

Volume 5: Appendix 13.4 – Outline Peat Management Plan (PMP)

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LIST OF ABBREVIATIONS

AOD: Above Ordnance Datum

BGS: British Geological Survey

BOP: Balance of Plant

ECoW: Environmental Clerk of Works

EIA: Environmental Impact Assessment

FLS: Forestry and Land Scotland

GE: Geotechnical Engineer

kV: Kilovolt

LOD: Limit of Deviation

OHL: Overhead Line

PLHRA: Peat Landslide Hazard and Risk Assessment

OPMP: Outline Peat Management Plan

SEPA: Scottish Environment Protection Agency

SuDS: Sustainable Drainage Systems

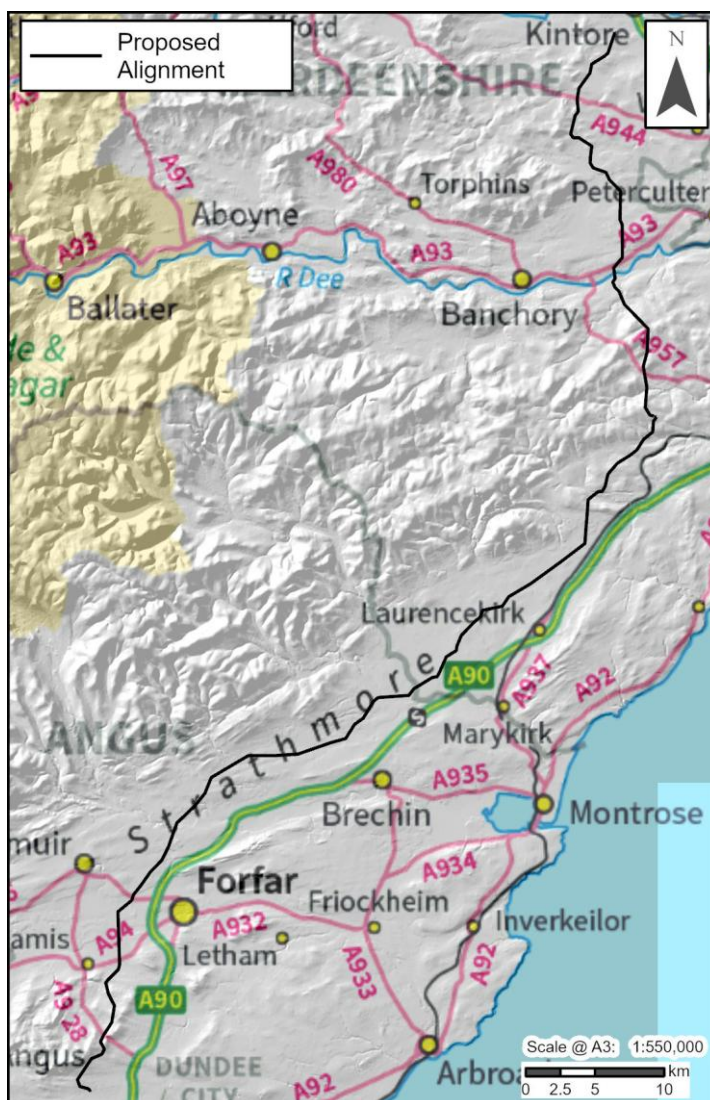
UK BAP: UK Biodiversity Action Plan

1 INTRODUCTION

1.1 Background

- 1.1.1 Scottish & Southern Electricity Networks (SSEN Transmission, the Applicant) is seeking Consent under Section 37 of the *Electricity Act 1989* and deemed planning permission under the *Town and Country Planning (Scotland) Act 1997* for construction of the Kintore to Tealing 400 kilovolt (kV) Overhead Transmission Line (OHL) from Aberdeenshire to Angus (hereafter the 'Proposed Development').
- 1.1.2 The Proposed Development comprises six sections (A to F) from a new proposed 400 kV substation known as Emmock, near Tealing in the south, to the existing Kintore Substation in the north. The Proposed Development is approximately 105.2 km in length, comprising double circuit 400 kV OHL supported by a combination of suspension and tension towers with associated workings to enable construction and access. A broad overview of the Proposed Alignment is shown on **Plate 13.4.1: Location of the Proposed Development** Please see **Volume 1, Chapter 3: Project Description** for full details of the Proposed Development.

Plate 13.4.1: Location of the Proposed Development



- 1.1.3 This draft Outline Peat Management Plan (PMP) follows guidance (Scottish Renewables & SEPA, 2012)¹ on the assessment of peat excavation and reuse for electricity infrastructure in Scotland. The outline PMP is informed by peat depth probing undertaken by Kaya Consulting Ltd and documented in **Volume 5, Appendix 13.3: Peat Depth Survey Report**.

¹ Scottish Renewables and Scottish Environmental Protection Agency, 2012. *Developments on Peatland: Guidance on the assessment of peat volumes, reuse of excavated peat and the minimisation of waste*. Version 1, January 2012. SR and SEPA Joint Publication, 23p.

