Achany Wind Farm Extension Grid Connection

Appendix 7.1: Peat Landslide Hazard and Risk Assessment

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 ASH design+assessment on behalf of Scottish and Southern Electricity Networks (SSEN) Transmission to undertake a Peat Landslide Hazard and Risk Assessment (PLHRA) for the proposed Achany Wind Farm Extension Grid Connection (the “Proposed Development”).

The Proposed Development is situated in a predominantly rural setting, approximately 2.3 km north of Invershin and 300 m west of Inveran, see **Figure 7.1.1**. The Proposed Development comprises approximately 16 km of overhead line (OHL) and 1.2 km of underground cable (UGC), from its northern extent located at the Achany Wind Farm Extension on-site substation at National Grid Reference (NGR) NC 46355 08761 to the existing Shin Power Station located at approximately NGR NH 57220 97484.

The methods adopted for the assessment follow the best practice guidance[1] issued by the Scottish Government for investigation, assessment and reporting for windfarms 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. 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) and wind farm construction good practice guidance.

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 Fellow of the Chartered Institution of Water and Environmental Management (CIWEM) and Chartered Water and Environment Manager, with more than 30 years’ consultancy experience and specialising in the assessment of soils, geology and water for renewable power and infrastructure projects in Scotland.

1.2 Proposed Development

It is anticipated that the Proposed Development would comprise approximately 16 km of OHL supported by trident H-wood pole, shown on **Figure 7.1.2**. There would be a requirement to install a short section of underground cable (UGC), of approximately 1.2 km into to the consented Achany Wind Farm Extension on-site substation. This is due to the proximity of the proposed Achany Wind Farm Extension wind turbines and the engineering requirement to maintain a minimum separation from OHL infrastructure within their vicinity.

Full details of the Proposed Development are provided in the **Environmental Appraisal (EA), Chapter 3: The Proposed Development.**

1.3 Scope and Objectives

The purpose of this report is to identify those parts of the Proposed Development that are naturally susceptible to a higher risk of instability so that they can be avoided or accommodated. It should be noted that all peat slopes have a risk of instability, and the vast majority of peat slope failures occur naturally.

1 Energy Consents Unit Scottish Government, Second Edition (April 2017) Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments, available at [https://www.gov.scot/publications/peat-landslide-hazard-risk-assessments-best-practice-guide-proposed-electricity/documents/]

The peat stability assessment is primarily concerned with the influence of the peat on the development of 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.

It is important to note that peat instability and the impacts of any instability are not constrained by artificial site or ownership boundaries but by topographic and geomorphologic boundaries. It is therefore important to ensure that the breadth of scope of any assessment adequately covers the areal extent of possible impact.

The peat depth interpolation and peat slide risk calculation areas extend out to a maximum extent defined as 100 m from each peat depth survey point, with consideration of wider assessment areas not defined by distance but by review of geomorphology with review of hydrological and topographic boundaries which are factors influencing the peat stability assessment.

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 and their impact on possible receptors.

The conceptual layout of the Proposed Development was considered alongside the findings from the peat probing, sampling and analysis by the design team to optimise the Proposed Development layout and associated access to avoid or mitigate areas of unacceptable peat slide risk. The layout presented in the drawings represents the final iteration of the scheme layout.

The system outlined above was developed in accordance with the guidelines on PLHRA by the Scottish Government[1] 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.

The objectives have been achieved by completion of the following scope of works:

- a desk-based review of available reports which include geological, hydrological and topographical information;
- peat depth surveys and peat augering;
- 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 at the Proposed Development; and
- provide recommendations for further work or specific construction methodologies to suit the ground conditions at the Proposed Development to mitigate any significant risk of potential peat instability.

Construction of the Proposed Development would only increase the risk of peat slope instability if good geotechnical construction practice is ignored, and it is a requirement of all power infrastructure developments to follow a very carefully worded and designed

Construction and Environmental Management Plan (CEMP) which incorporates the recommendations of the PLHRA.

Without the guidance contained in a CEMP, the following factors could increase the risk of instability:

- construction of access tracks;
- installation of UGC and OHL infrastructure;
- stockpiling of peat and loading of slopes; and
- blocking of natural drainage, inappropriate new drainage or drainage discharge.

2.0 Peat Instability

The importance of assessing the stability of peat deposits in relation to renewable energy and power infrastructure developments came to the fore because of peat failures during the construction of Derrybrien[2] Windfarm in Ireland in 2003. Although no fatalities were associated with these failures, there was a significant environmental impact. There is a potential for peat instability to occur, particularly where deposits are more than 1 m depth. Peat instability is influenced by many factors, including, but not limited to, peat depth, hill slope gradient, underlying geology and subsurface hydrology.

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

- significant peat depths over impermeable bedrock or minimal soil;
- the presence of slope gradients greater than 4º (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;
- forestry plantations and 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 years[3]. 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.

Lindsay[4] 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 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.

2 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

3 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.

4 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 bog[5], typically less than 0.5 m deep, 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. Catotelm is the lower, more typically decomposed and permanently saturated layer of 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 Grunland[6]. The humification value ranges from H1 (no decomposition) to H10 (completely decomposed). The extended system set out by Hobbs[7] 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.

2.2 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 vegetable 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 off set 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.

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

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

7 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.

2.3 Peat Stability

2.3.1 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 below:

- 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 Proposed Development and property down slope or downstream of the Proposed Development 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 nutrients 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 equilibrium and drainage of the slopes and the 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[8] 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 that operate at different scales and speed. Failure to understand this and to disrupt the transmission process for the groundwater could result in instability.
- Artificial Drainage – where artificial 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.

8 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.

2.3.2 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 power infrastructure, therefore it is important to identify such instability as part of the PLHRA.

2.3.3 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. A brief description is given below:

- 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[9];
- 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 stratum[9]; 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.

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 in excess of 1.5 m with no upper limit;
- shallow gradients, generally within the range of 2 to 10^{o}, peat thicker than 1.5 m is generally not observed on slopes steeper than 10^{o}, 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)[10];
- greater humification of the lower catotelm within the waterlogged ground; and
- lower surface tensile strength of the fibrous acrotelm 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 turbary (peat cutting), failure is made more likely.

Peat Slides

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

9 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.

10 Crisp, D.T., Dawes, M. & Welch, D. (1964), 'A Pennine Peat Slide', The Geographical Journal, Vol 130, No4, pp519-524.

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

- peat depth up to 2 m;
- slope gradients between 5^o and 15^o;
- 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.

Bog Slides

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

Natural Instability

The stability of a peat mass is maintained by a complex interrelationship of many factors, some of which may not be immediately obvious. 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 come a time, on sloping ground, where the forces causing instability, 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 rainfall 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 Study

3.1 Topography

Ground elevations across the Proposed Development range from approximately 400 m Above Ordnance Datum (AOD) within the northern extent, near Carn nam Bo Maola, to approximately 2 m AOD at the southern extent of the Proposed Development near the Kyle of Sutherland and River Shin confluence. The approximate ground levels of the connection point at Shin Power Station are 10 m AOD. Further detail is provided in Section 3.12.

3.2 Geology

3.2.1 Artificial Ground

Published BGS online data[11] indicates that made ground deposits are not present within the Proposed Development.

3.2.2 Superficial Geology

Based on the available BGS online data[11], the superficial geology mapping shows that the northern extent of the Proposed Development is generally underlain by glacial till deposits whilst the southern extent of the Proposed Development is generally underlain by glacial till and morainic deposits.

Areas of peat are mapped within the Proposed Development, particularly within the north-eastern extents near the slopes of Cnoc nan Imrichean and within the southern extents of the Proposed Development near Braemore Wood.

In the southern extents of the Proposed Development, near to Kyle of Sutherland, alluvium, river terrace and alluvial fan deposits are noted. Alluvial deposits are also recorded within the extents of the larger watercourses within the Proposed Development.

Figure 7.1.3 shows the superficial geology BGS mapping across the Proposed Development.

3.2.3 Bedrock Geology

Based on the available BGS online data[11], the majority of the Proposed Development is underlain by psammites of the Altnaharra Psammite Formation. A strip across the centre of the Proposed Development, near Doir' a Chatha, is shown to be underlain by the Lewisianoid Gneiss Complex comprising orthogneisses.

There are several amphibolite and phyllonite intrusions noted across the southern extents of the Proposed Development.

There are no inferred faults recorded within the Proposed Development.

Figure 7.1.4 shows the bedrock geology BGS mapping across the Proposed Development.

3.3 Peatland Classification

The Carbon and Peatland Map 2016[12] indicates that the majority of the northern extent of the Proposed Development is underlain by Class 2 peatland with areas of Class 1 peatland confined to the eastern edges of the Proposed Development. Class 1 and Class 2 peatlands

11 British Geological Survey, GeoIndex Onshore, available online at: https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.133433804.376188765.1646739904-1030004651.1646739904

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

are considered nationally important carbon-rich soils, deep peat and priority peatland which are considered to have high conservation value.

Much of the southern extent of the Proposed Development is located within Class 5 peatland (habitats which may contain carbon rich soils and deep peat but are not considered to be of high conservation value) with localised areas of Class 1, Class 2 and Class 3 peatland also recorded. The southern extent of the Proposed Development area around Linsidemore is shown to be underlain by mineral soils (Class 0) whereby peatland habitats are not typically found.

3.4 Ground Stability Hazards

The BGS GeoIndex[11] shows no ground stability hazards within the vicinity of the Proposed Development.

3.5 Mining and Mineral Sites

The Coal Authority Interactive Map viewer[13] indicates that the Proposed Development is not located within a Coal Mining Reporting area, Development High Risk area or Surface Coal Resource area.

There are no active BGS mineral sites within the area of the Proposed Development.

3.6 Hydrology

The Proposed Development is located entirely within the Kyle of Sutherland surface water catchment, in particularly the following three sub catchments:

- The northern extents of the Proposed Development is largely located within the surface water catchment of the River Cassley. The River Cassley flows in a generally north-west to south east direction from Fionn Loch Mor to the Dornoch Firth, approximately 1.8km west of the Proposed Development. A number of smaller watercourses drain into the River Cassley, notably the Allt Bad an t-Segairt and Allt an Rasail which cross the Proposed Development.
- The central part of the Proposed Development is located within the surface water management catchment of the Allt Mor. Allt Mor flows from Loch Doire a’ Chatha generally south-westerly towards its discharge into the Kyle of Sutherland.
- The south-eastern extent of the Proposed Development lies within the River Shin surface water catchment. A small area north of the Proposed Development, near to Loch Sgeireach, also falls into this catchment. The River Shin flows from Loch Shin to Dornoch Firth with many smaller burns draining towards it. The river is approximately 200 m east of the Proposed Development near to the existing tower at Shin Power Station.

3.7 Hydrogeology

Information from Scotland’s environment map[14] that the majority of the Proposed Development is underlain by impermeable Precambrian rocks which have been classified as a low productivity aquifer whereby small amounts of groundwater are expected in near surface weathered zones and secondary fractures. The alluvium, river terrace and alluvial fan

13 Coal Authority Viewer. Available at [https://mapapps2.bgs.ac.uk/coalauthority/home.html]

14 Scotland’s Environment Online Viewer. Available at [https://map.environment.gov.scot/sewebmap/]

deposits, near Kyle of Sutherland, are classified as a concealed aquifer whereby limited or local potential of groundwater may occur.

The majority of the Proposed Development is underlain by low productivity bedrock aquifers. These aquifers are defined as having limited groundwater potential. Any groundwater that is present would be confined to shallow depths and would flow exclusively through fractures.

The glacial superficial deposits are predominantly classified as unproductive aquifers whilst the alluvium and river terrace deposits in the south-west of the Proposed Development are classified as moderate to high productivity aquifers whereby significant yields of groundwater may be present in continuity with the Kyle of Sutherland.

The Aquifer Productivity and Groundwater Vulnerability datasets classifies the underlying aquifer (superficial and bedrock) according to the predominant groundwater flow mechanism (fracture or intergranular) and the estimated groundwater productivity. Groundwater vulnerability is divided into five classes (1 to 5) with 1 being least vulnerable and 5 being most vulnerable.

The Proposed Development is shown to be underlain by groundwater vulnerability Class 3 to 5. The highest vulnerability is noted within the northern parts of the Proposed Development near the elevated areas of Carn nam Bo Maota and Coire Buidhe and in some southern areas where superficial deposits are absent and thus there is little attenuation of potential pollutants prior to entry to groundwater.

3.8 Designated Sites

Review of NatureScot[15] confirms that there are four designated sites within the area of the Proposed Development, as shown on **Figure 7.1** contained within **Chapter 7**:

- Grudie Peatlands Site of Special Scientific Interest (SSSI) which also forms part of the larger Caithness and Sutherland Peatlands Special Protected Area (SPA), Special Area of Conservation (SAC) and RAMSAR site is located in the north-east of the Proposed Development. The site has been designated for several freshwater and upland habitats, including blanket bogs, otters and an assemblage of breeding birds. No development is proposed within the designated site or within the same surface water catchments as the designated site. The Proposed Development is not therefore considered to be hydraulically connected to the designated site and therefore the SSSI, SPA, SAC and RAMSAR site is not considered further in this assessment.
- The River Oykel SAC is located along the banks of the River Cassley, River Oykel and Kyle of Sutherland. The SAC is located south-west of the Proposed Development, approximately 425 m west of the proposed connection to the existing tower at Shin Power Station at its closest extent. The SAC has been designated for its Atlantic salmon and Kyle of Sutherland freshwater pearl mussel populations which are considered particularly sensitive to changes in water quality. Most of the Proposed Development drains to the SAC and therefore it is considered further within this assessment.

3.9 Groundwater Dependent Terrestrial Ecosystems (GWDTE)

A National Vegetation Classification (NVC) habitat mapping exercise was conducted as part of the ecology baseline assessment, and this has been used to identify potential areas of Groundwater Dependent Terrestrial Ecosystems (GWDTEs) within the Proposed

15 NatureScot Sitelink, available at https://sitelink.nature.scot/home

Development. The methodology and results of the NVC habitat mapping exercise are discussed in detail within **EA Chapter 7**.

There are no potential receptors relating to Groundwater Dependent Terrestrial Ecosystems (GWDTEs) across the Proposed Development.

