



Technical Appendix 9.1: Peat Landslide Hazard Risk Assessment

Glendye Wind Farm Overhead Line Grid Connection

Scottish & Southern Electricity Networks (SSEN) Transmission

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Basis of Report

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1.0 Introduction

1.1 General

SLR Consulting Ltd (SLR) was commissioned by Scottish & Southern Electricity Networks (SSEN) Transmission (the Applicant) to undertake a Peat Landslide Hazard and Risk Assessment (PLHRA) at the proposed Glendye Wind Farm Overhead Line Grid Connection (hereafter referred to as the “Proposed Development”). The location and layout of the Proposed Development are detailed on **Figure 9.1.1** and **Figure 9.1.2** with the red line defining ‘the site boundary’.

The methods adopted for the assessment follow the best practice guidance issued by the Scottish Government¹ for investigation, assessment and reporting for power infrastructure development in peat areas. The guidance provides a screening tool to determine whether a PLHRA is required.

The requirements to undertake a PLHRA are when blanket peat is present, slopes exceed 2° and the proposed infrastructure is located on peat, or when raised bogs are present. These conditions exist at the Proposed Development and therefore a PLHRA is required.

Where relevant, reference is also made to guidance published by the Scottish Environment Protection Agency (SEPA)² and wind farm construction good practice guidance³, where relevant to construction on peat.

The work has been undertaken by a team of Geotechnical Engineers and Geologists, with over 10 years’ experience in undertaking peat assessments. The team was led by a Chartered Hydrogeologist with 30 years’ consultancy experience and specialising in the assessment of soils, geology and water for renewable power projects in Scotland.

The report should be read in conjunction with **Chapter 9: Geology, Hydrology and Hydrogeology** and the following Technical Appendices:

- Technical Appendix 9.2: Peat Management Plan (PMP).
- Technical Appendix 9.3: Peatland Condition Assessment (PCA).

1.2 The Proposed Development

The Proposed Development is driven by the need to connect the consented Glendye Wind Farm⁴ to the electricity transmission network at Fetteresso substation. The Proposed Development would comprise of approximately 19 km of new single circuit 132 kV overhead line (OHL), supported by steel trident poles. New permanent and temporary access tracks would also be required to facilitate the construction and operation of the Proposed Development.

Full details of the Proposed Development are provided in **Chapter 2: The Proposed Development** of the EIA Report.

1 Energy Consents Unit Scottish Government., (April 2017) Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments. Second Edition.

2 Scottish Government, Scottish Natural Heritage, SEPA., (2017) Peatland Survey. Guidance on Developments on Peatland, on-line version only

3 NatureScot (July 2024), Good Practice During Wind Farm Construction. <https://www.nature.scot/doc/good-practice-during-wind-farm-construction>

4 S36 Consented Development - ECU Section 36 Ref: ECU00000676



1.3 Scope and Objectives of Report

The purpose of this report is to consider the extent of peat and potential peat slide hazard at the Proposed Development and consider the potential impact to any development, such that areas of deep peat and areas at high risk of a peat slide can be avoided during the design phase. Further consideration is given to stability risks, due to construction of the development and potential risks to receptors across the Proposed Development.

The peat stability assessment is primarily concerned with the influence of the peat on the Proposed Development. The main objective is to assess the potential peat stability at the Proposed Development, identify areas of potential concern and identify mitigation measures to ensure the maintenance of peat stability before, during and after construction. All aspects of construction (including design finalisations) should be based on ensuring minimum disruption to the peat areas. The objectives have been achieved by completion of the following:

- a desk-based review of available reports which include geological, hydrological and topographical information;
- several phases of peat depth surveys;
- geomorphological mapping of the Proposed Development to identify the prevailing conditions influencing the potential for, or any evidence of, active, incipient or relict peat instability, including identification of the location and photographic record, as appropriate;
- reporting on evidence of any active, incipient or relict peat instability, and the potential risk of future instability, describing the likely causes and contributory factors;
- identification of potential controls to be imposed on the Contractors for the works, to minimise the risk of peat instability occurring during the Proposed Development construction; and
- provide recommendations for further work or specific construction methodologies to suit the ground conditions at the Proposed Development, to mitigate any unacceptable risk of potential peat instability.

The risk assessment is based on ground models developed using a Geographical Information System (GIS) specifically for this Proposed Development. A numerical analysis was undertaken in which coefficients were allocated for each of the factors influencing peat stability.

This system outlined above was developed in accordance with the guidelines on PLHRA by the Scottish Government¹ for the investigation, assessment and reporting for power infrastructure developments in peat areas. The analysis and interpretation are based upon the results obtained from this process as well as previous experience and the results of case studies elsewhere. Where deviations from this guidance have occurred, this is highlighted and explained in the text.



2.0 Peat Instability

The importance of assessing the stability of peat deposits in relation to energy developments came to the fore as a result of peat failures during the construction of Derrybrien⁵ Wind Farm in Ireland in 2003. Although no fatalities were associated with these failures, there was a significant environmental impact. Wind farms and associated renewable energy infrastructure tend to be constructed in high moorland areas which are associated with significant peat deposits (typically blanket bogs). There is a potential for peat instability to occur, particularly where deposits are in excess of 1 m thick. Peat instability is influenced by many factors, including, but not limited to, peat thickness, hill slope gradient, underlying geology and subsurface hydrology.

This section reviews the nature of peat and how current and past activities can influence stability. Factors which are likely to influence the potential for peat instability include:

- Significant peat depths over impermeable bedrock or minimal soil;
- The presence of slope gradients greater than 4° (approximately) and general topography;
- Natural drainage paths;
- Evidence of past failures, including soil creep;
- Drainage features at the base of slopes which could lead to undercutting; and
- Forestry plantations, artificial drainage and recent climate patterns.

It should be noted that peat instability is not a recent phenomenon and there is documentary evidence of peat landslides dating back over 500 years⁶. Many landslides that involve peat have no human interference that could be considered as a trigger, and this should be borne in mind when considering the susceptibility of a site to potential instability.

2.1 Background Information Regarding Peat

Peat is found in extensive areas in the upland and lowland regions of the UK and is defined as the partly decomposed plant remains that have accumulated in-situ, rather than being deposited by sedimentation. When peat forming plants die, they do not decay completely as their remains become waterlogged due to regular rainfall. The effect of water logging is to exclude air and hence limit the degree of decomposition. Consequently, instead of decaying to carbon dioxide and water, the partially decomposed material is incorporated into the underlying material and the peat 'grows' in-situ.

Peat is characterised by low density, high moisture content, high compressibility and low shear strength, all of which are related to the degree of decomposition and hence residual plant fabric and structure. To some extent, it is this structure that affects the retention or expulsion of water in the system and differentiates one peat from another.

Lindsay⁷ defined two main types of peat bog, raised bog and blanket bog, which are prevalent on the West coast of Europe along the Atlantic seaboard. In Britain, the dominant peatland type is blanket bog, which occurs on the gentle slopes of upland plateaux, ridges and benches and is predominantly supplied with water and nutrients in the form of precipitation. Blanket peat is usually considered to be hydrologically disconnected from the underlying mineral layer.

5 Lindsay, R.A. and Bragg, O., (2004), 'Windfarm and Blanket Peat, The Bog Slide of 16th October 2003 at Derrybrien, Co. Galway, Ireland'. University of East London

6 Smith, L.T., (Ed) (1910), 'The literary of John Leland in or about the years 1535-1543.' Vol.5, Part IX. London: AF Bell and Sons.

7 Lindsay, R.A., (1995), 'Bogs: The ecology, classification and conservation of Ombrotrophic Mires.' Scottish Natural Heritage, Perth.



There are two distinct layers within a peat bog, the upper acrotelm and the lower catotelm. The acrotelm is the fibrous surface to the peat bog⁸, typically less than 0.5 m thick, which exists between the growing bog surface and the lowest position of the water table in dry summers. Below this are various stages of decomposition of the vegetation as it slowly becomes assimilated into the body of the peat.

For geotechnical purposes the degree of decomposition (humification) can be estimated in the field by applying the 'squeezing test', proposed by von Post and Grunland⁹ (1926). The humification value ranges from H1 (no decomposition) to H10 (highly decomposed). The extended system set out by Hobbs¹⁰ provides a means of correlating the types of peat with their physical, chemical and structural properties.

The relative position of the water table within the peat controls the balance between accumulation and decomposition and therefore its stability, hence artificial adjustment of the water table by drainage requires careful consideration.

2.1.1 Peat Shear Strength

In geotechnical terms, the shear strength of a soil is the physical characteristic that provides stability and coherence to a body of soil. For mineral soils such as clays or sands, such strength is variously given by an inter-particle friction value and cohesion. Depending on whether the mineral soil is predominantly cohesive (clay) or non-cohesive (sand) governs which of the components of strength control the behaviour of the soil.

For peat soils, where the major constituent is organic and there is likely to be little or no mineral component, the geotechnical definition of shear strength does not strictly apply. At present there is no real alternative method for defining the shear strength of peat, therefore the geotechnical definition is generally adopted, in the knowledge that it should be used with great caution.

As noted previously, the acrotelm or near surface peat comprises a tangle of fresh and slightly rotted roots and vegetal fibres. These roots and fibres impart a significant tensile shear strength capacity to the material which provides it with a significant load carrying capacity. The acrotelm is, in effect, a fibre reinforced soil.

In the more decomposed catotelm, the tensile shear strength is reduced as the roots and fibres become more rotted. However, the loss in strength due to decomposition is offset to a limited degree, by a gain in strength due to the overburden pressure. In geotechnical engineering there is an established relationship for recently deposited soils, between the shear strength of a sample and the thickness of overburden above it.

Consequently, it is almost impossible to predict a shear strength profile in peat, and attempts to measure the shear strength using normal geotechnical methods can be misleading. Typical values of shear strength from hand shear vanes would be in the range 10-60 kilopascal (kPa), although values over 100 kPa have been recorded in peat elsewhere. The higher strengths are almost certainly the influence of roots or other non-decomposed material. It is believed that the strength of peat should be quoted as a cohesion value, as there are few, if any, discrete particles to give the material a significant frictional resistance. It should be noted, however, that any quotation of shear strength for peat should be treated with extreme caution, due to the unpredictable characteristics of peat.

8 Ingram, H.A.P., (1978), 'Soil layers in mires: function and terminology'. *Journal of Soil Science*, 29, 224-227.

9 Von Post, L. and Grunland, E., (1926), 'Sodra Sveriges torvillganger 1' *Sveriges Geol. Unders. Avh.*, C335, 1-127.

10 Hobbs, N.B., (1986), 'Mire morphology and the properties and behaviour of some British and foreign peats.' *Quarterly Journal of Engineering Geology*, London, 19, 7-80.



2.1.2 Peat Stability-Factors to be Considered

There is considerable observational information relating to debris and peat flows, although the actual mechanisms involved in peat instability are not fully understood. The main influences on slope stability are geological, geotechnical, geomorphic, hydrological, topographic, climatic, agricultural and human influences such as drainage and construction activity. Peat is affected to a degree by changes in any of the above list and it is vital to appreciate that changes to the existing equilibrium would affect the level of slope stability during construction and operation of the Proposed Development. Some of the contributory factors to peat instability are summarised as follows:

- The geographical limits which could be affected by potential instability are not confined to the artificial boundaries imposed by land ownership; landslip occurring above a site could affect the site and property down slope or downstream for several kilometres.
- Agriculture and grazing have a substantial effect on peat areas, and this can be compounded in areas that have been managed to improve grazing. Grazing compacts the peat surface reducing the rainwater infiltration and the additional nutrient inputs from livestock can change the ecological balance of the original peat bog. Agricultural management can include surface drainage and periodic burning, both of which can leave the surface of the peat bare for a period of time, resulting in temporary desiccation of the surface. Subsequent wetting of the peat and resumption of peat accumulation results in the former desiccated and possibly ash covered surface being incorporated into the body of the peat which introduces a weak discontinuity in the profile; this in turn becomes another unknown factor in the stability assessment.
- Forestry has a substantial effect on slope stability, particularly in the early stages, as the creation of a forest involves disruption of the natural hydrological equilibrium, through drainage of the slopes and installation of artificial drains by deep ploughing. The construction of access tracks further disrupts the drainage and concentrates groundwater flow into narrow, fast flowing erosive streams. The work by Winter *et al*¹¹ noted that forest tracks can act to retard or concentrate the down slope flow of water and thus aid its penetration into the slope below. Such a mechanism has been observed at a number of recent landslips that have affected the road network in Scotland.
- Natural drainage – some of the precipitation falling onto a natural upland peat bog would be absorbed into the low permeability catotelm peat. However, most of the water would run-off as sheet flow through upper, high permeability acrotelm. Thus, the water is transmitted to the lower slopes in a reasonably controlled manner through a range of interconnections operating at different scales and speed. Failure to understand this and to disrupt the transmission process for the groundwater flow could result in instability.
- Artificial drainage - where agricultural drainage has been used to improve the quality of the grazing or to promote forestry it reduces the overall volume of water entering the bog and transfers this water to the edges more rapidly. This can result in ditches and streams becoming enlarged, causing increased erosion and a greater silt burden in the stream water.

¹¹ Winter, M.R., Macgregor, F. and Shackman, L. (2005a), 'Scottish tracks networks landslide study' Trunk tracks: network management division, published report series. The Scottish Government.



2.2 Peat Mass Stability

The principal surface indicator of peat slide potential is cracking of the peat land surface, and it is the identification of crack patterns in the field and the attendant causes of the cracking that is fundamental to a peat stability assessment.

Sites that have exhibited natural instability in the past are likely to be more susceptible to future instability during and following construction of a renewable energy development; therefore it is important to identify such instability as part of the Peat Stability Assessment.

2.2.1 Types of Failure

The result of instability in peat is the down-slope mass movement of the material; there are a number of definitions of peat instability which are used to characterise the type of failure including:

- Bog bursts or bog flows – the emergence of a fluid form of well humified, amorphous peat from the surface of a bog, followed by the settling of the residual peat, in-situ ¹²;
- Peat slides – the failure of the peat at or below the peat/ substratum interface, leading to translational sliding of detached blocks of surface vegetation together with the whole underlying peat stratum¹²; and
- Bog slide – an intermediate form of instability where failure occurs on a surface within the peat mass, with rafts of surface vegetation being carried by the movement of a mass of liquid peat.

2.2.2 Bog Bursts

Accounts of bog bursts are generally associated with very wet climates or areas which have received storm rainfall events. Bog bursts can be associated with particularly wet peat landscapes; therefore, it is possible to identify broad regions of a higher susceptibility to these failures. The constraints used to identify the areas of higher susceptibility to bog burst failure are given below:

- Peat thickness greater than 2 m;
- Shallow gradients, generally within the range of 2 to 5°, peat thicker than 1.5 m is generally not observed on slopes steeper than 10°, also moisture content is generally reduced on steeper slopes due to drainage);
- Ground which is annually waterlogged to within the upper 1 m below ground level (the groundwater level may rise above this but rarely falls below); and
- Greater humification of the lower catotelm within the waterlogged ground; with lower surface tensile strength of the fibrous peat and vegetation.

The humified mass can be considered as analogous to a heavy liquid and the stability of this mass is maintained by the strength of the surface or acrotelm peat. Should the surface become weakened through erosion or desiccation, or the construction of a surface drainage ditch for agricultural or forestry reasons, or through turbarry (peat cutting), failure is made more likely.

2.2.3 Peat Slides

Peat slides tend to be translational failures with a defined shear surface at or close to the interface with the substrate.

¹² Dykes, A.P and Kirk, K.J., (2001), 'Initiation of a multiple peat slide on Cuilcagh Mountain, Northern Ireland.' *Earth Surface Processes and Landforms*, 26, 395-408.



The factors generally considered to influence susceptibility to peat slide failures are listed below:

- Peat depth up to 3 m;
- Slope gradients between 4.5° and 32°;
- Natural or artificial drainage cut into the surrounding peat landscape;
- Greater humification of the lower catotelm within the waterlogged ground; and
- Lower surface tensile strength of the fibrous peat and vegetation.

It is noted that some of the factors causing instability are common to both bog bursts and peat slides.

The peat – substrate interface is the primary zone of failure and is enhanced by elevated water content at this boundary and softening or weathering of the lower mineral surface. For this reason, any investigation or probing should try to distinguish the nature of the lower mineral substrate.

2.2.4 Bog Slides

A bog slide is a variation on a peat slide where part of the peat mass is subject to movement. This usually occurs in an internal layer of material which may be more prone to movement, such as an interface between the acrotelm and catotelm layer.

2.2.5 Natural Instability

The stability of a peat mass is maintained by a complex interrelationship of many factors. Key factors include sloping rock head and proximity to a water body. Rainfall often acts as the trigger after the slope has already been conditioned to fail by natural processes.

It should also be remembered that peat bogs are growing environments and that there would naturally come a time, where on sloping ground, the forces causing instability combined with the weight of the bog can no longer be resisted by the internal strength of the peat and its interface with the underlying mineral surface. At this point, failure would occur.

The weight of the peat bog or any soils mantling steep hill slopes would be increased during periods of very heavy rain and it is common to see landslips occurring following extreme rain events. This may be a concern for future developments where one of the predicted effects of global warming will be a greater frequency of extreme weather, intense storms being one element.



3.0 Desk Based Review

3.1 Study Area

The study area encompasses the area over which all desk-based and field data were gathered to inform the assessment presented in this Chapter, as shown on **Figures 9.1 to 9.8**. This includes a buffer of 500 m of the proposed overhead line (OHL) and new, temporary and existing access tracks that would be constructed or upgraded to facilitate construction and maintenance of the Proposed Development, as agreed with consultees at the scoping stage of the Proposed Development. Beyond this distance, any effect is considered to be so diminished as to be undetectable and therefore not significant. Beyond this distance, any effect is considered to be so diminished as to be undetectable and therefore not significant.

3.2 Site Description

The Proposed Development comprises a large area of varying land-use, geomorphology and topography. In the east, the land use is primarily commercial forestry and agricultural grazing fields. There is extensive commercial forestry infrastructure in the form of access tracks and borrow pit extractions across the east. The remainder of the Proposed Development to the west and central areas is situated across open moorland with moderately sloped hilltops. This area is primarily used for grouse shooting and rough grazing.

3.3 Topography

From review of OS mapping, the topography across the Proposed Development is generally at moderate elevations (approximately 300 m AOD on average). There are steeply sloped hillsides to the north of the western extent of the Proposed Development with Meluncart hill at 525 m AOD. The eastern extent of the Proposed Development features steeply sloped forested hillsides at Scare Hill (305 m AOD) and Boy's Hill (326 m AOD). The eastern areas of the Proposed Development are situated within agricultural fields and areas of rough grazing reaching a peak of approximately 250 m AOD at Hill of Quithel.

3.4 Geology and Soils

3.4.1 Artificial Ground

Based on the information available from the British Geological Survey (BGS) Geoindex¹³, no made ground deposits are noted across the Proposed Development.

3.4.2 Superficial Geology

The BGS Geoindex¹³ indicates that the majority of the western extent of the Proposed Development is underlain by peat up to and including Goyle Hill. There are also minor deposits of glacial till and alluvium in the western extent near Brae of Fawnyard. The majority of the eastern extent of the Proposed Development is absent of any superficial deposits, with minor pockets of peat and glacial till. Alluvium is also recorded adjacent to the banks of larger watercourses (Water of Charr, Bervie Water and Carron Water). The areas of peat are mapped at Hill of Quithel and at Foggy Moss.

Figure 9.1.3 shows the superficial geology BGS mapping and the Proposed Development.

¹³ BGS Online Viewer, available at [https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.133433804.376188765.1646739904-1030004651.1646739904]



3.4.3 Bedrock Geology

The BGS Geindex¹³ indicates that the Proposed Development is generally underlain by pelites, semipelites, psammities of the Glen Effock Schist Formation and Glen Lethnot Grit Formation.

The north-west extent of the site, including two poles (127 and 128), is underlain by igneous granitic bedrocks of the Water of Dye Granite (Mount Battock Pluton). Part of the south-east of the site is underlain by sedimentary rocks comprising conglomerate and sandstones of the Arbuthnott Garvock Group and Carron Sandstone Formation.

Minor flowing intrusions are noted across the Proposed Development:

- Microgranite, Feldspar-Phyric, Quartz-Feldspar-Porphry, Microgabro and Porphyritic deposits of the North Britain Siluro-Devonian Calc-Alkaline Dyke Suite;
- Quartzite deposits of the Glen Effock Schist Formation; and
- Quartz-Microgabro deposits of the Central Scotland Late Carboniferous Theolitic Dyke Swarm.

Figure 9.1.4 shows the bedrock geology BGS mapping and the Proposed Development.

3.4.4 Structural Geology

There are many inferred faults mapped across the Proposed Development; the majority are concentrated to the east. The western inferred faults trend east to west. The faults to the east trend both east to west and north to south.

3.5 Peatland Classification

The Carbon and Peatland Map 2016¹⁴ indicates that the western extent of the Proposed Development (from the proposed Glendye Wind Farm onsite substation and underground cable (UGC) route¹⁵ to Pole 114 alongside areas underlying Poles 112, 111 & 013-009) is potentially Class 1 & 2 priority peatland, considered nationally important carbon-rich soils, deep peat and priority peatland habitat. Class 4 peatland is indicated to potentially underly much of the eastern extent of the Proposed Development including Poles 001-008, 014-050, 89-110 & 113. This class is noted to lack dominant priority peatland habitat cover with fragmented occasional areas of habitat and deep peat possibly present. The remaining areas of the Proposed Development are noted to be underlain by mineral soils with no peat deposits likely.

3.6 Geotechnical Hazards

The BGS Geindex¹³ records indicate that there is no risk regarding the mass movement or instability of materials.

3.7 Mining and Quarrying

Information from The Coal Authority Online Viewer¹⁶ indicates that the Proposed Development is not within a coal mining reporting area.

¹⁴ NatureScot, Carbon and Peatland Map 2016, Available online at: map.environment.gov.scot/soil_maps/

¹⁵ Undertaken utilising the Applicant's permitted development rights.

¹⁶ The Coal Authority, The Coal Authority Map Viewer, Available online at: <https://datamine-cauk.hub.arcgis.com/>



The BGS Geoindex¹³ indicates that there are three ceased quarries within the Proposed Development with references: Brawliemuir, Tipperty and Bogjurgan. No other quarries are noted across the Proposed Development.

3.8 Hydrogeology

Information from Scotland's environment map¹⁷ indicates that the peat and glacial till deposits within the study area are not considered a significant aquifer. The alluvial deposits, where present, are considered to be a moderate to high productive aquifer with intergranular flow.

It also confirms the igneous and metamorphic bedrock which underlies the majority of the Proposed Development are classified as low productivity aquifers whereby small amounts of groundwater are expected in near surface weathered zones and secondary fractures. The sedimentary bedrocks which underlie part of the south eastern extent of the Proposed Development are classified as a moderate productivity aquifer which can locally yield moderate amounts of groundwater.

3.9 Hydrology

Information from SEPA's Water Classification Hub¹⁸ indicate the western extent of the Proposed Development is located within the River Dee catchment, specifically the Water of Dye sub catchment. The Water of Dye flows generally eastward and northwards to the north of the Proposed Development before discharging into the River Dee approximately 10 km north of the Proposed Development.

A small part of the centre of the Proposed Development, including poles 101 to 114 and 131 to 134, are located within the River North Esk surface water catchment, specifically within the upper reaches of the Luther Water sub catchment.