1.2 Scope of Work

1.2.1 The scope of the PMP is as follows:

- identify the spatial scope of the PMP to ensure assessment is focused on sections of the route where there is likely to be overlap with peat;
- summarise the design principles adopted for the Proposed Development with respect to peat soils, including the approach to peat characterisation and the identification of opportunities taken to minimise impacts on peatlands within the Site;
- calculate the potential volumes of peat that may be excavated in association with construction, both acrotelmic and catotelmic peat;
- identify and justify reuse of acrotelmic and catotelmic peat where it cannot be reinstated at source; and
- identify good practice measures to ensure excavated peat is stored safely and with minimal loss of function prior to its reinstatement.

1.2.2 The PMP is informed by the advice issued in SEPA's Scoping Opinion response of 09 October 2024 (PCS-20003038).

1.3 Report Structure

1.3.1 This report is structured as follows:

- **Section 2** provides an outline of relevant guidance relating to the excavation, storage and reuse of peat.
- **Section 3** provides an overview of the Site and proposed infrastructure based on the scheme described in the main EIA chapters and on desk study review of site information; the section includes a description of the spatial scope of the assessment.
- **Section 4** describes the approach to and results of peat excavation calculations, and summarises opportunities for reuse of excavated peat soils within the Site.
- **Section 5** provides general good practice measures and measures specific to the conditions at the proposed site.

1.3.2 Where relevant information is available elsewhere in the Environmental Impact Assessment Report (EIAR), this is referenced in the text rather than repeated in this report.

2 CONTEXT TO PEAT MANAGEMENT

2.1 Peat as a Carbon Store

- 2.1.1 Priority peatland habitats comprise blanket bog, lowland raised bog, lowland fens, and part of the upland flushes, fens and swamps, as listed in the UK Biodiversity Action Plan (UK BAP). Blanket bog is the most widespread of these habitat types in Scotland, and therefore it is blanket bog that is usually of relevance for proposed developments/wind farms in upland areas.
- 2.1.2 Blanket bogs in the UK started forming in the early Holocene, with most UK bogs initiating prior to 6,000 years ago under cooler and wetter conditions than at present. Where bogs remain waterlogged and peat forming plant species persist, blanket bog is still considered to be actively forming and accumulating organic matter, and therefore can be considered a carbon sink. A bog that is not losing carbon/peat but is no longer accumulating organic matter can be considered a carbon store, and a degrading bog can be considered a carbon source (Mills et al, 2021)².
- 2.1.3 A peatland may change state between sink, store and source through natural processes or as a result of human activity. The purpose of the peat management plan is to avoid impacts on the peat carbon stores at infrastructure sites by avoiding peat, where possible, or by minimising impacts where peat cannot be avoided. Where there are opportunities to improve peat condition, eg through restoration, and in so doing, help convert carbon sources into stores or sinks, this may also be facilitated by the peat management plan.

2.2 Good Practice Guidance

- 2.2.1 Where peat is to be excavated in association with built infrastructure, it may be considered to be a waste product under the following legislation:
- *Environmental Protection Act 1990* (as amended);
 - *Landfill (Scotland) Regulations 2003* (as amended); and
 - *The Waste Management Licensing (Scotland) Regulations 2011*.
- 2.2.2 In order to address this legislation, a number of guidance documents have been issued to assist applicants in responsibly planning, installing and operating infrastructure in peatland settings. This PMP has been informed by this collective good practice, which includes the following documents:
- *Good Practice during Wind Farm Construction, Version 4* (Scottish Renewables, Scottish Natural Heritage, Scottish Environmental Protection Agency, Forestry Commission Scotland, 2019)³;
 - *Developments on Peat and Off-Site Uses of Waste Peat, WST-G-052* (SEPA, 2017)⁴;
 - *Peatland Survey. Guidance on Developments on Peatland* (Scottish Government, Scottish Natural Heritage and SEPA, 2017a)⁵;
 - *Peat Landslide Hazard and Risk Assessments, Best Practice Guide for Proposed Electricity Generation Developments* (Second Edition) (Scottish Government, 2017)⁶;
 - Carbon and Peatland 2016 Map (GIS) (Scottish Natural Heritage, 2016a)⁷;

² Mills AJ, Massey K and Trinick M, 2021. *Carbon-rich soils, deep peat and priority peatland habitat – A guide to project level assessment*. Natural Power, 39p.

³ Scottish Renewables, Scottish Natural Heritage, Scottish Environmental Protection Agency and Forestry Commission Scotland, 2019. *Good Practice during Wind Farm Construction, Version 4*.

⁴ SEPA, 2017. *SEPA Guidance – Developments on Peat and Off-Site Uses of Waste Peat – WST-G-052*. SEPA, 5p.

⁵ Scottish Government, Scottish Natural Heritage, SEPA, 2017. *Peatland Survey. Guidance on Developments on Peatland*, on-line version only, 18p.

