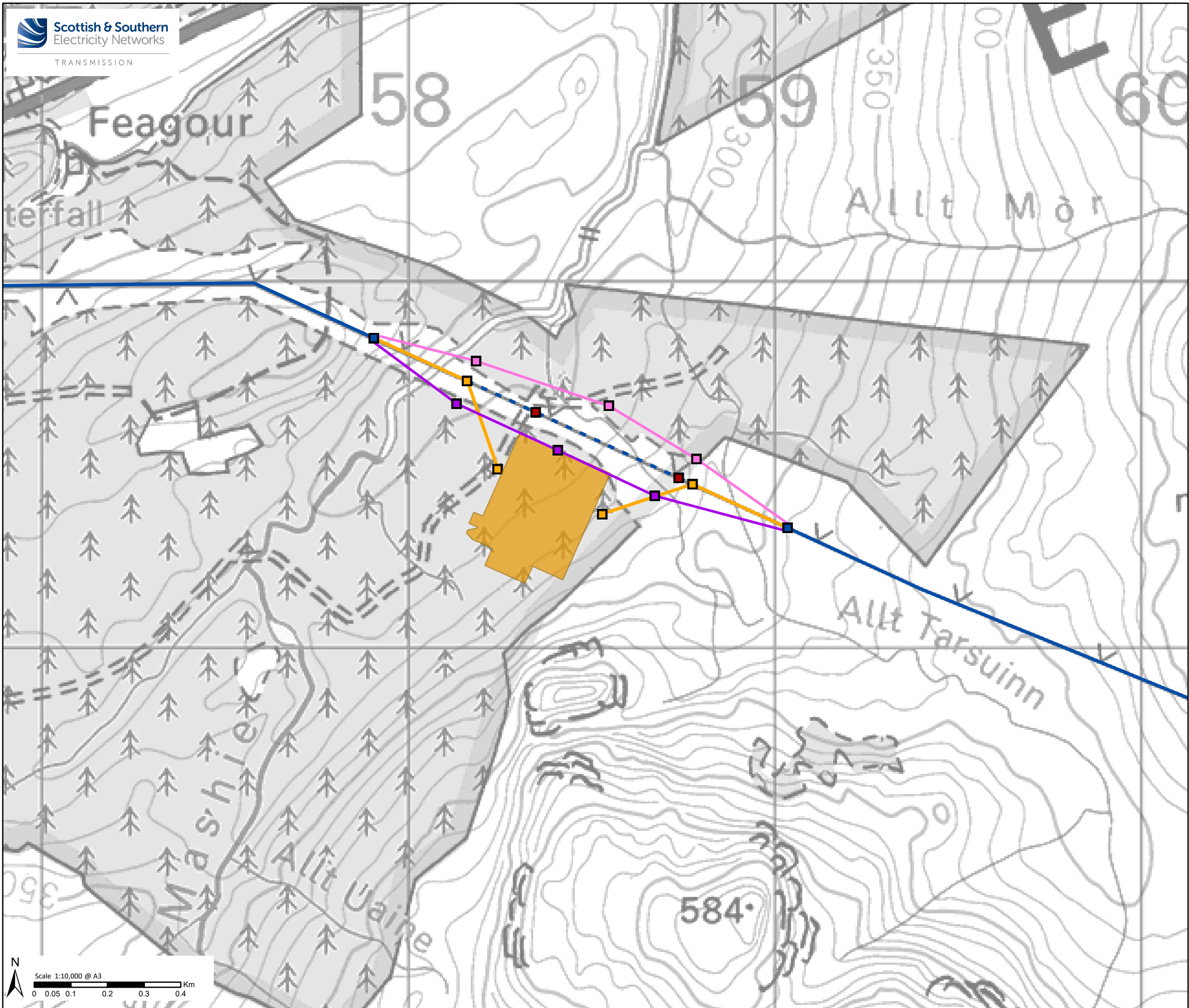
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 1a - Proposed Route, Proposed Substation and Alignment Options

Drawn By: M.T. **Date:** 17/09/2026

Drawing: 123015-D1-CD-1.0.0



Legend

Existing Infrastructure

- Beaulieu - Denny Towers
- Beaulieu - Denny Towers (to be removed)
- Beaulieu - Denny 400 kV (OHL) (to be dismantled)
- Beaulieu - Denny 400 kV (OHL)

Proposed Development (Indicative)

- Indicative Location for Coire Mashie Substation
- New Beaulieu - Denny Towers
- New Beaulieu - Denny 400 kV OHL

Proposed Temporary Infrastructure (Indicative)

- Towers (Northern Option)
- Towers (Southern Option)
- OHL (Northern Option)
- OHL (Southern Option)

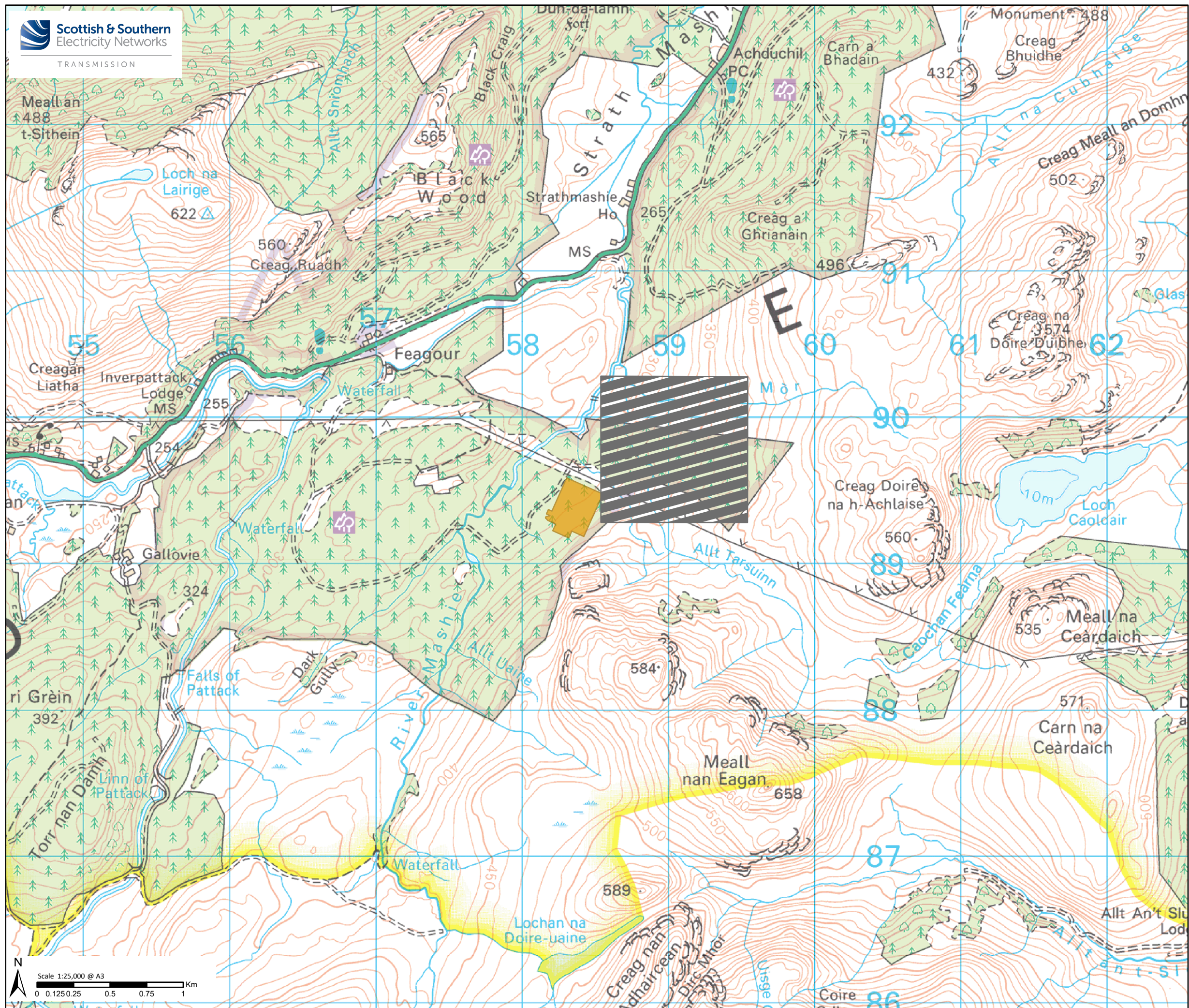
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 1b - Proposed Beaulieu-Denny OHL Reconfiguration

Drawn By: M.T. **Date:** 17/09/2026

Drawing: 123015-D1-CD-1.0.0



Legend

- Indicative Location for Coire Mashie Substation – May 2026
- Indicative Location for Coire Mashie Substation – October 2025

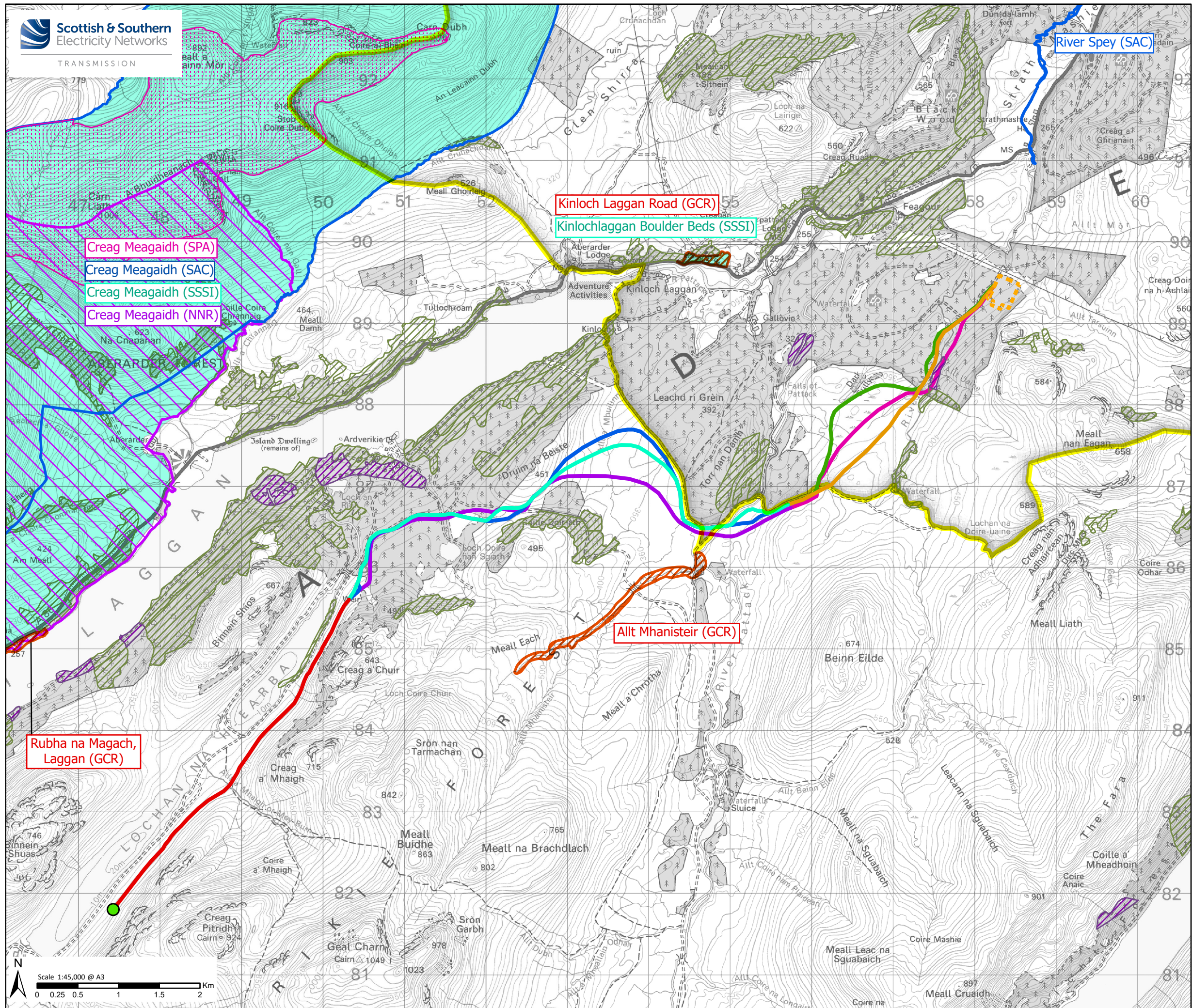
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 1c - Revised Proposed Substation Site Location