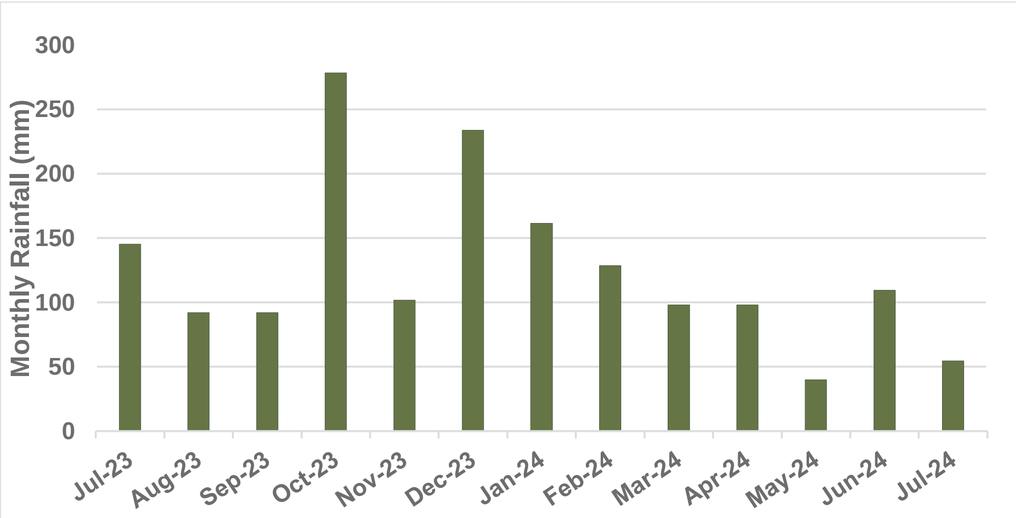
3.10 Private Water Supplies and Licenced Sites

A review of The Highland Council data and previous assessments within the area of the Proposed Development indicates that there are no private water supplies (PWS). However, one PWS was highlighted to be at risk out with the Proposed Development and safeguards are advised. Private Water Supplies are discussed in detail in the **EA Chapter 7** and recorded PWS and SEPA controlled activity regulation (CAR) registration are shown on **Figure 7.1**.

3.11 Rainfall

Periods of intense heavy rainfall are often seen as triggers for instability events. Rainfall data from the closest SEPA weather station[16] (Sgodachail approximately 9.5 km to the south-west of the Proposed Development) shows the monthly rainfall in the region from July 2023 until July 2024. The highest average monthly rainfall was 278 mm in October 2023.

Monthly Rainfall from Sgodachail Station



3.12 Geomorphology

Within the northern extents of the Proposed Development the topography typically slopes down to the south west and south with the Proposed Development typically located within the valley of the Coir’ an Rasail and the Allt an Rasail.

Further south from the Allt an Rasail towards the central extents of the Proposed Development there is gently sloping topography with occasional flatter topography on the higher elevation plateaus with typically steeper slopes which typically fall down to lower elevations around the Kyle of Sutherland and the River Shin typically located to the south of the Proposed Development.

With the exception of localised flatter topographic areas around the Allt Loch an Fheoir, Middle Hill and Middle Hill Wood the southern extents of the Proposed Development are typically

16 SEPA Rainfall Data. Available at [https://www2.sepa.org.uk/rainfall#464495]

located on steeper slopes which fall down towards the Kyle of Sutherland. **Figure 7.1.5** details the relevant geomorphology features identified across the Proposed Development.

Aerial photographs and historical mapping were used in conjunction with the DTM data to identify the major geomorphological features such as the breaks of slope and potential features indicative of mass movements. These were inspected where identified during site visits when more detailed assessment was undertaken. Interpretation of available aerial photographs and historical mapping was undertaken to assess and identify evidence of historic peat instability within the Proposed Development. The photographs and maps were examined using various techniques to highlight features of interest, such as:

- possible extension and / or compression features;
- areas of historic failure scars and debris;
- evidence of peat creep;
- areas with apparently poor drainage;
- areas with concentrations of surface drainage networks;
- steeply incised stream cuttings within peat deposits; and
- areas with peat drift recorded on steep slopes.

The main features are detailed in the following sections.

3.12.1 Peat Deposits

There are deep peat deposits situated within areas of the Proposed Development. However, these deposits are generally situated across flatter expanses and in the minor topographic lows. **Photo 1** shows typical ground conditions in areas of blanket bog.

There are areas of blanket bog situated north of Coire Bog, these blanket bogs are further described in the NVC survey detailed in **EA Chapter 5** with peat depths over 3 m recorded across this area. The distribution and extents of peat recorded during the peat depth surveys are detailed in Section 4.2.

Photo 1: Blanket bog at NC 46574 06363 northwest of Coire Bog

3.12.2 Peat Erosional Features

From review of aerial photography, there are peat haggs observed across the Proposed Development. This was confirmed by site visits where erosional features were recorded especially in the northern extents of the Proposed Development.

Photo 2: Peat haggs at NC 46123 07098 southeast of Loch Shiela

3.12.3 Natural Drainage

Drainage across the Proposed Development is characterised by a network of rivers and streams. The Proposed Development generally drains towards the east, with a series of minor rivers and streams feeding the Kyle of Sutherland situated to the south of the Proposed Development.

No areas of instability relating to surface water drainage were observed across the Proposed Development.

3.12.4 Artificial Drainage

Artificial drainage was frequently observed on review of aerial photography and during site visits. Artificial drainage across the Proposed Development is generally associated with the existing road and the forestry in the southern area of the Proposed Development. There are frequent artificial drains associated with the forestry with drainage furrows generally trending north to south. There are extensive drainage channels in the northern extent of the Proposed Development as shown in **Photo 3**.

No areas of instability relating to artificial drainage was observed across the Proposed Development.

Photo 3: Drainage channels at NC 46191 06947 trending east to west

3.12.5 Forestry

In the southern extents of the Proposed Development, there is an area of commercial forestry which is partially felled in areas as shown in **Photo 4**.

No areas of instability relating to forestry or felled forestry were observed across the Proposed Development.

Photo 4: Area of felled forestry at NC 50930 02649 facing west

3.12.6 Bedrock

The OS mapping and aerial photography exhibit bedrock exposures across the Proposed Development. This was also confirmed by site visits where exposed bedrock was infrequently recorded. Bedrock was observed in the northern extents of the Proposed Development on the flanks of Carn nam Bo Maola and in localised areas at Cnoc nam Gamhna in the central extend of the Proposed Development.

No areas of instability relating to bedrock exposures were observed across the Proposed Development.

Photo 5: Exposed bedrock at NC 47917 04390 at Cnoc nam Gamhna.

3.12.7 Extension / Compression Features

There was no evidence of any natural or infrastructure induced peat instability identified from the site walkover surveys. No extension or compression features were observed in the peat within the Proposed Development and within areas of existing infrastructure or natural and / or anthropogenic drainage indicating that the current conditions and infrastructure are not currently influencing peat stability.

There is no evidence of any significant historic peat failures or slides across the Proposed Development from the aerial photographs, nor from review of local newspapers or historic mapping.

4.0 Fieldwork

4.1 Methodology

The surveys carried out followed best practice guidance for developments on peatland[17,18]. Phase 1 peat probing resulted in probing on an approximate 50 - 100 m grid on initial assessment areas of the OHL route which was used in preliminary site layout designs. Phase 2 probing saw detailed probing undertaken across the Proposed Development layout, focussing on access tracks, cable routes, pole locations and other site infrastructure. The Phase 1 survey informed the site design such that areas of recorded peat could avoided where technically feasible.

Phase 2 probing was typically undertaken on linear infrastructure (permanent / temporary tracks) at 25 m to 50 m spacings with offset probing locations either side (approximately 10 m to 25 m). Infrastructure (poles) were typically probed at 10 m grid spacings within the working area as defined in **EA Chapter 3: The Proposed Development**.

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. An assessment of the substrate was made and recorded at each probe hole. 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 Recorded Peat Depth

Peat is generally defined as a soil with a surface organic layer more than 0.5 m[18]. Where the probing recorded a thickness of 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.

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

18 Scottish Natural Heritage (SNH), SEPA, Scottish Government & James Hutton Institute. (2014)’ Peat Survey Guidance; Developments on Peatland: Site Surveys’.

Peat >0.5 m was recorded within the area of the UGC and temporary access track routes in the northern area of the Proposed Development. Localised areas of deep peat >1.0 m were recorded in localised topographic lows predominantly within the northern section of the UGC and temporary access track route.

To the south of the UGC route within the Proposed Development areas of peat are present >0.5 m with deep peat >1.0 m recorded in the flatter topographic areas and gentler slopes to the east of Loch Shiela, the Allt an Rasail, Glen Rossal Burn and Cnoc nah Gamhna.

Peat is also present in the central area of the Proposed Development on the flatter expanses to the north-west of the Allt Doir a' Chatha. To the east of the Allt Doir a' Chatha within the area of the Proposed Development up to the Allt Loch an Fheoir, peat is typically absent due to the steeper topography. To the south of the Allt Loch an Fheoir and to the north of Middle Hill deep peat >1 m is present in the flatter expanses of the Proposed Development.

An area of deep peat >1 m is present within the Proposed Development within the flatter topographic area between Middle Hill Wood and Cnoc Eadar-mi. Peat >0.5 m is typically absent within the Proposed Development between the Allt a' Ghlugheran and Inveran at the Shin Substation.

A total of 14,800 peat probes were undertaken across all survey phases, with the results summarised in **Table A** and detailed within the peat depth interpolation figures (**Figure 7.1.6** and **Figure 7.1.7**). The interpolation of peat depths shown on the figures was undertaken using the Inverse Distance Weighting (IDW) methodology. All probing data is provided in **Annex B**.

Table A: Summary of Peat Probing Results

Peat Thickness (m)	No. of Probes	Percentage (of total probes undertaken on-site)
0 (no peat)	233	1.6
0.01 – 0.49 (peaty soil)	10,663	72
0.50 – 0.99	2,186	14.8
1.00 – 1.49	827	5.6
1.50 – 1.99	449	3
2.00 – 2.49	210	1.4
2.50 – 2.99	126	0.9
3.00 – 3.49	69	0.5
3.50 – 3.99	28	0.2
> 4.00	9	0.1

4.3 Peat Condition

Peat is described using BS5930[19] and the Von Post classification[20]. Five peat cores were undertaken by SLR, using a peat auger, and were used to inform interpretations of the peat condition and underlying substrate. The locations for the cores were selected based on their vicinity to infrastructure that were situated within areas of peat deposits.

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

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

Based on interpretations from probing and peat core samples, the peat within the Proposed Development is predominantly fibrous to pseudo fibrous. Shallow peat deposits across the Proposed Development are generally fibrous. Deeper peat deposits are generally characterised as pseudo-fibrous. The peat was classified using the Von Post classification as between H2 and H5, showing insignificant to moderate decomposition.

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

4.4 Substrate

The site inspection and probing campaigns have confirmed the substrate falls into one of two principal categories:

- granular (sand and / or gravel / weathered rock), of glacial origin and occasionally interbedded with silty sands; and
- rock, no rock samples were recovered from the probe locations although where exposed, the rock is seen to be metamorphic rock.

5.0 Hazard and Risk Assessment

5.1 Introduction

The Scottish Government Guidance[1] provides an overview of the principles of hazard and risk with respect to peat landslides. The guidance is noted as illustrative only and the Applicant 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 Guidance[1]. This is applied on the principle:

Hazard Ranking = Hazard x Exposure

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

Hazard Ranking = Risk Rating x 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 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. The factors requiring considerations would 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 Guidance[1] 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 B**.

Table B: Probability of Peat Landslide

Risk Rating Coefficient	Potential Stability Risk (Pre-Mitigation)	Action
<5	Negligible	No mitigation action required.
5 - 15	Low	As for negligible condition plus development of a site-specific construction and management plan for peat areas.
16 - 30	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.

Peat Depth

Table C 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 m to 1.5 m thick, with deposits in excess of this being 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 has been considered to be an organic soil rather than peat and are 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. No signs of instability were observed as detailed in Section 3.0 and therefore, no separate coefficients are required.

Table C: Coefficients for Peat Depth

Peat Depth Range	Description	Peat Depth Coefficients
(<0.5 m)	Peaty 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.**

Slope Gradients

Table D gives the coefficients applied to the categorised slope angles. The slope gradients were assessed by reference to the mapping and particularly the DTM which was used to generate a slope map (**Figure 7.1.8**), from which the gradient at each probe location could be determined. 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 D: Coefficients for Slope Gradients

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

Substrate

Table E shows the substrate type and their related substate 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)[21]. They have also been observed over glacial till without and 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.

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.

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.

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. For these reasons, at this stage, a rock interface has been given the same risk rating as clay.

Table E: 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 visual observations of exposures and coring at selected locations across the proposed infrastructure as shown on the figure contained within **Annex B**.

Results

The table of results, included in **Annex B,** shows that 14,800 probe locations were identified within the extent of the Proposed Development, peat (>0.5 m) was present at 3,904 locations. The stability risk rating identified the following:

- no peat was recorded at 233 locations (2%), hence no risk;
- negligible risk at 12,103 (82%) probe locations;
- low risk at 2,147 (14%) locations;
- medium risk at 312 (2%) locations; and
- high risk at 5 (<1%) locations.

Figure 7.1.9 presents the interpreted risk of peat instability based on the multiplication of the risk coefficients discussed above in **Table C** to **Table E**.

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

5.5 Impact Rating

An assessment of the receptors 'Impact Rating' of the medium and high-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 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 water courses 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 and poles) 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.

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 within the Proposed Development and surrounding area which could potentially be affected in the event of a peat slide were primarily watercourses and associated tributaries, existing tracks and paths and the proposed power infrastructure.

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

Table F: Coefficients for Receptor Ranking

Nature of Feature	Feature Coefficient
Non-critical infrastructure (minor / private roads, tracks)	1
Watercourses, GWDTE, PWS and critical infrastructure (pipelines, motorways, dwellings and business properties etc.)	3
Sub-Community (settlement 1-10 residents)	6
Community (settlement of >10 residents)	8

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 G** and **Table H** present the coefficients derived for distance and elevation of impact receptors.

Table G: Coefficient for Receptor Proximity

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

Table H: Coefficient for Impact Feature Elevation

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

Based on distance to impact receptors, in this instance we have identified watercourses (which are the most sensitive receptor near the Proposed Development). The other receptors have been discounted, 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 F** 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.

5.6 Hazard Ranking

In order 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 (shown in **Table I** below).

Table I: Rating Normalisation

Risk Rating		Impact Rating	
Current Scale	Normalised Scale	Current Scale	Normalised Scale
Negligible <5	1	Very Low <10	1
Low 5 - <15	2	Low 11 - 20	2
Medium 15 - 30	3	High 21 - 30	3
High 31 - 50	4	Very High 31-50	4

Risk Rating		Impact Rating	
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 Government[1]. The Hazard Ranking scale does equate to the Scottish Government[1] 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 Guidance[1] as illustrated in **Table J**.

Table J: 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 (98% of probe locations) with regards to stability based on **Figure 7.1.9**.

2% of probe locations are identified as medium or high 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 43 medium and high-risk sites have been identified and are discussed in the following section.