⁶ Scottish Government, 2017. *Peat Landslide Hazard and Risk Assessments, Best Practice Guide for Proposed Electricity Generation Developments* (Second Edition). Scottish Government, 84p.

⁷ Scottish Natural Heritage, 2016a. Carbon and Peatland 2016 Map.

- *Carbon-rich Soils, Deep Peat and Priority Peatland Habitat Mapping, Consultation Analysis Report* (Scottish Natural Heritage, 2016b)⁸;
- *Scotland's National Peatland Plan - Working for our future* (Scottish Natural Heritage, 2015a)⁹;
- *Constructed Tracks in the Scottish Uplands, 2nd Edition* (Scottish Natural Heritage, 2015b)¹⁰;
- *Developments on Peatland: Guidance on the assessment of peat volumes, reuse of excavated peat and the minimisation of waste* (Scottish Renewables and SEPA, 2012)¹; and
- *Floating Roads on Peat - A Report into Good Practice in Design, Construction and Use of Floating Roads on Peat with particular reference to Wind Farm Developments in Scotland* (Scottish Natural Heritage and Forestry Commission Scotland, 2010)¹¹.

- 2.2.3 In general terms, the guidance considers appropriate activities to be undertaken at the planning (Environmental Impact Assessment), post-consent/pre-construction and construction stages. The overarching principles are generally the same across the different guidance documents and are set out below.
- 2.2.4 During planning (EIA):
- i. determine at a sufficient level of detail the distribution of peat within a site in order to assess the likely level of impact of proposed works;
 - ii. calculate the volumes of peat likely to be excavated during construction; and
 - iii. demonstrate how excavated peat will be managed (ii and iii together comprising an assessment of the "*peat and soil balance*").
- 2.2.5 These activities are normally considered within an outline PMP, delivered as part of the Environmental Impact Assessment at the planning stage.
- 2.2.6 Post-consent, during the pre-construction period:
- i. a refined peat and soil mass balance should be calculated through further site investigation works (including intrusive works such as detailed probing across final infrastructure footprints and/or trial pits to verify the nature of probed materials);
 - ii. further detailed topographic survey and design level excavation, storage and reuse plans should be drafted to enable contractors to bid for and implement the works; and
 - iii. key good practice measures should be identified within the PMP that integrate with other related plans or control documents for construction, including, where applicable, the Construction and Decommissioning Environmental Management Plan, Site Waste Management Plan, Habitat Management Plan (where relevant) and Geotechnical Risk Register.
- 2.2.7 During the construction stage:
- i. utilise micro-siting to optimise infrastructure locations relative to final pre-construction information gathered on-site;
 - ii. monitor, adjust and implement the PMP to accommodate deviations in expected peat volumes and adapt reuse measures to actual site volumes; and
 - iii. set-up monitoring programmes to identify the new post-construction baseline and provide a basis for monitoring the success of the PMP and identify appropriate mitigation where necessary.
- 2.2.8 Through the different stages of the project, the strategy should be to prevent disturbance to and losses of peat through appropriate reuse, wherever possible.

⁸ Scottish Natural Heritage, 2016b. *Carbon-rich Soils, Deep Peat and Priority Peatland Habitat Mapping, Consultation Analysis Report*. Scottish Natural Heritage, 20p.

⁹ Scottish Natural Heritage, 2015a. *Scotland's National Peatland Plan – Working for our future*. Scottish Natural Heritage, 52p.

¹⁰ Scottish Natural Heritage, 2015b. *Constructed Tracks in the Scottish Uplands, 2nd Edition*. Land Use Consultants, 147p.

¹¹ Scottish Natural Heritage and Forestry Commission Scotland, 2010. *Floating Roads on Peat - A Report into Good Practice in Design, Construction and Use of Floating Roads on Peat with particular reference to Wind Farm Developments in Scotland*, 82p.

2.3 Approach for Kintore to Tealing 400 kV OHL

2.3.1 The strategy for peat management for the Proposed Development follows SEPA's guidance for developments on peat and uses of waste peat (SEPA, 2017)⁴ and aligns with *National Planning Framework 4*¹², Soils, Policy 5 in employing the mitigation hierarchy with respect to carbon-rich soils and peatlands. The hierarchy is as follows:

- **avoid** the creation of waste peat by avoiding overlap of infrastructure with peat entirely, where possible given other site and design constraints that may influence tower locations and associated infrastructure;
- **minimise** the creation of waste peat by siting infrastructure on the shallowest peat;
- **reuse** peat on-site in construction, reinstatement or in **restoration** (restoring off-site will require environmental authorisation); and
- **offset** for unavoidable impacts by compensating through habitat restoration, ideally within site, or where not possible to do so, as close to Site as is possible.

2.3.2 Disposal of peat (ie export from the site as waste) is no longer considered an acceptable outcome for materials generated during construction.