The remainder of the Proposed Development is located within three surface water catchments:

- Part of the eastern extent of the Proposed Development, including poles 37 to 100, is located within the Bervie Water surface water catchment. The Bervie Water flows generally southeastwards from the Proposed Development before discharging into the North Sea at Inverbervie. The Bervie Water and three tributaries of the Bervie Water (Burn of Brumlieshank, Maxie Burn and Burn of Guinea and their tributaries) cross the Proposed Development.
- The eastern most extent of the Proposed Development, including poles 1 to 36, is located within the Carron Water surface water catchment. The Carron Water flows eastwards from the Proposed Development before discharging into the North Sea at Stonehaven. Several tributaries of the Carron Water, including the Burn of Annamuick, cross the Proposed Development.
- Part of the northeastern extent of the Proposed Development is located within the Cowie Water surface water catchment; however, no development is proposed within this catchment.

3.10 Rainfall

Periods of intense heavy rainfall are often seen as triggers for instability events. Rainfall data from the closest SEPA weather station¹⁹ Charr Rain Gauge, shows the average monthly

¹⁷ Scotland's Environment, Scotland's Environment Map, Available online at: <https://map.environment.gov.scot/sewebmap/>

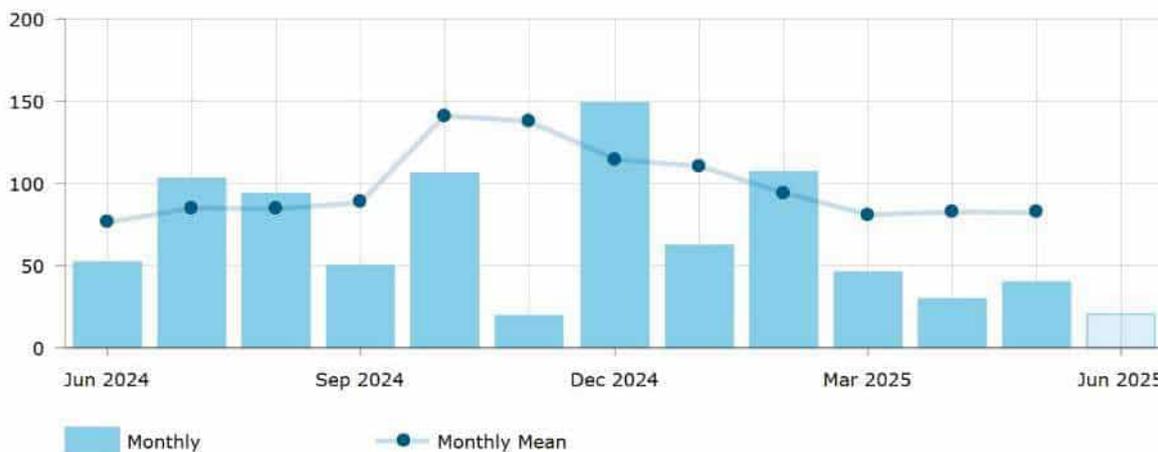
¹⁸ SEPA, Water Classification Hub, available online at: <https://www.sepa.org.uk/data-visualisation/water-classification-hub/>

¹⁹ SEPA, Rainfall Data for Scotland, available online at: <https://www2.sepa.org.uk/rainfall>



rainfall in the region from June 2024 to June 2025 (as shown on Figure 1 below). The highest monthly rainfall was 149 mm in December 2024 and the lowest monthly rainfall was 19.6 mm in November 2024.

Figure 1: Rainfall Data from Charr Weather Station (June 2024 – June 2025)



3.11 Environmental Designations

A review of NatureScot SiteLink²⁰ webpage confirms that no statutory designated sites are located within the study area.

The River Dee Special Area for Conservation (SAC) is located approximately 2.1 km north of the Proposed Development. The SAC have been designated for supporting *Salmo salar* and *Margaritifera margaritifera*, species which are recognised as particularly sensitive to changes in water quality. The SAC is considered to be hydraulically connected to the Proposed Development, located downstream of the proposed Overhead Line (OHL).

Potential effects as a consequence of the Proposed Development on the SSSI and SAC are also considered in **Volume 1: Chapter 8: Ecology** and **Volume 1: Chapter 10: Soils, Geology and Water**.

3.12 Groundwater Dependent Terrestrial Ecosystems (GWDTE)

A review of the National Vegetation Classification (NVC) habitat mapping concluded that no GWDTEs have been identified to be groundwater dependent and therefore, are not considered to be a potential receptor for peat instability. Further details are included within **Chapter 8: Ecology** and **Chapter 9: Soils, Hydrology and Hydrogeology**.

3.13 Private Water Supplies and Licenced Sites

A review of the Aberdeenshire Council data and assessment undertaken by SLR within the area of the Proposed Development indicates that there are two private water supplies (PWS) considered to be at risk from the Proposed Development. Further details of the PWS assessment undertaken are described within the **Technical Appendix 9.5: Private Water Supply Risk Assessment** and **Chapter 9: Soils, Hydrology and Hydrogeology**.

²⁰ NatureScot, Protected Areas of Scotland Map, available at: <https://sitelink.nature.scot/map>



3.14 Local Knowledge

No insight has been provided from discussions with landowners and adjacent developments to suggest that there has been a history of peat instability across the Proposed Development.

3.15 Historic Instability

Gulley erosion of mineral soils was noted along watercourses to the south of the Proposed Development. Photo 1, below, details mineral soil erosion located south of Pole 183 at Tough's Market. The instability was likely caused by progressive weathering and erosion of natural fractures within the superficial soils. No peat was observed where gulley erosion along watercourses was observed, only granular superficial soils were noted. The instability has no influence on the Proposed Development but is highlighted as part of the desk based review.

Photo 1: Mineral soil gulley erosion at Tough's Market. Taken from NGR: NO 61357 80192 facing north.



3.16 Geomorphology

The Proposed Development is comprised of moderately sloped hillsides to the west with plateaus on the hilltops. There are river gulleys throughout the western and central extents of the Proposed Development with gulleys mapped at the Water of Charr and its tributaries.

The centre of the Proposed Development is situated to the east of the B974 and extends to Drumtochty Forest. This area is characterised by moderately sloped hillsides and flat expanses comprising the Waird of the Cairn. Incised gulleys at Slack of Birnie are mapped to the south of the Proposed Development.

The eastern extent, which includes Brawliemuir to Fetteresso Forest, is located within forestry and improved grassland, intersected by multiple watercourse gulleys including that of the Bervie Water. The forestry is situated on steep slopes such as at Drumtochty Forest, with flatter hilltops being mapped at Goyle Hill (**See Photo 3**) and Boy's Hill.



The aerial photographs were used in conjunction with site walkovers to identify the major geomorphological features such as any significant breaks in slopes and landslips. The findings of the photographic review and site walkovers are summarised below in the following sections. Geomorphology mapping is detailed on **Figure 9.1.5**.

**Photo 2: Undulating hillside and forestry to the east of the Proposed Development.
Photo taken from National Grid Reference (NGR): NO 64958 81559 looking east.**



Photo 3: Extensive planation forestry to east of Goyle Hill. Photo taken from NGR: NO 68343 81996 looking north-east.



3.16.1 Peat Instability

No evidence of pre-failure indicators or historic peat instability was noted during the extensive surveys undertaken within the Proposed Development area. These features may include; tension cracks, tears in the acrotelm (upper vegetation mat), compression ridges, or bulges and thrusts. None of which were observed on site or from review of aerial imagery.

If evidence of instability was observed then a coefficient of 8 would be used for the peat depth (see Table D, Section 5.4, below). The absence of any indications of instability and the presence of drainage, drained and actively eroding extensive peat haggling, gullying and bare peat may indicate that the site is actually less susceptible to large scale instability and the factors utilised in the assessment within Section 5.0 are considered appropriate to determine the likelihood of peat instability at the Proposed Development.

3.16.2 Peat Deposits

Peat was encountered throughout the Proposed Development, with deposits generally associated with flatter expanses and breaks in slope and hollows allowing for the accumulation and formation of peatland (see **Photo 4** and **Photo 5** below). Peat greater than 2 m was largely confined to the central and western areas of the Proposed Development. Peat is largely absent across the eastern extent of the Proposed Development, with most of this area being situated within sloped, artificially drained plantation forestry. Eastern extents are also located in agricultural land where the area has been extensively drained. No areas of instability were noted in relation to peat deposits across the Proposed Development.

Figure 9.1.6 and **Figure 9.1.7** detail the extent of peat deposits across the Proposed Development.



Photo 4: Deep peat of >3 m present within flatter expanse at Pole 149. Taken from NGR: NO 64612 81484 looking west.



Photo 5: Peat constrained to hollow east of Pole 133. Taken from NGR: NO 66413 81593 looking east.



3.16.3 Peat Erosional Features

Erosional features were commonly encountered during site surveys, especially in the west of the Proposed Development where the peatland was dominated by hagged and vegetated



gulleys (as shown below in **Photo 6**). Peat hagsgs up to 3 m in height were observed with bare substrate at the bases. The central areas of the Proposed Development (east of the B974) also featured extensive erosional features, particularly to the south-west of Goyle Hill where peat hagsgs at around 1.5 m were recorded. In addition, there are some areas of peatland which have been heavily influenced by wind erosion across higher elevations to the north-west of the Proposed Development at Rough Bank (located within Glendye Wind Farm to the north-west of the Proposed Development). No areas of instability were noted in relation to any erosional features across the Proposed Development.

Photo 6: Peat hagsgs to the north of Pole 154. Taken from NGR: NO 64239 81218 looking east.



3.16.4 Artificial Drainage

The west of the Proposed Development is extensively drained with dendritic drainage observed trending predominantly east to west, following hill contour orientations. Drainage ditches were recorded up to 1.2 m deep and 1 m wide, with some drainage being blocked with vegetation (see **Photo 7**, below).

There is also extensive artificial drainage associated with plantation forestry across the eastern and central extents of the Proposed Development. Artificial forestry furrows were recorded as being orientated north to south and east to west, with dimensions between 0.3 – 0.5 m in width and depths of up to 1 m. Drainage was also associated with agricultural practices across the Proposed Development and is further discussed in **Section 3.16.7**.

No areas of instability were noted in relation to artificial/natural drainage across the Proposed Development.



Photo 7: Blocked artificial drainage ditch near of Pole 165. Taken from NGR: NO 63265 80773 looking west.



3.16.5 Forestry

Plantation forestry comprised the majority of the eastern and central areas of the Proposed Development. Some areas of forestry have been felled with active felling ongoing. The forestry across the Proposed Development is situated on steeply sloped hillsides within Drumtochty Forest and Fetteresso Forest. The artificial drainage furrows associated with the plantation forestry trends with slope direction (**Photo 8**, below). Sections of forestry were felled by strong winds and through this the substrate was able to be seen as mineral soil (as shown below in **Photo 9**). No areas of instability were noted in relation to forestry across the Proposed Development.

Photo 8: Extensive artificial drainage furrows within Drumtochty Forest. Photo taken from NGR: NO 69039 82075 looking north.

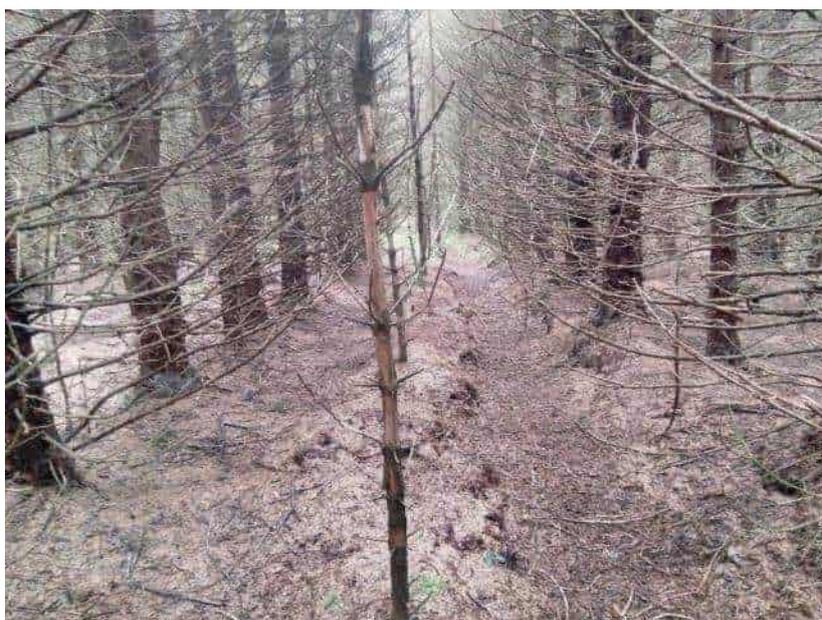


Photo 9: Windblown planation forestry to the south of Bowman’s Leap, highlighting shallow mineral soil. Photo taken from NGR: NO 70225 81959 looking north-east.



3.16.6 Bedrock

From review of aerial photography and site walkovers, bedrock exposures and near surface bedrock are rare across the Proposed Development. Bedrock was not commonly encountered across the hill slopes (as illustrated below in **Photo 10**) and instead mineral soils were frequently observed. No areas of instability were noted in relation to bedrock exposures across the Proposed Development.

Photo 10: Moderately sloped hillside, looking uphill at Rough Bank. Taken from NGR: NO 60817 80430 facing north-west.



3.16.7 Agricultural Land Uses

From review of aerial photography and site walkovers, the eastern extent of the Proposed Development features extensive mixed agricultural land use. The agricultural practices are split between pastoral, rough grazing and crop cultivation. **Photo 11**, below, displays an overview of the three different practices encountered during site surveys. Areas of improved pasture were well drained by extensive anthropogenic ditches (as shown below in **Photo 12**). Mapping of the extents of agricultural land use across the Proposed Development is displayed on **Figure 9.1.5**. **These areas are located generally south of the Proposed Development and towards east.**

No areas of instability were noted in relation to agricultural land uses or associated drainage across the Proposed Development.

Photo 11: Overview of various agricultural land uses, rough grazing, pasture and crop farming. Looking downhill at the Brae of Glenbervie Taken from NGR: NO 76662 85181 facing south.



Photo 12: Field drainage associated with improved pasture. Looking east near Brawliemuir. Taken from NGR: NO 75286 83893 facing south.



4.0 Site Work

4.1 Peat Depth Survey

Peat surveys were carried out in accordance with best practice guidance for developments on peatland^{21,22}. Phase 1 peat probing was conducted on a 100 m grid to allow for initial assessment of the Proposed Development for use in future preliminary site layout designs. Phase 2 probing saw detailed probing undertaken across the Proposed Development layout, focussing on pole locations, temporary access track, permanent access tracks and other site infrastructure. Phase 2 probing was typically undertaken on linear infrastructure (permanent / temporary tracks) at 50 m spacings with offset probing locations either side (approximately 10 m to 25 m). Infrastructure (pole locations etc.) was typically probed at 10 m grid spacings where areas of peat >0.5m was recorded.

Where surveys were undertaken, the thickness of the peat was assessed using a graduated peat probe, approximately 6 mm diameter and capable of probing depths of up to 10 m. This was pushed vertically into the peat to refusal and the depth recorded, together with a unique location number and the co-ordinates from a handheld Global Positioning System instrument (GPS). The accuracy of the GPS was quoted as ± 2 m, which was considered sufficiently accurate for this survey. All data was uploaded into a GIS database for incorporation into various drawings and analysis assessments.

Where the peat probing met refusal on a hard substrate, the 'feel' of the refusal can provide an insight into the nature of the substrate. The following criteria were used to assess material:

- Solid and abrupt refusal – rock;
- Solid but less abrupt refusal with grinding or crunching sound – sand or gravel or weathered rock;
- Rapid and firm refusal – clay; or
- Gradual refusal – dense peat or soft clay.

The relative stiffness of the peat was also assessed from the resistance to penetration of the probe and to the effort required to extract the probes (retrieval of the probe was often impossible for one person). In all instances refusal was met on obstructions allowing identification of subsurface geology.

4.2 Peat Depth

Peat is generally defined as a soil with a surface organic layer in excess of 0.5 m²¹. Where the probing recorded a surface organic layer less than 0.5 m thick, it is considered to be a peaty soil (or organo-mineral soil). Soils with a peaty organic horizon over mineral soil are often referred to as 'peaty soils'. These organo-mineral soils are extensive across the UK uplands, but do not meet recognised definitions of peat as they are either shallower than true peat or have a lower carbon density.

A total of 17,075 peat probes were undertaken across all survey phases, with the results summarised below in Table A with all probing data provided in **Annex A**. The average thickness of peat recorded across the Proposed Development was 0.6 m.

21 Scottish Renewables & SEPA (2012) 'Developments on Peatland Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste'.

22 Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland, on-line version only.



Table A: Peat Probing Results

Peat Thickness (m)	No. of Probes	Percentage (of total probes undertaken on-site)
0 (no peat or soil)	129	0.8
0.01 – 0.49 (peaty soil)	11695	68.5
0.50 – 0.99	1239	7.3
1.00 – 1.49	1265	7.4
1.50 – 1.99	1389	8.1
2.00 – 2.49	788	4.6
2.50 – 2.99	279	1.6
3.00 – 3.49	165	1.0
3.50 – 3.99	82	0.5
> 4.0	44	0.3

4.3 Peat Condition

Peat is described using the Code of Practice for Ground Investigations BS5930²³ and the Von Post classification²⁴. Six peat cores using a peat auger were collected by SLR during Phase 2 and used to inform interpretations of the underlying physical peat condition and underlying substrate. Peat samples were undertaken to depths of between 0.8 and 3 mbgl. The peat cores recorded fibrous to pseudo-fibrous condition.

Table B: Peat Coring Results

Location ID	Depth (mbgl)	Von Post Degree of Decomposition	Description
HA01:	GL - 1.0	H3, B3	Brown fibrous PEAT
HA02:	GL - 0.8	H2, B4	Brown fibrous PEAT
	0.8 - 1.3	H3, B3	Brown pseudo-fibrous PEAT
	1.3 - 2.3	H4, B3	Brown pseudo-fibrous PEAT
	2.3 - 3.0	H5, B3	Dark brown pseudo-fibrous PEAT
HA03:	GL - 0.5	H2, B3	Brown fibrous PEAT
	0.5 - 1.2	H3, B3	Brown fibrous PEAT
	1.2 – 1.5	H4, B3	Brown pseudo-fibrous PEAT
HA04:	GL - 0.8	H4, B2	Dark brown pseudo-fibrous PEAT
HA05:	GL - 0.7	H3, B3	Brown fibrous PEAT
	0.7 - 1.2	H4, B3	Brown pseudo-fibrous PEAT
	1.2 - 1.5	H5, B3	Dark brown pseudo-fibrous PEAT
HA06:	GL - 0.8	H3, B3	Brown fibrous PEAT
	0.8 - 1.5	H4, B3	Brown pseudo-fibrous PEAT

²³ BS 5930:2015+A1:2020, Code of practice for ground investigations

²⁴ Von Post, L. and Grunland, E., (1926), 'Sodra Sveriges torvillganger 1' Sverges Geol. Unders. Avh., C335, 1-127.



Location ID	Depth (mbgl)	Von Post Degree of Decomposition	Description
	1.5 – 2.0	H5, B3	Brown pseudo-fibrous PEAT

Peat core logs and photographs are presented within **Annex B**.

4.4 Substrate

Where possible, an assessment of the substrate was made, as described previously. From the evidence of the probing and coring, the substrate was recorded as the following:

- Granular, recorded at 16,767 (98%) probe locations; and
- Rock, recorded at 308 (2%) probe locations.



5.0 Hazard and Risk Assessment

5.1 Introduction

The Scottish Government Guidance¹ provides an overview of the principles of hazard and risk with respect to peat landslides. The guidance is noted as illustrative only and the developers can present their own methodology, providing it is clearly explained and incorporates consideration of the likelihood of instability and the consequences should it occur. The following sections detail the preferred methodology used within this assessment.

A 'Hazard Ranking' system has been applied based on the analysis of risk of peat slide as outlined in the Scottish Government Guidance¹. This is applied on the principle:

$$\text{Hazard Ranking} = \text{Hazard} \times \text{Exposure}$$

This philosophy can be applied to the assessment carried out so far in the following approach:

$$\text{Hazard Ranking} = \text{Risk Rating} \times \text{Impact Rating}$$

5.2 Methodology

The determination of Risk Rating and Impact Rating values is based on a number of variables which impact the likelihood of a peat slide and the relative importance of these variables specific to the Proposed Development.

Similarly, the consequences or exposure to receptors is dependent on variables including the particular scale of a peat slide, the distance it will travel, and the sensitivity of the receptor.

In the absence of a predefined system, the approach to determining and categorising Risk Rating and Impact Rating is determined on a site-by-site basis. The particular system adopted for the PLHRA is outlined in the following sections.

5.3 Slope Stability

The stability of peat is a complex subject and there are numerous inter-relationships that affect the stability.

A quantitative assessment requires a numerical input, and such an analysis cannot account for the unquantifiable input required for a comprehensive peat stability assessment. For this reason, a purely quantitative assessment should only be considered as a guide and a qualitative assessment of stability should be used to inform the final recommendations.

The characteristics of the peat failure phenomena have been incorporated in a stability risk assessment to evaluate the risk of instability occurring within the peat areas. The main factors controlling the stability of the peat mass are the surface gradients, the depth and condition of the peat at each location and the type of underlying substrate.

The natural moisture content and undrained shear strength of the peat are important; however, it is generally accepted that where present, the peat would be saturated and have a very low strength. It is believed to be unrealistic to rely on specific values of shear strength to maintain stability when back analysis of failed slopes indicates that there is often a significant discrepancy between measured strength in peat and stability. Shear strength has been assumed to be constant and worst case, throughout this assessment. It has also been assumed, as a worst case, that the groundwater level is coincident with the ground surface.



5.4 Risk Rating

The potential for a peat slide to occur during the construction of the Proposed Development depends on several factors, the importance of which can vary from site to site. Factors requiring consideration typically include:

- Peat depth;
- Slope gradient;
- Substrate material; and
- Evidence of instability or potential instability;

Of these, peat depth and slope gradient are considered to be principal factors. Without a sufficient peat depth and a prevailing slope, peat slide hazard would be negligible.

The rating system outlined below differs slightly from that proposed in the Scottish Government Guidance¹ as the system adopted here incorporates three inputs compared to two in the guidance, with the potential impact of substrate added in this section.

The probability of a peat landslide 'Risk Rating' (score) was derived by multiplying the coefficients for the four key factors (with historic instability as 1) together to produce a risk rating which is a measure of the likelihood of peat instability, and this enables potential areas of concern to be highlighted. For the assessment, the following rating system was applied as shown in Table C.

Table C: Probability of Peat Landslide

Risk Coefficient	Rating	Potential Stability Risk (Pre-Mitigation)	Action
<5		Negligible	No mitigation action required.
5 - <16		Low	As for negligible condition plus development of a site-specific construction and management plan for peat areas.
16 - <31		Medium	As for Low condition plus may require mitigation to improve site conditions.
31-50		High	Unacceptable level of risk, the area should be avoided. If unavoidable, detailed investigation and quantitative assessment required to determine stability and sensitivity to minor changes in strength and groundwater regime, combined with long term monitoring.
>51		Very High	Unacceptable level of risk, the area should be avoided.

5.4.1 Peat Depth

The peat depth is shown on the peat depth interpolation figures provided in **Figure 9.1.6** and **Figure 9.1.7**. The interpolation was undertaken using the Spline with Barriers tool in ArcGIS Pro methodology.