The stability risk assessment results presented in **Table K** below shows the calculated hazard ranking associated with every location where there is a stability risk of medium or above, at or close to infrastructure. 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 K**, 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. These range from infrastructure specific measures to general good practice that should be applied across the Proposed Development 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.
- 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” or “High” risk. These mitigation measures will also help further reduce “Low” and “Negligible” risks to potential receptors with Sections 6.3 to 6.4 providing information on good practice pre-construction, during construction and post-construction (i.e. during operation).

6.2 Proposed Mitigation

As noted in **Figure 7.1.9**, where the risk assessment has identified a negligible or low risk of peat instability, no specific mitigation measures are necessary. However, in order to ensure best practise is employed, there would be a need for careful monitoring and the construction management must include careful design of both the permanent and temporary works appropriate for peat soils; these are discussed further in Sections 6.3 to 6.4.

As noted in Section 5.6, the areas of the infrastructure that were rated as medium or high risk, or above, 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 site 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 K lists the locations that have been identified to have a medium or high risk of peat instability on the Proposed Development infrastructure and these risk areas are shown on Figure 7.1.9. 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 K: Risk Register

Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure	Key Receptor	Mitigation	Revised Hazard Ranking
1	Medium	Low	Significant	P2 Working Area	Cor' an Rasail	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the east. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
2	Medium	Very Low	Insignificant	P8 Working Area	Cor' an Rasail	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the east. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
3	Medium	Very Low	Insignificant	P9 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the east. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
4	Medium	Very Low	Insignificant	P10 Working Area	Cor' an Rasail	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the east. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant

Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure	Key Receptor	Mitigation	Revised Hazard Ranking
5	Medium	Very Low	Insignificant	P11 Working Area	Cor' an Rasail	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the east. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
6	Medium	Low	Significant	P14 Working Area	Cor' an Rasail	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the east. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
7	Medium	Very Low	Insignificant	P15 Working Area	Cor' an Rasail	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the east. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
8	Medium	Very Low	Insignificant	P16 Working Area	Cor' an Rasail	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant

Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure	Key Receptor	Mitigation	Revised Hazard Ranking
9	High	Very Low	Insignificant	P18 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
10	Medium	Very Low	Insignificant	P30 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
11	Medium	Very Low	Insignificant	Temporary Track	Temporary Track	Temporary track is likely to be trackway so no excavations and mitigation would be required. However, should excavations be required, the temporary track could be impacted by localised area of peat. Good construction practices and excavation of peat prior to construction will mitigate against peat landslide to the west. Micro-siting track or benching of slopes along tracks would also mitigate against risk.	Insignificant
12	Medium	Very Low	Insignificant	Temporary Track	Temporary Track	Temporary track is likely to be trackway so no excavations and mitigation would be required. However, should excavations be required, the temporary track could be impacted by localised area of peat. Good construction practices and excavation of peat prior to construction will mitigate against peat landslide to the west. Micro-siting track or benching of slopes along tracks would also mitigate against risk.	Insignificant

Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure	Key Receptor	Mitigation	Revised Hazard Ranking
13	Medium	Low	Significant	Temporary Track	Temporary Track	Temporary track is likely to be trackway so no excavations and mitigation would be required. However, should excavations be required, the temporary track could be impacted by localised area of peat. Good construction practices and excavation of peat prior to construction will mitigate against peat landslide to the west. Micro-siting track or benching of slopes along tracks would also mitigate against risk.	Insignificant
14	Medium	Low	Significant	P33 Working Area	Allt na Chriche	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
15	Medium	Low	Significant	P34 Working Area	Allt na Chriche	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
16	Medium	Low	Significant	P37 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant

Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure	Key Receptor	Mitigation	Revised Hazard Ranking
17	Medium	Very Low	Insignificant	P38 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
18	Medium	High	Significant	P42 Working Area	Glen Roussal Burn	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south-west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
19	Medium	Low	Significant	P43 Working Area	Glen Roussal Burn	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
20	Medium	High	Significant	P44 Working Area	Glen Roussal Burn	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant

Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure	Key Receptor	Mitigation	Revised Hazard Ranking
21	Medium	High	Significant	P47 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
22	Medium	Low	Significant	P48 Working Area	Estate Tracks	Distance to the nearest receptor is over 1km and deemed not be at risk of peat slide. However, to ensure peat stability, peat should be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
23	High	Low	Significant	P49 Working Area	Estate Tracks	Distance to the nearest receptor is over 1km and deemed not be at risk of peat slide. However, to ensure peat stability, peat should be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
24	Medium	Low	Significant	P50 Working Area	Estate Tracks	Distance to the nearest receptor is over 1km and deemed not be at risk of peat slide.	Insignificant

Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure	Key Receptor	Mitigation	Revised Hazard Ranking
						However, to ensure peat stability, peat should be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	
25	Medium	High	Significant	P51 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
26	Medium	Low	Significant	P52 Working Area	River Cassley	Distance to the nearest receptor is over 1km and deemed not be at risk of peat slide. However, to ensure peat stability, peat should be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
27	Medium	Low	Significant	P53 Working Area	River Cassley	Distance to the nearest receptor is over 1km and deemed not be at risk of peat slide. However, to ensure peat stability peat deposits to be excavated prior to construction which will mitigate against peat landslide to the west. Suitable shoring of excavations would assist in	Insignificant

Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure	Key Receptor	Mitigation	Revised Hazard Ranking
						mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	
28	Medium	Very Low	Insignificant	P57 Working Area	Unnamed watercourse	Distance to the nearest receptor is over 1km and deemed not be at risk of peat slide. However, to ensure peat stability peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
29	Medium	Low	Significant	P72 Working Area	Allt Doir o' Chatha	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
30	Medium	Low	Significant	P74 Working Area	Allt Doir’ a' Chatha	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant

Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure	Key Receptor	Mitigation	Revised Hazard Ranking
31	Medium	Very Low	Insignificant	P77 Working Area	Allt Doir' a' Chatha	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south-east. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
32	Medium	Very Low	Insignificant	P81 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the east. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
33	Medium	Very High	Substantial	Existing Track	P88	Existing track is unlikely to require any modification/excavations and mitigation would be required. However, should excavations be required, the temporary track could be impacted by localised area of peat. Good construction practices and excavation of peat prior to construction will mitigate against peat landslide to the west. Micro-siting track or benching of slopes along tracks would also mitigate against risk.	Insignificant
34	Medium	Low	Significant	P109 Working Area	Allt Mor	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant

Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure	Key Receptor	Mitigation	Revised Hazard Ranking
35	Medium	Low	Significant	Temporary Track	Unnamed watercourse	Temporary track is likely to be trackway so no excavations and mitigation would be required. However, should excavations be required, the temporary track could be impacted by localised area of peat. Good construction practices and excavation of peat prior to construction will mitigate against peat landslide to the west. Micro-siting track or benching of slopes along tracks would also mitigate against risk.	Insignificant
36	Medium	Very Low	Insignificant	P116 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
37	Medium	High	Significant	P119 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
38	Medium	Low	Significant	P145 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant

Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure	Key Receptor	Mitigation	Revised Hazard Ranking
39	Medium	Low	Significant	Temporary Track	Unnamed watercourse	Temporary track is likely to be trackway so no excavations and mitigation would be required. However, should excavations be required, the temporary track could be impacted by localised area of peat. Good construction practices and excavation of peat prior to construction will mitigate against peat landslide to the west. Micro-siting track or benching of slopes along tracks would also mitigate against risk.	Insignificant
40	Medium	Low	Significant	P155 Working Area	Temporary track	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
41	Medium	Very Low	Insignificant	P156 Working Area	Temporary track	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant
42	Medium	Low	Significant	P162 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant

Location	Risk Rating	Impact Rating	Hazard Ranking	Infrastructure	Key Receptor	Mitigation	Revised Hazard Ranking
43	Medium	Low	Significant	P147 Working Area	Unnamed watercourse	Peat deposits to be excavated prior to construction which will mitigate against peat landslide to the south. Suitable shoring of excavations would assist in mitigating risk during construction. Good construction practices, as detailed in 6.3 and 6.4, should be followed to mitigate against any instability. Working areas to be fully reinstated post-construction which will mitigate against long-term instability.	Insignificant

6.3 Good Practice During Construction

The paragraphs below detail good practice that is recommended during construction. These measures are considered 'embedded mitigation' for the purposes of the assessment, and have been assumed to be in place for the purposes of the assessment presented in the EA Report:

For 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 ensures 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).

For permanent tracks:

- 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 it water remains free-flowing and that no blockages have occurred.

For temporary tracks:

- Prior to the construction, setting out the centreline of the proposed track should include a walk over performed by the site manager or general foreman, along with the 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.

For storage of peat:

- Ensure stored peat is not located in areas identified with ‘Medium’ or higher peat landslide likelihoods.
- Undertake site specific stability analysis 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 >1.5- m in depth.
- 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. Mitigate any run-off.

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

- A geotechnical risk register (GRR) should be prepared for the site 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 locations highlighted in Section 6.2 should be included within the GRR.
- 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.

6.4 Good Practice During Operation

The following activities will be built into any monitoring of groundworks undertaken for the 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.

7.0 Conclusion

The report has highlighted the complicated inter-relationship between all the aspects that influence the stability of peat. The Proposed Development has been assessed for potential hazards associated with peat instability and 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 and publications and aerial photography; and
- a programme of peat survey and coring fieldwork.

The overall conclusion regarding peat stability is that there are areas of medium or high risk of peat instability across the Proposed Development and most have these have been avoided during the design process. For the remaining 43 medium and high-risk areas, a hazard impact assessment was completed which concluded that, with the employment of appropriate mitigation measures, all of the areas can be assessed as posing an insignificant risk.

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

This report should be considered as the first stage in the development of a fundamental understanding of the various inter-relationships that govern and control the peatlands. More detailed ground investigations will be required to support the detailed design stage of the Proposed Development and this PLHRA should be revised and updated when the results of these investigations are available.

The commissioned assessment has purposefully kept the extent of physical intrusion into the sensitive peat areas to an absolute minimum. The results are considered appropriate to support a planning application.

Providing that the recommended mitigation measures are put in place and adhered to, the risk of peat landslide as a result of the Proposed Development is assessed as not significant.

Figures

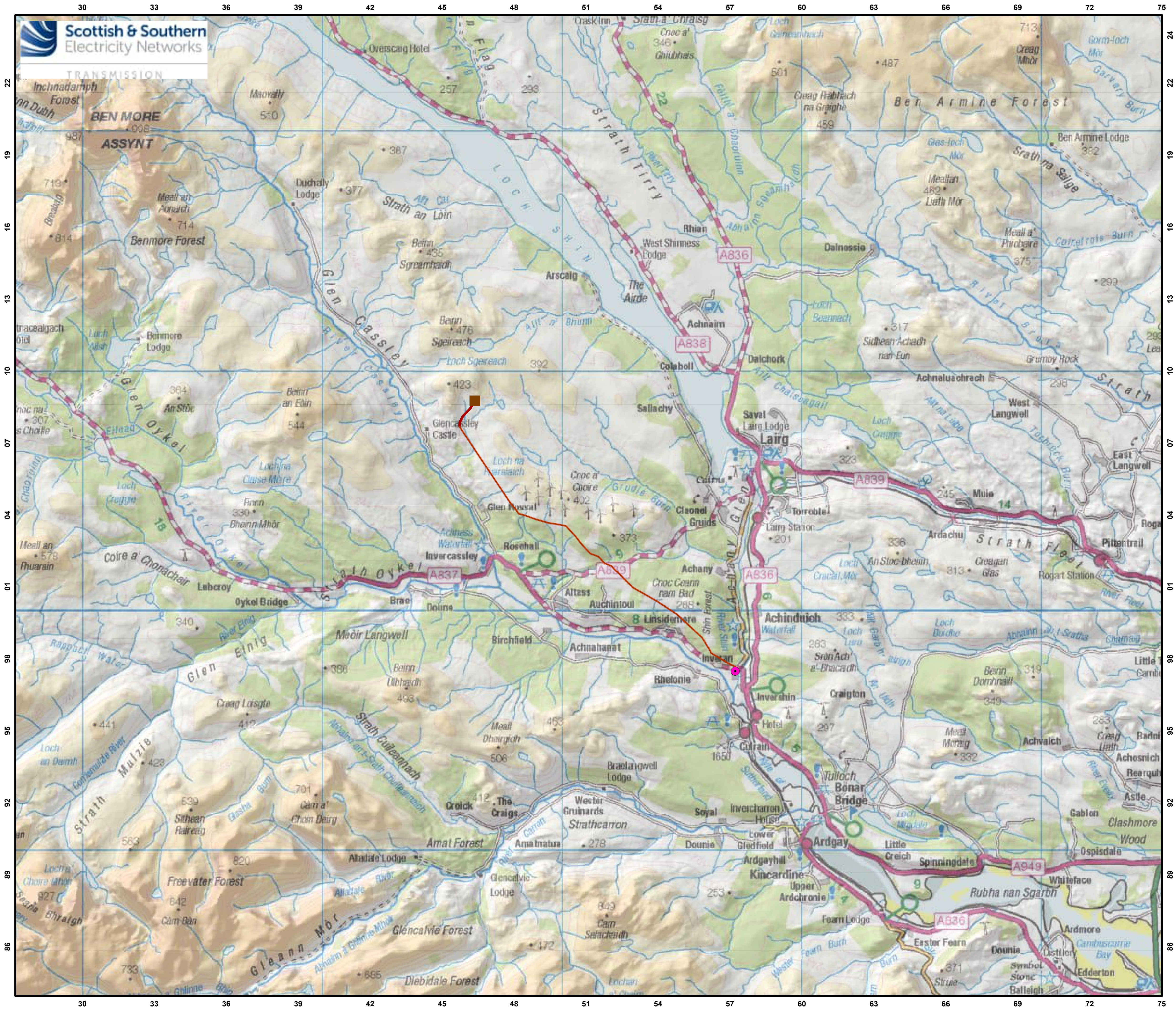
Achany Wind Farm Extension Grid Connection

Appendix 7.1: Peat Landslide Hazard and Risk Assessment

SSEN Transmission

SLR Project No.: 428.064120.00001

Scottish & Southern Electricity Networks
TRANSMISSION



Legend

S.37 Overhead Line (OHL) Works

Proposed Overhead Line (OHL)