2.3.3 For the Kintore to Tealing 400 kV OHL, a combination of prevention, reuse and restoration has formed the peat management strategy. Outline details of this strategy are provided below, and full detail of excavation, reuse and restoration proposals are provided in **Section 4**.

2.4 Prevent

2.4.1 Prevention involves minimising the amount of peat excavated during construction by informed layout planning. The extent to which this is possible is not just a function of the amount of peat on-site, but also of the presence of other constraints (eg landscape and visual impacts, hydrology, terrestrial ecology) and the practical requirements of construction (eg tower spacings and access requirements).

2.4.2 Peat is relatively limited in extent along the route of the Proposed Development, and therefore efforts have been made to minimise overlap as far as possible. This has resulted in:

- Two out of 300 towers having overlap with peat (ie probed depths >0.5 m); and
- minimal overlap of ancillary and temporary infrastructure with peat, with c. 400 m of temporary (floating) access track overlapping peat areas (the majority of which is in afforested peatland).

2.4.3 As a result of careful layout design, the Proposed Development avoids excavation of peat over most of its footprint.

2.5 Reuse

2.5.1 The primary reuse strategy for peat management is to reinstate temporarily excavated peat in temporary excavation footprints (tower working areas).

2.5.2 Reinstatement approaches are derived from the *Good Practice Guidance* detailed in **Section 2.2** and from wider good practice approaches developed as part of (primarily) wind farm construction over the last few years. This is considered in further detail in **Section 4**.

2.6 Restore

2.6.1 All permanently excavated peat will be used to restore afforested peatland adjacent to the two tower locations that overlap peat (N77, N78) and in an area affected by crossing scaffold that is to be erected over an existing forestry track. The restoration proposals utilise a shallow translocation technique being applied on ongoing forest-to-bog restoration work taking place at an in-construction wind farm site on the FLS estate elsewhere in Scotland.

¹² Scottish Government (2023) National Planning Framework 4 (NPF4) [online]. Available at: <https://www.gov.scot/publications/national-planning-framework-4/documents/> [Accessed: 20 May 2025].