Drawn By: M.T. **Date:** 17/09/2026

Drawing: 123015-D1-CD-1.0.0



Legend

- Earba Pumped Storage Hydro (PSH) Substation
- Indicative Location for Coire Mashie Substation
- Alignment Options**
 - Loch Earba PSH Alignment
 - Alignment Option 1 South
 - Alignment Option 2 South
 - Alignment Option 3 South
 - Alignment Option 1 North
 - Alignment Option 2 North
 - Alignment Option 3 North
- Natural Heritage Constraints**
 - Special Protection Area (SPA)
 - Special Areas of Conservation (SAC)
 - Site of Special Scientific Interest (SSSI)
 - Cairngorns National Park
 - National Nature Reserve (NNR)
 - Geological Conservation Review
- Ancient Woodland Inventory (AWI)**
 - Ancient (of semi-natural origin)
 - Other (on Roy map)

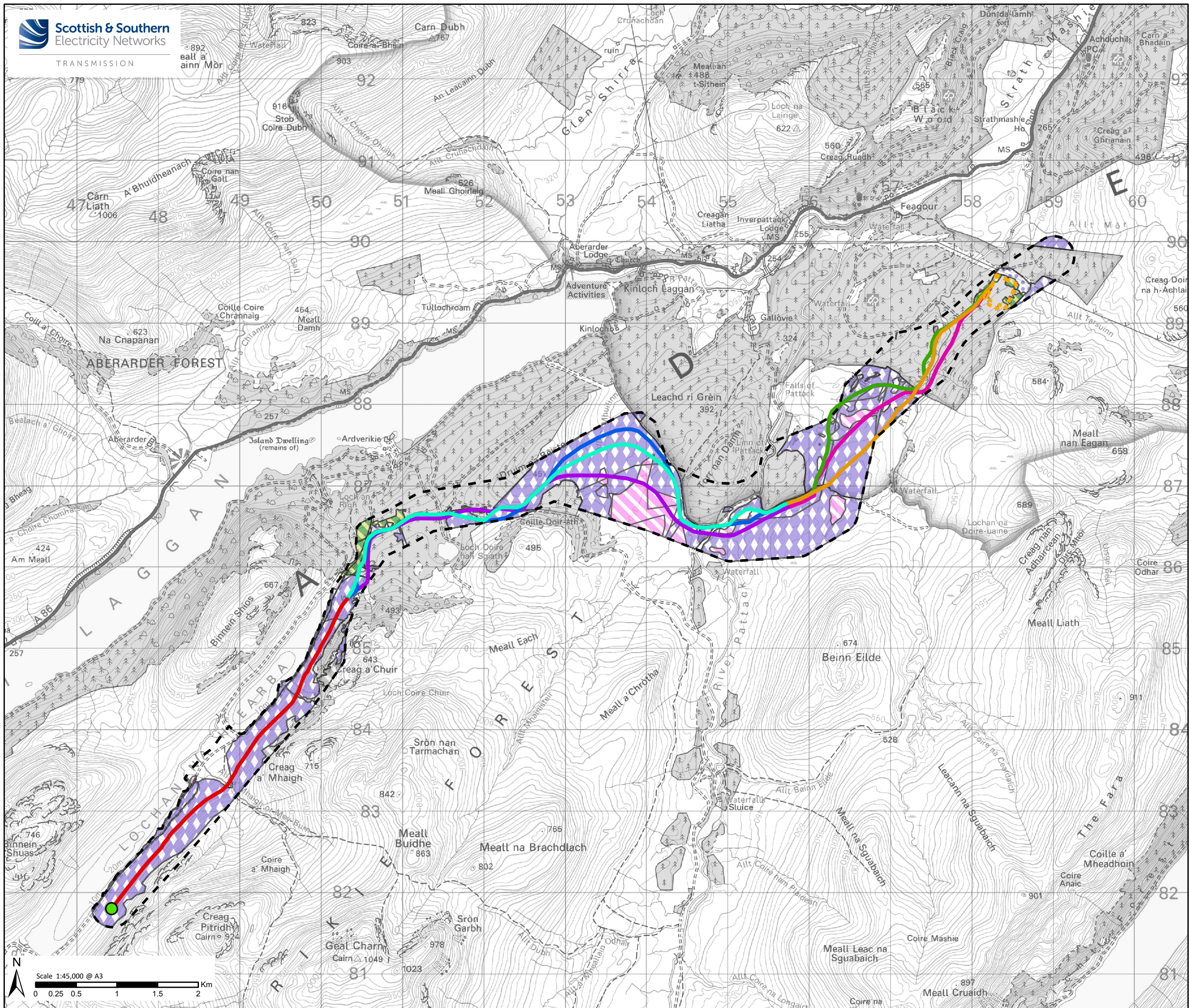
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 2 - Natural Heritage Designations

Drawn By: M.T. **Date:** 16/09/2026

Drawing: 123015-D2-CD-1.0.0



Legend

- Proposed Route
- Earba Pumped Storage Hydro (PSH) Substation
- Indicative Location for Coire Mashie Substation

Alignment Options

- Loch Earba PSH Alignment
- Alignment Option 1 South
- Alignment Option 2 South
- Alignment Option 3 South
- Alignment Option 1 North
- Alignment Option 2 North
- Alignment Option 3 North

UK Habitat Classifications

- 3160 Natural dystrophic lakes and ponds (UKHab Code: r1c7)
- 4010 Northern Atlantic wet heaths (UKHab Code: h1b6)
- 4030 European dry heaths (UKHab Code: h1b5)
- 7130 Blanket bogs (UKHab Code: f1a5)
- H91C0 Caledonian Forest (UKHab Code: w2a5)
- H8110 Siliceous Scree (UKHab Code: s1a5)

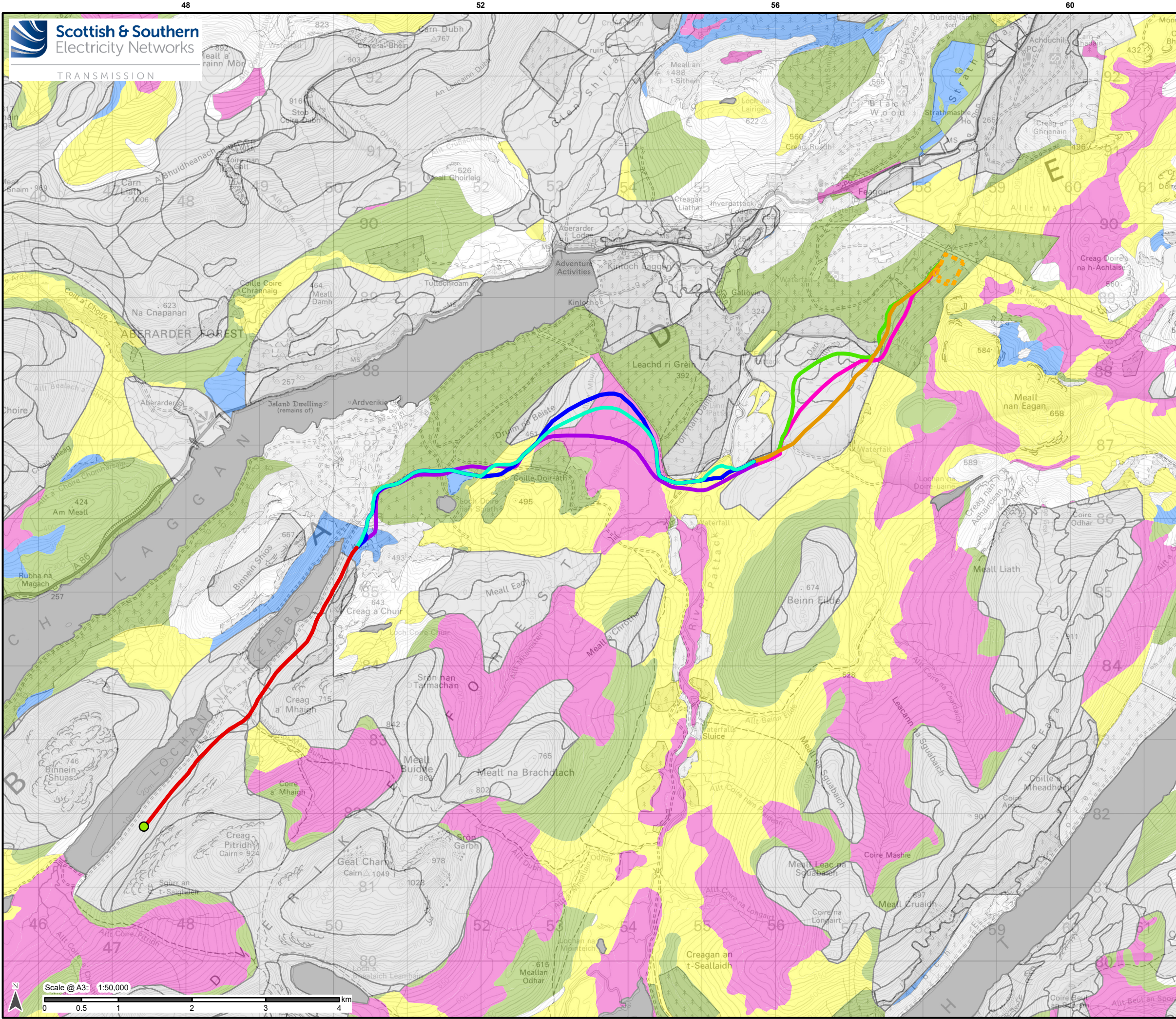
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 3 - Sensitive Habitats