Permitted Development

Indicative Underground Cable (UGC) Alignment

Consented Infrastructure

Achany Wind Farm Extension Substation

Existing Infrastructure

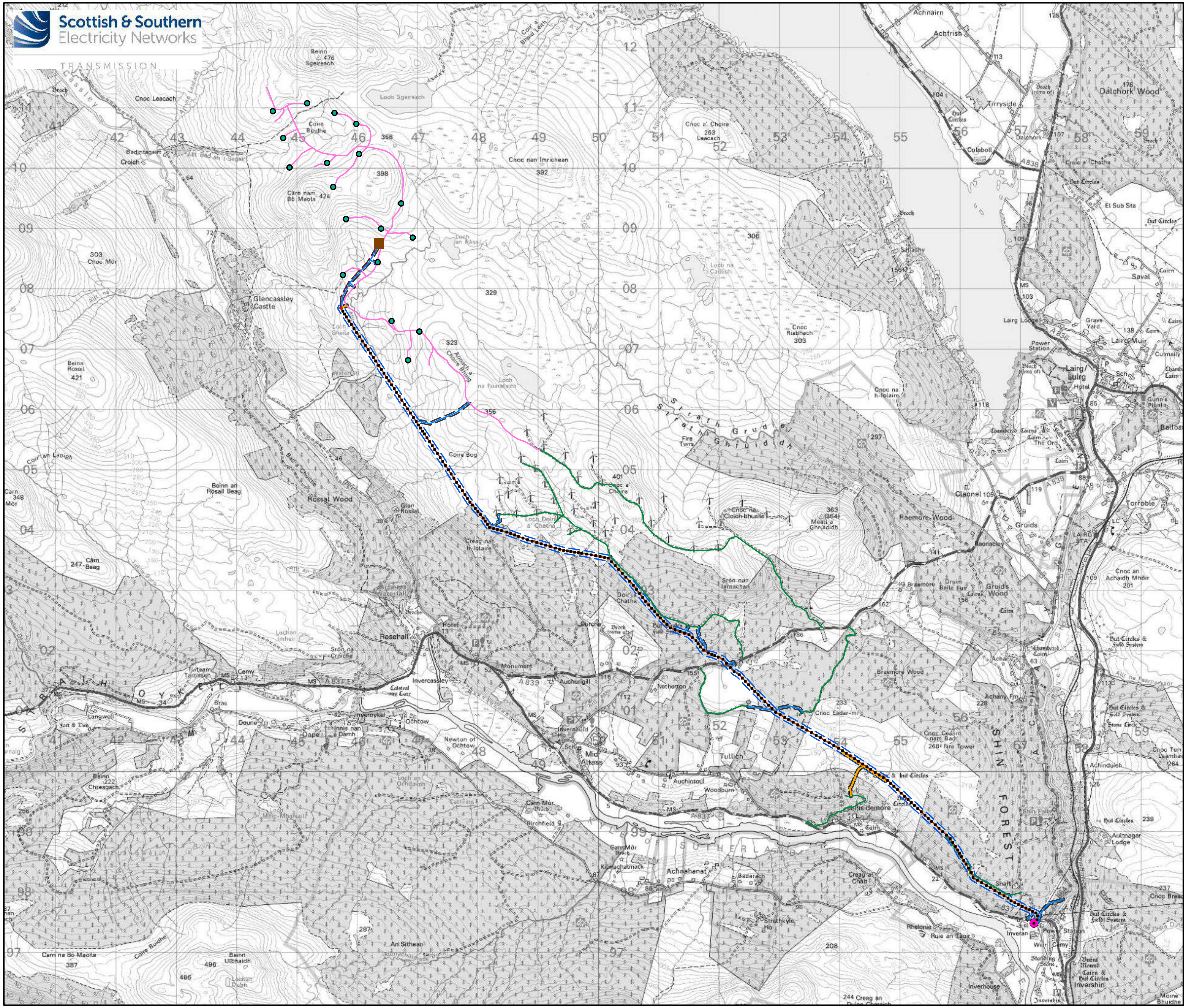
Shin Substation

N

0 2.5 5 km

Scale - 1:150,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.1 - Site Location
Drawn by:	MM — Date: 16/10/2024
Drawing:	428.V64120.00001.0014.0



Legend

S.37 Overhead Line (OHL) Works

- Proposed Overhead Line (OHL)
- Proposed Pole Location
- Limit of Deviation (LoD) for Proposed OHL (50m either side)
- Permanent and Temporary Access Track LoD (25m either side)

Permitted Development

- Indicative Underground Cable (UGC) Alignment

Consented Infrastructure

- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure

- Shin Substation
- Existing Tracks

N

0 0.5 1 2 3 km

Scale - 1:60,000 @ A3

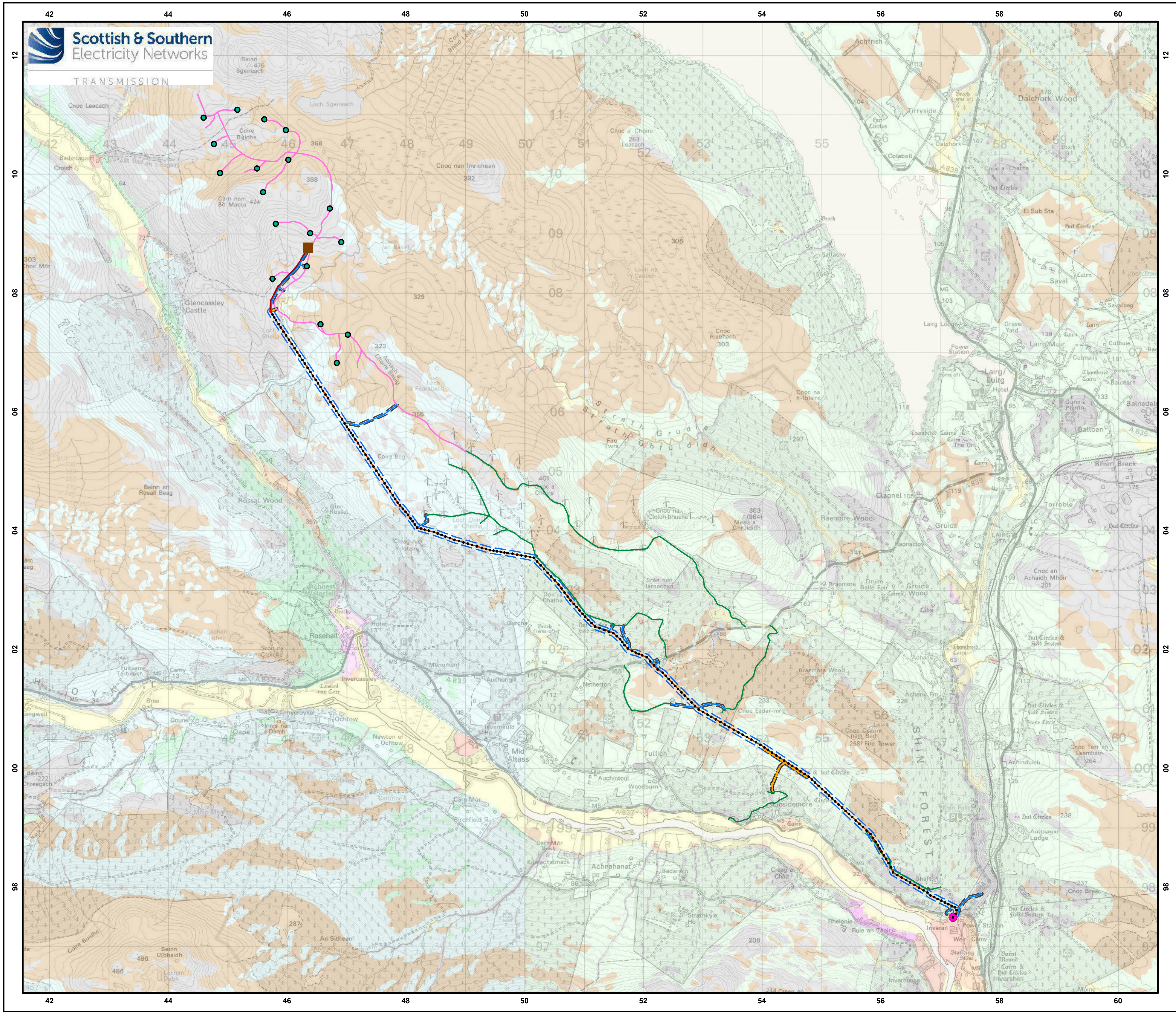
Project: Achany Extension Wind Farm Grid Connection: Peat Landslide Hazard and Risk Assessments

Title: Figure 7.1.2 : Site Layout

Drawn by: MM

Date: 03/04/2025

Drawing: 428.V64120.00001.0015.0



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development

- Temporary Access Track (Likely Trackway)
- New - Permanent Access Track
- Permanent and Temporary Access Track LoD (25m either side)

Permitted Development

- Indicative Underground Cable (UGC) Alignment

Consented Infrastructure

- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure

- Shin Substation
- Existing Tracks

Superficial Geology

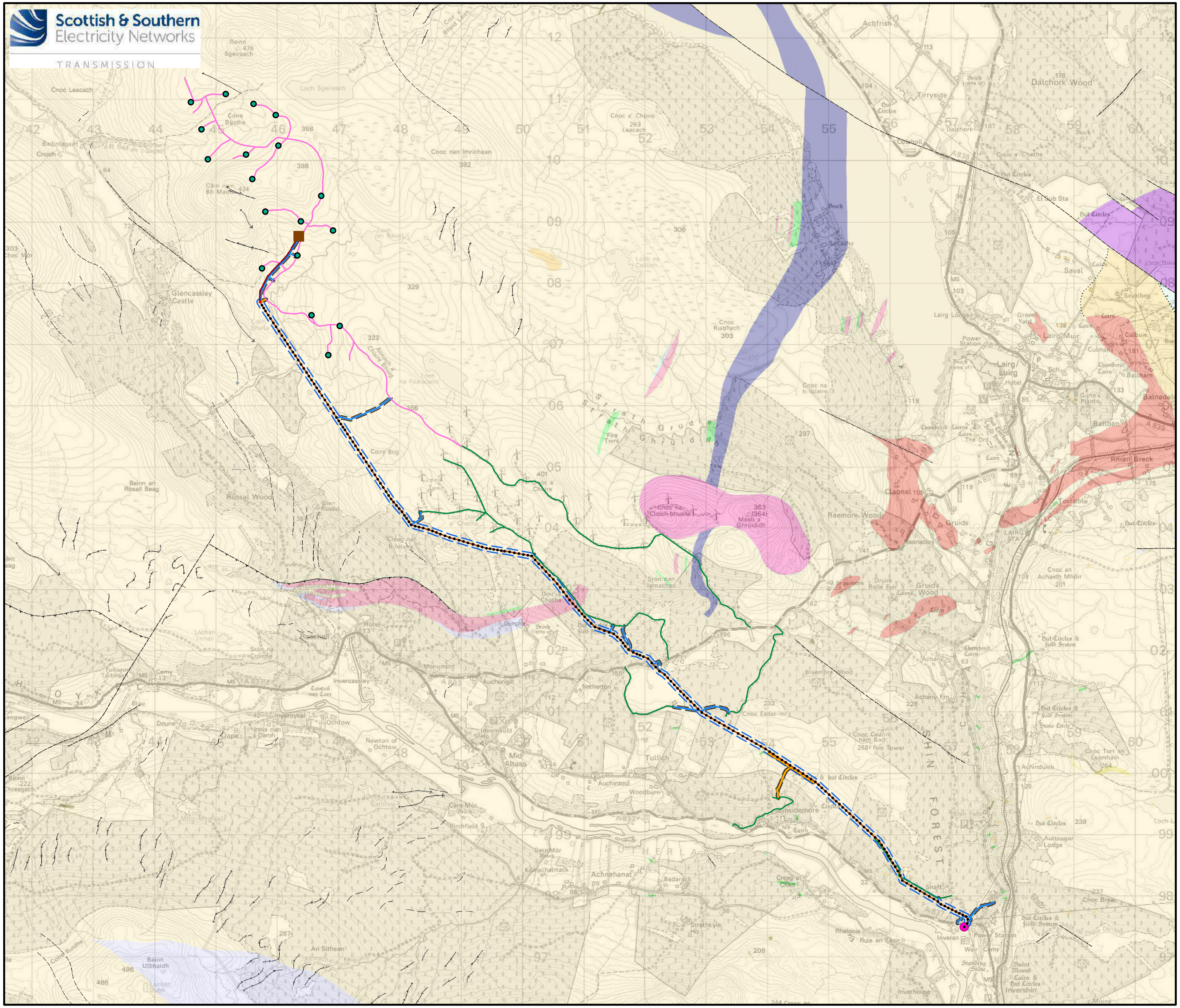
- Alluvial Fan Deposits - Gravel, Sand, Silt And Clay
- Alluvial Fan Deposits - Sand And Gravel
- Alluvium - Clay, Silt, Sand And Gravel
- Alluvium - Sand And Gravel
- Glaciofluvial Fan Deposits - Sand And Gravel
- Glaciofluvial Ice Contact Deposits - Sand And Gravel
- Glaciofluvial Sheet Deposits - Gravel, Sand And Silt
- Hummocky (moundy) Glacial Deposits - Diamicton
- Peat - Peat
- Raised Marine Beach Deposits, Late Devensian - Gravel, Sand And Silt
- River Terrace Deposits - Gravel, Sand And Silt
- River Terrace Deposits - Sand And Gravel
- Talus - Rock Fragments, Angular, Undifferentiated Source Rock
- Till - Diamicton
- Till And Morainic Deposits - Diamicton, Sand And Gravel
- Bedrock at or Near Surface

N

0 0.5 1 2 3 km

Scale - 1:60,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.3 - Superficial Geology
Drawn by:	MM — Date: 03/04/2025
Drawing:	428.V64120.00001.0016.0



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development

- Temporary Access Track (Likely Trackway)
- New - Permanent Access Track
- Permanent and Temporary Access Track LoD (25m either side)

Permitted Development

- Indicative Underground Cable (UGC) Alignment

Consented Infrastructure

- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure

- Shin Substation
- Existing Tracks

Note: The Bedrock Geology legend can be found on Figure 7.1.4b

N

0 0.5 1 2 3 km

Scale - 1:60,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.4a - Bedrock Geology
Drawn by:	MM — Date: 03/04/2025
Drawing:	428.V64120.00001.0017.0

Scottish & Southern Electricity Networks
TRANSMISSION

Legend

Linear Feature

- Fault Inferred
- Fault, Thrust, Inferred, Triangle on Hangingwall Side
- Fault, Slide, Observed Hangingwall, unspecified
- Fault Undifferentiated Inferred
- Fold Anticline
- Fold Monocline Lower
- Fold Synform
- Glacial Meltwater Channel Centre Undifferentiated
- Limit Diorite Granodiorite
- Limit Migmatisation
- Moraine Crestline
- Rogen Moraine Crestline