2.7 Disposal

2.7.1 There are no proposals to dispose of peat as part of the Proposed Development.

3 BASELINE CONDITIONS

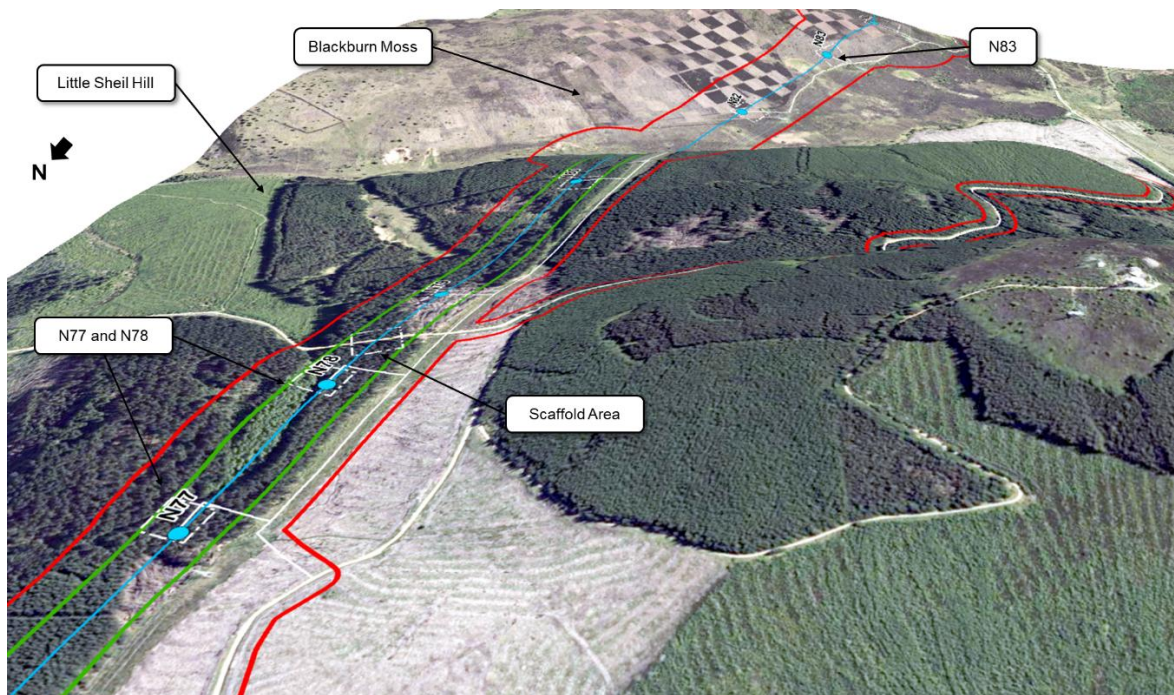
3.1 Spatial Scope of Assessment

- 3.1.1 Given the extent of OHL developments and the numerous land holdings traversed by this type of scheme, many of which are outside peatland areas, an initial screening exercise was undertaken to identify areas with the potential to contain peat with the intent to probe and verify its presence, or scope sections of the route out for assessment of impact.
- 3.1.2 The following data sources were used for the screening exercise:
- **The Carbon and Peatland (SNH, 2016) Map** – this provides a high level overview of the likely presence of peat (soil) and peatland vegetation in a series of Classes (from 1 to 5 plus additional ‘non peat’ classes).
 - **BGS Superficial Geology data** – this provides an interpretation of the superficial geology for the full extent of the UK, peat being one of the categories in the dataset.
 - **Satellite imagery** – some textures and landscape characteristics are typically associated with peatland (eg peatland erosion features, specific tones and textures associated with characteristic peatland vegetation, patterns associated with land management such as burning and drains).
- 3.1.3 The screening exercise was used to focus Phase 1 peat depth probing in areas where peat was indicated to be present by these datasets. Where probing confirmed the presence of peat, additional infrastructure-specific probing was undertaken to fully characterise the depth and distribution of peat in these areas.
- 3.1.4 **Figure A13.4.1: Screening of Peat Over OHL Route** shows the Carbon and Peatland (2016) Map, the OHL Limit of Deviation (LOD) and tower positions. Sections of the route subject to Phase 1 surveys are highlighted. Based on the screening exercise:
- Section A has no peat and is therefore outside the scope of assessment.
 - Section B has no peat and is therefore outside the scope of assessment.
 - Section C has no peat and is therefore outside the scope of assessment.
 - Section D has no peat and is therefore outside the scope of assessment.
 - Section E has no peat between Hurlie and Slug Road, but peat of up to 4.0 m between Slug Road and Meikledams, and therefore is assessed.
 - Section F has localised peat, but away from infrastructure and is therefore outside the scope of assessment.
- 3.1.5 Peat depth probing in Section E confirmed the presence of peat at a subset of tower locations (N77, N78, and very locally at N83). For the purposes of this assessment, the area between towers N77 and N83 is considered to be the study area.

3.2 Site Overview (Study Area Only)

- 3.2.1 The OHL section between Tower N77 and N83 lies on mainly east facing afforested hillslopes at elevations of between 210 and 270 m AOD. Where the OHL exits the treeline between N81 and N82, the hillside faces west in the vicinity of Craigneil and Blackburn Moss. Slope angles are relatively subdued, typically less than 7.5° other than at Towers N81 and N83 where slope angles increase slightly. The first two panels of **Figure A13.4.2: Elevation, Slope, Geology and Peat Depth** show elevation and slope angle for the study area.
- 3.2.2 The BGS superficial geology layer for this section shows peat to be present between Towers N77 and N83 (third panel on **Figure A13.4.2: Elevation, Slope, Geology and Peat Depth**). Bedrock geology comprises Water of Dye granite. The Carbon and Peatland (2016) Map shows Class 5 soils in this area. This class is typically used in afforested peatland areas to indicate the presence of peat soils without characteristic peatland vegetation.

Plate 13.4.2: 3D Perspective View of Study Area Showing Key Features



3.2.3 Satellite imagery shows commercial plantation between Towers N77 and N81, with burned/managed open moorland south of N81 to N83. There are no features of geomorphological interest in relation to peat in this area.

3.3 Peat Depth

3.3.1 A peat depth survey report (**Volume 5, Appendix 13.3: Peat Depth Survey Report**) summarises peat deposits across the full probed extent of the OHL route. Probing was undertaken on a 10 m grid within tower working areas and on a coarser modified Phase 1 grid of 100 m along the centreline axis with 50 m intervals from the centreline out to the limit of deviation (see **Figure A13.4.2: Elevation, Slope, Geology and Peat Depth**, fourth panel).

3.3.2 In summary:

- peat is generally thin to absent over much of this section of the OHL;
- locally, immediately to the north and partially overlapping the N77 working area, peat reaches up to 2.0 m in depth within a topographic hollow facing east towards Strans Burn;
- a second isolated pocket of peat is present to the west of the unnamed summit adjacent to Tower N78 – peat is up to 2.0 m in depth at the margin of the tower and working area; and
- Towers N79 to N82 are not located in peat.

3.3.3 Another small area of peat is present to the northwest of Tower N83, with small patches of peat within the working area. The recorded depths are on the margin between carbon-rich soil and peat (c. 0.5 m) and are likely to be avoidable by micro-siting only a short distance. Therefore, there is no further consideration of N83 within this outline PMP.

3.3.4 No amorphous peat was recorded.

3.4 Peat Geomorphology and Condition

3.4.1 The peat survey report indicates that all peatland within the route (including areas outside the study area) is modified and that there is no 'near natural' peatland along the route alignment. There are no features of geomorphological interest within the study area and no opportunities to use translocated peat materials to repair erosion features.