Drawn By: M.T. **Date:** 16/09/2026

Drawing: 123015-D3-CD-1.0.0



Legend

- Earba Pumped Storage Hydro (PSH) Substation
- Indicative Location for Coire Mashie Substation

Alignment Options

- Loch Earba PSH Alignment
- Alignment Option 1 South
- Alignment Option 2 South
- Alignment Option 3 South
- Alignment Option 1 North
- Alignment Option 2 North
- Alignment Option 3 North

National Importance for Carbon-rich Soil, Deep Peat and Priority Peatland Habitat

- CLASS 1 All Vegetation Cover is Priority Peatland Habitats. All Soils are Carbon-rich Soils and Deep Peat
- CLASS 2 The Vegetation Cover is Dominated by Priority Peatland Habitats. All Soils are Carbon-rich Soil and Deep Peat
- CLASS 3 Dominant Vegetation Cover is not Priority Peatland Habitat but is Associated with Wet and Acidic Type. Occasional Peatland Habitats Can Be Found. Most Soils are Carbon-rich Soils, With Some Areas of Deep Peat
- CLASS 4 Area Unlikely to be Associated with Peatland Habitats or Wet and Acidic Type. Area Unlikely to Include Carbon-rich Soils
- CLASS 5 Soil Information Takes Precedence Over Vegetation Data. No Peatland Habitat Recorded. May Also Show Bare Soil. All Soils are Carbon-rich Soil and Deep Peat
- Mineral Soils - Peatland Habitats are not Typically Found on Such Soils
- Non-soil (i.e. loch, built up area, rock and scree)

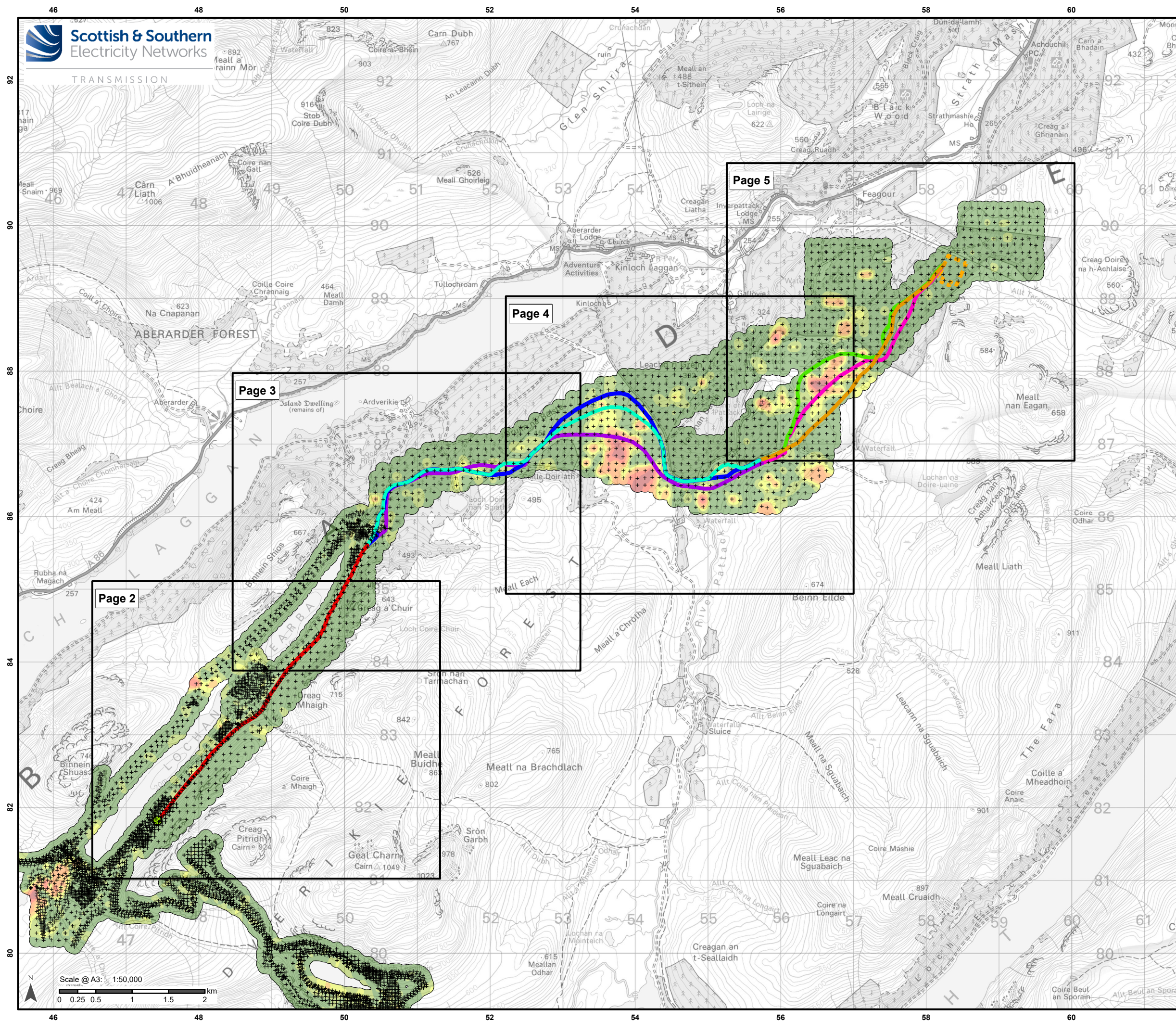
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Scottish Natural Heritage (SNH) has prepared a consolidated spatial dataset of 'carbon rich soil, deep peat and priority peatland habitats' in Scotland derived from existing soil and vegetation data (James Hutton Institute 1:25,000 and 1:250,000 scale soil data and Land Cover Scotland 1988. Used with the permission of The James Hutton Institute. All rights reserved).

Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 4a - Peatland Classification

Drawn by: AA

Date: 18/09/2026



Legend

- Earba Pumped Storage Hydro (PSH) Substation
- Indicative Location for Coire Mashie Substation
- Alignment Options**
 - Loch Earba PSH Alignment
 - Alignment Option 1 South
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 - Alignment Option 3 South
 - Alignment Option 1 North
 - Alignment Option 2 North
 - Alignment Option 3 North
 - + Peat Depth Probe

Peat Depth (m)

- < 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- > 5

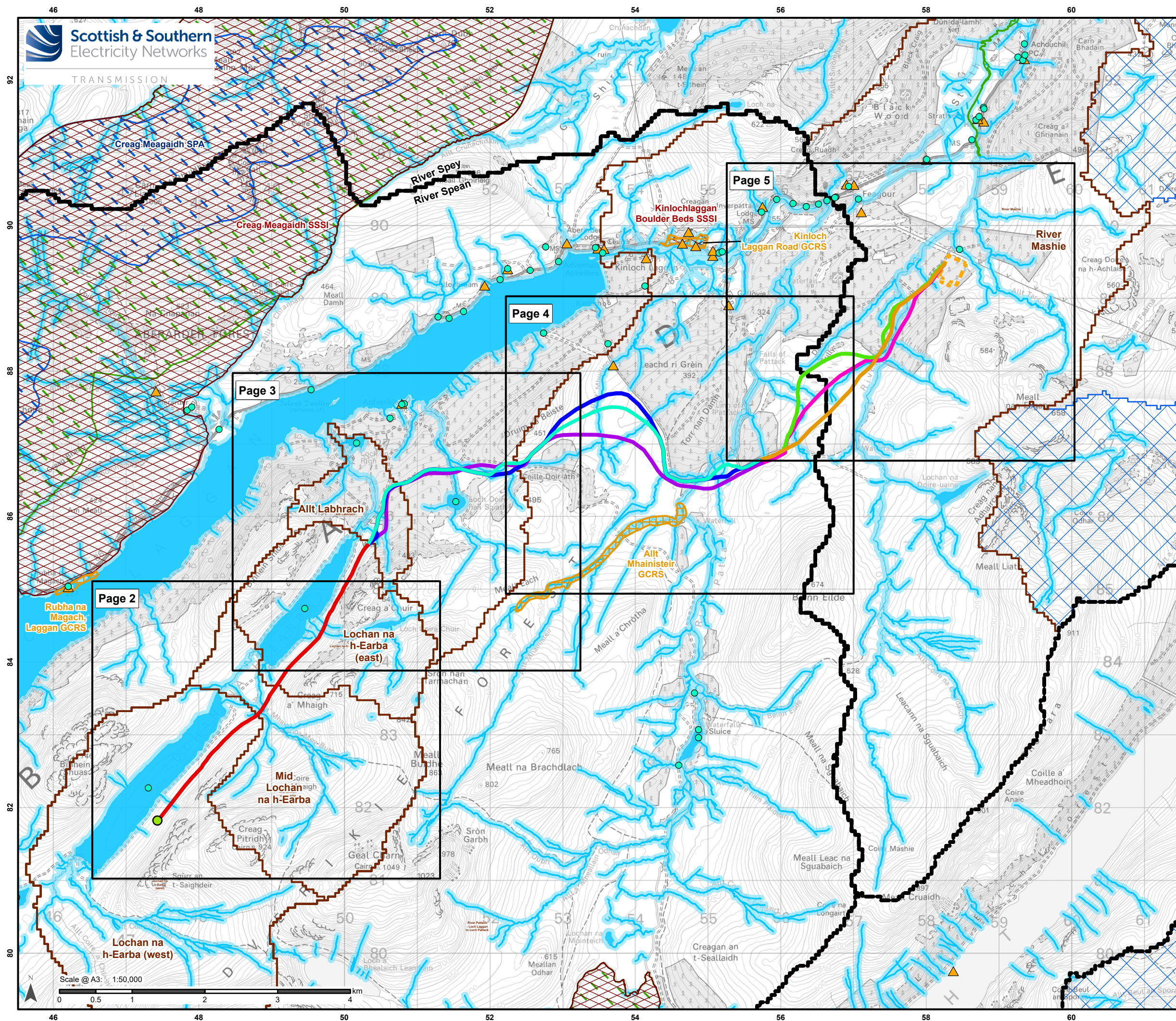
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 4b - Peat Depth Plan
Page 1

Drawn by: AA

Date: 18/09/2026



Legend

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- Designated Sites**
 - Special Area of Conservation (SAC)
 - Special Protection Area (SPA)
 - Site of Special Scientific Interest (SSSI)
 - Geological Conservation Review Site (GCRS)
- Local Hydrology**
 - SEPA EASR Authorised Activity (Previously Known as SEPA CAR Licenced Activity)
 - The Highland Council Private Water Supply Database
 - SEPA Drinking Water Protected Area (DWPA)
 - SEPA Nested Waterbody Catchment
 - River Spey / River Spean Catchment Boundary
 - Watercourse (OS OpenMap Local)
 - Waterbody (OS OpenMap Local)
 - Watercourse and Waterbody 50 m Buffer

Note
Flood data shown on subsequent figures.