Bedrock Geology

Igneous

- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Lamprophyres
- Ach'uaine Cluster - Meladiorite, Hornblende
- North Britain Siluro-devonian Calc-alkaline Dyke Suite - Minette
- Scottish Highland Siluro-devonian Calc-alkaline Minor Intrusion Suite - Granite
- Scottish Highland Siluro-devonian Calc-alkaline Minor Intrusion Suite - Pegmatite And Pegmatitic Microgranite
- Grugie Pluton - Leucogranite
- Lairg Intrusions - Granodiorite And Quartz-monzodiorite
- Rogart Pluton, Phase 1 - Quartz-monzodiorite

Silurian

Devonian

Metamorphic

- Altnaharra Psammite Formation - Psammite
- Altnaharra Psammite Formation - Psammite And Micaceous Psammite
- Altnaharra Psammite Formation - Psammite, Hornfelsed
- Altnaharra Psammite Formation - Quartzite
- Altnaharra Psammite Formation - Semipelite
- Glen Achall Psammite And Semipelite Member - Semipelite, Garnet
- Neoproterozoic Basic Minor Intrusion Suite - Amphibolite
- Glascarnoch Psammite Formation - Psammite
- Lewisianoid Gneiss Complex - Orthogneiss, Mafic
- Lewisianoid Gneiss Complex - Amphibolite
- Lewisianoid Gneiss Complex - Hornblendite
- Lewisianoid Gneiss Complex - Metacarbonate-rock And Calcsilicate-rock
- Lewisianoid Gneiss Complex - Orthogneiss
- Unnamed Metamorphic Rocks, Pre-caledonian To Caledonian - Phyllonite

Tonian

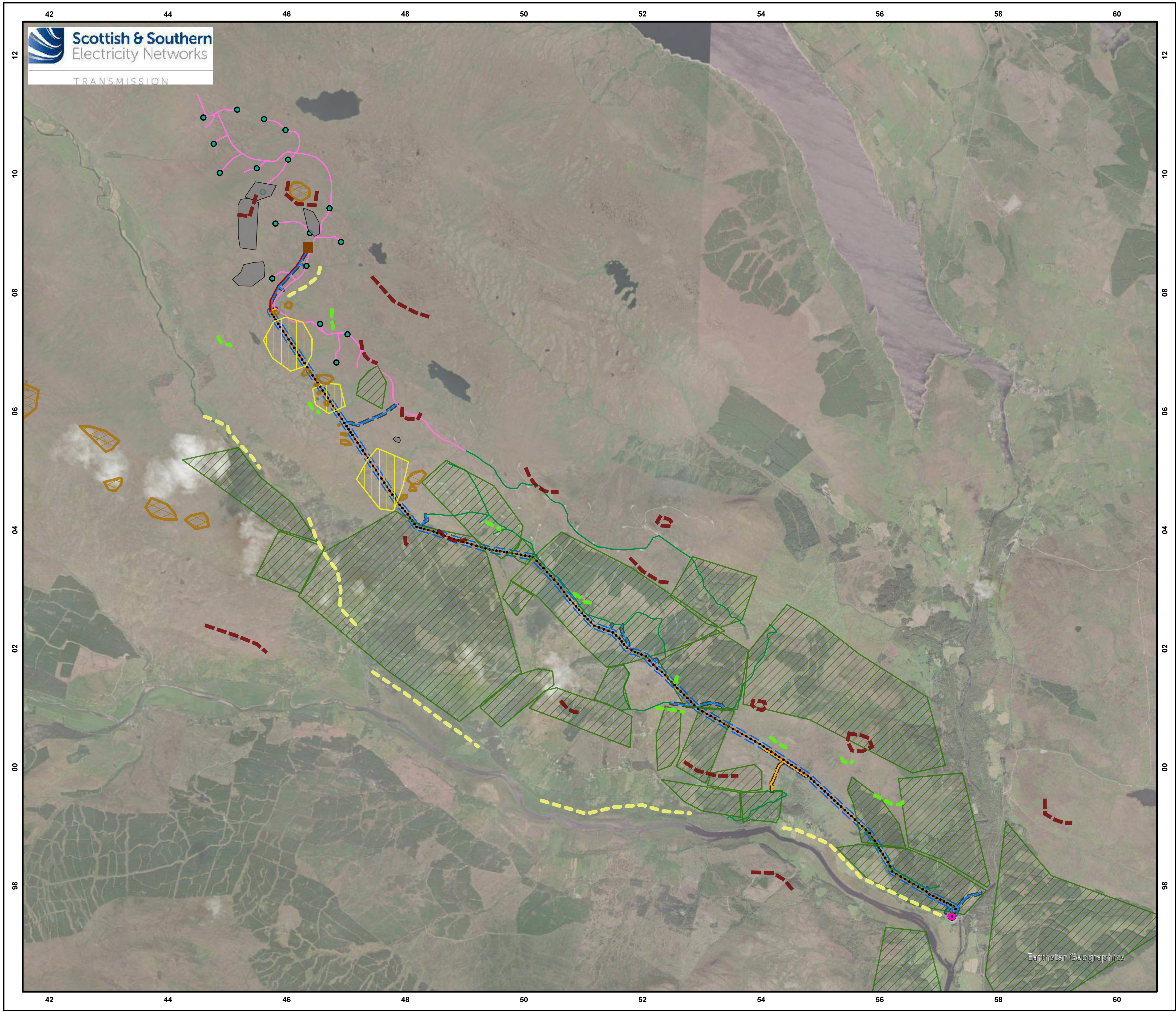
Siderian

Archean Eon

Ediacaran

Silurian

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.4b - Bedrock Geology Legend
Drawn by:	MM — Date: 03/04/2025
Drawing:	428.V64120.00001.0018.0



Legend

S.37 Overhead Line (OHL) Works
- Proposed Pole Location
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development
- Temporary Access Track (Likely Trackway)
- New - Permanent Access Track
- Permanent and Temporary Access Track LoD (25m either side)

Permitted Development
- Indicative Underground Cable (UGC) Alignment

Consented Infrastructure
- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure
- Shin Substation
- Existing Tracks

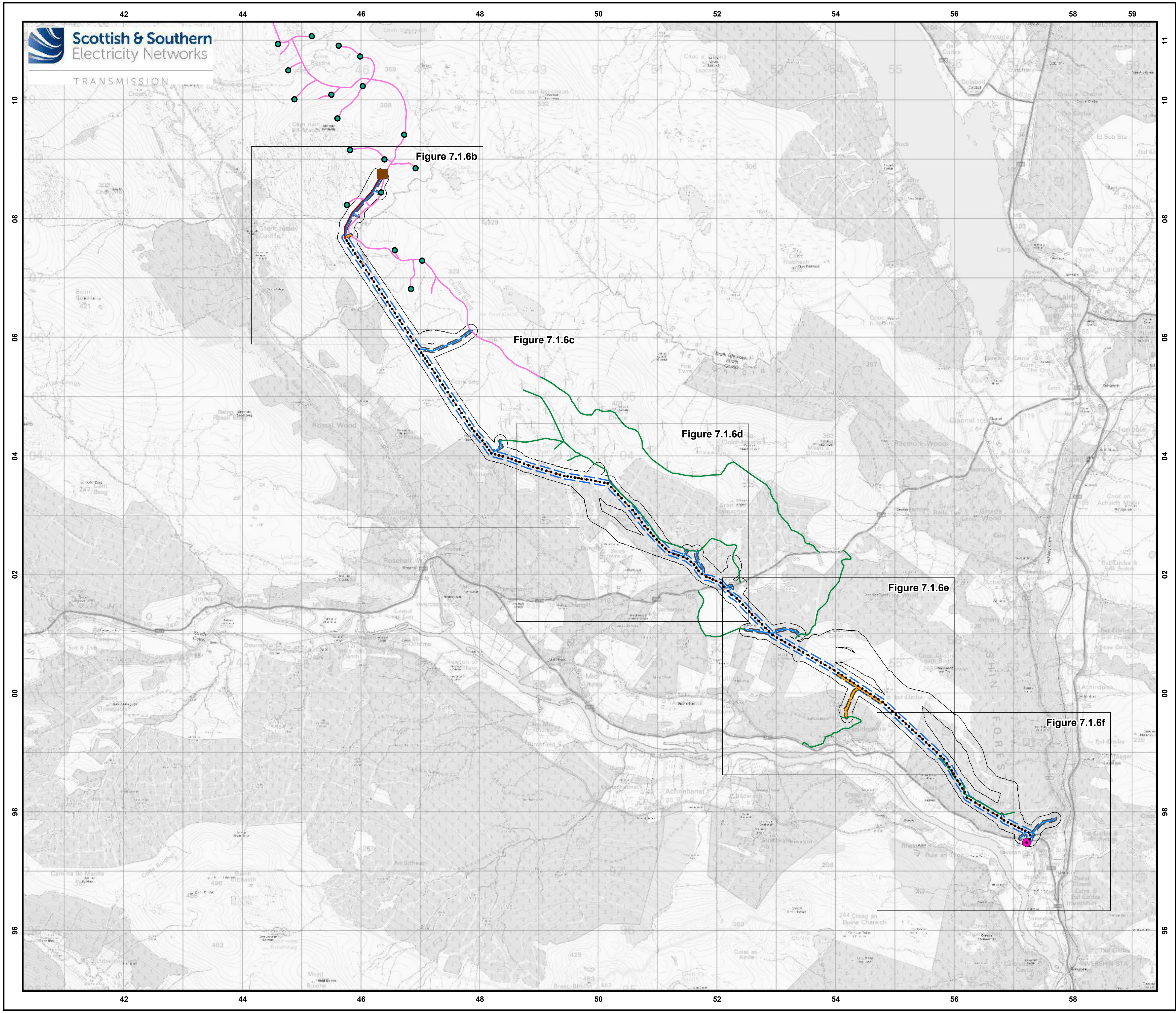
Geomorphology
- Top of Slope
- Bottom of Slope
- Break in Slope
- Peat Haggs
- Blanket Bog
- Bedrock
- Forestry and Artifical Drainage

N

0 0.5 1 2 3 km

Scale - 1:60,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.5 - Geomorphology
Drawn by:	MM
Date:	03/04/2025
Drawing:	428.V64120.00001.0019.0



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location (Labelled as P with Pole Number)
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development

- New - Permanent Access Track
- Temporary Access Track (Likely Trackway)
- Permanent and Temporary Access Track LoD (25m either side)

Consented Infrastructure

- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure

- Shin Substation
- Existing Tracks

Peat Depth (m)

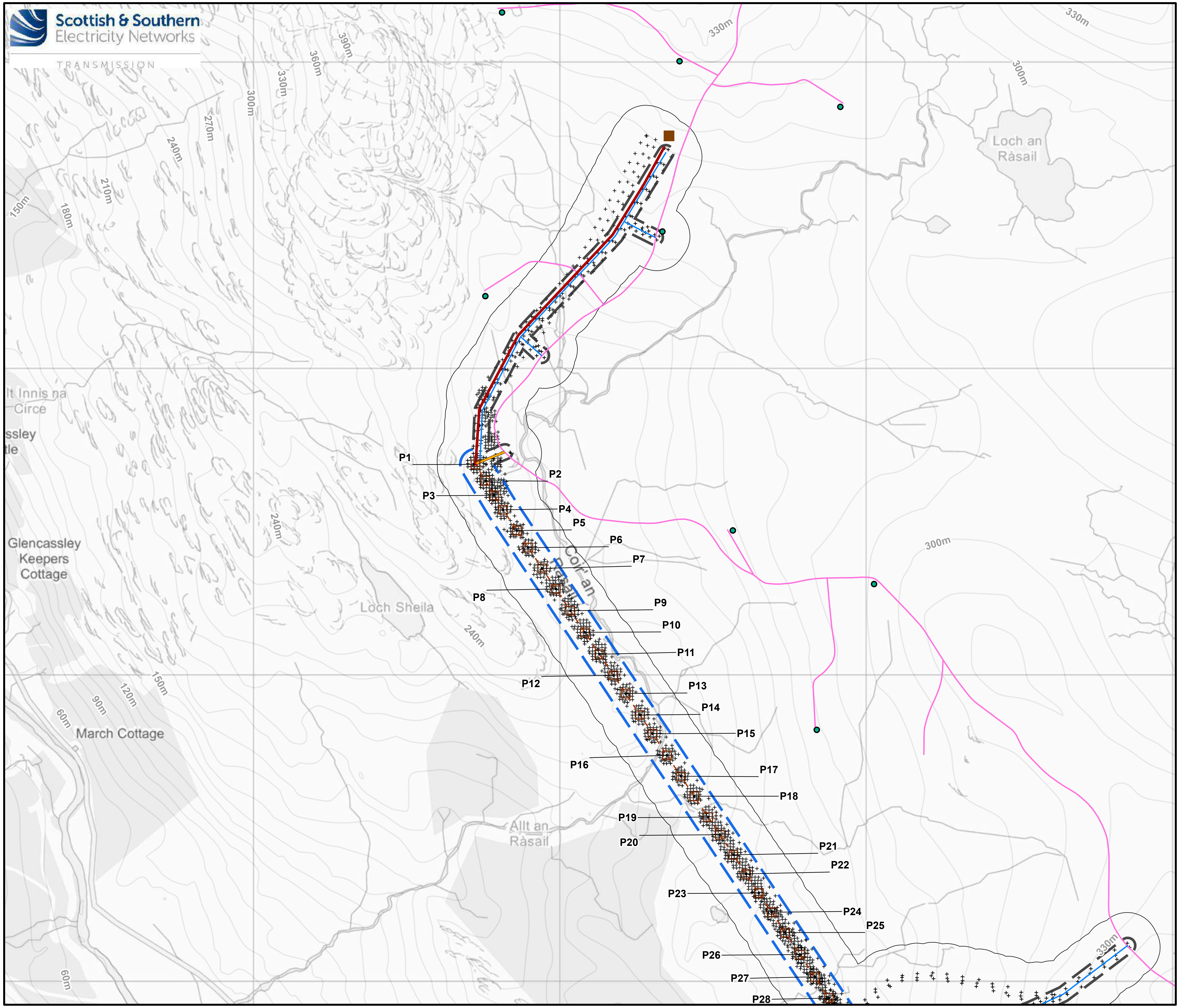
- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

N

0 250 500 m

Scale - 1:60,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.6a - Peat Depth Plan
Drawn by:	MM — Date: 03/04/2025
Drawing:	428.V64120.00001.0020.0



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location (Labelled as P with Pole Number)
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Pole Working Area
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development

- New - Permanent Access Track
- Temporary Access Track (Likely Trackway)
- Permanent and Temporary Access Track LoD (25m either side)

Consented Infrastructure

- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure

- Shin Substation
- Existing Tracks
- Peat Probe Location

Peat Depth (m)