Table D, below, shows the peat depth ranges and their related peat depth coefficients. The ground conditions were assessed by using peat depths recorded during peat probing. Thin peat was classed as being 0.5 to 1.5 m thick, with deposits in excess of this classed as thick. The thickness ranges used are intended to reflect the risk of instability associated with both peat slides (in thin peat) and bog slides. Where the probing recorded peat less than 0.5 m thick, this was considered as organic soil rather than peat and falls outside the scope of this assessment.



In addition to peat thickness, the presence of existing landslip debris or indicators of meta-stable conditions such as tension cracks or slumping in the peat, suggest the material is likely to become even less stable should the existing ground conditions change. Where evidence of historical slips, collapses, creep or flows is seen, a separate coefficient has been applied.

Table D: Coefficients for Peat Depth

Peat Depth Range	Description	Peat Depth Coefficients
(<0.5 m)	Peaty/organic soil	0
(0.5 – 1.5 m)	Thin Peat	2
(>1.5 m)	Thick Peat	3*
-	Slips /collapses / creep / flows	8

*Note that thicker peat generally occurs in areas of shallow gradients and records indicate that thick peat does not generally occur on steeper gradients.

5.4.2 Slope Gradients

Table E, below, gives the coefficients applied to the categorised slope angles. The slope gradients were assessed by reference to the mapping and particularly the Digital Terrain Model (DTM) which was used to generate a slope map (**Figure 9.1.8**), from which the gradient at each probe location could be determined and input into the risk rating spread sheet (**Annex A**). The gradient quoted at each location was based on the average gradient over a 5 m grid.

Coefficients for slope gradient have been assigned to ensure the potential for both peat slides (gradients of 4-15°) and bog slides (gradients of 2-10°) are addressed. By simple inspection it is clear that steeper slopes pose a greater risk of instability than shallow gradients. Therefore, a graduated gradient scale from 0° to >12° (the practical maximum gradient on which peat is commonly observed) has been applied.

Table E: Coefficients for Slope Gradients

Slope Angle (°)	Slope Angle Coefficients
Slope <2°	1
2° ≤ Slope <4°	2
4° ≤ Slope <8°	4
8° ≤ Slope <12°	6
>12° Slope	8

5.4.3 Substrate

Table F, below, shows the substrate type and their related substrate coefficient. As noted above, most failures in thin peat layers occur at the interface with the underlying substrate; the nature of the substrate has an influence on the probable level of stability.

Peat failures often occur within glacial till deposits in which an iron pan is observed in the upper few centimetres (Dykes and Warburton, 2007)²⁵. They have also been observed over glacial till without an obvious iron pan, or over impermeable bedrock. They are rarely cited over permeable bedrock as the formation of peat deposits is deemed to be less likely.

25 Dykes A and Warburton J (2007) Mass movements in peat: A formal classification scheme. *Geomorphology* 86, pp. 73–93



Where sand and/or gravel (derived from glacial till) form the substrate, the effective strength of the interface can be considered to be good with comparatively high friction values. Under these conditions, failure is likely to occur in a zone within the peat, just above the interface. Further factors are necessary to cause a failure of this nature (increased pore pressures within the peat) and occurrence of such events is rare.

A rock substrate provides a high strength stratum, however, the rock surface can be smooth, and, depending on the dip orientation of the strata, it can provide a very weak interface. Therefore, it has been given a rating higher than that of granular material.

Where clay forms the interface, there is likely to be a significant zone of softening in the clay (due to saturation at low normal stresses, poor or non-existent vertical drainage and the effect of organic acids), resulting in either very low undrained shear strength or low effective shear strength parameters. The result is that potential shearing could occur either in the peat, on the interface or in the clay; all three possibilities have been documented in the past.

Table F: Coefficients for Substrate

Substrate Conditions	Substrate Coefficients
Granular	1
Rock	2
Cohesive	3
Not proven	3
Slip material (Existing materials)	5

Probing across the Proposed Development indicated primarily granular and bedrock substrates using the refusal method. This was confirmed by coring at selected locations across the Proposed Development.

5.4.4 Results

The table of results, included in **Annex A**, shows that 17,075 probe locations were identified within the extent of the DTM, peat (>0.5 m) was present at 5,251 locations. The stability risk rating identified the following:

- No peat was recorded at 129 locations (<1%), hence no risk;
- Negligible risk at 12,599 (74%) locations;
- Low risk at 3,703 (22%) locations;
- Medium risk at 644 (3%) locations; and
- High risk at 0 (0%) locations.

Figure 9.1.9 presents the interpreted risk of peat instability based on the multiplication of the risk coefficients discussed above in Table D to Table F.

5.4.5 Impact Rating

An assessment of the receptors 'Impact Rating' of the medium risk locations has been undertaken. It should be noted that the impact assessment is primarily concerned with impacts that affect the environment, ecology, public or infrastructure associated with the Proposed Development, both on-site and potentially off-site. This assessment does not consider the detailed ecological impact of construction induced peat instability; however, the majority of the sensitive on-site receptors are the watercourses and thus the inferred ecological and environmental issues are addressed. The proposed mitigation measures in



Section 6.0 would limit the potential for any slope failures into watercourses and drainage features hence limit such impacts. The effect a slope failure may have on the construction site and infrastructure can be easily identified. However, the effect of an instability event on features impacted by an event not associated with the Proposed Development is harder to predict. In order to address this effect, it is not considered appropriate to assess the effect at every potential receptor location close to the Proposed Development; but rather to assess the effect a particular infrastructure feature (tracks, pole locations etc.) would have on the structures or features surrounding it. By adopting such an approach, the assessment of infrastructure features where a risk ranking of ‘negligible’ or ‘low’ (assessed in the stability risk assessments described above) is discounted from further assessment.

The impact rating coefficient (score) is derived by multiplying the receptor ranking coefficient (score) by the distance coefficient (score) and the elevation coefficient (score) for each impact receptor associated with a particular infrastructure feature. The ranking process by attributing the different weighting systems to each factor is detailed in the following sub-sections.

5.4.6 Receptor Ranking

Receptors are generally nearby structures or features that may be affected by peat movements caused during or following construction. Generally, only receptors immediately down gradient of the infrastructure feature could be affected by peat instability, therefore the first phase of feature ranking requires topographic ridges and valleys to be identified across the Proposed Development and surrounding area. From this, receptors at risk from particular infrastructure features can be identified. However, should instability occur on a steep slope, there is the risk of the back scarp of the instability migrating up-slope, there-by affecting areas previously considered not to be at risk.

The main receptors located across the Proposed Development and surrounding area which could potentially be affected in the event of a peat slide; were primarily watercourses and proposed infrastructure (as shown below in Table L and **Figure 9.1.9**). No GWDTE or PWS have been identified as possible receptors of any potential peat instability across the Proposed Development.

Following identification of receptors at risk, these are ranked according to their size and sensitivity. Table G, below, presents the coefficients placed on particular receptor types.

Table G: Coefficients for Receptor Ranking

Nature of Feature	Feature Coefficient
Non-critical Infrastructure (including minor/private roads, estate tracks)	1
Proposed Development Infrastructure (including tracks, compounds, etc.,)	3
Sensitive Hydrological Feature (including watercourses, tributaries, GWDTE, PWS, etc.,)	3
Sub-Community (settlement 1-10 residents)	6
Community (settlement of >10 residents)	8

5.4.7 Receptor Proximity

The proximity of an impact receptor is also critical in assessing the likely level of disruption it may suffer following an instability event. Based on this, two further coefficients – distance from infrastructure feature and relative elevation differences between the infrastructure feature and



impact receptor - are applied in deriving an impact ranking. Table H and Table I below present the coefficients derived for distance and elevation of impact receptors.

Table H: Coefficient for Receptor Proximity

Distance from Coefficient Feature	Distance Coefficient
> 1 km	1
100 m – <1 km	2
10 – <100 m	3
0 – <10 m	4

Table I: Coefficient for Impact Feature Elevation

Relative Elevation of Feature	Elevation Coefficient
0 – <10 m	1
10 – <50 m	2
50 – <100 m	3
> 100 m	4

Based on distance to impact receptors, in this instance watercourses have been identified (which are the most sensitive receptor near the Proposed Development). The other receptors have been discounted, as either they are not present or distance to receptor mitigates risk. Watercourses are the principal receptor as they are at risk of not only direct impact from a peat slide, but potentially the watercourse creates a pathway to impact other receptors indirectly, either ecological or potential water users downstream. Based on Table J (below) the watercourses would have an impact receptor coefficient (score) of 3 and then considering the distance to the receptor and the relative elevation differences on-site of receptors, a potential impact can be derived.

5.5 Hazard Ranking

To achieve a meaningful and manageable result from the hazard ranking, the results of the Risk Rating and Impact Rating have been normalised to a standard numerical scale, as detailed in Table J (below).

Table J: Rating Normalisation

Risk Rating		Impact Rating	
Current Scale	Normalised Scale	Current Scale	Normalised Scale
Negligible <5	1	Very Low <10	1
Low 5 - <16	2	Low 11 - 20	2
Medium 16 – <31	3	High 21 - 30	3
High 31 - 50	4	Very High 31-50	4
Very High >51	5	Extremely High >51	5

The method of assessing probability of landslide, adverse consequence and hazard developed by SLR Consulting incorporates additional critical elements such as the substrate interface and coefficients for the receptor position, distance and elevation and as such is considered to be more rigorous than the assessment scheme proposed by the Scottish



Government¹. The Hazard Ranking scale does equate to the Scottish Government¹ scale, with rankings divided over four zones.

A simple multiplication of these coefficients would result in potentially large and unwieldy risk and impact rating numbers. SLR has therefore opted to normalise these values to bring them in line with the values used in the Scottish Government Guidance¹, as illustrated below in Table K.

Table K: Hazard Ranking

Hazard Ranking	Hazard Ranking Zone	Action
1-4	Insignificant	No mitigation action required although slide management and monitoring shall be employed. Slide management shall include the development of a site specific construction plan for peat areas.
5 - 10	Significant	As for Insignificant condition, plus further investigation to refine the assessment combined with detailed quantitative risk assessment, to determine appropriate mitigation through relocation or re-design.
11 - 16	Substantial	Consideration of avoiding project development in these areas should be made, unless hazard mitigation can be put in place without significant environmental effect.
17-25	Serious	Unacceptable level of hazard; development within the area should be avoided.

The stability risk assessment has demonstrated that the majority of the Proposed Development lies within an area of negligible to low risk (90% of probe locations) with regards to stability based on **Figure 9.1.9**.

4% of probe locations identified a medium risk of peat instability across the Proposed Development. Following review, the majority of these locations are not considered to have either a potential impact on the development infrastructure, due to locality, either well away from influencing infrastructure, in a down gradient position or have no impact on the local watercourses (receptors). Therefore 27 medium risk sites have been identified and are discussed in the following section.

The stability risk assessment results presented below in Table L shows the calculated hazard ranking associated with every location where there is a stability risk of medium or above, at or close to infrastructure, but outwith the inundation area. The particular mitigation measures to reduce the risk of instability occurring are dependent upon location and the type of proposed structure. Proposed mitigation measures and actions already undertaken to reduce the risk of peat instability occurring are also identified in Table L, together with the associated, revised hazard ranking. A more detailed discussion of the possible mitigation measures is presented in **Section 6.0**.



6.0 Slide Risk and Mitigation

6.1 Overview

A number of mitigation measures can be implemented to further reduce the risk levels identified across the Proposed Development site. These range from infrastructure specific measures to general good practice that should be applied across the Proposed Development (during construction and operation) to increase awareness of peat instability and enable early identification of potential displacement and opportunities for mitigation.

Risks may be mitigated by:

- Undertaking site specific stability analysis using better quality geotechnical data, final design loads for infrastructure and detailed ground models in areas of specific concern; and
- Precautionary construction measures – including use of monitoring, good practice and a geotechnical risk register relevant to all locations.

Mitigation measures are provided below specific to each area of “Medium” risk. These mitigation measures will also help further reduce “Low” and “Negligible” risks to potential receptors. Section 6.2 provides information on good practice pre-construction, during construction and post-construction (i.e. during operation).

6.2 Embedded Mitigation

The paragraphs below detail good practice recommended during construction and follows the principles detailed in the NatureScot Guidance (2024)³. These measures are considered 'embedded mitigation' for the purposes of the assessment, and have been assumed to be in place throughout Proposed Development construction for the purposes of the assessment presented in the EIA Report:

6.2.1 Excavated Groundworks

- Use of appropriate supporting structures around peat excavations to prevent collapse and the development of tension cracks.
- Avoid cutting trenches or aligning excavations across slopes (which may act as incipient head scarps for peat failures) unless appropriate mitigation has been put in place.
- Implement methods of working that minimise the cutting of the toes of slopes, e.g. working up-to downslope during excavation works.
- Monitor the ground upslope of excavation works for creep, heave, displacement, tension cracks, subsidence or changes in surface water content.
- Monitor cut faces for changes in water discharge, particularly at the peat-substrate contact.
- Minimise the effects of construction on natural drainage by ensuring natural drainage pathways are maintained or diverted such that there is no significant alteration of the hydrological regime of the site; drainage plans should avoid creating drainage / infiltration areas or settlement ponds towards the tops of slopes (where they may act to both load the slope and elevate pore pressures).

6.2.2 Permanent Tracks

- Prior to commencement of construction, setting out of the centreline of proposed permanent tracks should include a walk over performed by the site manager or general foreman, along with a suitably qualified Geotechnical Engineer and appropriate Clerk of



Works. This should be carried out to check that the ground conditions/drainage paths are as expected, and “fine-tuning / micrositing” of the alignment if required.

- Maintain drainage pathways through tracks to avoid ponding of water upslope.
- Monitor the top line of excavated peat deposits for deformation post-excavation.
- Monitor the effectiveness of cross-track drainage to ensure water remains free-flowing and that no blockages have occurred.
- Where upgraded tracks are required, existing tracks and surrounding areas should be further investigated to determine the most suitable sections to upgrade. Avoiding deeper areas of peat adjacent to the existing track is deemed a priority.
- Where possible, upgraded sections of track should tie into the existing track construction.

6.2.3 Temporary Tracks

- Prior to commencement of construction, setting out of the centreline of the proposed temporary tracks should include a walk over performed by the site manager or general foreman, along with a suitably qualified Geotechnical Engineer and appropriate Clerk of Works. This should be carried out to check that the ground conditions / drainage paths are as expected, and “fine-tuning / micrositing” of the alignment if required.
- Weather policy should be agreed and implemented during works, e.g. identifying ‘stop’ rules (i.e. weather dependent criteria) for cessation of track construction or trafficking (e.g. allowing tracks to thaw following periods of hard frost).
- Allow peat to undergo primary consolidation by adopting rates of road construction appropriate to weather conditions.

6.2.4 Peat Storage

Providing a detailed plan of all potential temporary storage locations for peat for the whole development area is not considered appropriate at this initial planning stage based on the current limited information. However, the following control measures and good practice will be implemented when considering temporary storage of peat during the construction.

- The location of potential peat storage areas should not be sited on areas identified with ‘medium’ or higher peat landslide likelihoods.
- Site specific stability analysis should be undertaken for all areas of peat storage to ensure the likelihood of destabilisation of underlying peat is minimised. Analysis should consider the slope angle of the storage location, the thickness of peat being stored and being loaded, and use representative parameters for both the stored and underlying peat.
- Avoid storage of peat in areas of peat >1 m in depth.
- Ensure adequate drainage is maintained for any peat storage areas.
- Minimise haul distances for peat, storing as near to excavation as possible.
- Monitor effects of wetting / re-wetting stored peat on surrounding peat areas, and prevent water build up on the upslope side of peat mounds.

6.2.5 Monitoring during and post construction

The following activities will be built into any monitoring of groundworks undertaken for the Proposed Development:



- Ponding on the upslope side of infrastructure sites and on the upslope side of access tracks.
- Subsidence and lateral displacement of tracks.
- Blockage or underperformance of the installed site drainage system.
- Development of tension cracks, compression features, bulging or quaking bog anywhere in a 50 m corridor surrounding the site of any construction activities or site works.

This monitoring should be undertaken on a quarterly basis in the first year after construction, biannually in the second year after construction and annually thereafter. In the event that unanticipated ground conditions arise during construction, the frequency of these intervals should be reviewed, revised and justified accordingly.

6.2.6 General Good Practice

In addition to these control measures, the following good practice should be followed:

- A geotechnical risk register (GRR) should be prepared for the Proposed Development following intrusive investigations post-consent and location specific stability analyses – the risk register should be considered a live document and updated with site experience as infrastructure is constructed.
- The observation of any peat instability and pre-failure indicators should be recorded in the GRR during the setting out of proposed works.
- All construction activities and operational decisions that involve disturbance to peat deposits should be overseen by an appropriately qualified geotechnical engineer with experience of construction on peat sites.
- Awareness of peat instability and pre-failure indicators should be incorporated in site induction and training to enable all site personnel to recognise ground disturbances and features indicative of incipient instability.
- Monitoring checklists should be prepared with respect to peat instability addressing all construction activities proposed for site.
- A documented procedure and rapid reaction strategy shall be in place prior to commencement of construction on peatland. This strategy shall be enacted should signs of peat movement be recorded across the Proposed Development. This approach requires periodic and continued monitoring of the construction process by a suitably qualified geotechnical engineer.
- A detailed Construction Environmental Management Plan (CEMP) shall be produced and will incorporate the conclusions of the peat stability report, continuously updating the assessment and developing appropriate mitigations to respond to the peat slide risk as the Proposed Development proceeds.
- As part of the GRR, regular inspection and monitoring of stored peat should be undertaken until temporary storage has been completed. This involves the recording of any visual signs of ground movement including identification of tension cracking or slumping of peat material. Future inspection frequency would be determined post construction and be dependent upon meteorological conditions.
- Awareness of peat instability and pre-failure indicators should be incorporated in site induction and training to enable all site personnel to recognise ground disturbances and features indicative of incipient instability.



6.3 Proposed Mitigation

As noted in **Figure 9.1.9**, where the risk assessment has identified a negligible or low risk of peat instability, no specific mitigation measures are deemed necessary. However, to ensure best practice is employed, there remains a requirement for careful monitoring and design of both the permanent and temporary works appropriate for peat soils, as detailed in **Section 6.2**.

The areas of the infrastructure rated as medium were subjected to a hazard assessment; a number of areas were discounted as they do not fall within influencing distance of any of the key Proposed Development infrastructure. The procedure adopted was to review the peat slide risk data and identify those areas with a medium risk or greater, that were in close proximity or influencing distance of any of the proposed infrastructure or watercourses. Those risk areas where there is no development would not affect the natural stability of the peat.

Table L below lists the locations that have been identified to have a medium or high risk of peat instability on the Proposed Development infrastructure (as shown on **Figure 9.1.9**). A variety of mitigation measures are recommended to reduce the risk of peat instability. Analysis of each location has shown that all can be mitigated to a Hazard Ranking of “Insignificant”.



Table L: Peat Instability Risk Register

Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
1	Medium	Low	Significant	Temporary stone track (to be floated)	Existing access track (northwest)	<p>Risk location impacted by localised peat deposits (0.5 to 2 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
2	Medium	Low	Significant	Temporary stone track (to be floated)	Grains watercourse (north)	<p>Risk location impacted by localised peat deposits (0.5 to 1.5 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
3	Medium	Very Low	Insignificant	Permanent track	Water of Charr (southeast)	<p>Risk location impacted by localised peat deposits (0.5 to 1 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Excavation of peat prior to construction would reduce and mitigate risk of peat landslide towards receptor. Suitable shoring of excavations would assist in mitigating risk during construction. Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
4	Medium	Low	Significant	Temporary stone track (to be floated)	Unnamed watercourse (northeast)	<p>Risk location impacted by localised peat deposits (0.5 to 2 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
5	Medium	Very Low	Insignificant	Temporary stone track (to be floated)	Pitlethen Burn (northeast)	<p>Risk location impacted by localised peat deposits (0.5 to 2 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
6	Medium	Low	Significant	Temporary stone track (to be floated) and Pole 172	Pitlethen Burn (northwest)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track and/or pole location out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Pole working area to be excavated prior to construction. Suitable shoring of excavations would assist in mitigating risk during construction.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
						Good construction practices, as detailed in Section 6.2 , should be followed to mitigate against any instability.	
7	Medium	Low	Significant	Temporary stone track (to be floated) and pole 171	Pitlethen Burn (northwest)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track and/or pole location out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Pole working area to be excavated prior to construction. Suitable shoring of excavations would assist in mitigating risk during construction.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
8	Medium	Low	Significant	Temporary stone track (to be floated)	Pitlethen Burn (northwest)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
						<p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	
9	Medium	Very Low	Insignificant	Temporary stone track (to be floated) and pole 167	Pitlethen Burn (northwest)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track and/or pole location out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Pole working area to be excavated prior to construction. Suitable shoring of excavations would assist in mitigating risk during construction.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
10	Medium	Very Low	Insignificant	Temporary stone track (to be floated)	Tributary of the Stag Burn (northwest)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
						<p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	
11	Medium	Low	Significant	Temporary stone track (to be floated)	Tributary of the Stag Burn (west)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
12	Medium	Very Low	Insignificant	Temporary stone track (to be floated)	Tributary of the Stag Burn (north)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
						<p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	
13	Medium	Low	Significant	Temporary stone track (to be floated)	Tributary of the Stag Burn (north)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
14	Medium	Very Low	Insignificant	Temporary stone track (to be floated) and pole 160	Tributary of the Stag Burn (northeast)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track and/or pole location out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Pole working area to be excavated prior to construction. Suitable shoring of excavations would assist in mitigating risk during construction.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
						<p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	
15	Medium	Very Low	Insignificant	Temporary stone track (to be floated) and pole 159	Tributary of the Stag Burn (northwest)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track and/or pole location out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Pole working area to be excavated prior to construction. Suitable shoring of excavations would assist in mitigating risk during construction.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
16	Medium	Very Low	Insignificant	Temporary stone track (to be floated)	Temporary stone track (to be floated) (northeast)	<p>Risk location impacted by localised peat deposits (0.5 to 2 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
						<p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	
17	Medium	Very Low	Insignificant	Pole 152	Tributary of the Stag Burn (northeast)	<p>Risk location impacted by localised peat deposits (0.5 to 2 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed pole location out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Pole working area to be excavated prior to construction. Suitable shoring of excavations would assist in mitigating risk during construction.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
18	Medium	Low	Significant	Temporary stone track (to be floated)	Tributary of the Cairn Burn (northeast)	<p>Risk location impacted by localised peat deposits (0.5 to 2 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
						<p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	
19	Medium	Very Low	Insignificant	Temporary stone track (to be floated)	Tributary of the Cairn Burn (north)	<p>Risk location impacted by localised peat deposits (0.5 to 2 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
20	Medium	Low	Significant	Temporary stone track (to be floated)	Tributary of the Cairn Burn (north)	<p>Risk location impacted by localised peat deposits (0.5 to 2m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
						<p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	
21	Medium	Low	Significant	Temporary stone track (to be floated) and pole 137	Cairn Burn (north)	<p>Risk location impacted by localised peat deposits (0.5 to 2 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track and/or pole location out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Pole working area to be excavated prior to construction. Suitable shoring of excavations would assist in mitigating risk during construction.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
22	Medium	Very Low	Insignificant	Temporary stone track (to be floated)	Temporary stone track (to be floated) (north)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
						<p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	
23	Medium	Low	Significant	Temporary stone track (to be floated) and pole 137	Cairn Burn (north)	<p>Risk location impacted by localised peat deposits (0.5 to 2 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track and/or pole location out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Pole working area to be excavated prior to construction. Suitable shoring of excavations would assist in mitigating risk during construction.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
24	Medium	Very Low	Insignificant	Temporary stone track (to be floated)	No receptor, risk location confined by slopes	<p>Risk location impacted by localised peat deposits (0.5 to 2 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track and/or pole location out of medium risk areas would be the first stage of mitigation against slide risk.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
						<p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Pole working area to be excavated prior to construction. Suitable shoring of excavations would assist in mitigating risk during construction.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	
25	Medium	Very Low	Insignificant	Temporary stone track (to be floated)	Tributary of the Spital Burn (north)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	Insignificant
26	Medium	Low	Significant	Temporary stone track (to be floated) and pole 122	Spital Burn (northwest)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
						<p>Micro-siting of proposed access track and/or pole location out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Pole working area to be excavated prior to construction. Suitable shoring of excavations would assist in mitigating risk during construction.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p> <p>Good construction practices, as detailed in Section 6.2, should be followed to mitigate against any instability.</p>	
27	Medium	Low	Significant	Temporary stone track (to be floated) and pole 120 & 121	Spital Burn (northwest)	<p>Risk location impacted by localised peat deposits (0.5 to 3 m) and steep slopes across the proposed infrastructure.</p> <p>Micro-siting of proposed access track and/or pole location out of medium risk areas would be the first stage of mitigation against slide risk.</p> <p>Temporary track to be floated which would remove requirement for excavations within area.</p> <p>Pole working area to be excavated prior to construction. Suitable shoring of excavations would assist in mitigating risk during construction.</p> <p>Catch wall ditches or fences could be constructed downslope of the risk location to mitigate against any peat slide during construction works.</p> <p>Drainage pathways should be maintained during and post construction to reduce risk of peat slide.</p>	Insignificant



Identified Risk Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure at Risk Zone	Key Receptor	Mitigation	Revised Hazard Ranking
						Good construction practices, as detailed in Section 6.2 , should be followed to mitigate against any instability.	