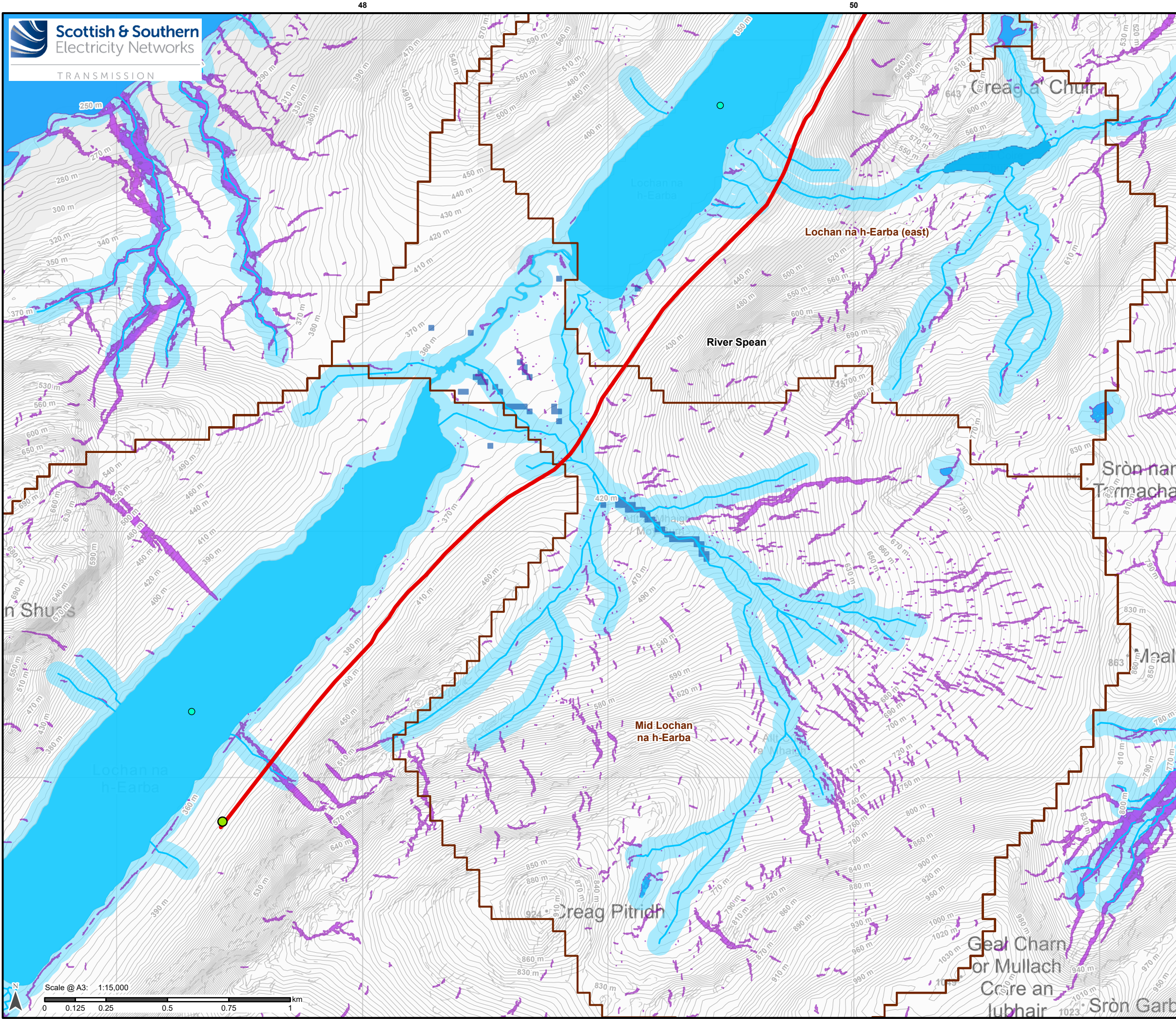
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 5 Local Hydrology
Page 1

Drawn by: AA

Date: 18/09/2026



Legend

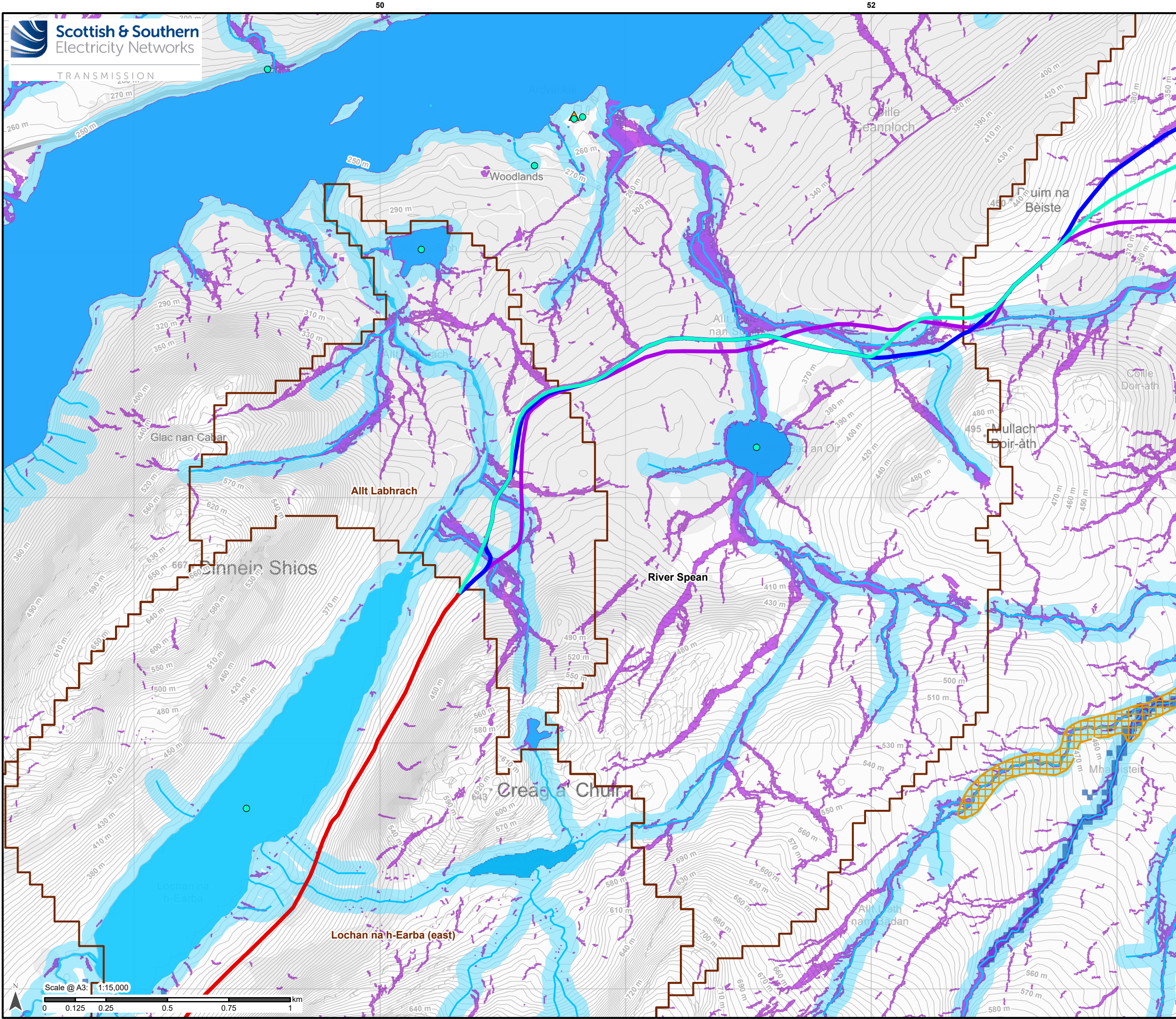
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 - Future (2070) Surface Water and Small Watercourses Medium Likelihood Flood Extent (0.5% AEP)
 - Future (2080) River Medium Likelihood Flood Extent (0.5% AEP)

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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 5 Local Hydrology
Page 2

Drawn by: AA Date: 18/09/2026



Legend

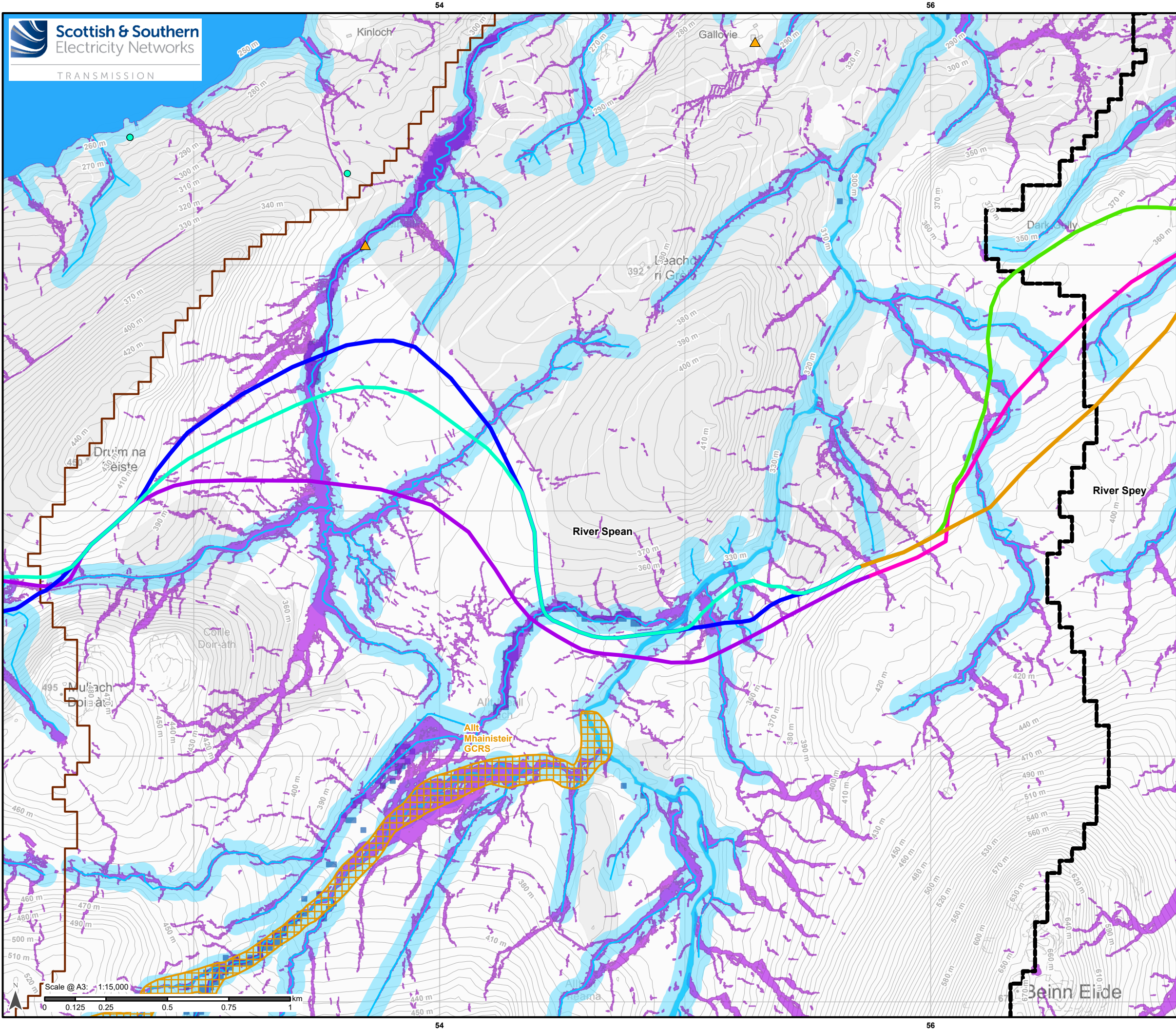
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 5 Local Hydrology
Page 3