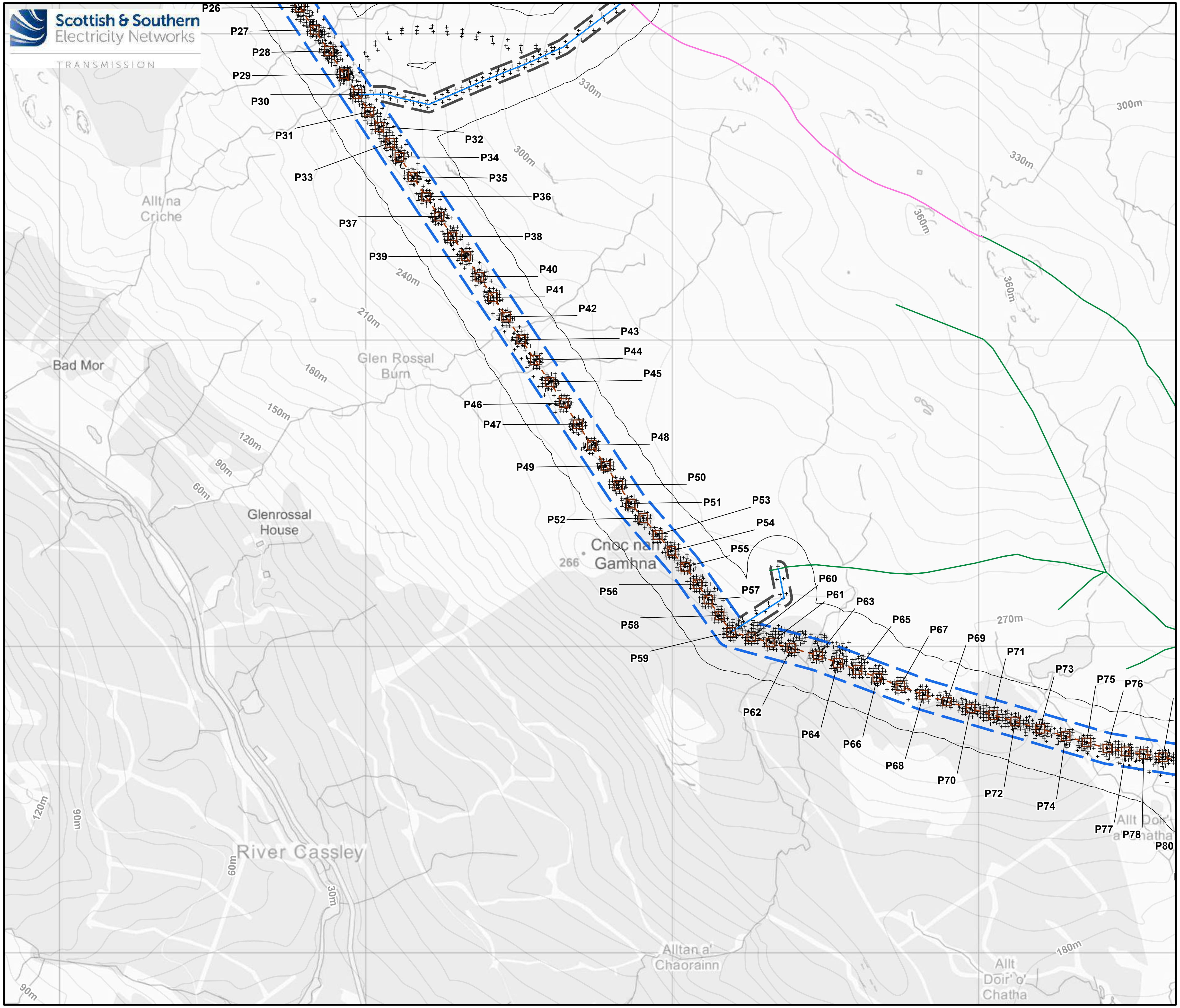
- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

N

0 250 500 Metres

Scale - 1:12,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.6b - Peat Depth Plan
Drawn by:	MM
Date:	03/04/2025
Drawing:	428.V64120.00001.0020.0



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location (Labelled as P with Pole Number)
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Pole Working Area
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development

- New - Permanent Access Track
- Temporary Access Track (Likely Trackway)
- Permanent and Temporary Access Track LoD (25m either side)

Consented Infrastructure

- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure

- Shin Substation
- Existing Tracks
- Peat Probe Location

Peat Depth (m)

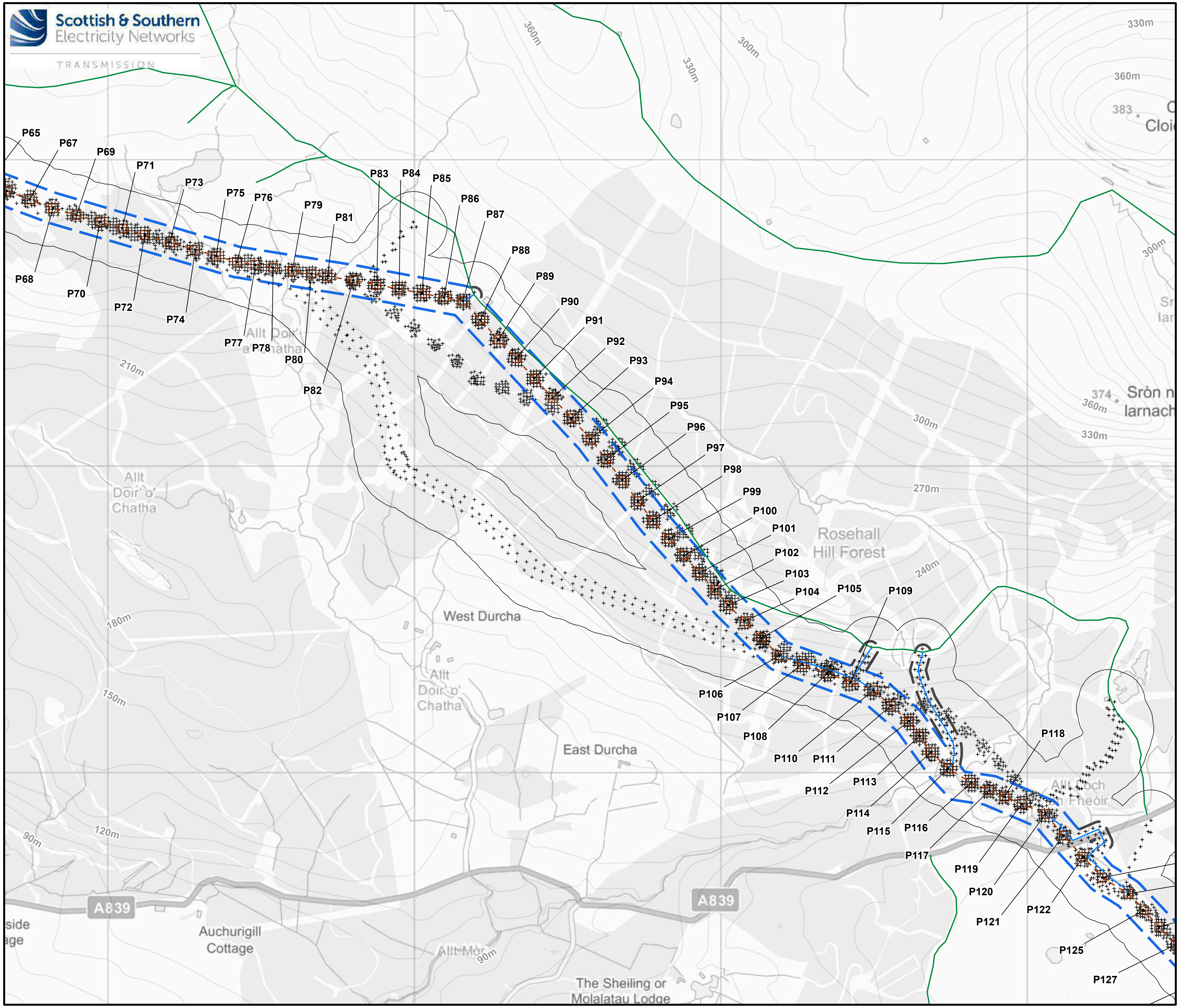
- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

N

0 250 500 Metres

Scale - 1:12,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.6c - Peat Depth Plan
Drawn by:	MM
Date:	03/04/2025
Drawing:	428.V64120.00001.0020.0



Legend

S.37 Overhead Line (OHL) Works
- Proposed Pole Location (Labelled as P with Pole Number)
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Pole Working Area
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development
- New - Permanent Access Track
- Temporary Access Track (Likely Trackway)
- Permanent and Temporary Access Track LoD (25m either side)

Consented Infrastructure
- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure
- Shin Substation
- Existing Tracks
- Peat Probe Location

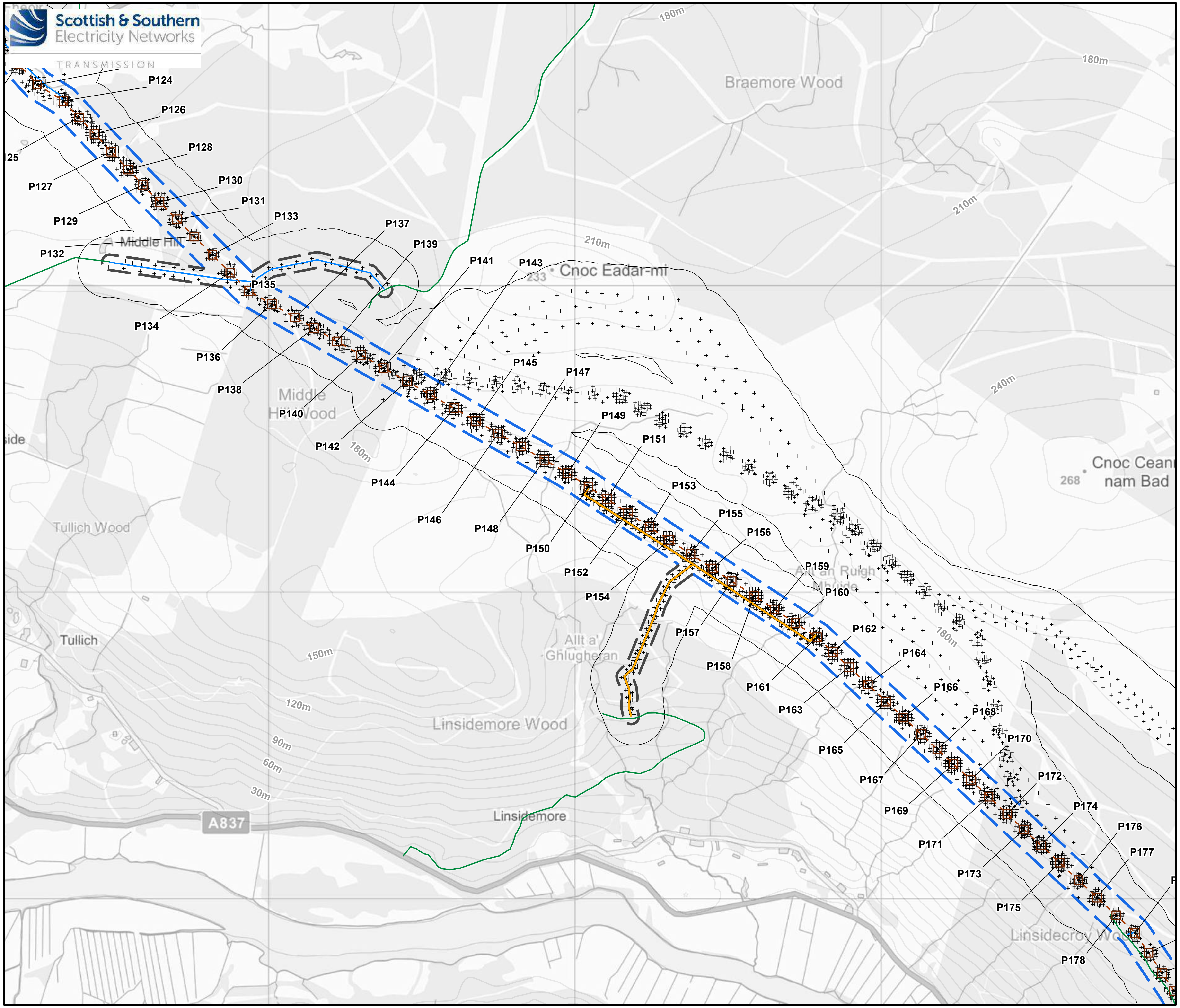
Peat Depth (m)
- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

N

0 250 500 Metres

Scale - 1:12,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.6d - Peat Depth Plan
Drawn by:	MM — Date: 03/04/2025
Drawing:	428.V64120.00001.0020.0



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location (Labelled as P with Pole Number)
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Pole Working Area
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development

- New - Permanent Access Track
- Temporary Access Track (Likely Trackway)
- Permanent and Temporary Access Track LoD (25m either side)

Consented Infrastructure

- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure

- Shin Substation
- Existing Tracks
- Peat Probe Location

Peat Depth (m)

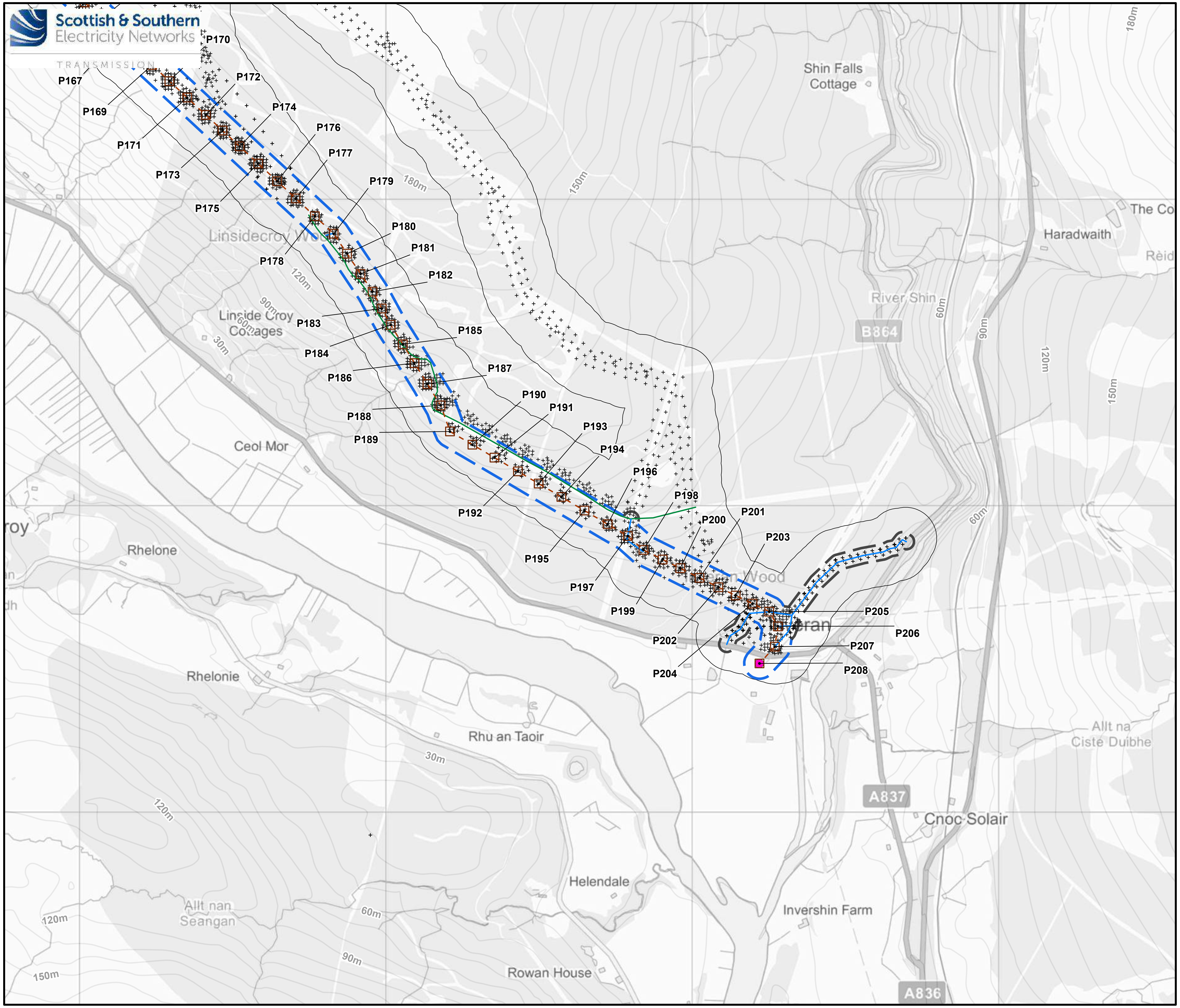
- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