7.0 Conclusion

This report has highlighted the complicated inter-relationship between all the aspects that have an effect on the stability of peat. Consequently, the discussion has also addressed areas of construction and drainage in order to proactively avoid a stability problem, rather than attempt to put it right after the event. The Proposed Development has been assessed for potential hazards associated with peat instability. The assessment has been based on:

- A walk-over survey by an experienced geologist;
- A thorough inspection of the digital terrain map;
- Review of historical and geological maps, publications and aerial photography; and
- A detailed geotechnical probing exercise in areas of identified peat to determine the thickness thereof.

Peat was encountered throughout the Proposed Development, with deposits generally associated to flatter expanses, breaks in slope and hollows that allow for the accumulation and formation of peatland. Peat greater than 2 m was largely confined to the central and western areas of the Proposed Development. Peat is largely absent across the eastern extent of the Proposed Development, with most of this area being situated within sloped, artificially drained plantation forestry. Eastern extents are also located in agricultural land where the area has been extensively drained. No areas of instability were noted in relation to peat deposits across the Proposed Development.

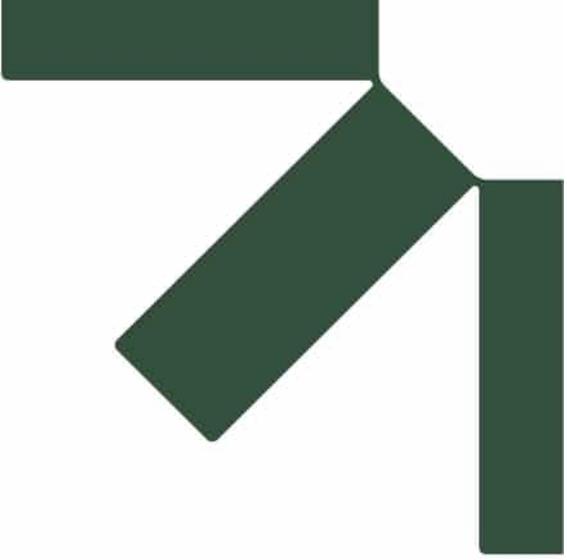
A total of 17,075 peat probes were undertaken across all survey phases. The average thickness of peat recorded across the Proposed Development was 0.6 m.

The results indicate that 2% of probe locations are at medium or greater risk of peat instability with 27 risk sites discussed in detail.

The overall conclusion regarding peat stability is that there is a negligible to low risk of peat instability over most of the main site, although some areas of medium and high risk have been identified. For these medium and high risk areas, a hazard impact assessment was completed which concluded that, subject to micro-siting and the employment of appropriate mitigation measures, all these areas can be considered as an insignificant hazard.

Additional mitigation measures have been identified in areas where hazards are already considered insignificant to further reduce the risk of potential hazards occurring.





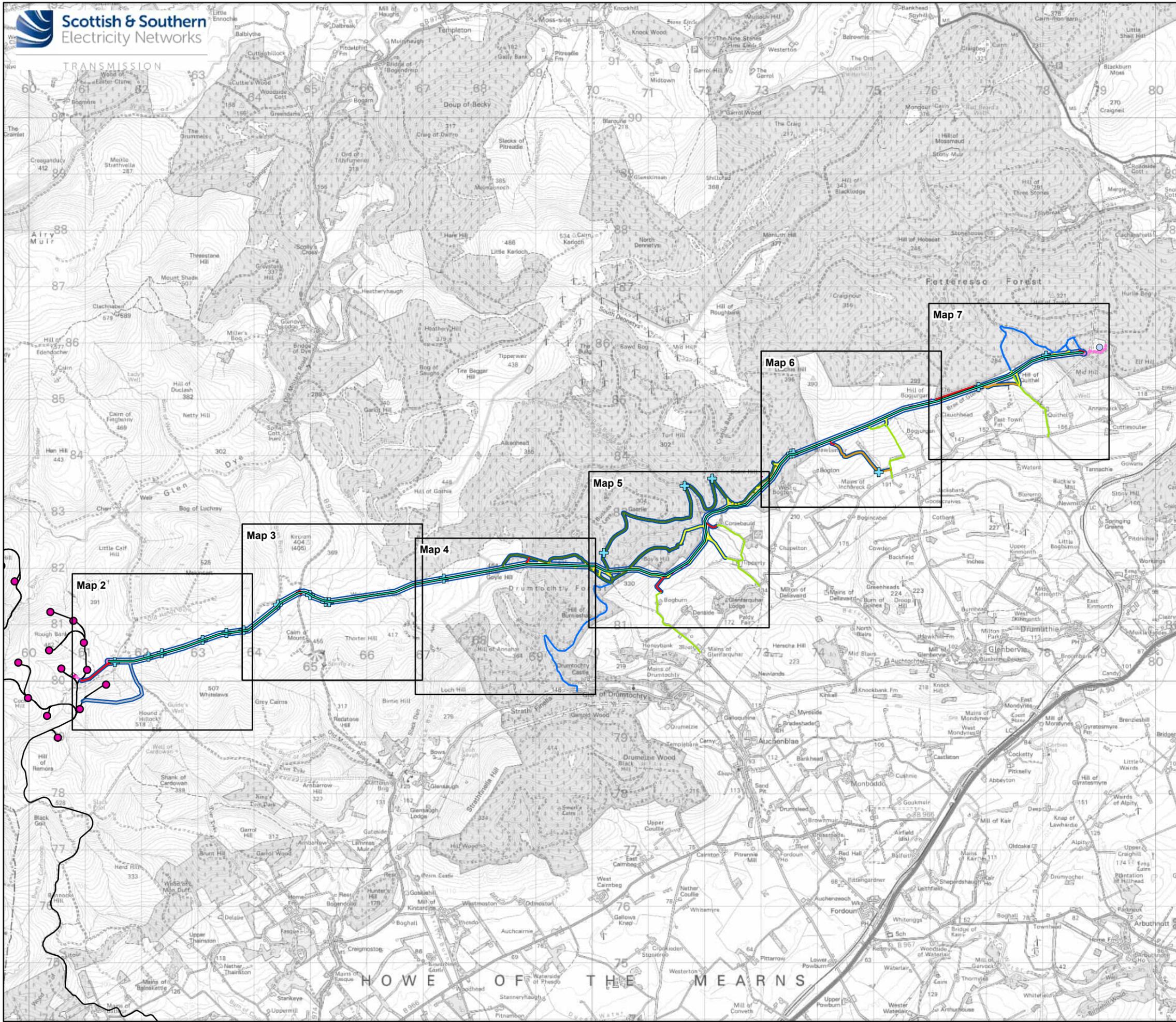
Figures

Technical Appendix 9.1: Peat Landslide Hazard Risk Assessment

Glendye Wind Farm Overhead Line Grid Connection

Scottish & Southern Electricity Networks (SSEN) Transmission

SLR Project No.: 428.013097.00001



- Legend**
- S.37 Overhead Line (OHL) Works**
- Proposed OHL Alignment
 - Proposed CSE Hardstand
- Ancillary Development**
- + Proposed Permanent Bridge or Culvert
 - Proposed Permanent Track
 - Proposed Temporary Trackway Panel
 - Proposed Temporary New Stone Track
 - Existing Forest Tracks to be Upgraded
 - Existing Field Tracks to be Upgraded
 - Proposed ATV Route
 - Existing Forest Track
 - Existing Field Track
- Limit of Deviation**
- Proposed OHL and Access Track Limit of Deviation (LoD)
- Permitted Development**
- ⋯ Proposed 123kV Underground Cable (UGC) Alignment
- Consented Development**
- Glendye 123kV Substation
 - Glendye Wind Farm Turbine Location
 - Glendye Wind Farm Access Track
- Existing Development**
- Fetteresso Substation

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N

0 1 2 Km

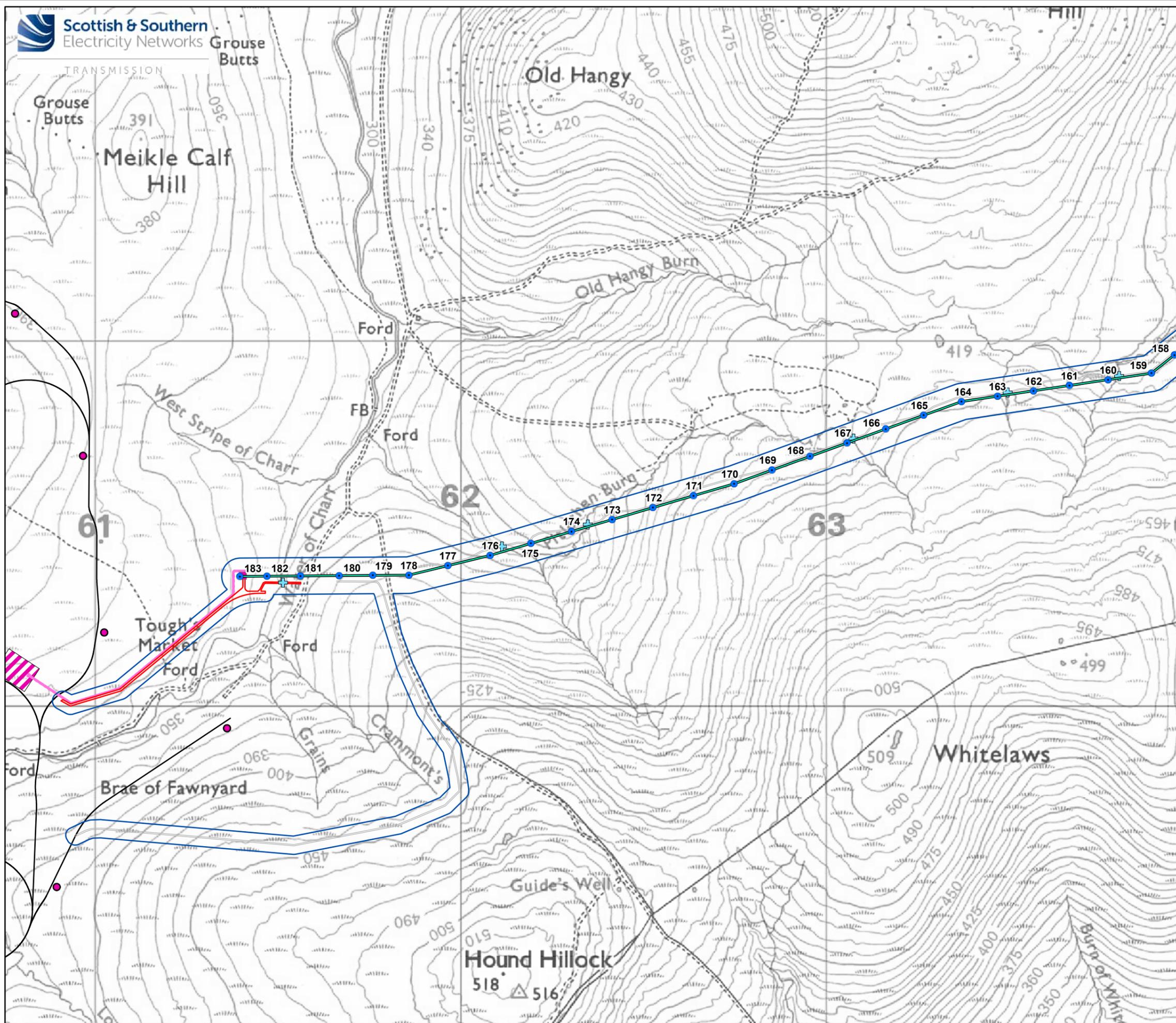
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Project: Glendye Wind Farm Grid Connection PLHRA

Title: Figure 10.1.2.1 - Site Layout Overview

Drawn by: MM Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed OHL Alignment
- Proposed CSE Hardstand

Ancillary Development

- + Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary New Stone Track

Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

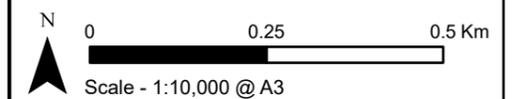
Permitted Development

- - - Proposed 123kV Underground Cable (UGC) Alignment

Consented Development

- Glendye 123kV Substation
- Glendye Wind Farm Turbine Location
- Glendye Wind Farm Access Track

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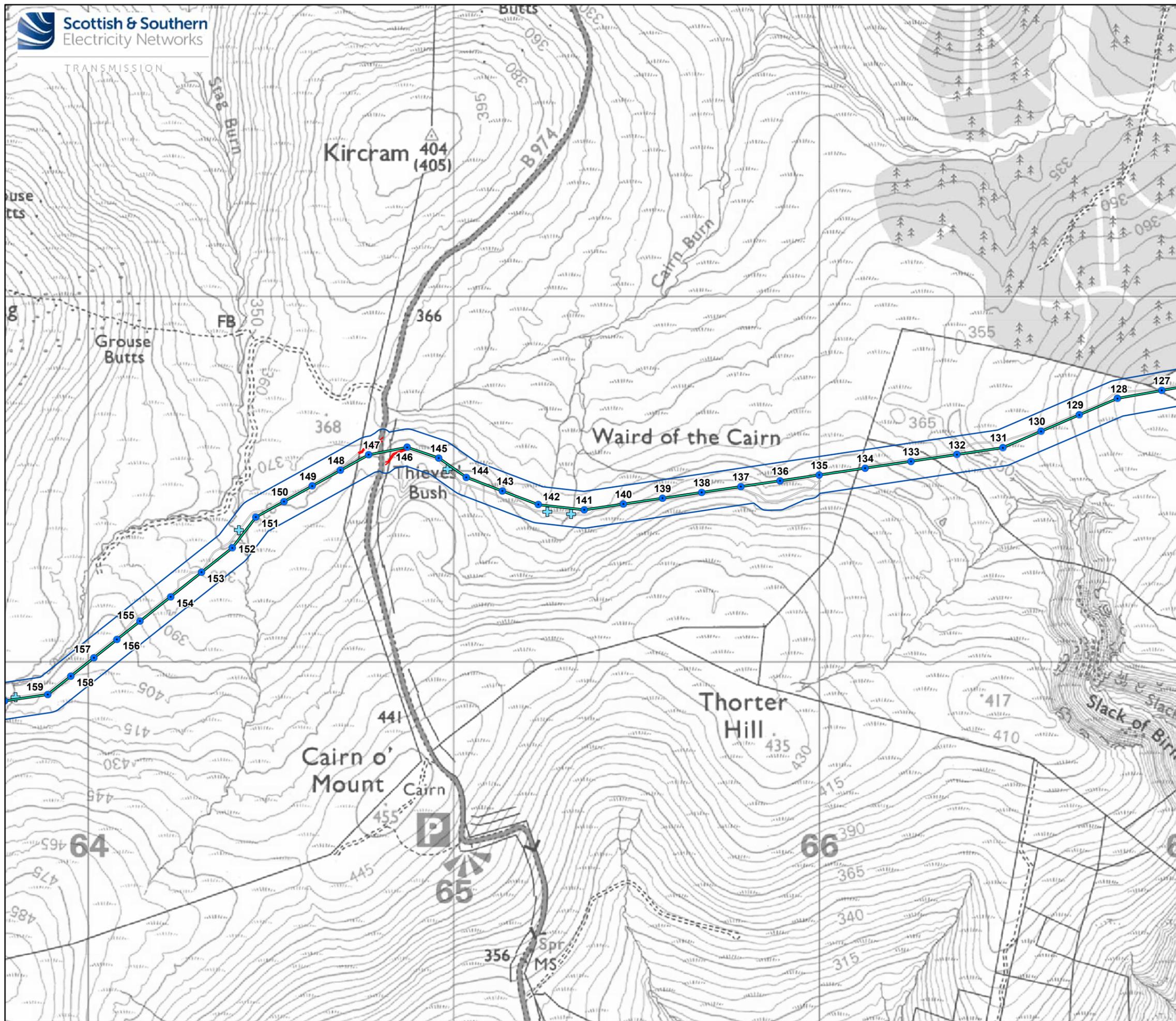


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PLHRA

Title: Figure 10.1.2.2 - Site Layout
Map 2

Drawn by: MM Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed OHL Alignment

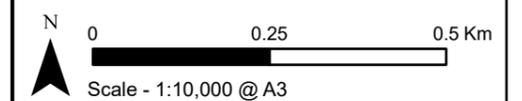
Ancillary Development

- + Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary New Stone Track

Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

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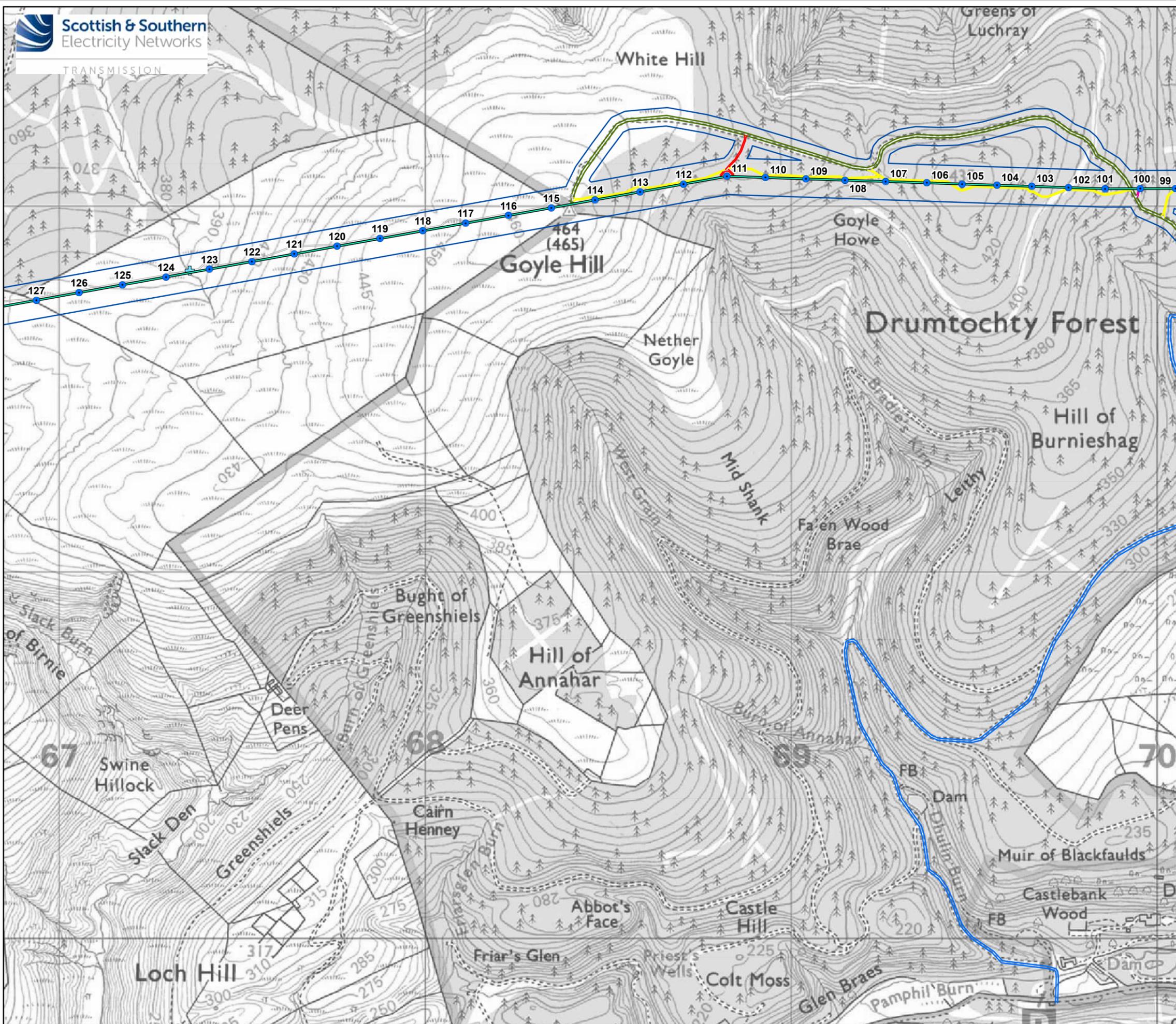


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PLHRA

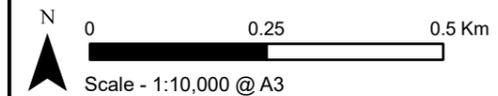
Title: Figure 10.1.2.3 - Site Layout
Map 3

Drawn by: MM Date: 25/06/2025



- Legend**
- S.37 Overhead Line (OHL) Works**
- Proposed Pole Location
 - Proposed OHL Alignment
- Ancillary Development**
- ⊕ Proposed Permanent Bridge or Culvert
 - Proposed Permanent Track
 - Proposed Temporary Trackway Panel
 - Proposed Temporary New Stone Track
 - Existing Forest Tracks to be Upgraded
 - Proposed ATV Route
 - Existing Forest Track
- Limit of Deviation**
- Proposed OHL and Access Track Limit of Deviation (LoD)