Drawn by: AA Date: 18/09/2026



Legend

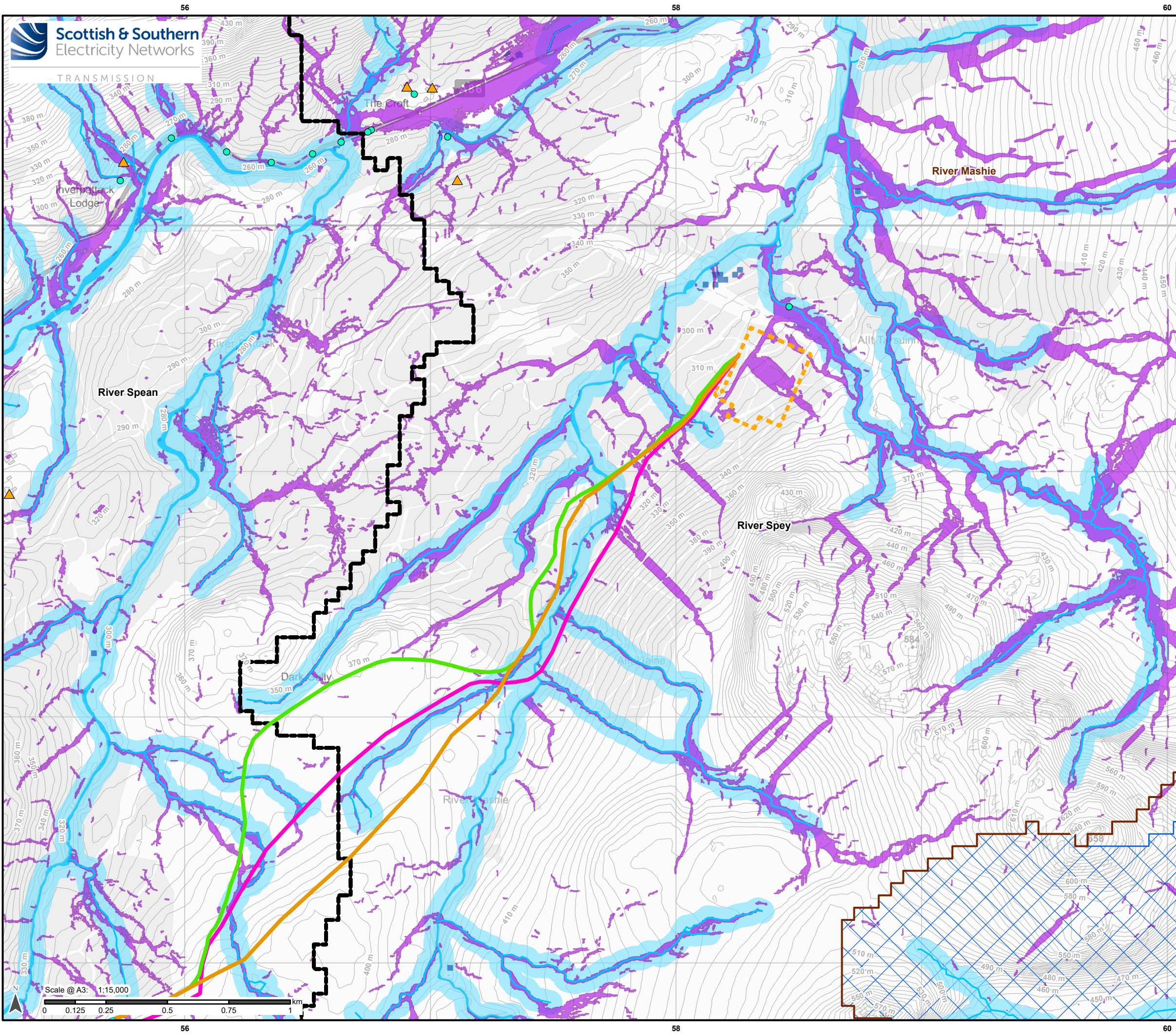
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 5 Local Hydrology
Page 4

Drawn by: AA Date: 18/09/2026



Legend

- Earba Pumped Storage Hydro (PSH) Substation
- Indicative Location for Coire Mashie Substation
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 - Future (2070) Surface Water and Small Watercourses Medium Likelihood Flood Extent (0.5% AEP)
 - Future (2080) River Medium Likelihood Flood Extent (0.5% AEP)

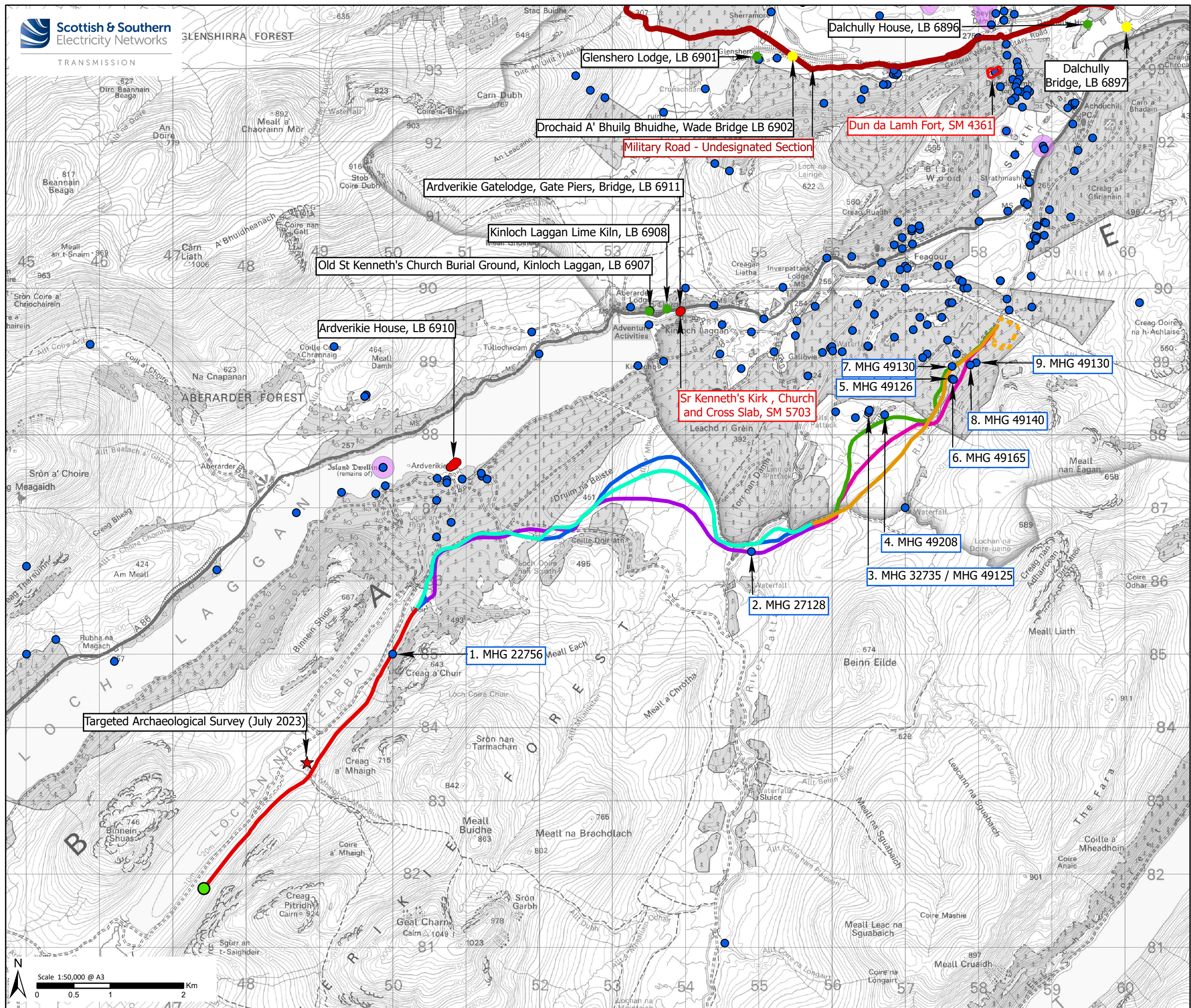
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 5 Local Hydrology
Page 5

Drawn by: AA

Date: 18/09/2026



Legend

● Earba Pumped Storage Hydro (PSH) Substation

■ Indicative Location for Coire Mashie Substation

Alignment Options

— Loch Earba PSH Alignment

— Alignment Option 1 South

— Alignment Option 2 South

— Alignment Option 3 South

— Alignment Option 1 North

— Alignment Option 2 North

— Alignment Option 3 North

Cultural Heritage Constraints

▨ Scheduled Monuments

● Historic Environment Record (HER): Monument Point Features

■ Historic Environment Record (HER): Monument Polygon Features

■ Military Roads - Undesignated

★ Targeted Archaeological Survey (July 2023)

Listed Buildings

● Category A

● Category B

● Category C

Cultural Heritage Assets

- 1 - Ardverkie House; Power Station, MHG 22756
- 2 - River Pattack; Enclosure, MHG 27128
- 3 - The Cramlets, Building; Cairn, MHG 32735 / MHG 49125
- 4 - The Cramlets East; Cairn, MHG 49208
- 5 - River Mashie; Buildings, MHG 49126
- 6 - Strathmashie Forest; River Mashie MHG 49165
- 7 - Strathmashie Forest; Building, MHG 49130
- 8 - Stron a' Mhadaih South, MHG 49140
- 9 - Strathmashie Forest; Stone Wall, MHG 49130