N

0 250 500 Metres

Scale - 1:12,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.6e - Peat Depth Plan
Drawn by:	MM — Date: 03/04/2025
Drawing:	428.V64120.00001.0020.0



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location (Labelled as P with Pole Number)
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Pole Working Area
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development

- New - Permanent Access Track
- Temporary Access Track (Likely Trackway)
- Permanent and Temporary Access Track LoD (25m either side)

Consented Infrastructure

- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure

- Shin Substation
- Existing Tracks
- Peat Probe Location

Peat Depth (m)

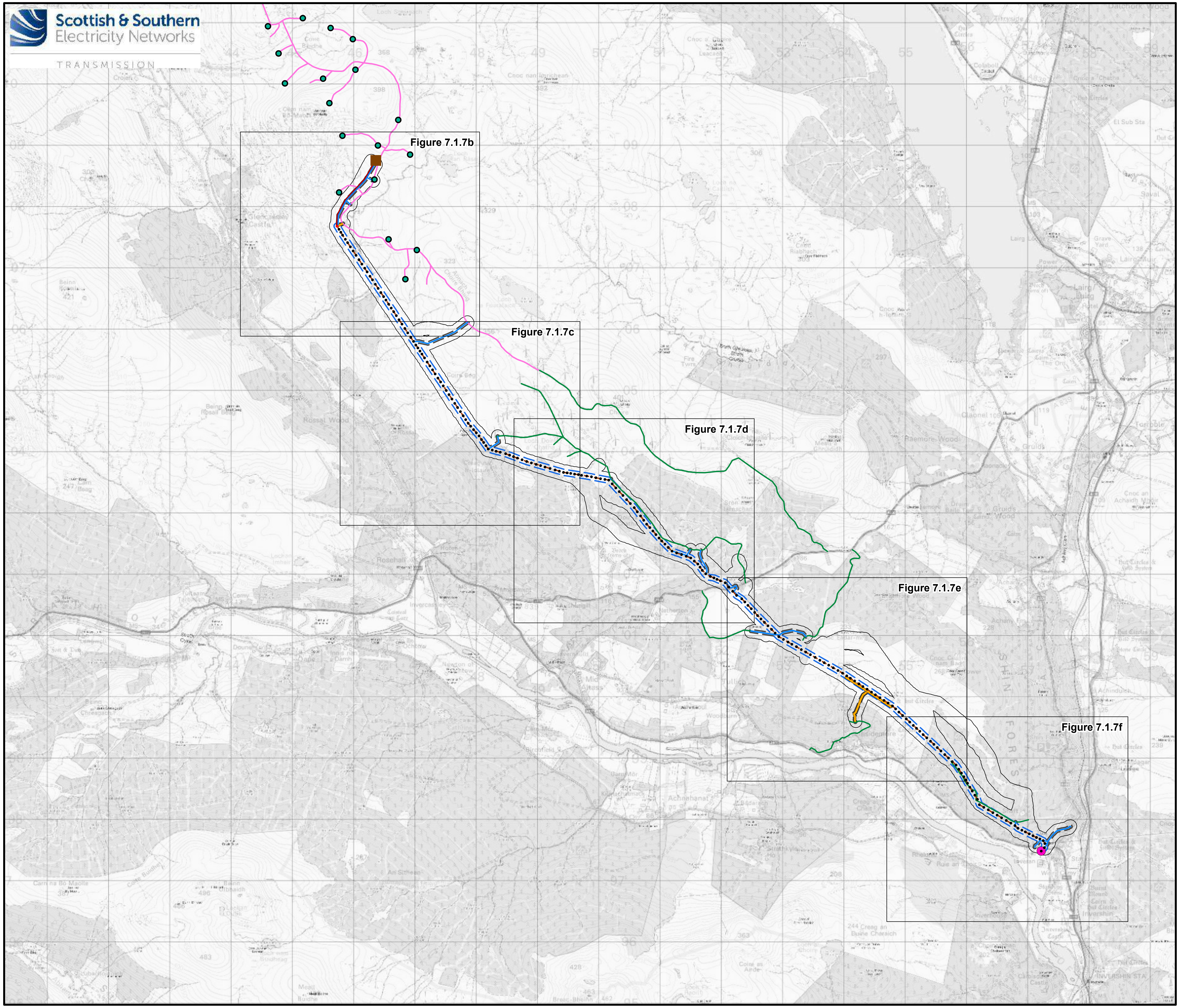
- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5

N

0 250 500 Metres

Scale - 1:12,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.6f - Peat Depth Plan
Drawn by:	MM
Date:	03/04/2025
Drawing:	428.V64120.00001.0020.0



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location (Labelled as P with Pole Number)
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development

- New - Permanent Access Track
- Temporary Access Track (Likely Trackway)
- Permanent and Temporary Access Track LoD (25m either side)

Consented Infrastructure

- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure

- Shin Substation
- Existing Tracks

Peat Depth (m)

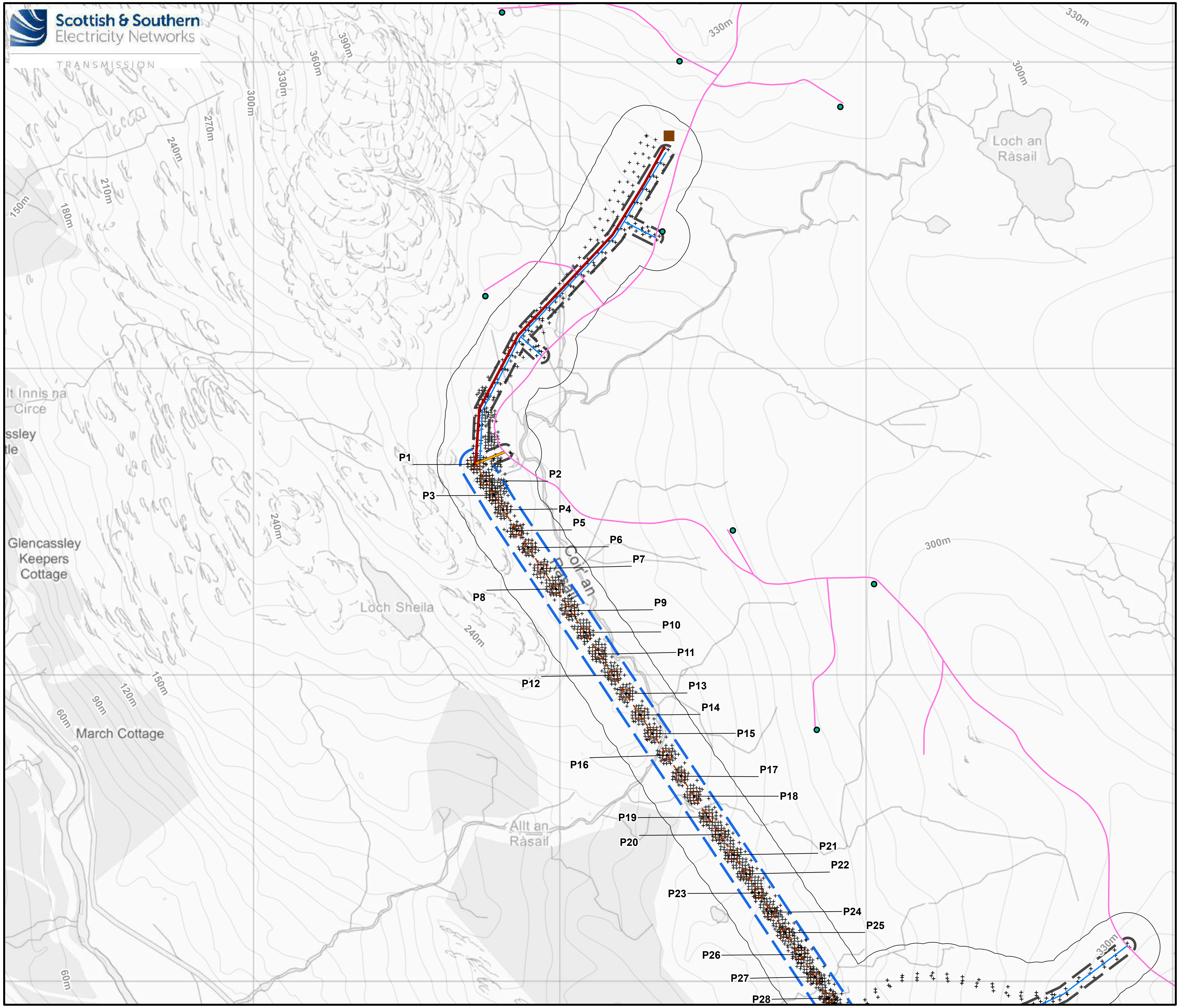
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

N

0 250 500 m

Scale - 1:60,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.7a - Peat Depth Over 0.5 m
Drawn by:	MM — Date: 03/04/2025
Drawing:	428.V64120.00001.0021.0



Legend

S.37 Overhead Line (OHL) Works
- Proposed Pole Location (Labelled as P with Pole Number)
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Pole Working Area
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development
- New - Permanent Access Track
- Temporary Access Track (Likely Trackway)
- Permanent and Temporary Access Track LoD (25m either side)

Consented Infrastructure
- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure
- Shin Substation
- Existing Tracks
- Peat Probe Location

Peat Depth (m)
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

N

0 250 500 Metres

Scale - 1:12,000 @ A3

Project: Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments

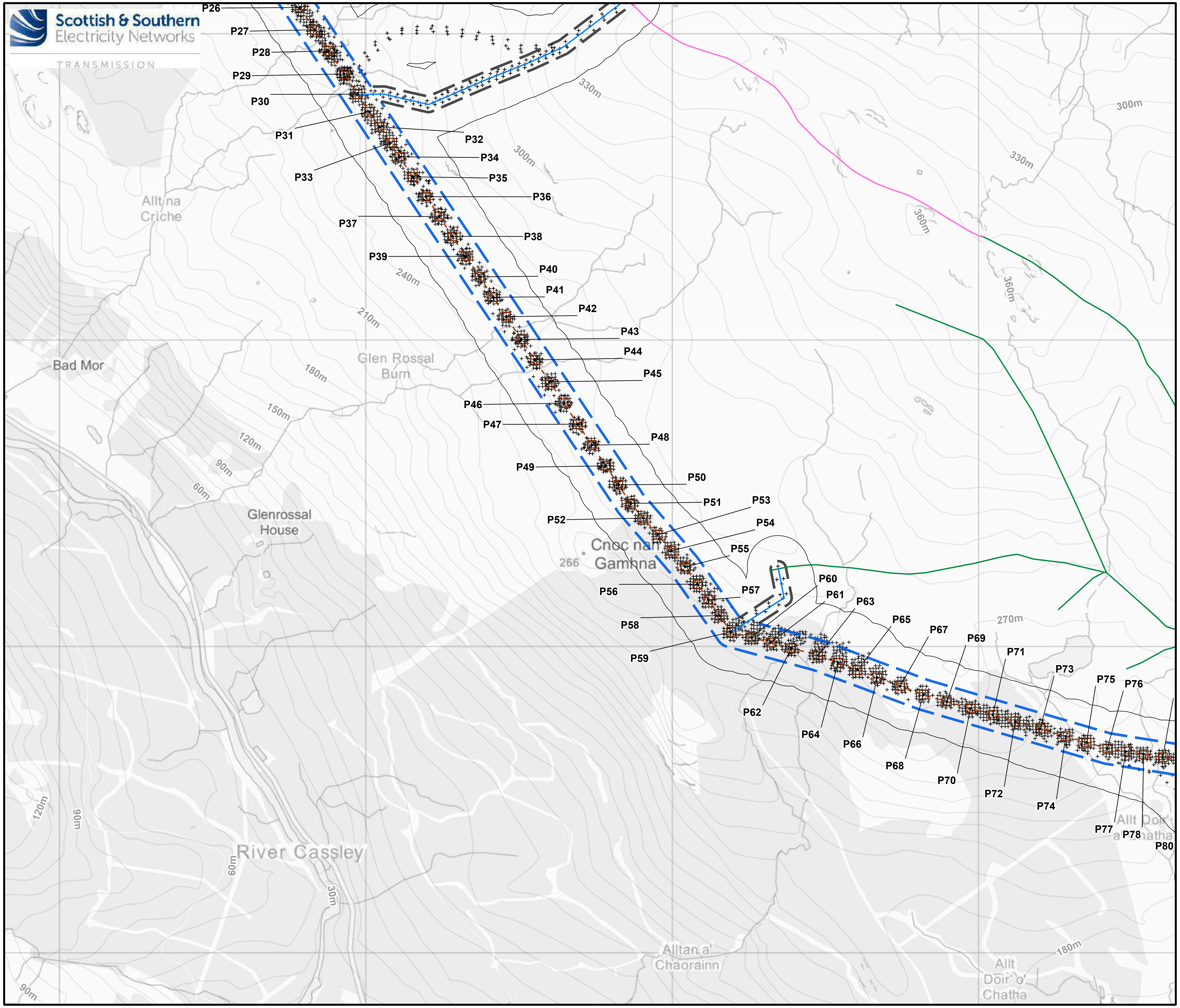
Title: Figure 7.1.7b - Peat Depth Over 0.5 m