3.5 Land Use and Drainage

- 3.5.1 The study area comprises commercial forestry plantation and associated forest roads, while the southern section immediately outside the forest comprises managed moorland which has been subject to burning or mowing to manage vegetation. Artificial drainage is limited within the forest cover.
- 3.5.2 The upper peat surface is ploughed prior to planting in order to create a ridge and furrow topography, the ridges becoming the planting locations for trees and the furrows acting to direct water away from the drying ridges, making them more suited to tree growth. With time the ridges become irreversibly dried.
- 3.5.3 Interception of rainfall by trees and uptake of water by roots may act to dewater the peat further, sometimes including furrow areas. Leaf litter and brash may crowd out any surface vegetation that remains, producing a barren understorey and as a result, peatland underlying commercial forestry is typically devoid of peatland species, or what little bog vegetation remains is of poor quality.

4 PEAT EXCAVATION AND STORAGE

4.1 Terminology

4.1.1 Within this appendix, the following terms are used:

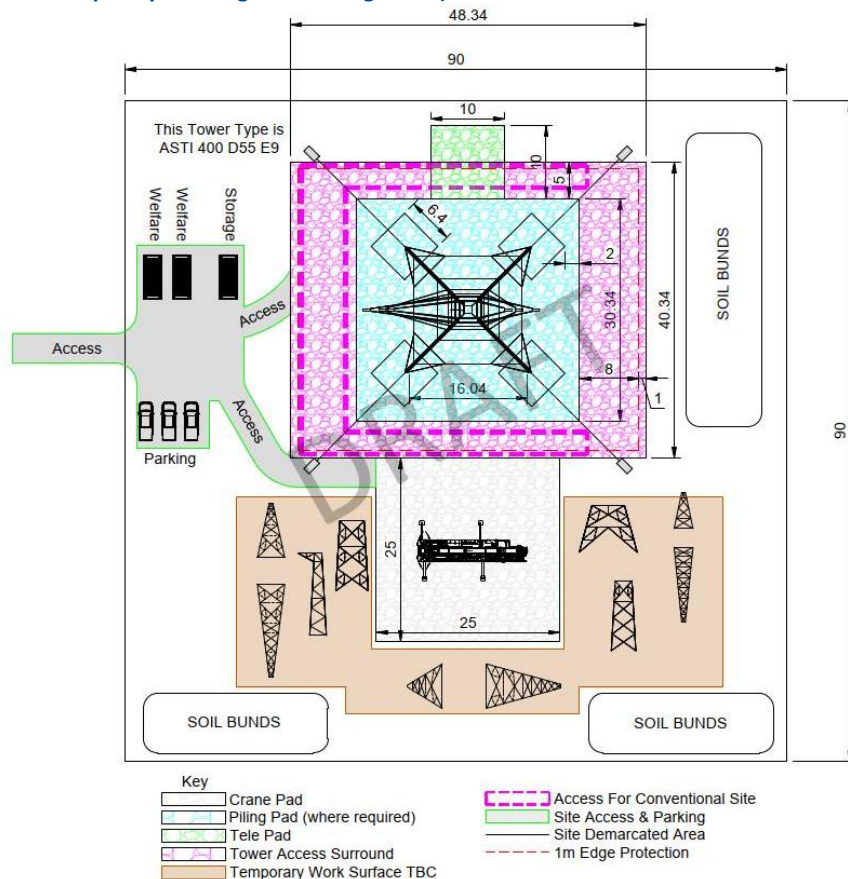
- **permanently excavated:** peat will be permanently removed from the infrastructure footprint, stored locally and reused elsewhere;
- **temporarily excavated:** peat will be temporarily removed from the infrastructure footprint, stored locally and fully reinstated at the point of excavation post-construction;
- **landscaping:** the process of using peat to 'dress' the boundaries of infrastructure; and
- **restoration:** the use of excavated materials to improve the quality of land areas that are considered degraded through mechanisms other than associated construction (eg through erosion or forestry); the term is not used to describe reinstatement activities at infrastructure.

4.1.2 The sections below consider the approach to excavation calculations for infrastructure due to be constructed in peatland areas.

4.2 Types of Infrastructure

4.2.1 Within the area identified as having peat soil and therefore potential excavation and associated impacts, towers, ancillary infrastructure and access tracks are required to enable construction. At the pre-consent stage, layout design comprises a tower location, indicative working area (based on a standardised 60 m x 60 m footprint) and indicative access track alignments. Within the indicative working area, a typical construction layout has been defined, shown on **Plate 13.4.3: Illustrative image of tower foundation construction (reproduced from Volume 1, Chapter 3: Project Description, Plate 3.3: Indicative Temporary Working Area)**. The base dimensions vary by tower type (detailed in **Volume 5, Appendix 3.1: Tower Schedule**).