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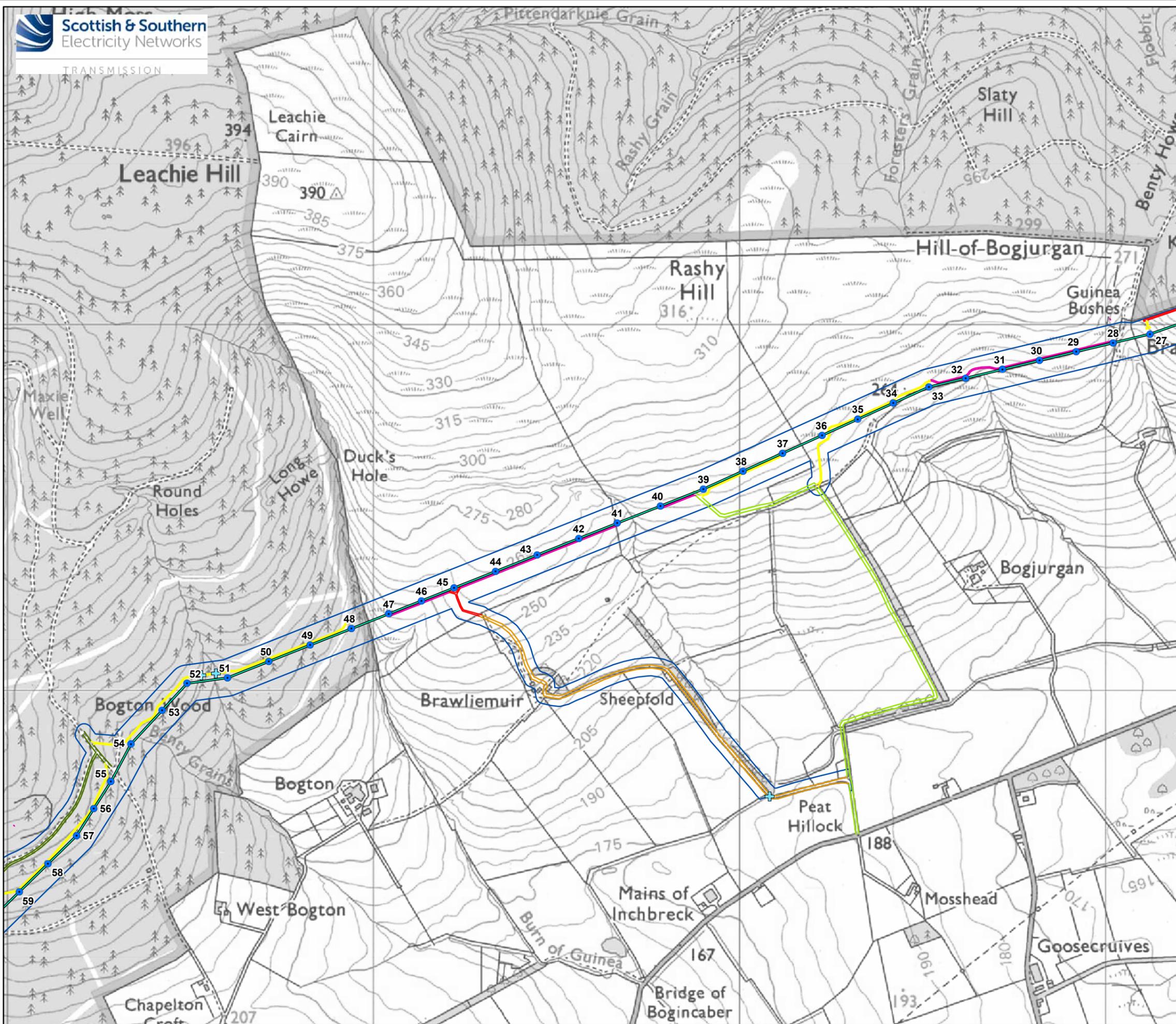


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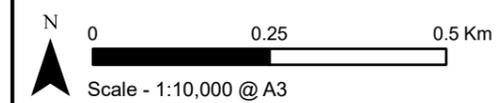
Title: Figure 10.1.2.4 - Site Layout
Map 4

Drawn by: MM Date: 25/06/2025



- Legend**
- S.37 Overhead Line (OHL) Works**
- Proposed Pole Location
 - Proposed OHL Alignment
- Ancillary Development**
- + Proposed Permanent Bridge or Culvert
 - Proposed Permanent Track
 - Proposed Temporary Trackway Panel
 - Existing Forest Tracks to be Upgraded
 - Existing Field Tracks to be Upgraded
 - Proposed ATV Route
 - Existing Field Track
- Limit of Deviation**
- Proposed OHL and Access Track Limit of Deviation (LoD)

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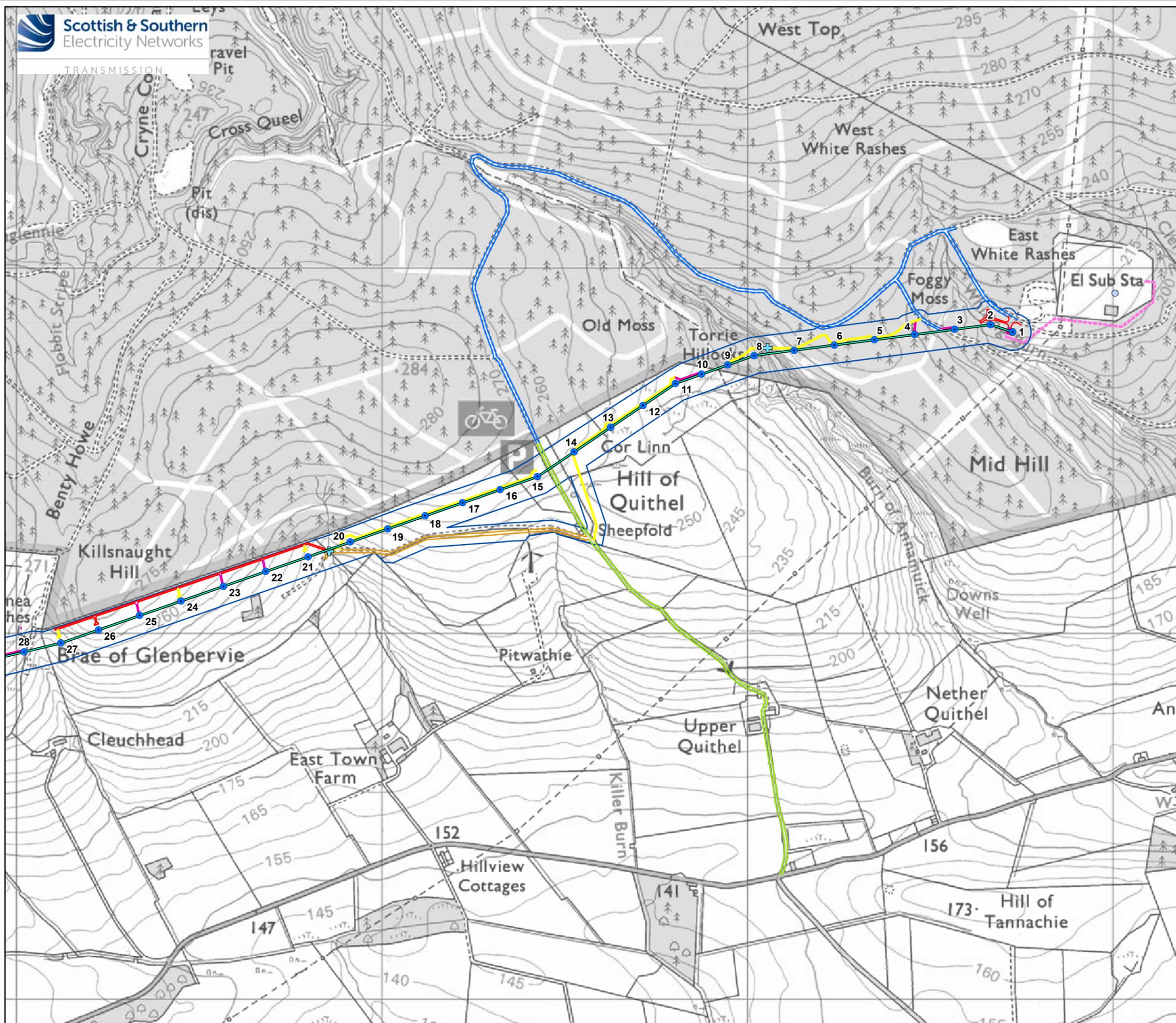


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Project: Glendye Wind Farm Grid Connection PLHRA

Title: Figure 10.1.2.6 - Site Layout Map 6

Drawn by: MM Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed OHL Alignment
- Proposed CSE Hardstand

Ancillary Development

- ⊕ Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary Trackway Panel
- Existing Field Tracks to be Upgraded
- Proposed ATV Route
- Existing Forest Track
- Existing Field Track

Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

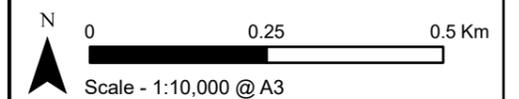
Permitted Development

- ⋯ Proposed 123kV Underground Cable (UGC) Alignment

Existing Development

- Fetteresso Substation

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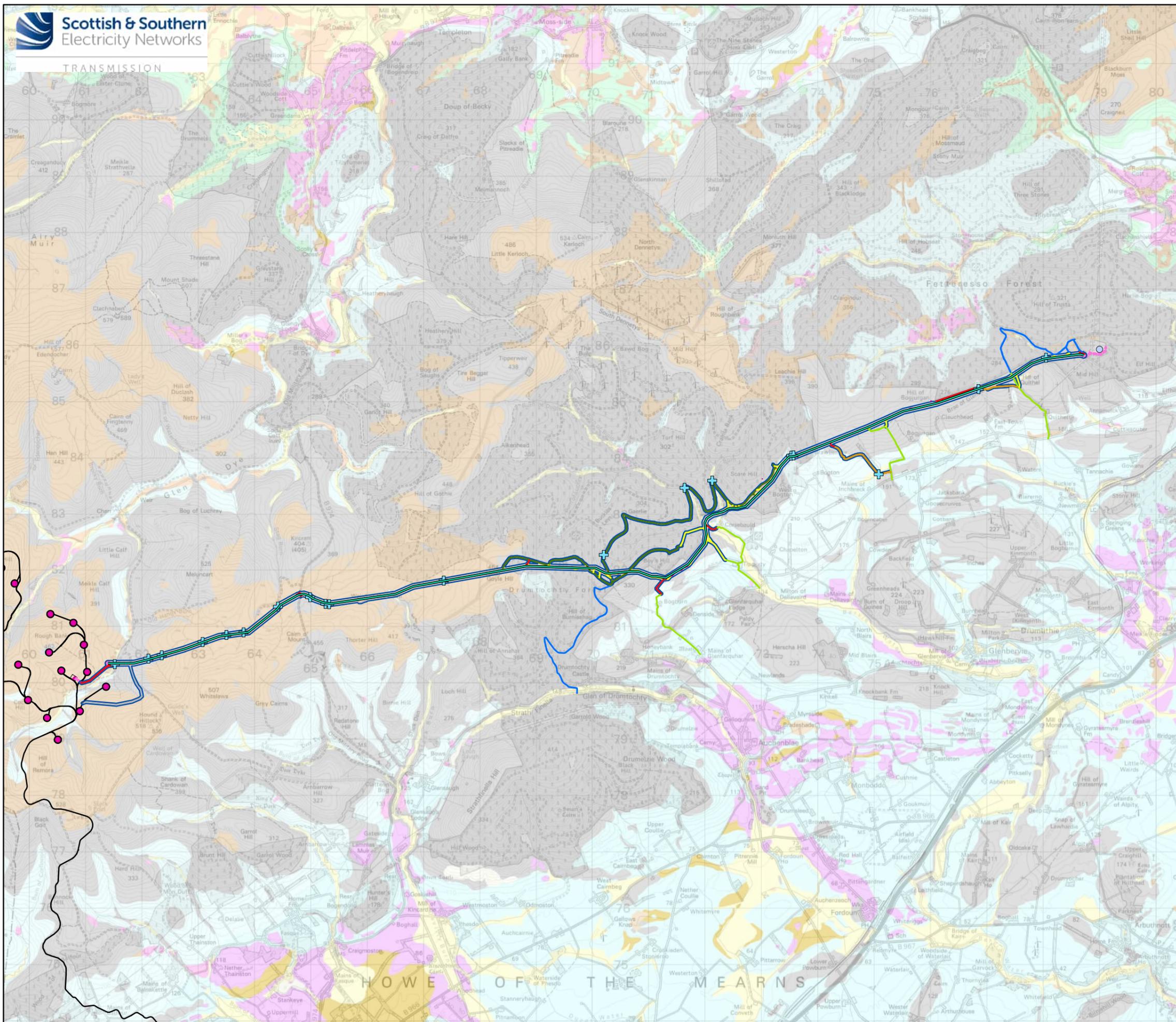


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PLHRA

Title: Figure 10.1.2.7 - Site Layout
Map 7

Drawn by: MM Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

Proposed OHL Alignment

Proposed CSE Hardstand

Ancillary Development

Proposed Permanent Bridge or Culvert

Proposed Permanent Track

Proposed Temporary Trackway Panel

Proposed Temporary New Stone Track

Existing Forest Tracks to be Upgraded

Existing Field Tracks to be Upgraded

Proposed ATV Route

Existing Forest Track

Existing Field Track

Limit of Deviation

Proposed OHL and Access Track Limit of Deviation (LoD)

Permitted Development

Proposed 123kV Underground Cable (UGC) Alignment

Consented Development

Glendye 123kV Substation

Glendye Wind Farm Turbine Location

Glendye Wind Farm Access Track

Existing Development

Fetteresso Substation

Superficial Geology

Alluvium - Clay, Silt, Sand And Gravel

Banchory Till Formation - Diamicton

Mill Of Forest Till Formation - Diamicton

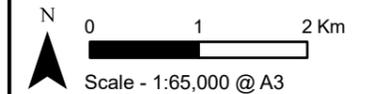
Peat - Peat

Till, Devensian - Diamicton

Bedrock at or Near Surface

Note: Only superficial geology within 500m of infrastructure is shown in the legend.

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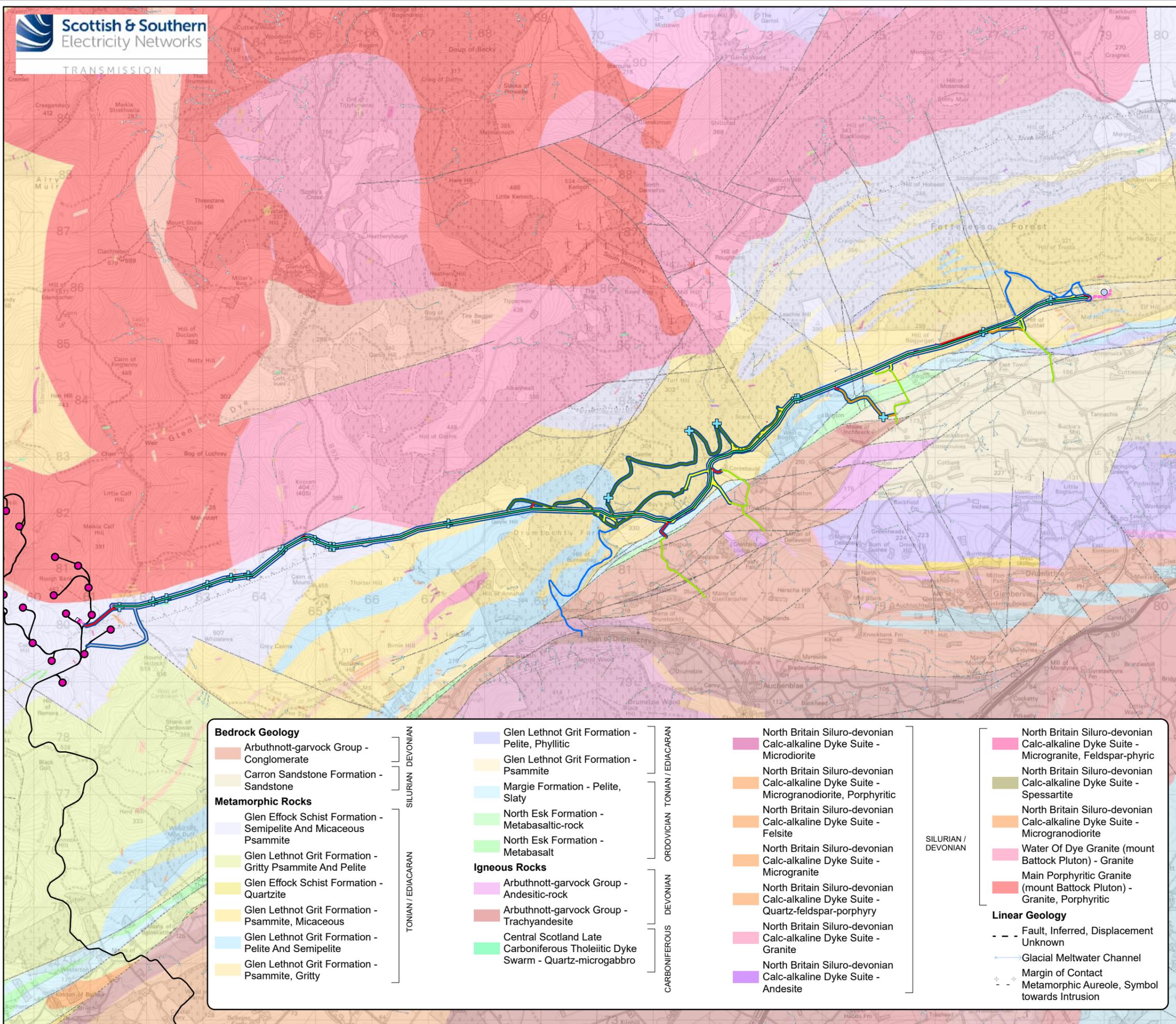


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Title: Figure 10.1.3 - Superficial Geology

Drawn by: MM Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

- Proposed OHL Alignment
- Proposed CSE Hardstand
- Ancillary Development**
- Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary Trackway Panel
- Proposed Temporary New Stone Track
- Existing Forest Tracks to be Upgraded
- Existing Field Tracks to be Upgraded
- Proposed ATV Route
- Existing Forest Track
- Existing Field Track

Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

Permitted Development

- Proposed 123kV Underground Cable (UGC) Alignment

Consented Development

- Glendye 123kV Substation
- Glendye Wind Farm Turbine Location
- Glendye Wind Farm Access Track

Existing Development

- Fetteresso Substation

Note: Only bedrock geology within 500m of infrastructure is shown in the legend.

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Title: Figure 10.1.4. - Bedrock Geology

Drawn by: MM

Date: 25/06/2025

Bedrock Geology

- Arbutnott-garvock Group - Conglomerate
- Carron Sandstone Formation - Sandstone

Metamorphic Rocks

- Glen Effock Schist Formation - Semipelite And Micaceous Psammite
- Glen Lethnot Grit Formation - Gritty Psammite And Pelite
- Glen Effock Schist Formation - Quartzite
- Glen Lethnot Grit Formation - Psammite, Micaceous
- Glen Lethnot Grit Formation - Pelite And Semipelite
- Glen Lethnot Grit Formation - Psammite, Gritty

SILURIAN / DEVONIAN
TONIAN / EDIACARAN

- Glen Lethnot Grit Formation - Pelite, Phyllitic
- Glen Lethnot Grit Formation - Psammite
- Margie Formation - Pelite, Slaty
- North Esk Formation - Metabasaltic-rock
- North Esk Formation - Metabasalt

Igneous Rocks

- Arbutnott-garvock Group - Andesitic-rock
- Arbutnott-garvock Group - Trachyandesite
- Central Scotland Late Carboniferous Tholeiitic Dyke Swarm - Quartz-microgabbro

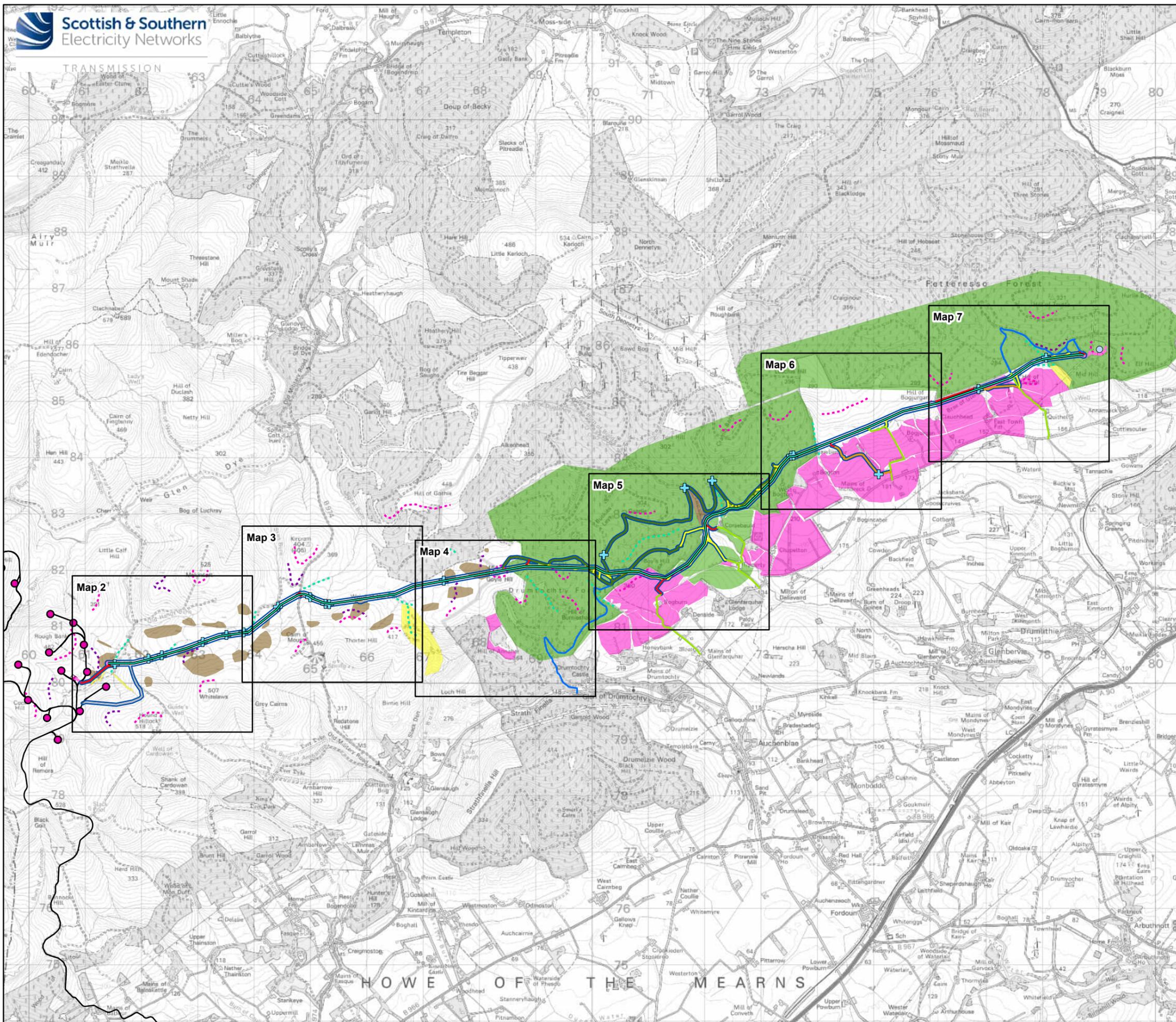
SILURIAN / DEVONIAN
ORDOVICIAN / TONIAN / EDIACARAN
CARBONIFEROUS / DEVONIAN

- Glen Lethnot Grit Formation - Pelite, Phyllitic
- Glen Lethnot Grit Formation - Psammite
- Margie Formation - Pelite, Slaty
- North Esk Formation - Metabasaltic-rock
- North Esk Formation - Metabasalt
- Arbutnott-garvock Group - Andesitic-rock
- Arbutnott-garvock Group - Trachyandesite
- Central Scotland Late Carboniferous Tholeiitic Dyke Swarm - Quartz-microgabbro
- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Microdiorite
- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Microgranodiorite, Porphyritic
- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Felsite
- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Microgranite
- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Quartz-feldspar-porphry
- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Granite
- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Andesite

- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Microgranite, Feldspar-phyric
- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Spessartite
- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Microgranodiorite
- Water Of Dye Granite (mount Battock Pluton) - Granite
- Main Porphyritic Granite (mount Battock Pluton) - Granite, Porphyritic

Linear Geology

- Fault, Inferred, Displacement Unknown
- Glacial Meltwater Channel
- Margin of Contact Metamorphic Aureole, Symbol towards Intrusion



- Legend**
- S.37 Overhead Line (OHL) Works**
- Proposed OHL Alignment
 - Proposed CSE Hardstand
- Ancillary Development**
- Proposed Permanent Bridge or Culvert
 - Proposed Permanent Track
 - Proposed Temporary Trackway Panel
 - Proposed Temporary New Stone Track
 - Existing Forest Tracks to be Upgraded
 - Existing Field Tracks to be Upgraded
 - Proposed ATV Route
 - Existing Forest Track
 - Existing Field Track
- Limit of Deviation**
- Proposed OHL and Access Track Limit of Deviation (LoD)
- Permitted Development**
- Proposed 123kV Underground Cable (UGC) Alignment
- Consented Development**
- Glendye 123kV Substation
 - Glendye Wind Farm Turbine Location
 - Glendye Wind Farm Access Track
- Existing Development**
- Fetteresso Substation
- Geomorphology**
- Slope Top
 - Break in Slope
 - Slope Bottom
 - Mineral Soil Gully Erosion
 - Forest and Artificial Drainage
 - Peat Hags
 - Agricultural Land

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N

0 1 2 Km

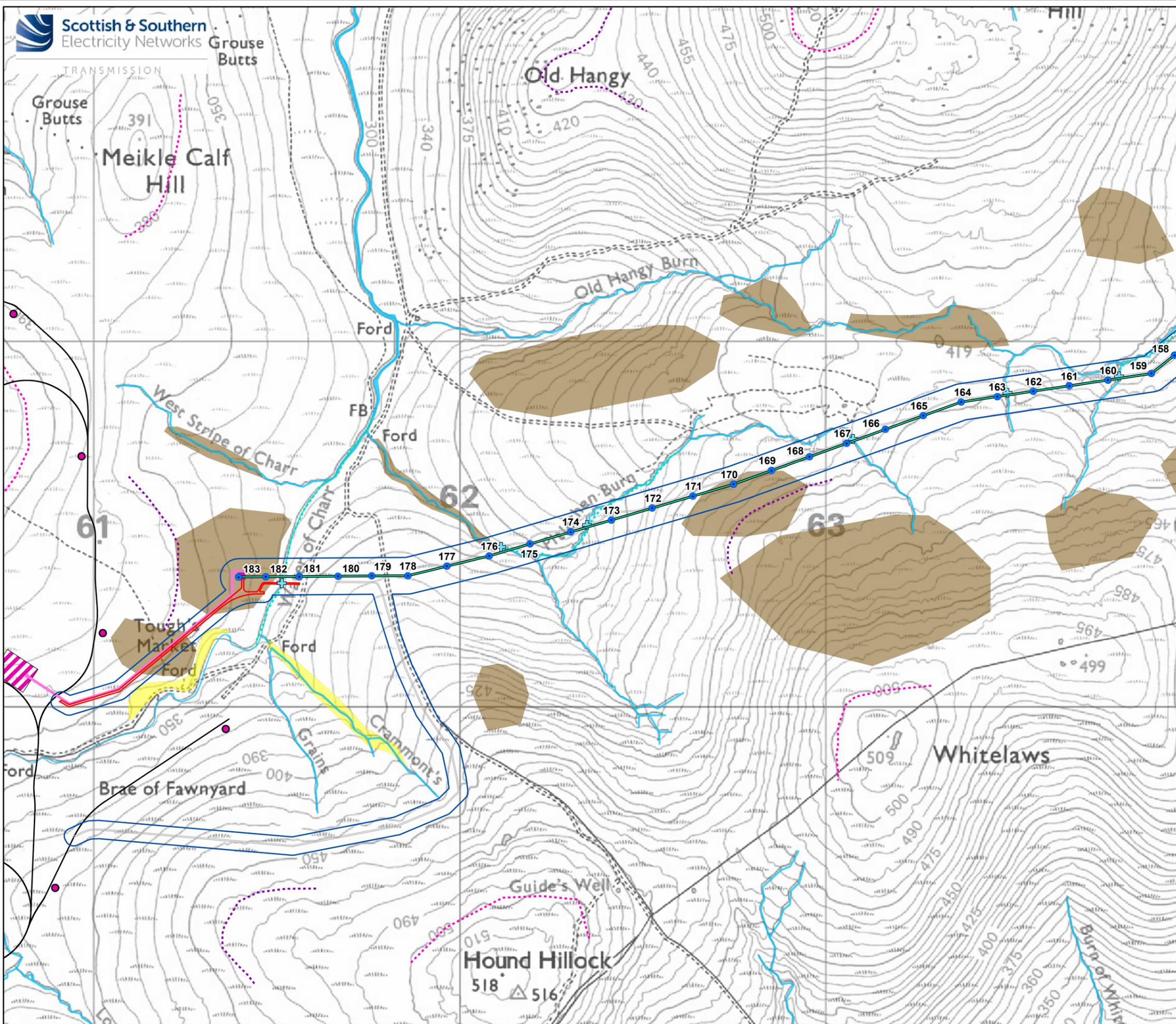
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Project: Glendye Wind Farm Grid Connection PLHRA

Title: Figure 10.1.5.1 - Geomorphology Overview

Drawn by: MM Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed OHL Alignment
- Proposed CSE Hardstand

Ancillary Development

- + Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary New Stone Track

Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

Permitted Development

- - - Proposed 123kV Underground Cable (UGC) Alignment

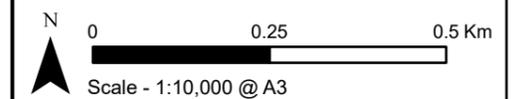
Consented Development

- Glendye 123kV Substation
- Glendye Wind Farm Turbine Location
- Glendye Wind Farm Access Track

Geomorphology

- - - Slope Top
- - - Break in Slope
- - - Slope Bottom
- Mineral Soil Gully Erosion
- Peat Hags
- Waterbody (OS OpenMap Local)
- Watercourse (OS OpenMap Local)

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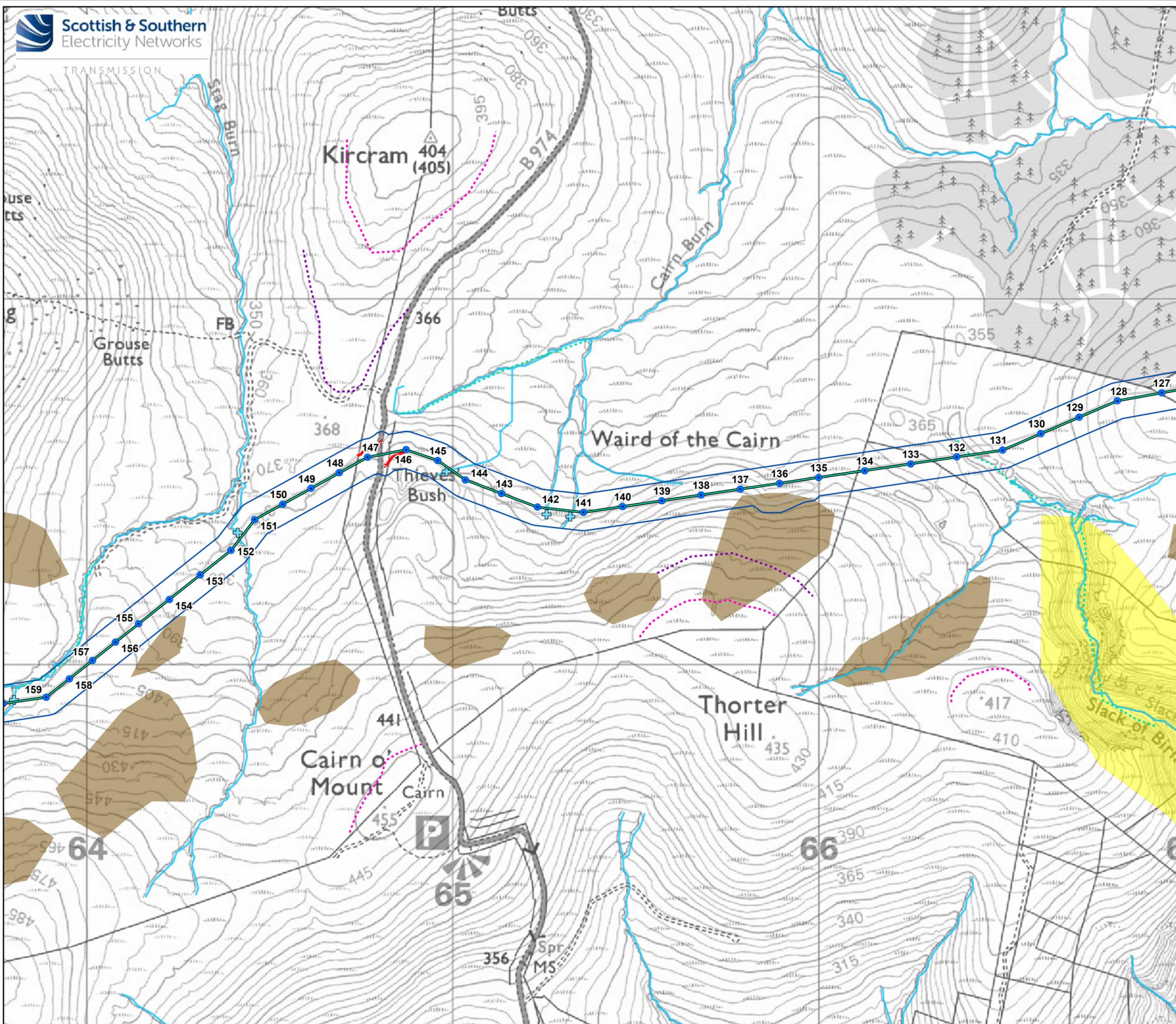


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PLHRA

Title: Figure 10.1.5.2 - Geomorphology
Map 2

Drawn by: MM Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed OHL Alignment

Ancillary Development

- + Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary New Stone Track

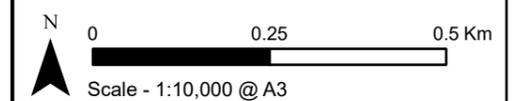
Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

Geomorphology

- ⋯ Slope Top
- ⋯ Break in Slope
- ⋯ Slope Bottom
- Mineral Soil Gully Erosion
- Peat Hags
- Watercourse (OS OpenMap Local)

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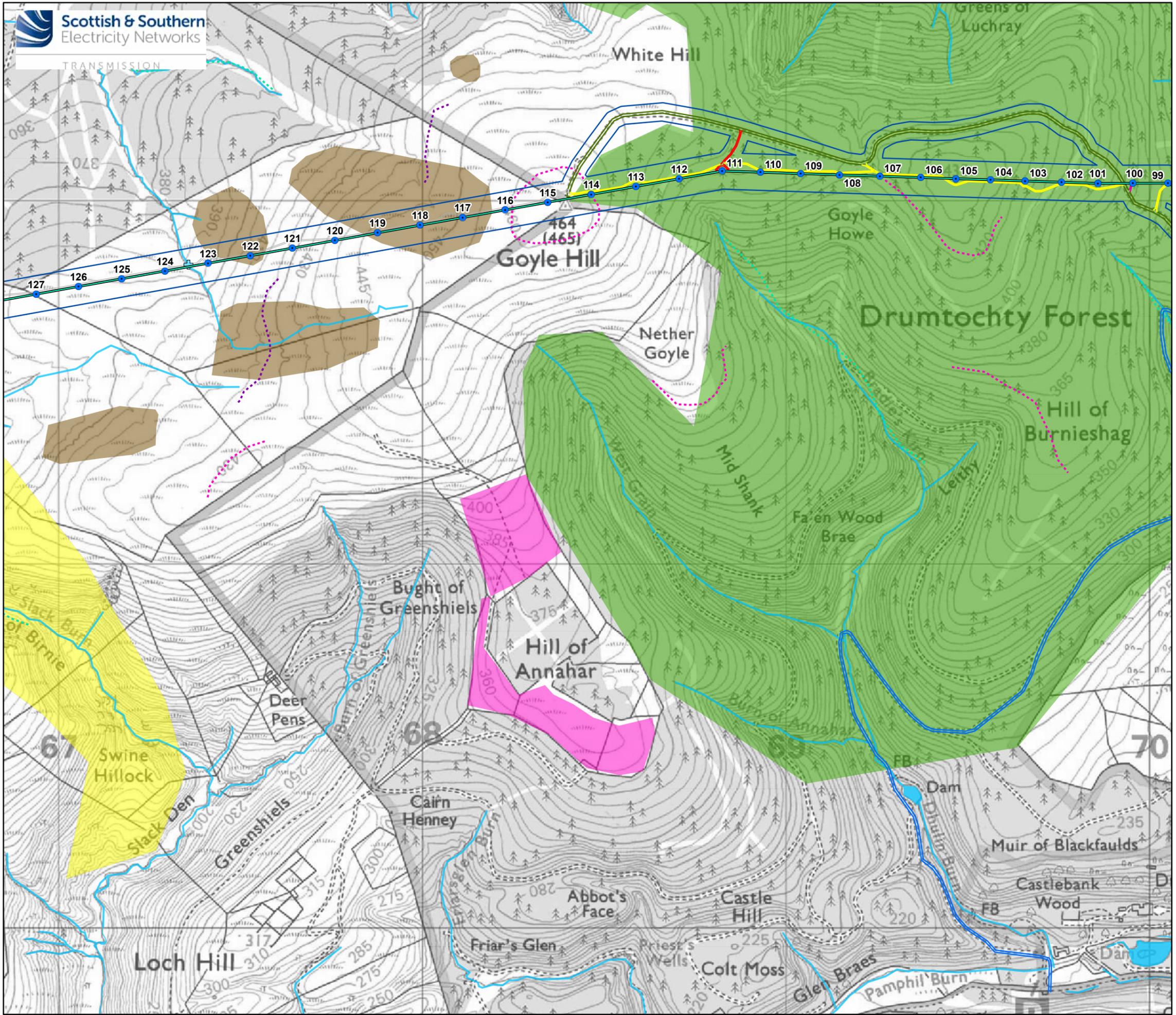


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PLHRA

Title: Figure 10.1.5.3 - Geomorphology
Map 3

Drawn by: MM Date: 25/06/2025



- Legend**
- S.37 Overhead Line (OHL) Works**
- Proposed Pole Location
 - Proposed OHL Alignment
- Ancillary Development**
- Proposed Permanent Bridge or Culvert
 - Proposed Permanent Track
 - Proposed Temporary Trackway Panel
 - Proposed Temporary New Stone Track
 - Existing Forest Tracks to be Upgraded
 - Proposed ATV Route
 - Existing Forest Track
- Limit of Deviation**
- Proposed OHL and Access Track Limit of Deviation (LoD)
- Geomorphology**
- Slope Top
 - Break in Slope
 - Slope Bottom
 - Mineral Soil Gully Erosion
 - Forest and Artificial Drainage
 - Peat Hags
 - Agricultural Land
 - Waterbody (OS OpenMap Local)
 - Watercourse (OS OpenMap Local)

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N

0 0.25 0.5 Km

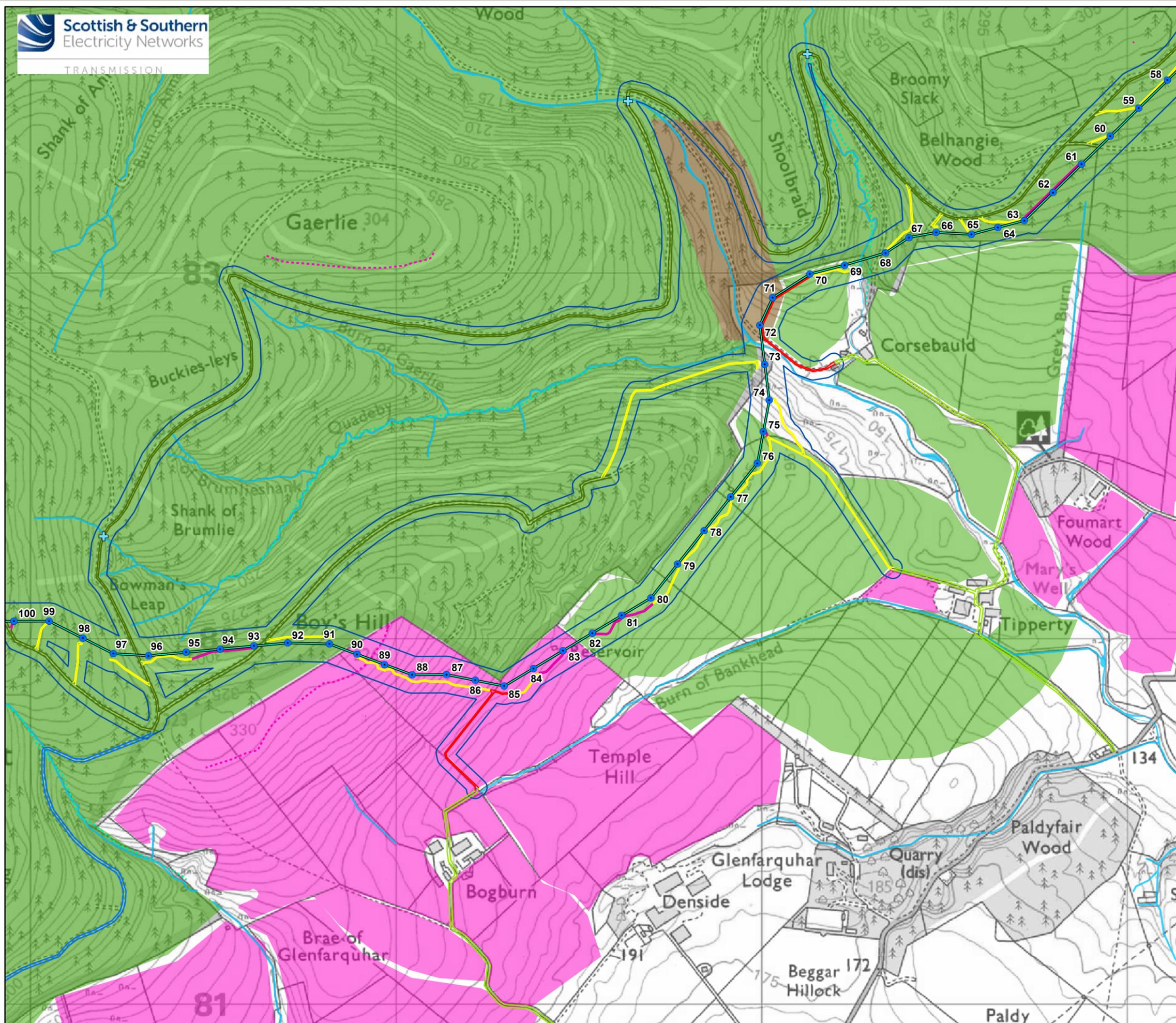
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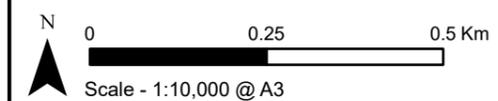
Title: Figure 10.1.5.4 - Geomorphology
Map 4

Drawn by: MM Date: 25/06/2025



- Legend**
- S.37 Overhead Line (OHL) Works**
- Proposed Pole Location
 - Proposed OHL Alignment
- Ancillary Development**
- Proposed Permanent Bridge or Culvert
 - Proposed Permanent Track
 - Proposed Temporary Trackway Panel
 - Existing Forest Tracks to be Upgraded
 - Proposed ATV Route
 - Existing Forest Track
 - Existing Field Track
- Limit of Deviation**
- Proposed OHL and Access Track Limit of Deviation (LoD)
- Geomorphology**
- Slope Top
 - Slope Bottom
 - Forest and Artificial Drainage
 - Peat Hags
 - Agricultural Land
 - Waterbody (OS OpenMap Local)
 - Watercourse (OS OpenMap Local)

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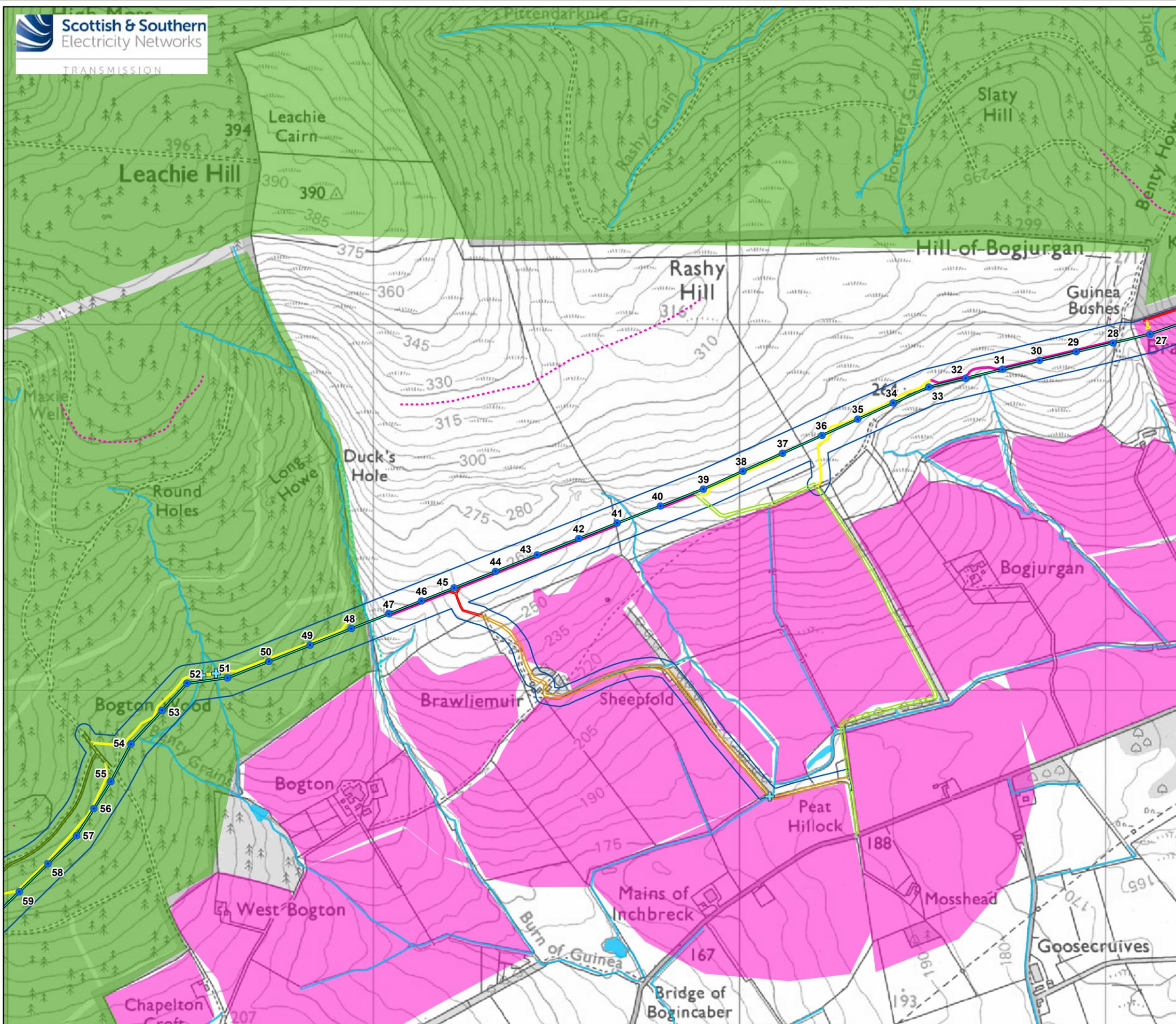