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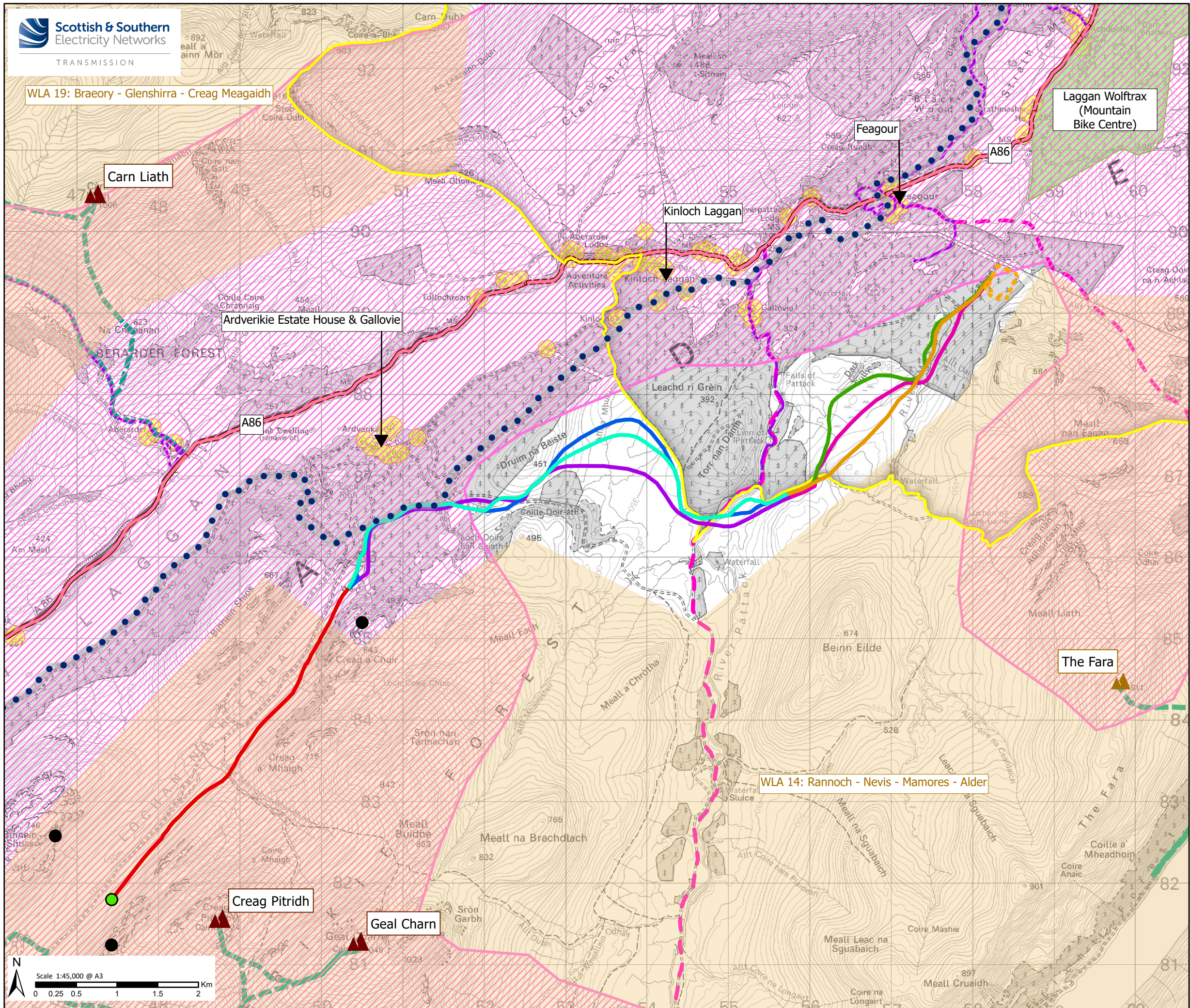
Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 6 - Cultural Heritage

Drawn By: M.T. **Date:** 16/09/2026

Drawing: 123015-D6-CD-1.0.0

WLA 19: Braeory - Glenshirra - Creag Meagaidh



Legend

- Earba Pumped Storage Hydro (PSH) Substation
- Indicative Location for Coire Mashie Substation
- Alignment Options**
 - Loch Earba PSH Alignment
 - Alignment Option 1 South
 - Alignment Option 2 South
 - Alignment Option 3 South
 - Alignment Option 1 North
 - Alignment Option 2 North
 - Alignment Option 3 North
- Landscape & Visual Constraints**
 - Cairngorns National Park
 - Wild Land Areas (WLA)
 - Ben Alder, Laggan & Glen Banchor - Special Landscape Area (SLA)
- Potential Visual Receptor Locations**
 - 100m Building Buffer
 - Core Paths
 - East Highland Way
 - Scottish Hill Tracks
 - Mountain Routes
 - A Road
 - Laggan Wolfrax (Mountain Bike Centre)
 - Climbing Venues
 - ▲ Corbett
 - ▲ Munro

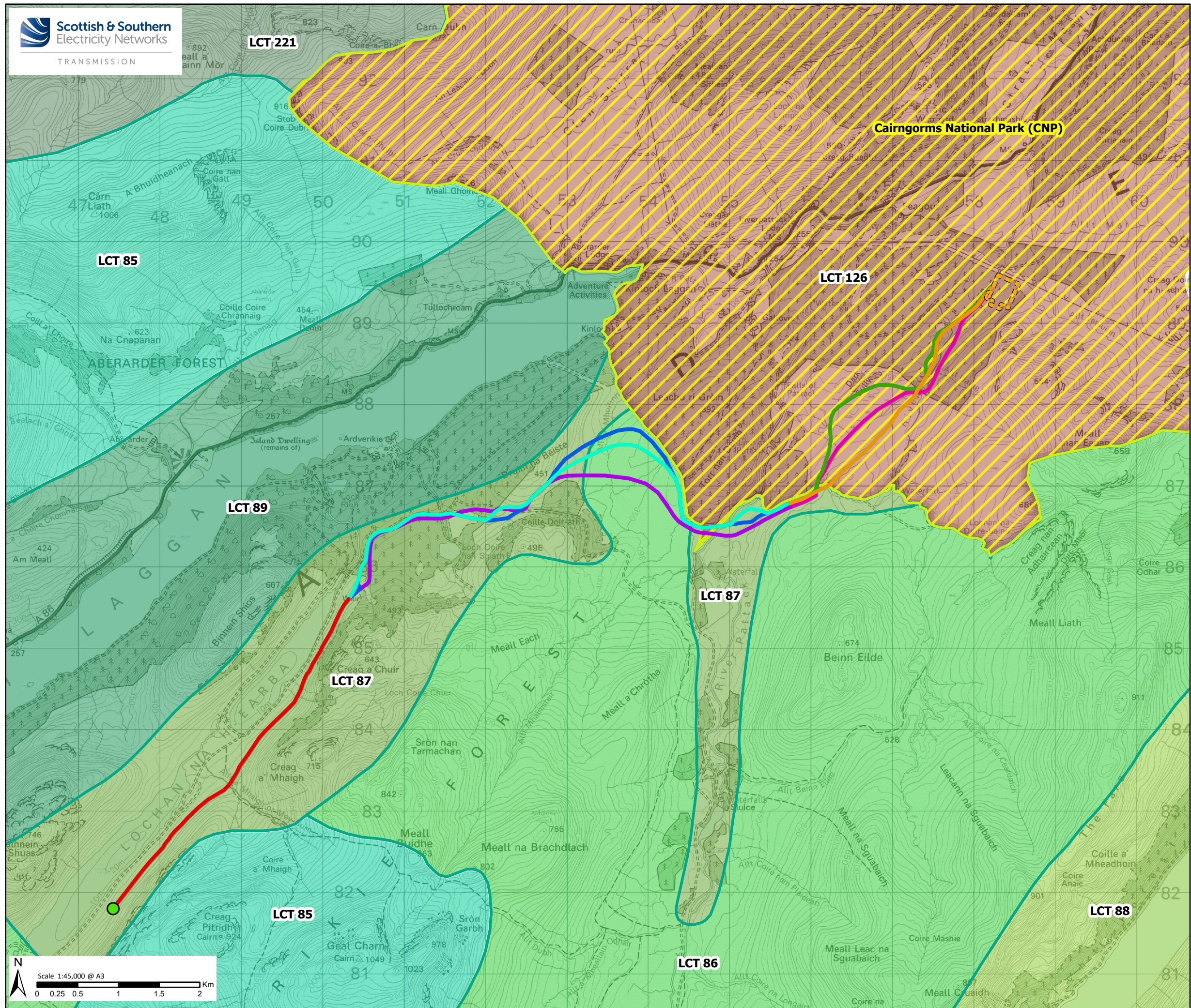
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 7 - Landscape and Visual Constraints

Drawn By: M.T. **Date:** 16/09/2026

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Legend

● Earba Pumped Storage Hydro (PSH) Substation

□ Indicative Location for Coire Mashie Substation

Alignment Options

— Loch Earba PSH Alignment

— Alignment Option 1 South

— Alignment Option 2 South

— Alignment Option 3 South

— Alignment Option 1 North

— Alignment Option 2 North

— Alignment Option 3 North

Landscape Constraints

▨ Cairngorms National Park (CNP)

Landscape Character Types

— LCT 85 - Isolated Mountain Plateau

— LCT 86 - Smooth Rounded Hills - Badenoch & Strathspey

— LCT 87 - Small Craggy Knolls and Hills

— LCT 88 - Loch and Glen

— LCT 89 - Broad Loch and Glen

— LCT 123 - Smooth Rounded Hills - Cairngorms

— LCT 126 - Upland Glen - Cairngorms*

— LCT 221 - Rolling Uplands - Inverness

* The Cairngorms National Park Authority (CNPA) has undertaken its own review of character within the CNP and identified Landscape Character Areas (LCAs) at a higher level of detail for upland areas and straths and glens. These LCAs are all situated within LCT 126 (Upland Glen - Cairngorms).

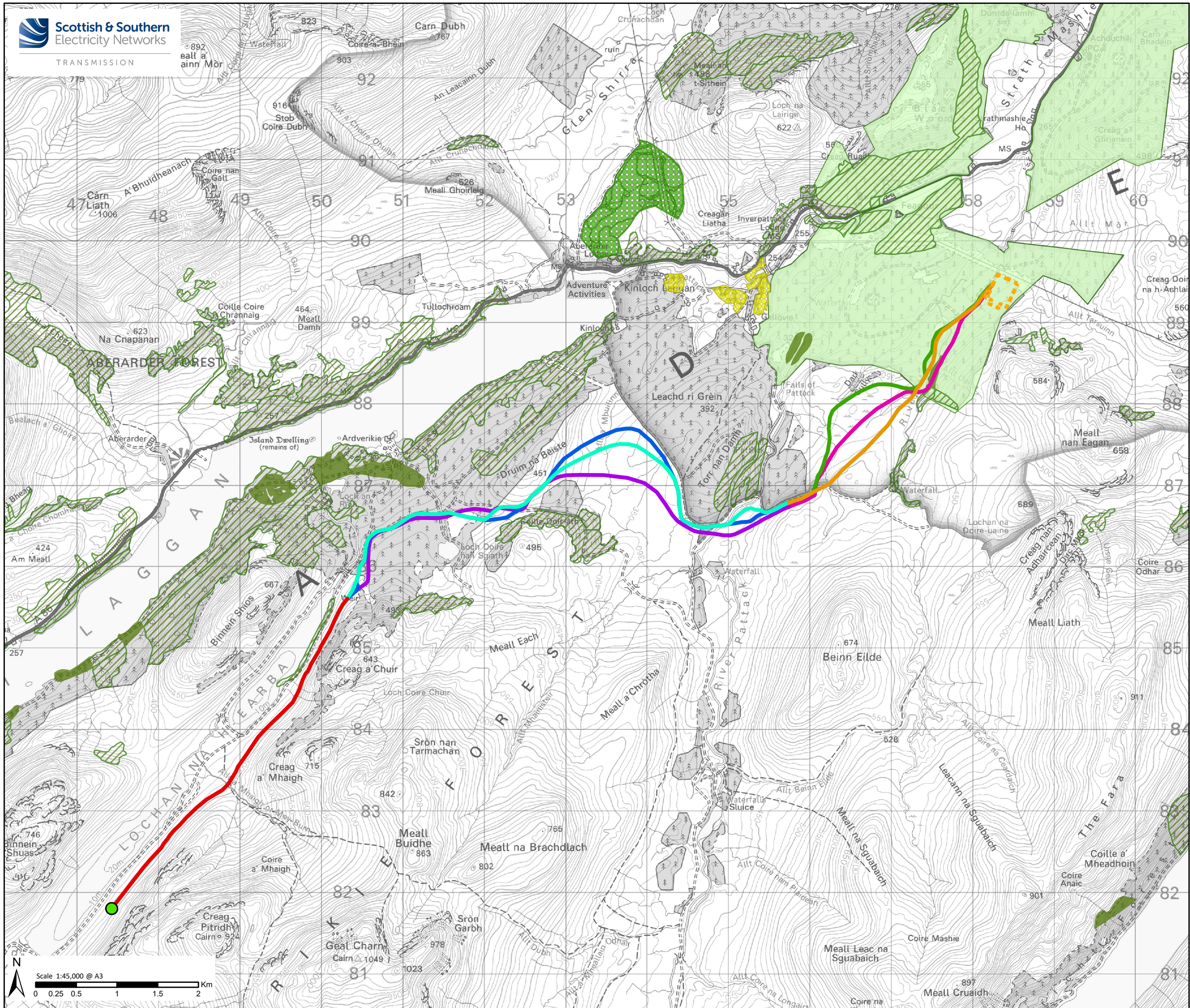
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 8 - Landscape Character Types