Plate 13.4.3: Illustrative image of tower foundation construction (reproduced from Volume 1, Chapter 3: Project Description, Plate 3.3: Indicative Temporary Working Area Arrangement) *



*note the footprint is for a larger working area than the 60 m x 60 m for the towers being assessed

4.2.2 Each tower has four legs. Three design scenarios were considered:

1. a mini-pile solution with pile cap;
 2. a pad and column solution; and
 3. a concrete block foundation.
- 4.2.3 Scenario 1 considered piled foundations for each leg, with a pile cap of up to 6.0 x 6.0 m above the ground surface of up to 2 m thickness. The pile caps would sit atop 12 mini-piles (of 0.15 to 0.30 m diameter) at each leg (see **Volume 1, Chapter 3: Project Description, Section 3.8: Typical Construction Activities for Overhead Line Infrastructure** for more detail). This scenario was discounted due to the need to construct a working surface for the piling rig, which would involve stripping of peat, thereby negating the benefits of a piled foundation.
- 4.2.4 Scenario 2 considered the use of a concrete pad with column foundation. The pad would be set within the shallow substrate below the peat, and the column within the peat horizon (following excavation of peat). The column was initially estimated to be c. 1 m x 1 m in cross-section to support the leg, with peat being reinstated around the column, minimising permanent displacement. This scenario was discounted due to concerns about the lack of lateral stability offered by peat as a fill material once reinstated over the pad. Options for wider columns with less requirement for support from the surrounding peat soils have not been investigated as of yet.
- 4.2.5 Scenario 3 considered the use of a 7.3 m x 7.3 m concrete block for each leg, involving full excavation and permanent displacement of peat. This option is the preferred option as it provides the required stability, ensuring a safe working area can be achieved.
- 4.2.6 For all options, a crane would be required to assemble the tower, with temporary crane pad construction involving full excavation of all peat and soil underlying the proposed footprint and replacement with crushed stone, geogrid and geotextiles to provide a level and stable base. Further detail on construction is provided in **Volume 1, Chapter 3: Project Description, Section 3.8: Typical Construction Activities for Overhead Line Infrastructure**.
- 4.2.7 Additional working areas around the foundations and crane pad may not require excavation but may require clearance and placement of geotextile to support equipment laydown and storage, vehicle parking and temporary soil storage.
- 4.2.8 Access tracks within areas of peat (>0.5 m) and deeper carbon-rich soils (0.3 - 0.5 m) may be of floating construction (subject to design validation following ground investigation) and therefore would involve no excavation. Were temporary excavation to be required, excavated soils would be stored and reinstated immediately after construction.
- 4.2.9 All of these infrastructure elements sit within the wider LOD for the scheme, permission being sought for:
- **suspension towers:** up to 100 m horizontal deviation to either side of the alignment centre line (towers could move up to 55 m);
 - **tension towers:** up to a 200 m radius of horizontal deviation around the tower position (towers could move up to 100 m);
 - **new temporary or permanent access tracks:** up to 100 m to either side of the track centre line; and
 - **upgraded tracks:** up to 25 m deviation from the existing track centre line.
- 4.2.10 Further detail is provided in **Volume 1, Chapter 3: Project Description, Section 3.4: Associated Works**. Micrositing within the LOD therefore has the potential to change peat impacts. As set out in **Volume 1, Chapter 3: Project Description**, prior to any change being made to the Proposed Development within the LOD, a change control process would be undertaken to ensure that there is no unacceptable increase in adverse impacts as a result of the change.

4.3 Excavation Calculations

- 4.3.1 For each infrastructure item, the upper 0.3 m of the peat profile is assumed to be acrotelm and any remaining depth is assumed to be catotelm. A 0.3 m thickness of turf and underlying peat is a sufficiently thick continuous layer to avoid damaging the roots of the excavated vegetation and provide a coherent 'turf' to relay.
- 4.3.2 Soils less than 0.5 m in depth are assumed to be organic (or other) soils other than peat and are classed as 'soil' for the purposes of this assessment.