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 PLHRA

Title: Figure 10.1.5.5 - Geomorphology
 Map 5

Drawn by: MM Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed OHL Alignment

Ancillary Development

- + Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary Trackway Panel
- Existing Forest Tracks to be Upgraded
- Existing Field Tracks to be Upgraded
- Proposed ATV Route
- Existing Field Track

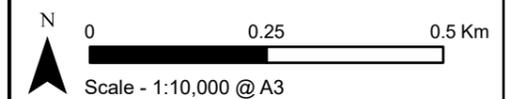
Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

Geomorphology

- ⋯ Slope Top
- ⋯ Slope Bottom
- Forest and Artificial Drainage
- Agricultural Land
- Waterbody (OS OpenMap Local)
- Watercourse (OS OpenMap Local)

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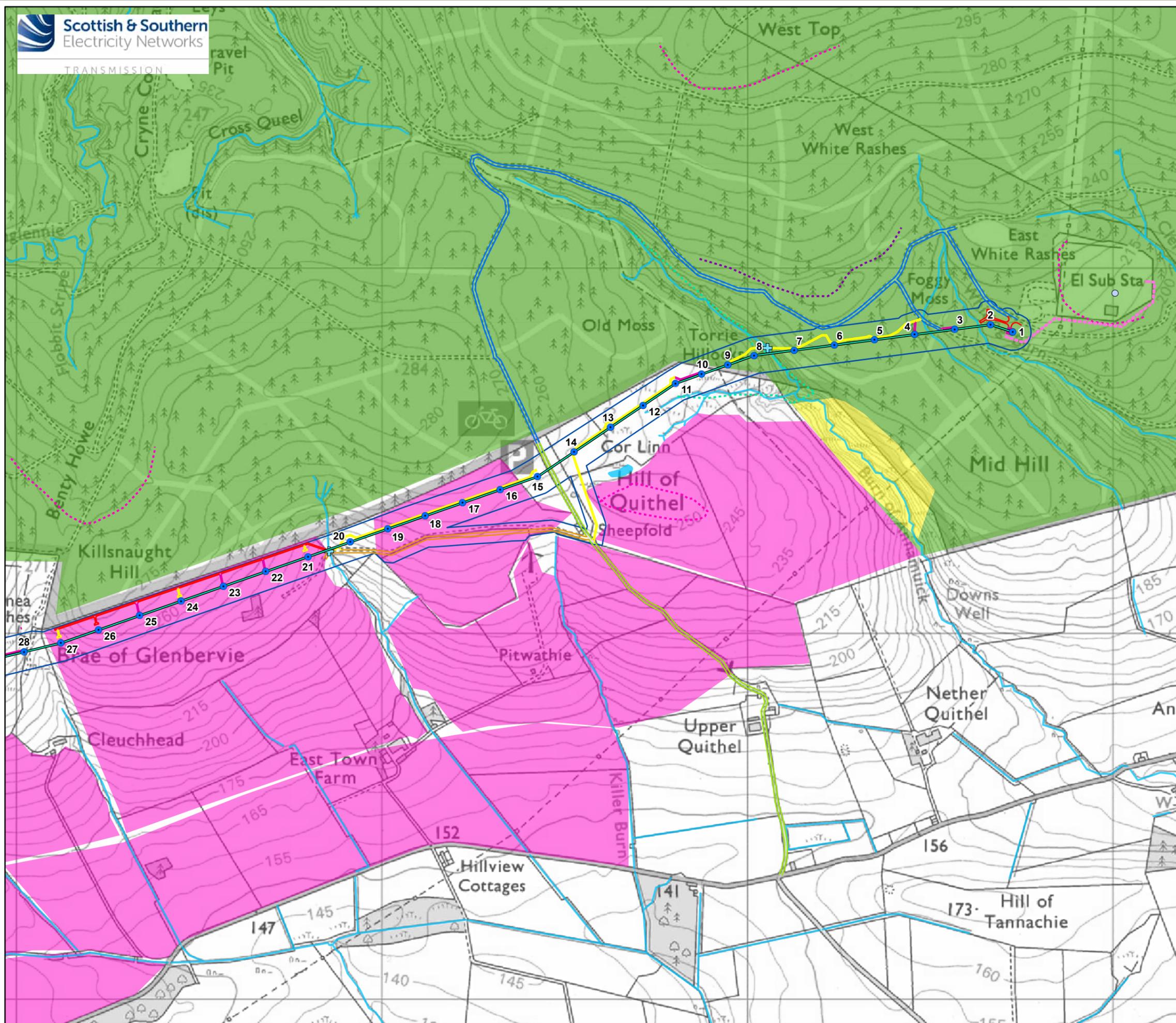


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Project: Glendye Wind Farm Grid Connection PLHRA

Title: Figure 10.1.5.6 - Geomorphology Map 6

Drawn by: MM Date: 25/06/2025



- Legend**
- S.37 Overhead Line (OHL) Works**
- Proposed Pole Location
 - Proposed OHL Alignment
 - Proposed CSE Hardstand
- Ancillary Development**
- + Proposed Permanent Bridge or Culvert
 - Proposed Permanent Track
 - Proposed Temporary Trackway Panel
 - Existing Field Tracks to be Upgraded
 - Proposed ATV Route
 - Existing Forest Track
 - Existing Field Track
- Limit of Deviation**
- Proposed OHL and Access Track Limit of Deviation (LoD)
- Permitted Development**
- - - Proposed 123kV Underground Cable (UGC) Alignment
- Existing Development**
- Fetteresso Substation
- Geomorphology**
- - - Slope Top
 - - - Break in Slope
 - - - Slope Bottom
 - Mineral Soil Gully Erosion
 - Forest and Artificial Drainage
 - Peat Hags
 - Agricultural Land
 - Waterbody (OS OpenMap Local)
 - Watercourse (OS OpenMap Local)

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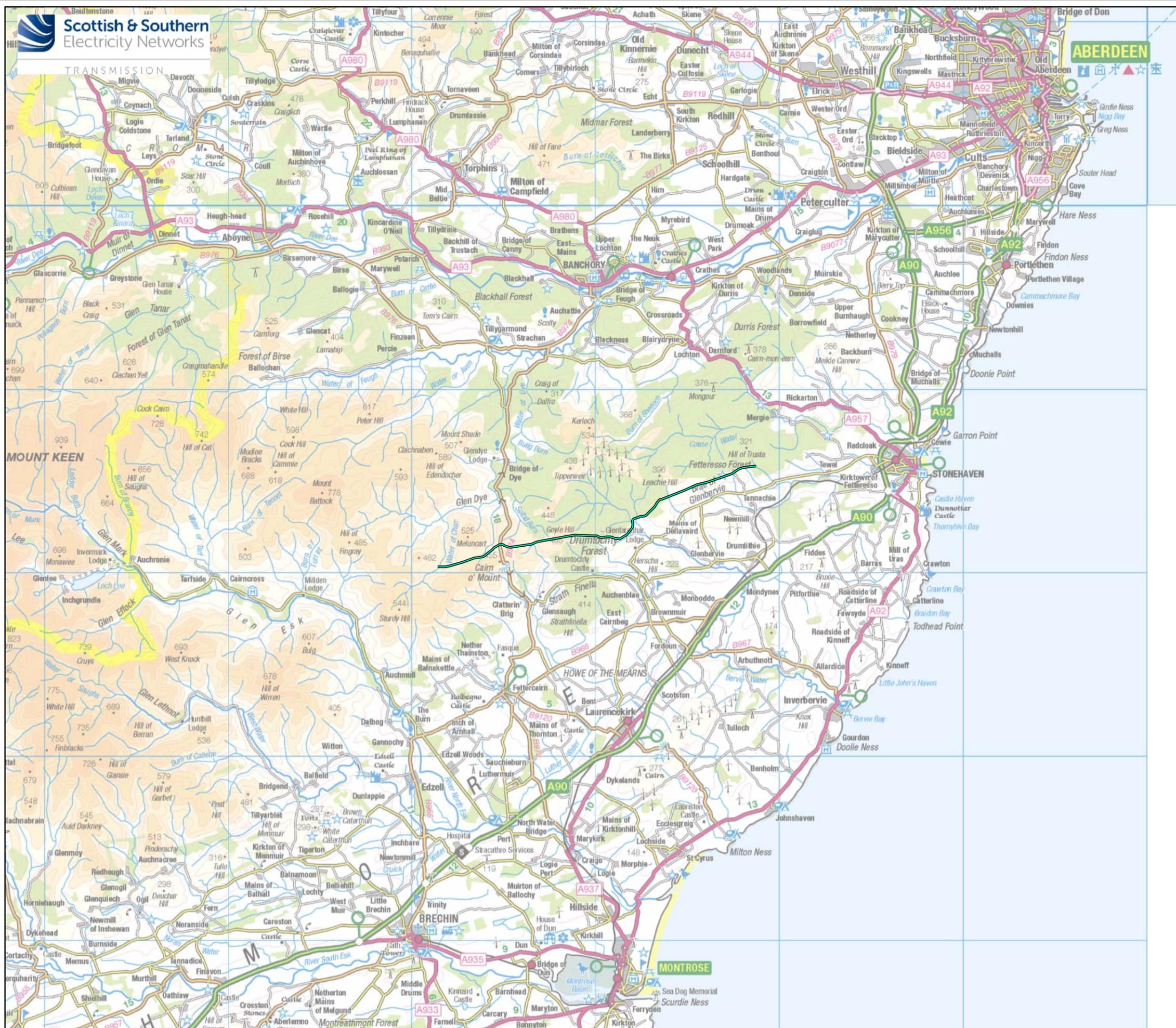


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Project: Glendye Wind Farm Grid Connection PLHRA

Title: Figure 10.1.5.7 - Geomorphology Map 7

Drawn by: MM Date: 25/06/2025

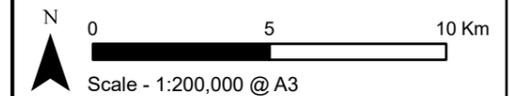


Legend

S.37 Overhead Line (OHL) Works

— Proposed OHL Alignment

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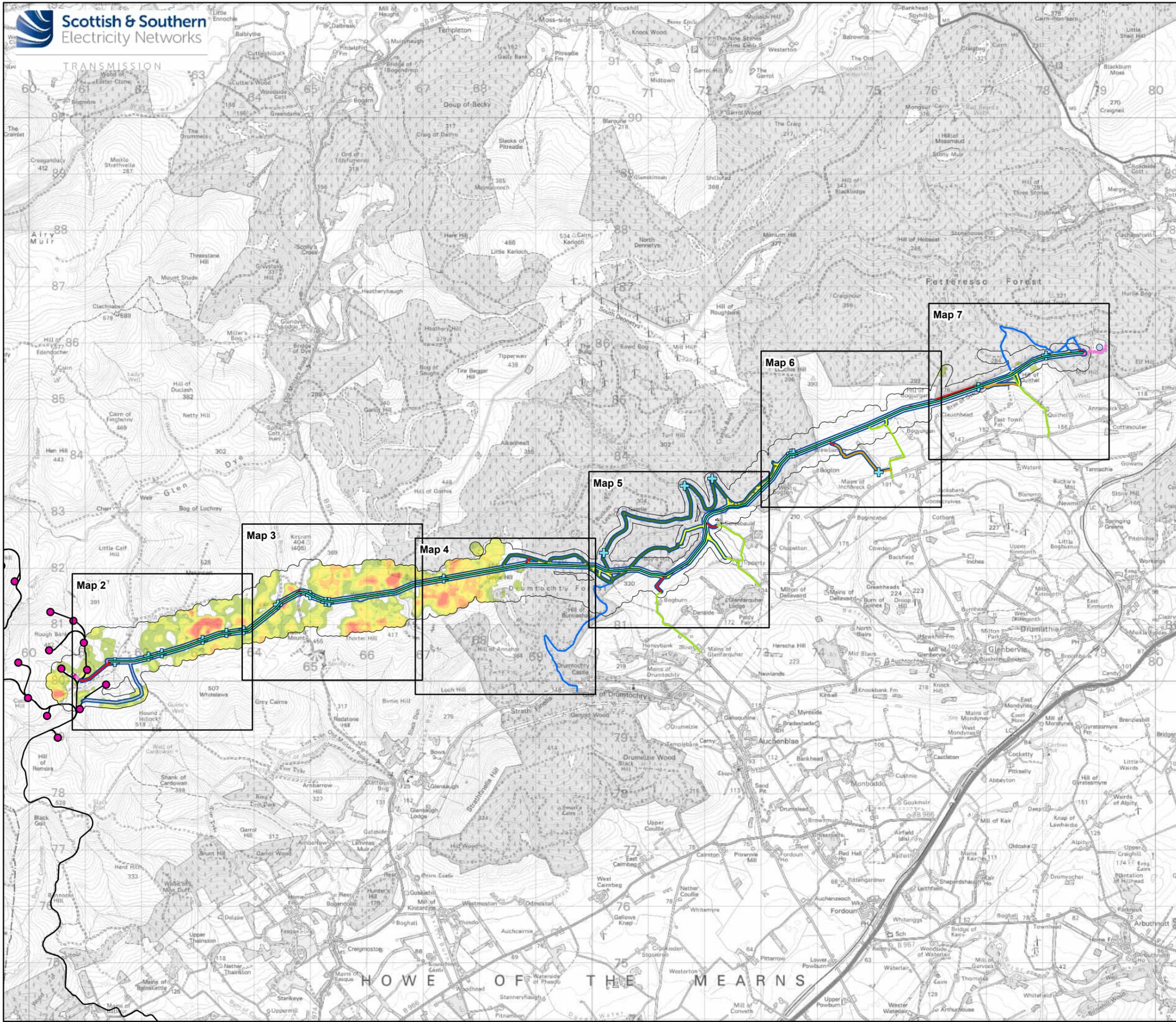
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Title: Figure 10.1.6 Site Location

Drawn by: MM

Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

- Proposed OHL Alignment
- Proposed CSE Hardstand

Ancillary Development

- Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary Trackway Panel
- Proposed Temporary New Stone Track
- Existing Forest Tracks to be Upgraded
- Existing Field Tracks to be Upgraded
- Proposed ATV Route
- Existing Forest Track
- Existing Field Track

Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

Permitted Development

- Proposed 123kV Underground Cable (UGC) Alignment

Consented Development

- Glendye 123kV Substation
- Glendye Wind Farm Turbine Location
- Glendye Wind Farm Access Track

Existing Development

- Fetteresso Substation

Peat Depth (m)

- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

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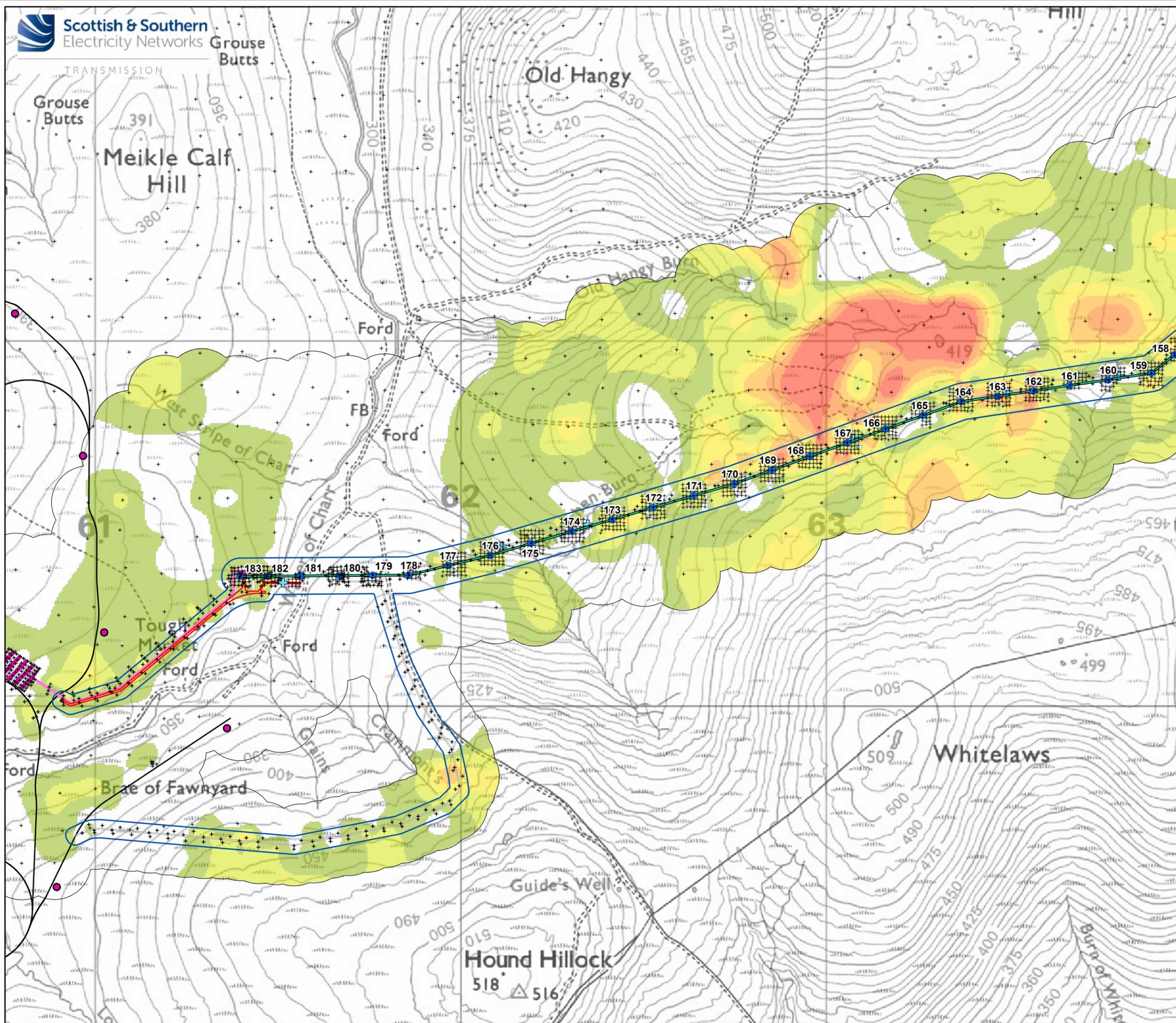
N 0 1 2 Km
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Project: Glendye Wind Farm Grid Connection PLHRA

Title: Figure 10.1.7.1 - Peat Depth over 0.5m Overview

Drawn by: MM Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed OHL Alignment
- Proposed CSE Hardstand

Ancillary Development

- + Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary New Stone Track

Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

Permitted Development

- - - Proposed 123kV Underground Cable (UGC) Alignment

Consented Development

- Glendye 123kV Substation
- Glendye Wind Farm Turbine Location
- Glendye Wind Farm Access Track

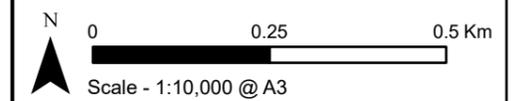
Peat Data

- + Peat Probe Location

Peat Depth (m)

- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

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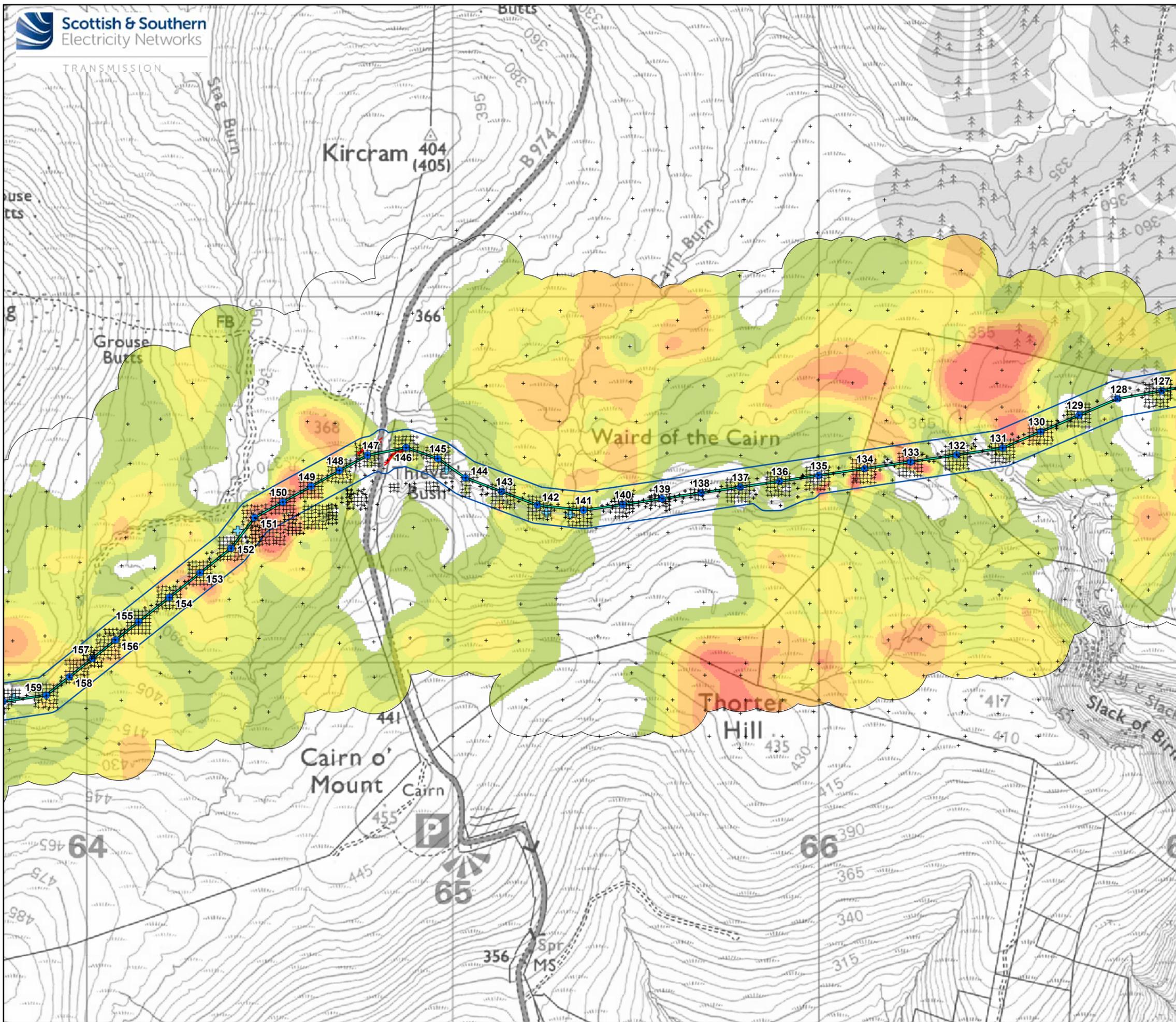


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Title: Figure 10.1.7.2 - Peat Depth over 0.5m
Map 2