Drawn by: MM

Date: 03/04/2025

Drawing: 428.V64120.00001.0021.0

Scottish & Southern Electricity Networks
TRANSMISSION



Legend

S.37 Overhead Line (OHL) Works
- Proposed Pole Location (Labelled as P with Pole Number)
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Pole Working Area
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development
- New - Permanent Access Track
- Temporary Access Track (Likely Trackway)
- Permanent and Temporary Access Track LoD (25m either side)

Consented Infrastructure
- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure
- Shin Substation
- Existing Tracks
- Peat Probe Location

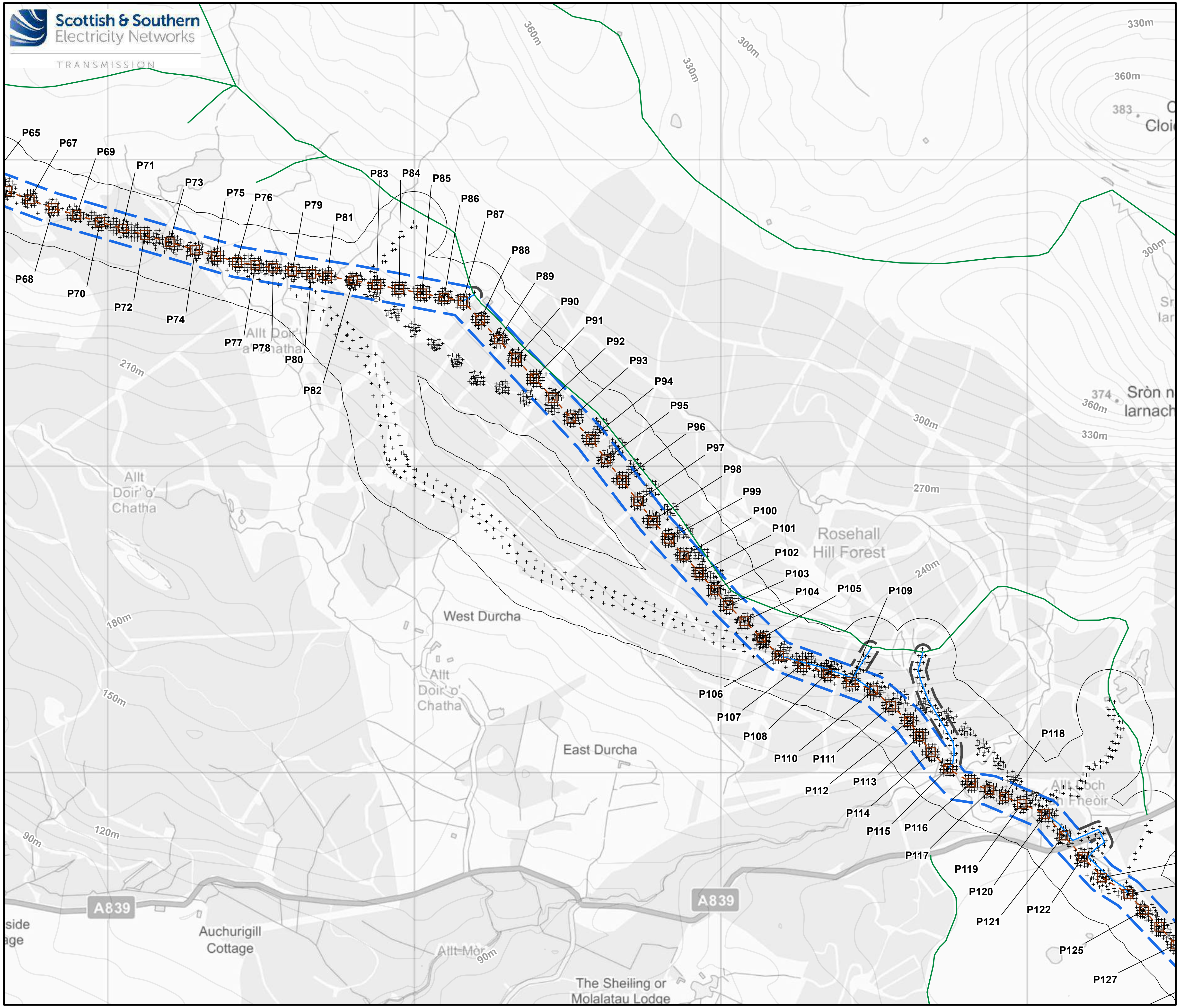
Peat Depth (m)
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

N

0 250 500 Metres

Scale - 1:12,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.7c - Peat Depth Over 0.5 m
Drawn by:	MM Date: 03/04/2025
Drawing:	428.V64120.00001.0021.0



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location (Labelled as P with Pole Number)
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Pole Working Area
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development

- New - Permanent Access Track
- Temporary Access Track (Likely Trackway)
- Permanent and Temporary Access Track LoD (25m either side)

Consented Infrastructure

- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure

- Shin Substation
- Existing Tracks
- Peat Probe Location

Peat Depth (m)

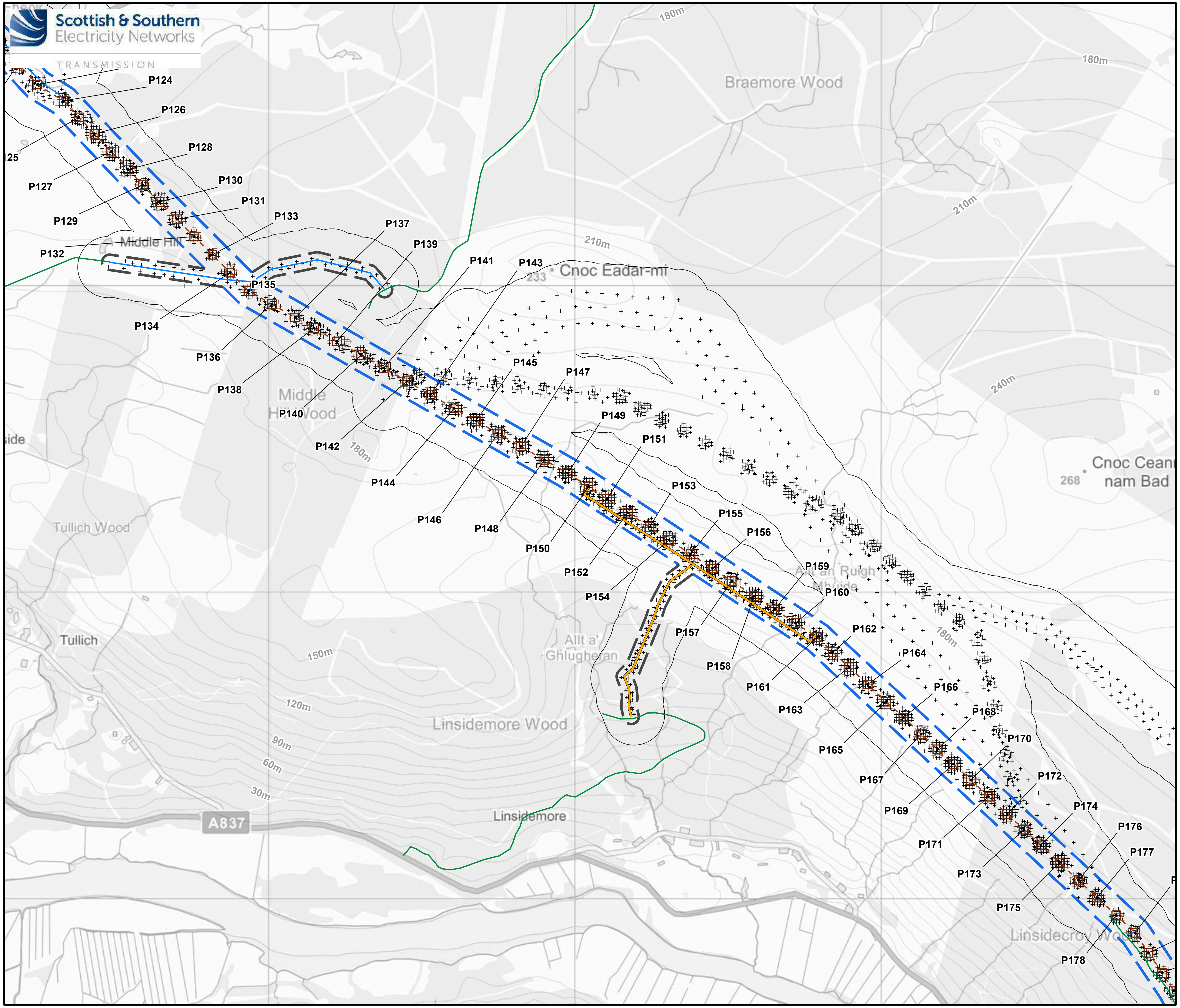
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

N

0 250 500 Metres

Scale - 1:12,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.7d - Peat Depth Over 0.5 m
Drawn by:	MM Date: 03/04/2025
Drawing:	428.V64120.00001.0021.0



Legend

S.37 Overhead Line (OHL) Works
- Proposed Pole Location (Labelled as P with Pole Number)
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Pole Working Area
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development
- New - Permanent Access Track
- Temporary Access Track (Likely Trackway)
- Permanent and Temporary Access Track LoD (25m either side)

Consented Infrastructure
- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure
- Shin Substation
- Existing Tracks
- Peat Probe Location

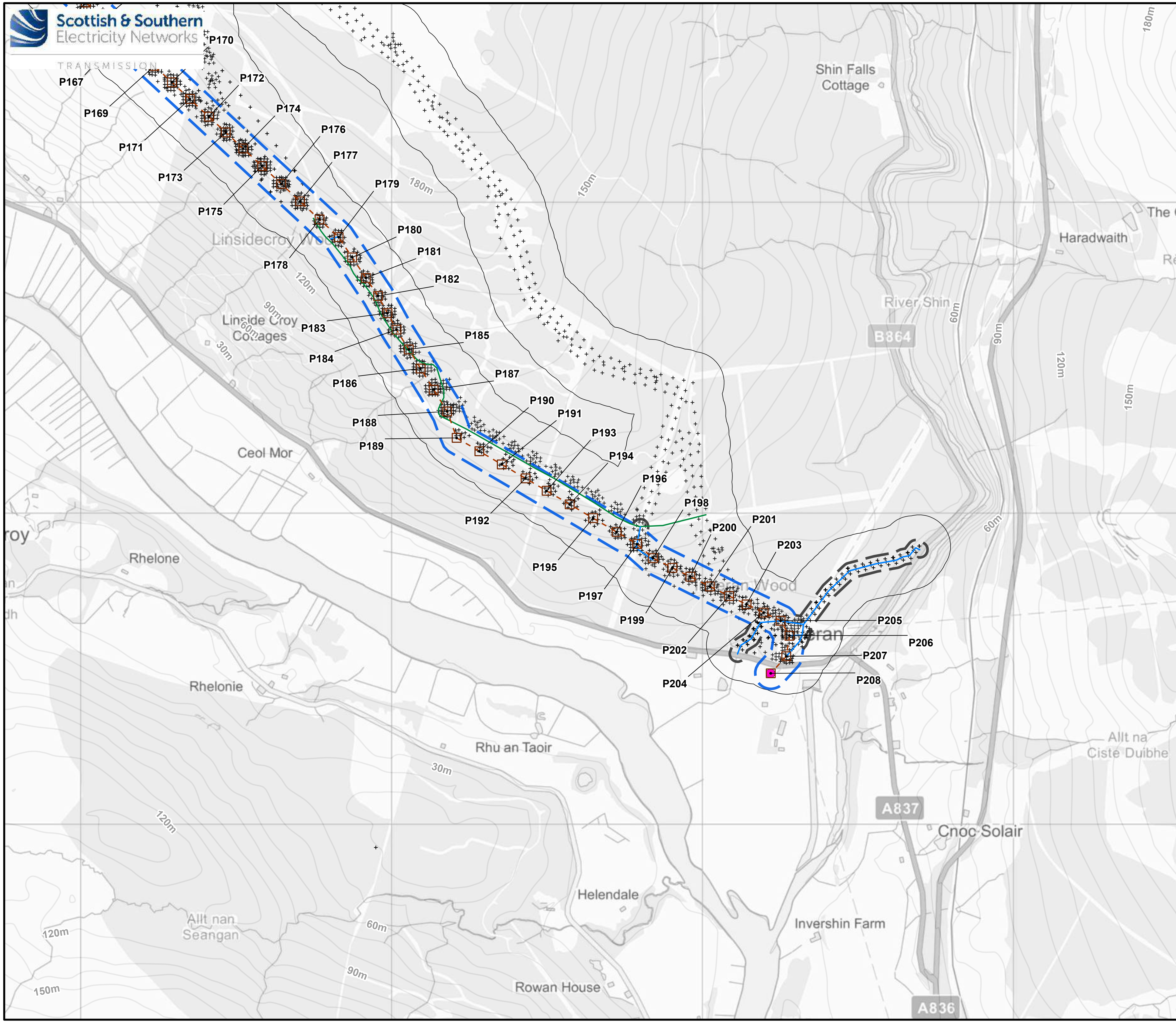
Peat Depth (m)
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

N

0 250 500 Metres

Scale - 1:12,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.7e - Peat Depth Over 0.5 m
Drawn by:	MM — Date: 03/04/2025
Drawing:	428.V64120.00001.0021.0



Legend

S.37 Overhead Line (OHL) Works

- Proposed Pole Location (Labelled as P with Pole Number)
- Proposed Cable Sealing End (CSE) Pole Structure Location
- Proposed Pole Working Area
- Proposed Overhead Line (OHL)
- Limit of Deviation (LoD) for Proposed OHL (50m either side)

Ancillary Development

- New - Permanent Access Track
- Temporary Access Track (Likely Trackway)
- Permanent and Temporary Access Track LoD (25m either side)

Consented Infrastructure

- Achany Wind Farm Extension Substation
- Achany Wind Farm Extension Turbines
- Achany Wind Farm Extension Access Track

Existing Infrastructure

- Shin Substation
- Existing Tracks
- Peat Probe Location

Peat Depth (m)

- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5

N

0 250 500 Metres

Scale - 1:12,000 @ A3

Project:	Achany Wind Farm Extension Grid Connection: Environmental Appraisal Peat Landslide Hazard & Risk Assessments
Title:	Figure 7.1.7f - Peat Depth Over 0.5 m
Drawn by:	MM
Date:	03/04/2025
Drawing:	428.V64120.00001.0021.0