Drawn By: M.T. F.L. **Date:** 18/09/2026

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Legend

● Earba Pumped Storage Hydro (PSH) Substation

□ Indicative Location for Coire Mashie Substation

Alignment Options

— Loch Earba PSH Alignment

— Alignment Option 1 South

— Alignment Option 2 South

— Alignment Option 3 South

— Alignment Option 1 North

— Alignment Option 2 North

— Alignment Option 3 North

Forestry & Woodland

■ National Forestry Estate (NFE)

Ancient Woodland Inventory (AWI)

▨ Ancient (of semi-natural origin)

■ Other (on Roy map)

Planting Schemes

▨ Aberarder Planting Scheme (consented)

▨ Lower Pattack Wood Forestry Grant Scheme (FGS) (proposed)

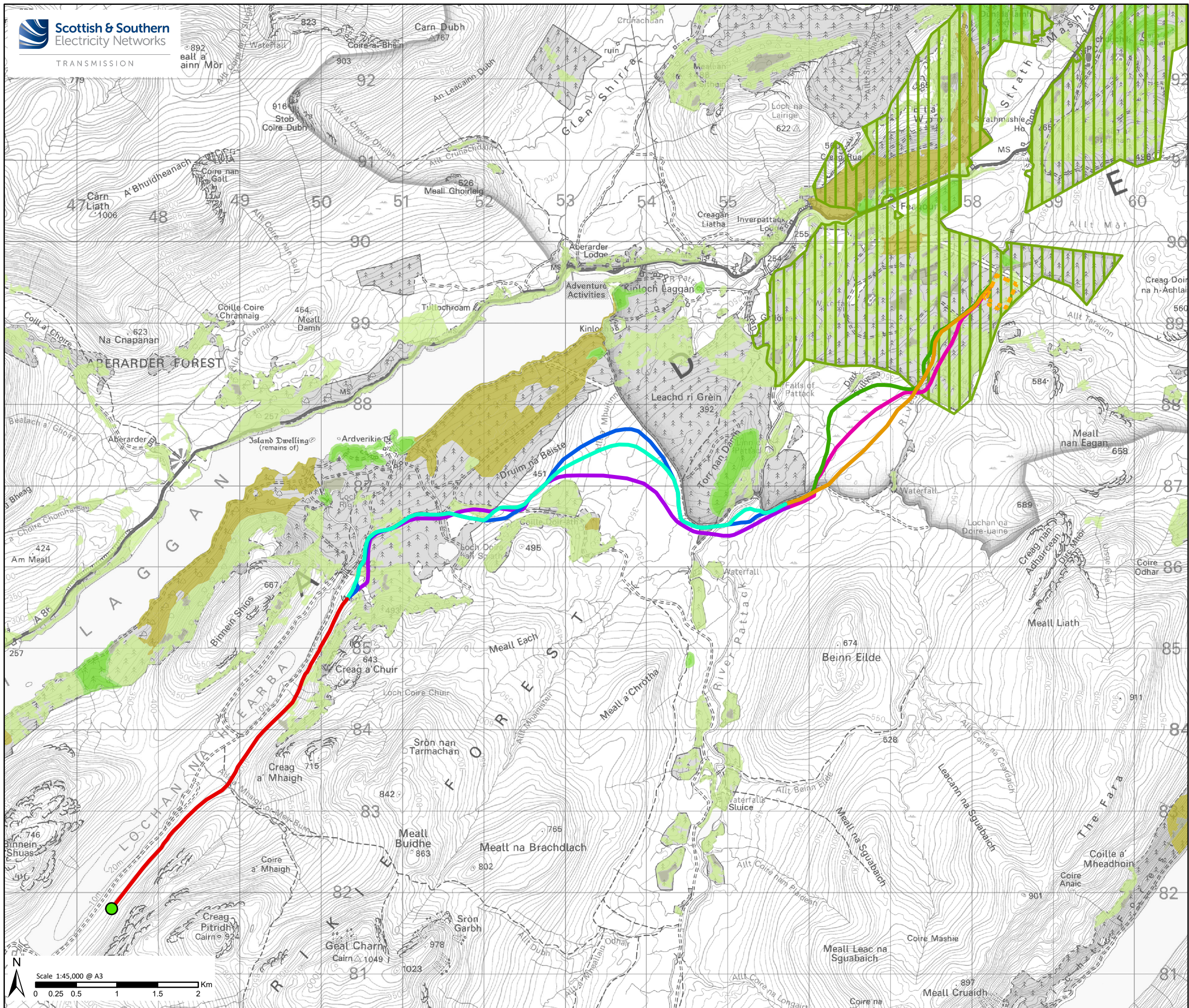
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 9a - Forestry - Ancient Woodland and Planting Schemes

Drawn By: M.T. **Date:** 17/09/2026

Drawing: 123015-D9-CD-1.0.0



Legend

- Earba Pumped Storage Hydro (PSH) Substation
- Indicative Location for Coire Mashie Substation

Alignment Options

- Loch Earba PSH Alignment
- Alignment Option 1 South
- Alignment Option 2 South
- Alignment Option 3 South
- Alignment Option 1 North
- Alignment Option 2 North
- Alignment Option 3 North

Forestry & Woodland

- National Forestry Estate (NFE)

Native Woodland Survey of Scotland (NWSS)

- Native woodland
- Nearly-native woodland
- Open land habitat
- Plantations on Ancient Woodland Sites (PAWS)

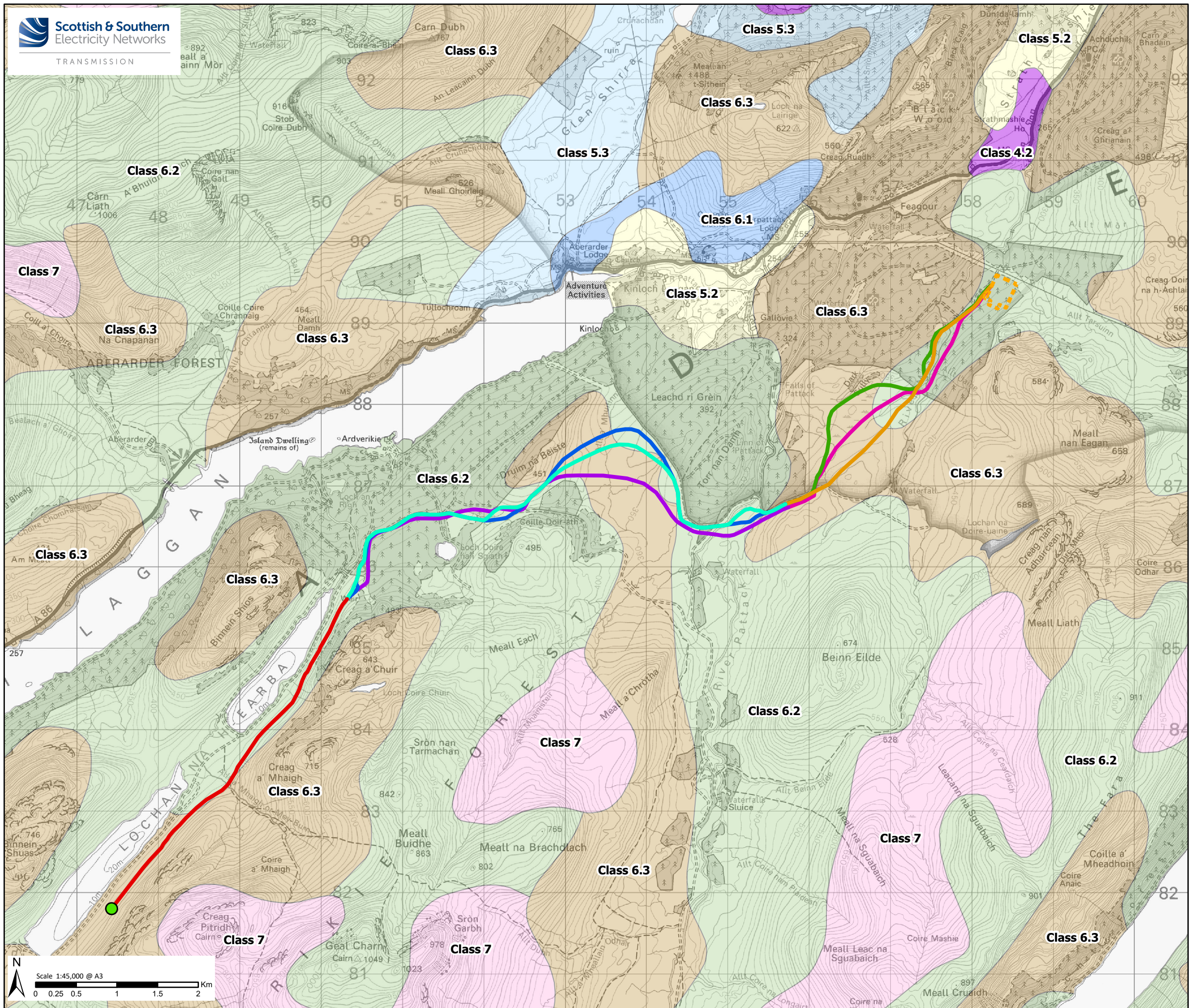
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 9b - Forestry - Native Woodland