Drawn by: MM Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed OHL Alignment

Ancillary Development

- Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary New Stone Track

Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

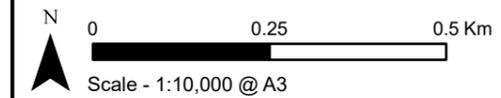
Peat Data

- Peat Probe Location

Peat Depth (m)

- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

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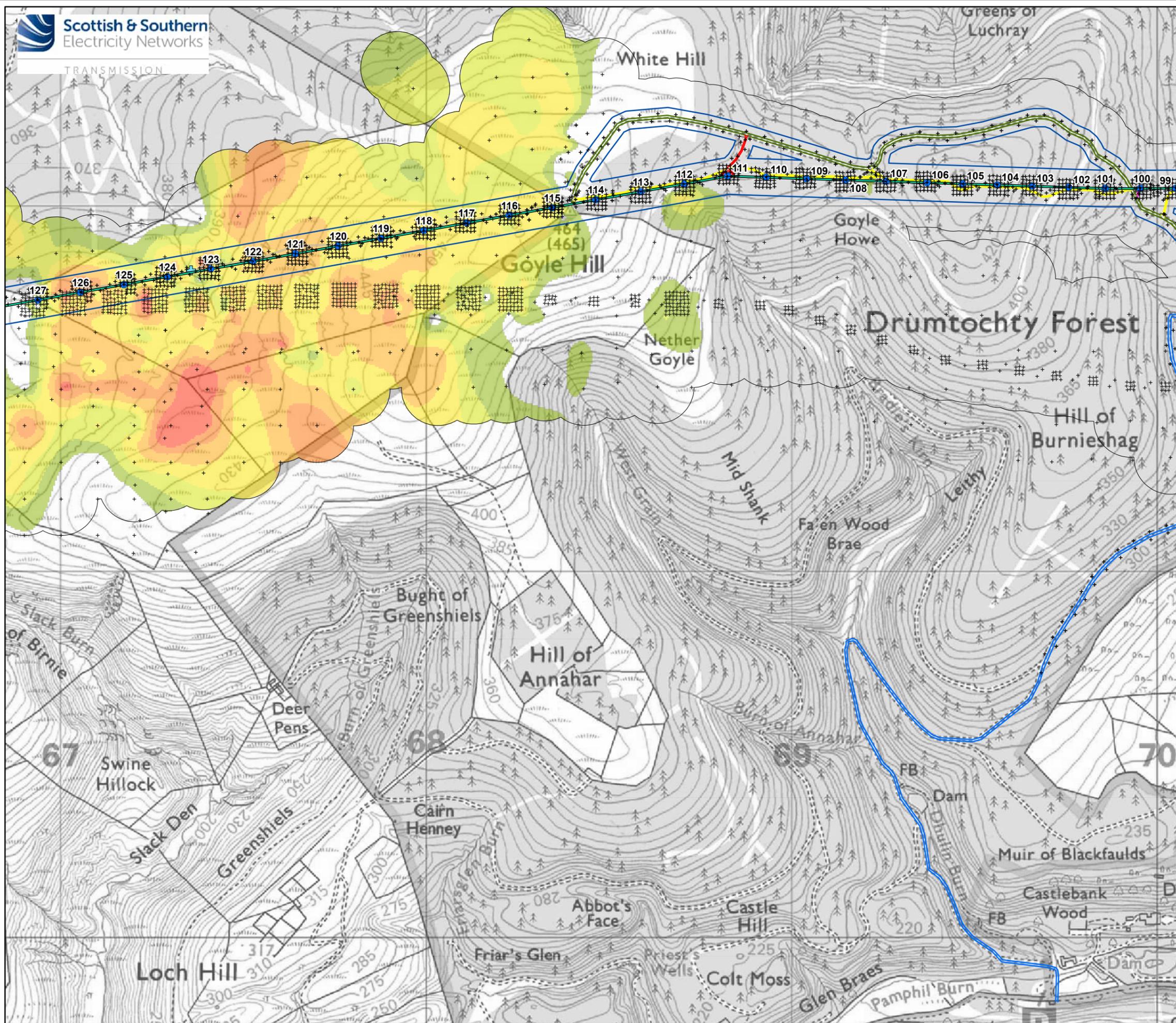


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Title: Figure 10.1.7.3 - Peat Depth over 0.5m
Map 3

Drawn by: MM Date: 25/06/2025



- Legend**
- S.37 Overhead Line (OHL) Works**
- Proposed Pole Location
 - Proposed OHL Alignment
- Ancillary Development**
- + Proposed Permanent Bridge or Culvert
 - Proposed Permanent Track
 - Proposed Temporary Trackway Panel
 - Proposed Temporary New Stone Track
 - Existing Forest Tracks to be Upgraded
 - Proposed ATV Route
 - Existing Forest Track
- Limit of Deviation**
- Proposed OHL and Access Track Limit of Deviation (LoD)
- Peat Data**
- + Peat Probe Location
- Peat Depth (m)**
- 0.5 - 1
 - 1 - 1.5
 - 1.5 - 2
 - 2 - 2.5
 - 2.5 - 3
 - > 3

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N

0 0.25 0.5 Km

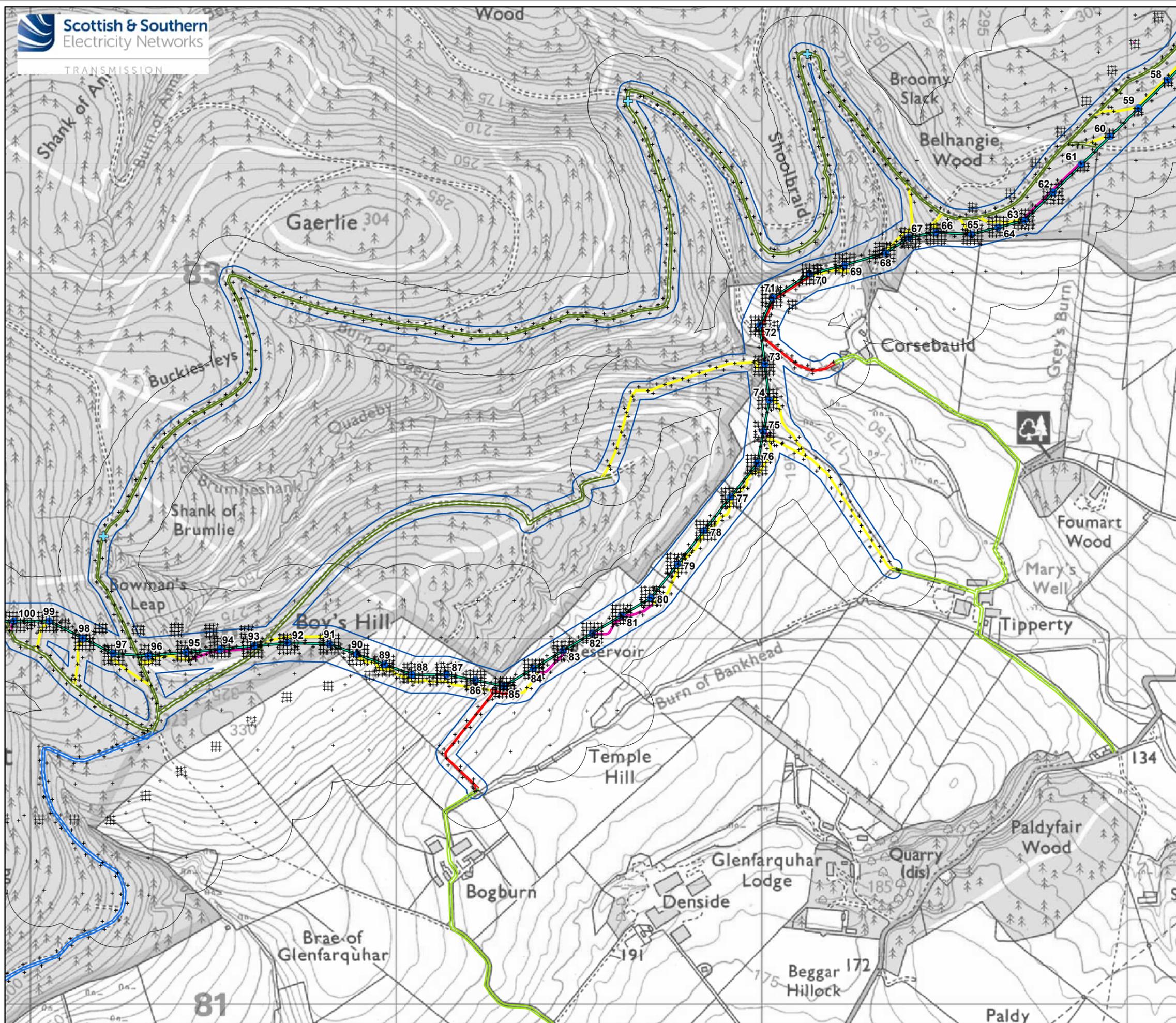
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Title: Figure 10.1.7.4 - Peat Depth over 0.5m Map 4

Drawn by: MM Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed OHL Alignment

Ancillary Development

- + Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary Trackway Panel
- Existing Forest Tracks to be Upgraded
- Proposed ATV Route
- Existing Forest Track
- Existing Field Track

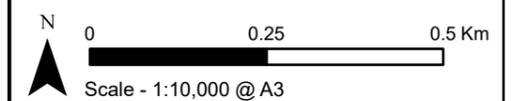
Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

Peat Data

- + Peat Probe Location

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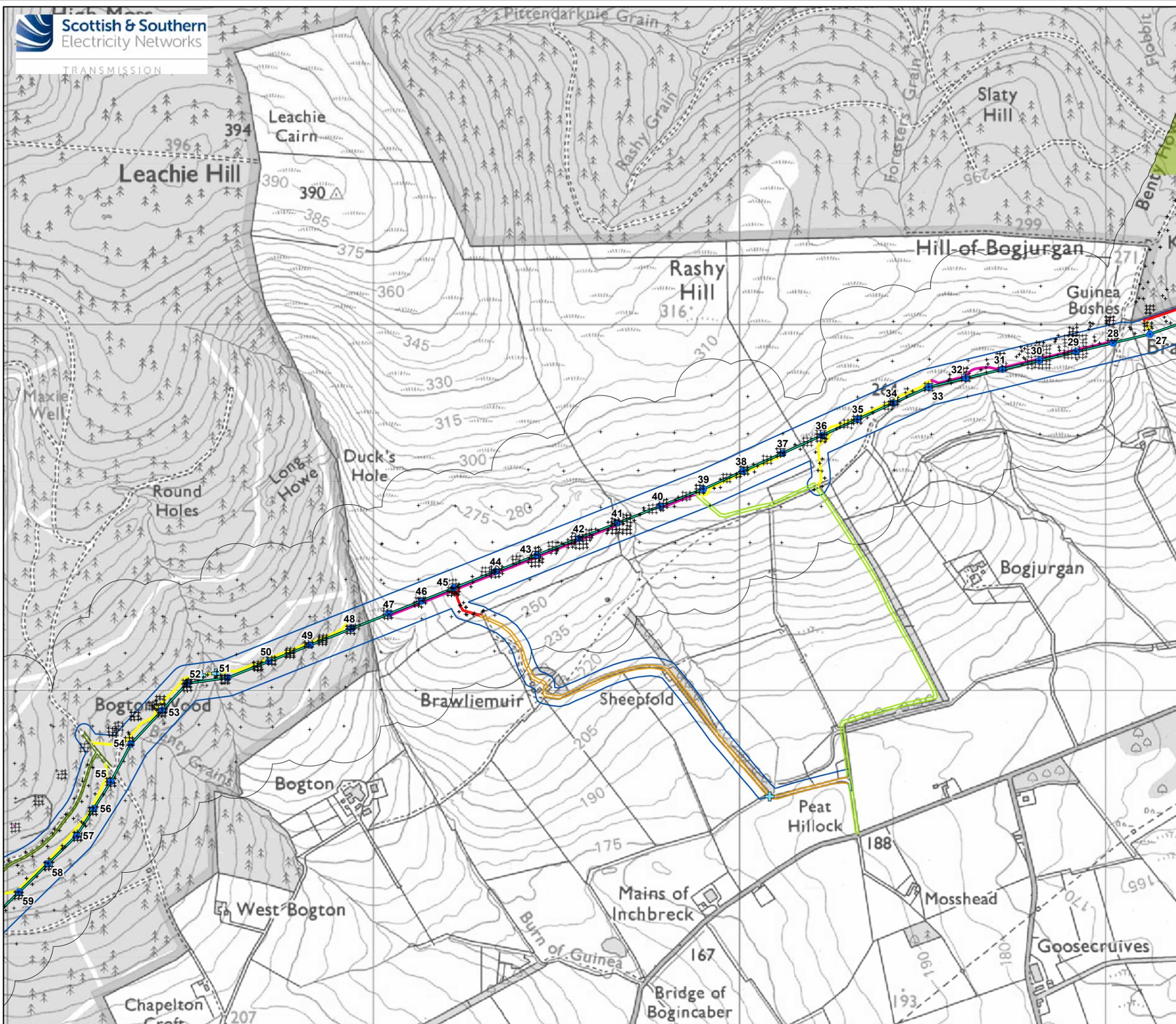


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Title: Figure 10.1.7.5 - Peat Depth over 0.5m Map 5

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Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed OHL Alignment

Ancillary Development

- + Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary Trackway Panel
- Existing Forest Tracks to be Upgraded
- Existing Field Tracks to be Upgraded
- Proposed ATV Route
- Existing Field Track

Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

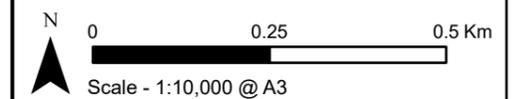
Peat Data

- + Peat Probe Location

Peat Depth (m)

- 0.5 - 1

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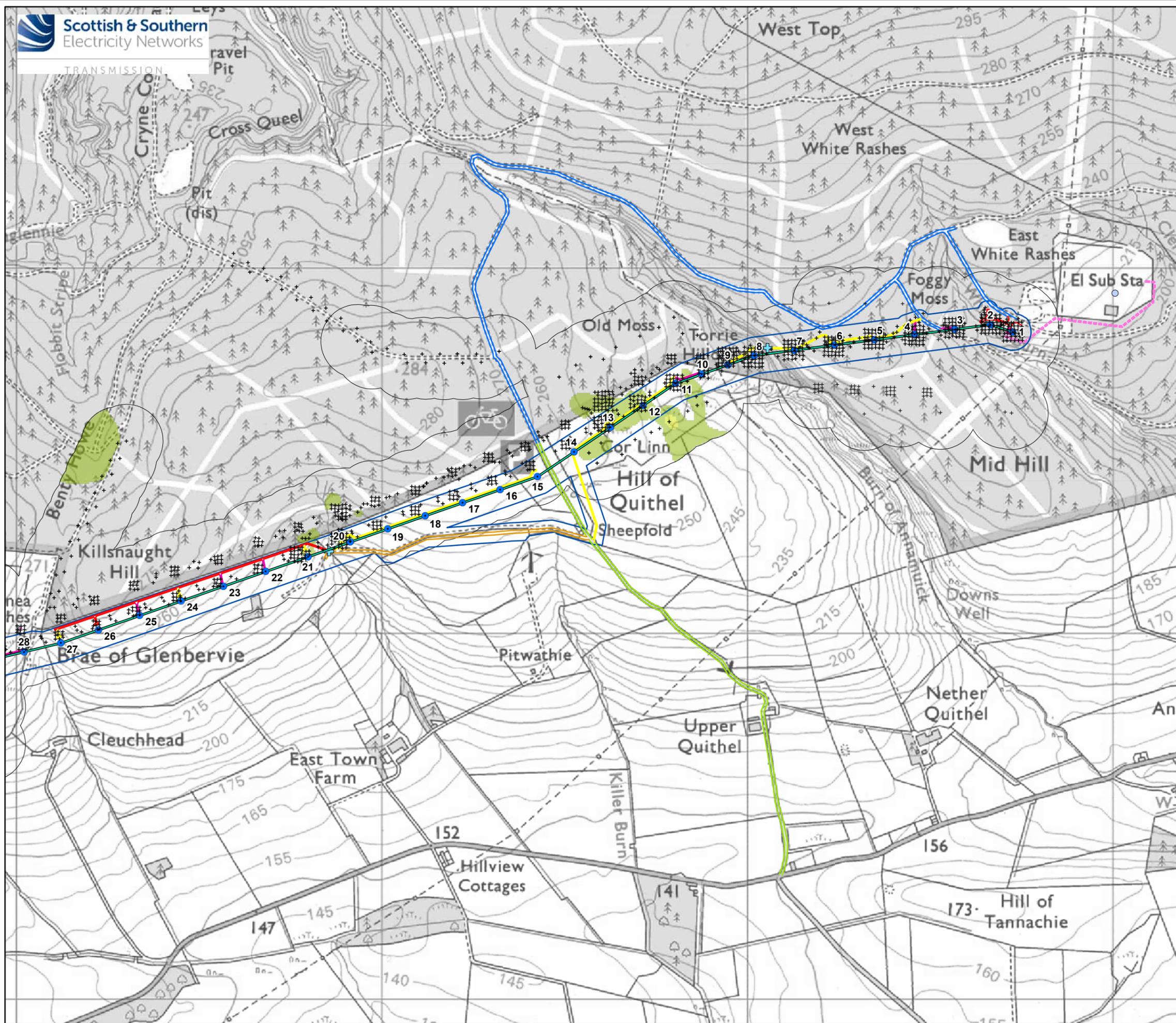


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Title: Figure 10.1.7.6 - Peat Depth over 0.5m Map 6

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Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed OHL Alignment
- Proposed CSE Hardstand

Ancillary Development

- + Proposed Permanent Bridge or Culvert
- Proposed Permanent Track
- Proposed Temporary Trackway Panel
- Existing Field Tracks to be Upgraded
- Proposed ATV Route
- Existing Forest Track
- Existing Field Track

Limit of Deviation

- Proposed OHL and Access Track Limit of Deviation (LoD)

Permitted Development

- Proposed 123kV Underground Cable (UGC) Alignment

Existing Development

- Fetteresso Substation

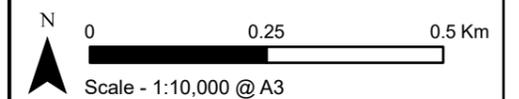
Peat Data

- + Peat Probe Location

Peat Depth (m)

- 0.5 - 1
- 1 - 1.5

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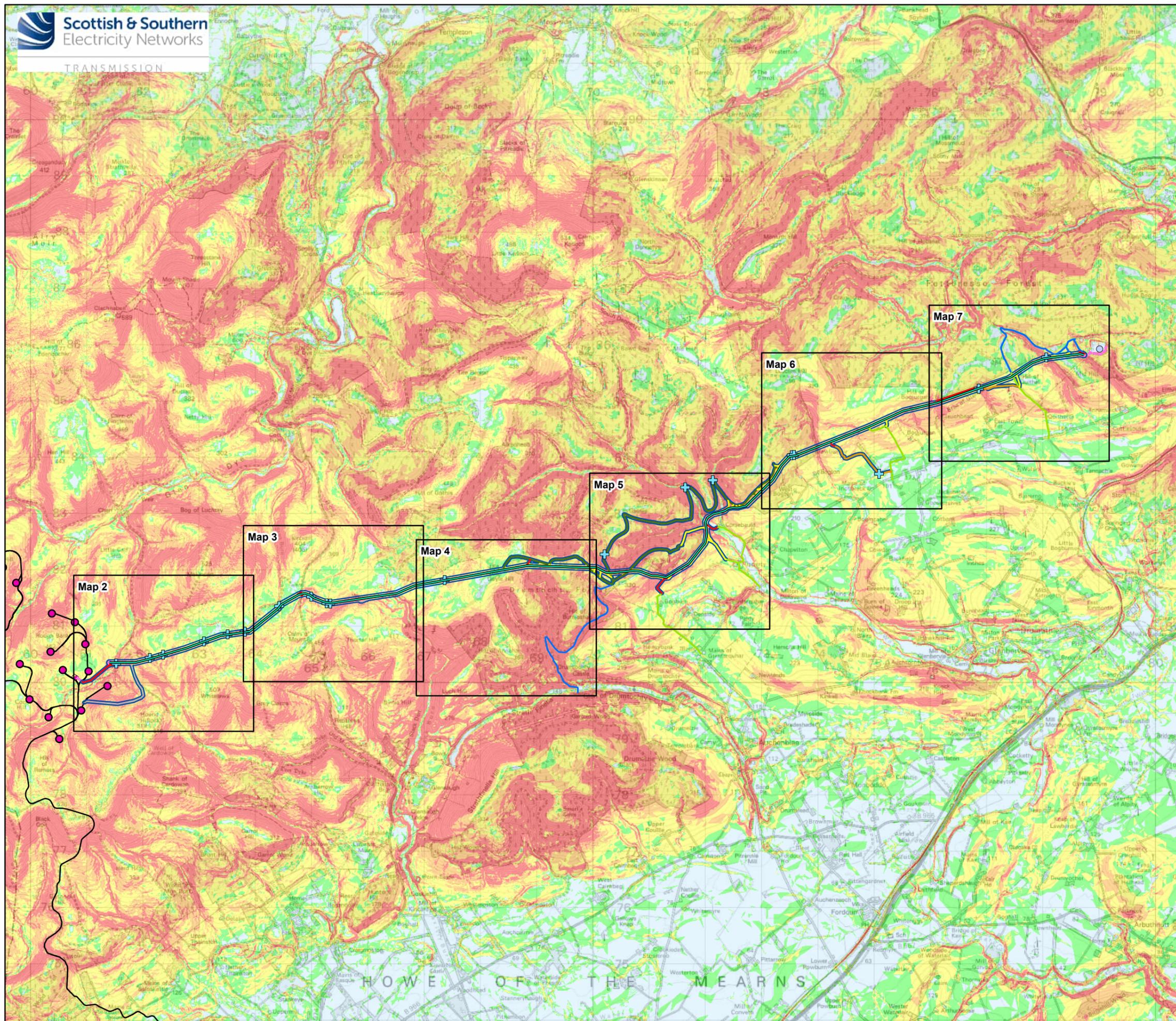


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Title: Figure 10.1.7.7 - Peat Depth over 0.5m Map 7

Drawn by: MM Date: 25/06/2025



Legend

S.37 Overhead Line (OHL) Works

— Proposed OHL Alignment

■ Proposed CSE Hardstand

Ancillary Development

+ Proposed Permanent Bridge or Culvert

— Proposed Permanent Track

— Proposed Temporary Trackway Panel

— Proposed Temporary New Stone Track

— Existing Forest Tracks to be Upgraded

— Existing Field Tracks to be Upgraded

— Proposed ATV Route

— Existing Forest Track

— Existing Field Track

Limit of Deviation

□ Proposed OHL and Access Track Limit of Deviation (LoD)

Permitted Development

⋯ Proposed 123kV Underground Cable (UGC) Alignment

Consented Development

▨ Glendye 123kV Substation

● Glendye Wind Farm Turbine Location

— Glendye Wind Farm Access Track

Existing Development

○ Fetteresso Substation

Slope (Degrees)

0 - 2

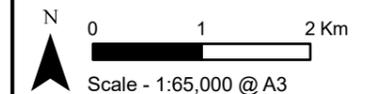
2 - 4

4 - 8

8 - 12

>12

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Title: Figure 10.1.7.1 - Slope
Overview

Drawn by: MM

Date: 25/06/2025