Drawn By: M.T. **Date:** 16/09/2026

Drawing: 123015-D9-CD-1.0.0



Legend

- Earba Pumped Storage Hydro (PSH) Substation

- Indicative Location for Coire Mashie Substation

Alignment Options

- Loch Earba PSH Alignment
- Alignment Option 1 South
- Alignment Option 2 South
- Alignment Option 3 South
- Alignment Option 1 North
- Alignment Option 2 North
- Alignment Option 3 North

Land Capability for Agriculture

Class 4.2 Land is primarily suited to grassland with some limited potential for other crops (barley, oats and forage crops)

Class 5.2 Land is capable of use as improves grassland; sward establishment presents no difficulties but physical limitations can cause maintenance problems

Class 5.3 Land is capable of use as improves grassland and although sward can be established, deteriorated can be rapid due to a range of factors

Class 6.1 Land is capable of only rough grazing due to intractable physical limitations; the semi-natural vegetation provides grazing of moderate value

Class 6.2 Land is capable of only rough grazing due to intractable physical limitations; the semi-natural vegetation provides grazing of moderate value

Class 6.3 Land is capable of only rough grazing due to intractable physical limitations; the semi-natural vegetation provides grazing of low value

Class 7 Land is of very limited agricultural value and use is restricted to very poor rough grazing

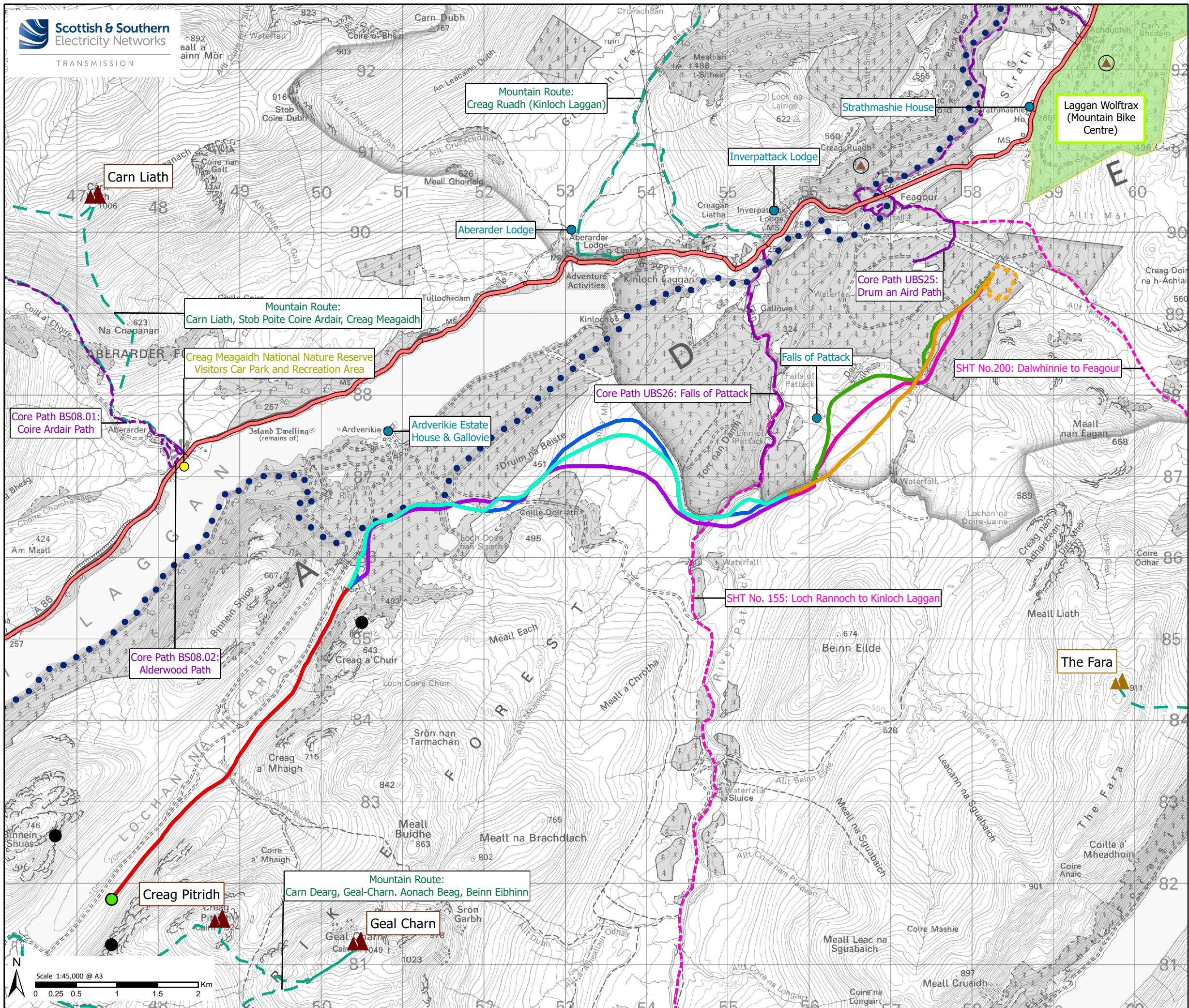
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 10 - Land Use: Agriculture

Drawn By: M.T. Date: 16/09/2026

Drawing: 123015-D10-CD-1.0.0



Legend

- Earba Pumped Storage Hydro (PSH) Substation
- Indicative Location for Coire Mashie Substation
- Alignment Options**
 - Loch Earba PSH Alignment
 - Alignment Option 1 South
 - Alignment Option 2 South
 - Alignment Option 3 South
 - Alignment Option 1 North
 - Alignment Option 2 North
 - Alignment Option 3 North
- Land Use**
 - A Road
- Points of Recreational Interest**
 - Landmark
 - Nature Reserve
 - Nature or Forest Trail
 - Viewpoint (Limited)
 - Climbing Venues
 - Corbett
 - Munro
- Recreational Routes**
 - Core Paths
 - Mountain Routes
 - Scottish Hill Tracks
 - East Highland Way
 - Laggan Wolfrax (Mountain Bike Centre)

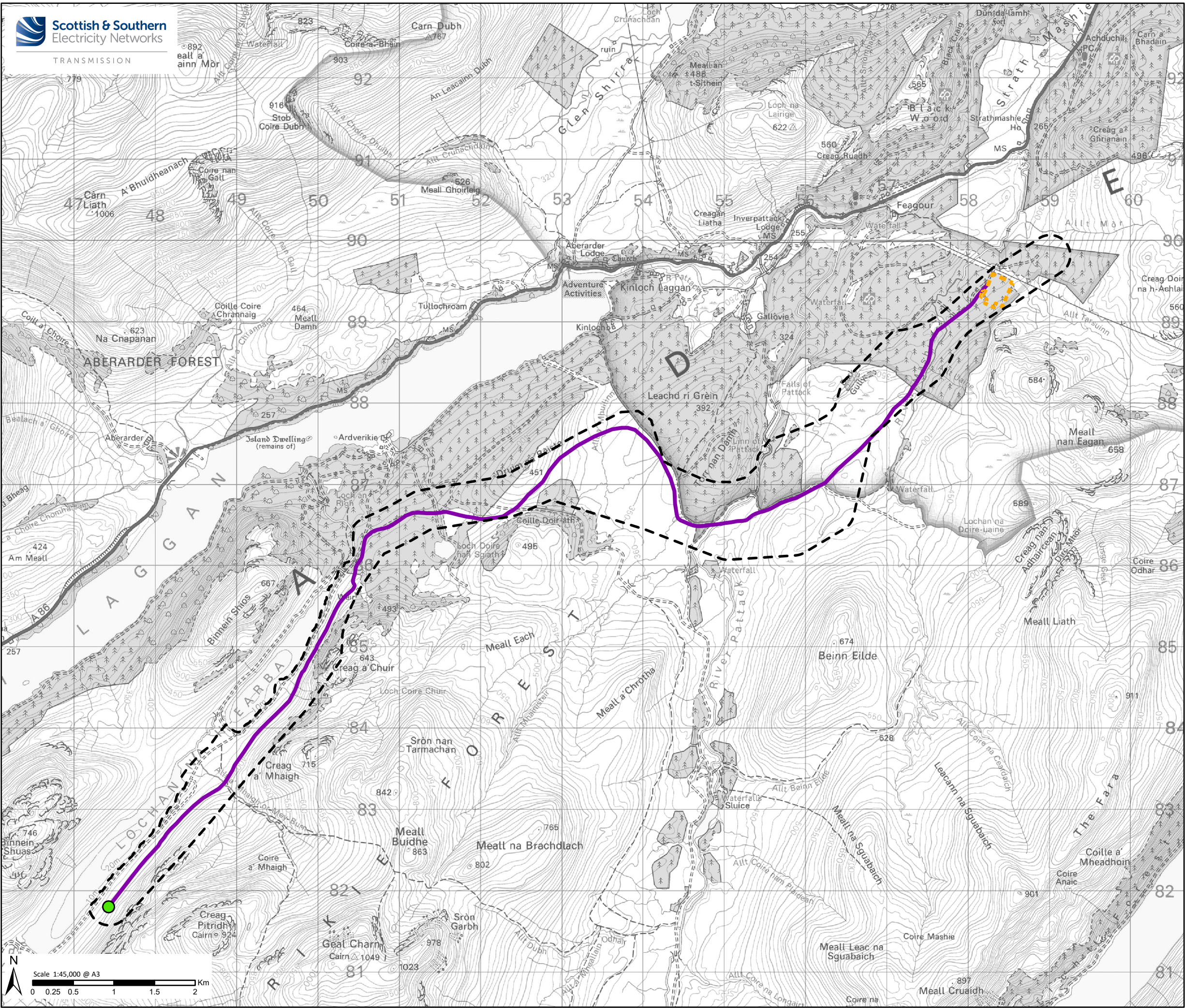
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Project: Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)

Title: Figure 11 - Land Use: Recreation

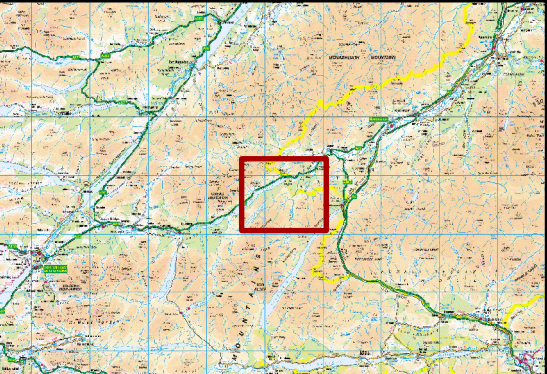
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Legend

- Proposed Route
- Earba Pumped Storage Hydro (PSH) Substation
- Indicative Location for Coire Mashie Substation
- Alignment Option**
 - Preferred Alignment



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Project:	Earba Pumped Storage Hydro Scheme Grid Connection (LT513-515) and Coire Mashie Substation (LT00505)	
Title:	Figure 12 - Preferred Alignment and Proposed Substation	
Drawn By:	M.T.	Date: 16/09/2026
Drawing:	123015-D12-CD-1.0.0	