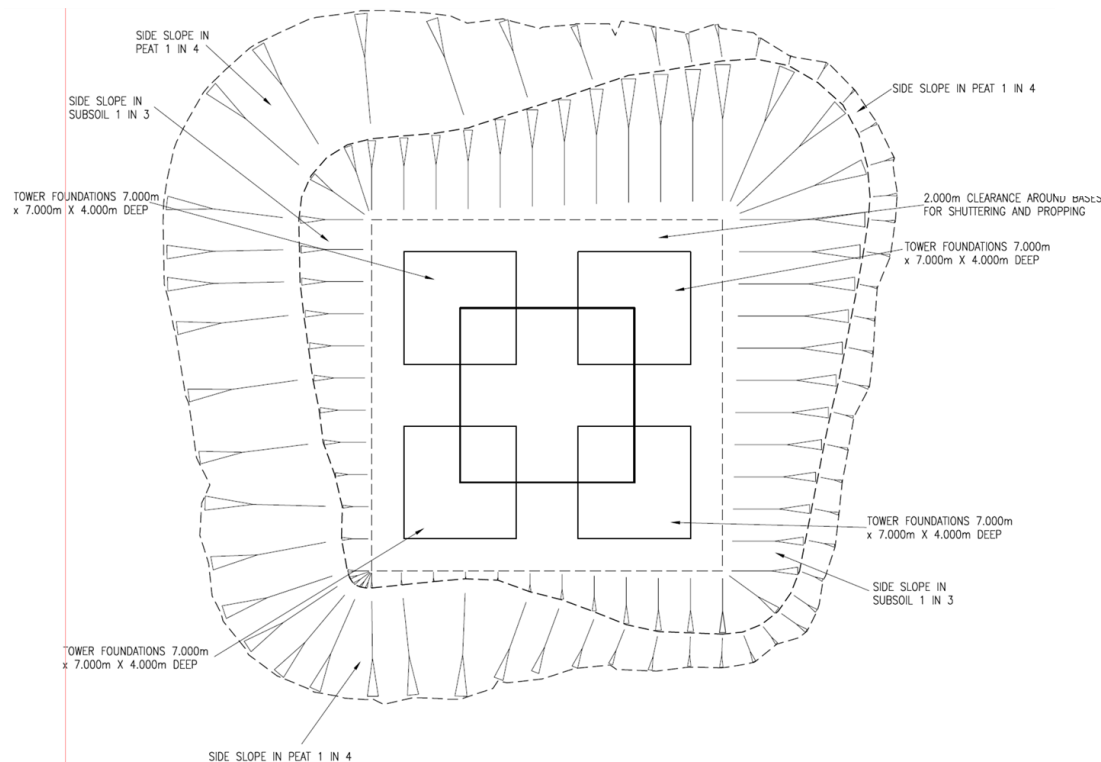
Foundations

- 4.3.3 Under scenario 3, all peat within the footprints of the concrete block foundations will be permanently excavated and must be reused elsewhere.

Temporary working areas

- 4.3.4 The temporary working areas comprise an immediate work area footprint with a 1:4 sideslope in peat and 1:3 sideslope in underlying subsoil around a clearance area centred on the concrete blocks at each tower. Typically, the excavated sideslopes would require extraction of peat in the former area and extraction of peat and soil in the latter. As a precautionary principle, given that this excavation is temporary, all peat within the combined footprint has been calculated as temporary excavation, other than that within the concrete foundation footprints (4 no. 7.3 m x 7.3 m foundations). An example schematic is shown in **Plate 13.4.4: Example Tower-Specific Design for N78** below.

Plate 13.4.4: Example Tower-Specific Design for N78



- 4.3.5 In addition to the immediate work area, within which the crane hardstanding may be located, a wider temporary working area will require excavation to enable formation of a crane pad, parking, component storage and soil storage. This area is estimated at c. 60 m x 60 m in dimensions. All peat and soil temporarily excavated from the working area footprint will be stored locally and directly reinstated thereafter (with no permanent loss).

Temporary access

- 4.3.6 Temporary access tracks will be of floating construction, and no excavation is required, therefore no calculation has been undertaken.

Calculated volumes

Table 13.4.1: Peat Excavation Volumes for Scenario 3 shows peat and soil excavation volumes for Towers N77 and N78 based on permanent excavation of all peat underlying each tower leg within the footprint of the concrete foundation (7.3 m x 7.3 m footprint for each leg).

Table 13.4.1: Peat Excavation Volumes for Scenario 3

			Excavation Volume (m3)			
Description		Type	Acrotelm	Catotelm	Soil	Total Peat
N77	Inter-foundation clearance area	Temporary	99	452	0	551
	Foundation NE	Permanent	15	73	0	88

			Excavation Volume (m3)			
	Foundation NW	Permanent	15	95	0	110
	Foundation SE	Permanent	15	51	0	66
	Foundation SW	Permanent	15	57	0	72
	Temporary working area	Temporary	256	358	518	614
	Sideslope in peat (1:4)	Temporary	193	858	43	1,051
	Sideslope in peat and soil (1:3)	Temporary	151	486	78	637
N78	Inter-foundation clearance area	Temporary	90	283	22	373
	Foundation NE	Permanent	15	17	2	31
	Foundation NW	Permanent	16	75	0	91
	Foundation SE	Permanent	14	19	3	33
	Foundation SW	Permanent	16	84	0	100
	Temporary working area	Temporary	146	605	575	752
	Sideslope in peat (1:4)	Temporary	182	970	34	1,152
	Sideslope in peat and soil (1:3)	Temporary	89	328	105	417
Total permanent			122	470	5	592
Total temporary			1,192	4,323	1,374	5,515
Grand total			1,314	4,792	1,378	6,106

- 4.3.7 Under this scenario a total of c. 6,106 m³ of peat will be displaced, of which c. 5,515 m³ will be temporarily excavated and c. 592 m³ will require reuse elsewhere.

4.4 Reuse

- 4.4.1 Excavated peat will be reused in two ways:

1. reinstatement of temporary excavations for infrastructure; and
2. restoration of felled plantation forestry over peat soils.

- 4.4.2 The following sections describe these reuse opportunities.

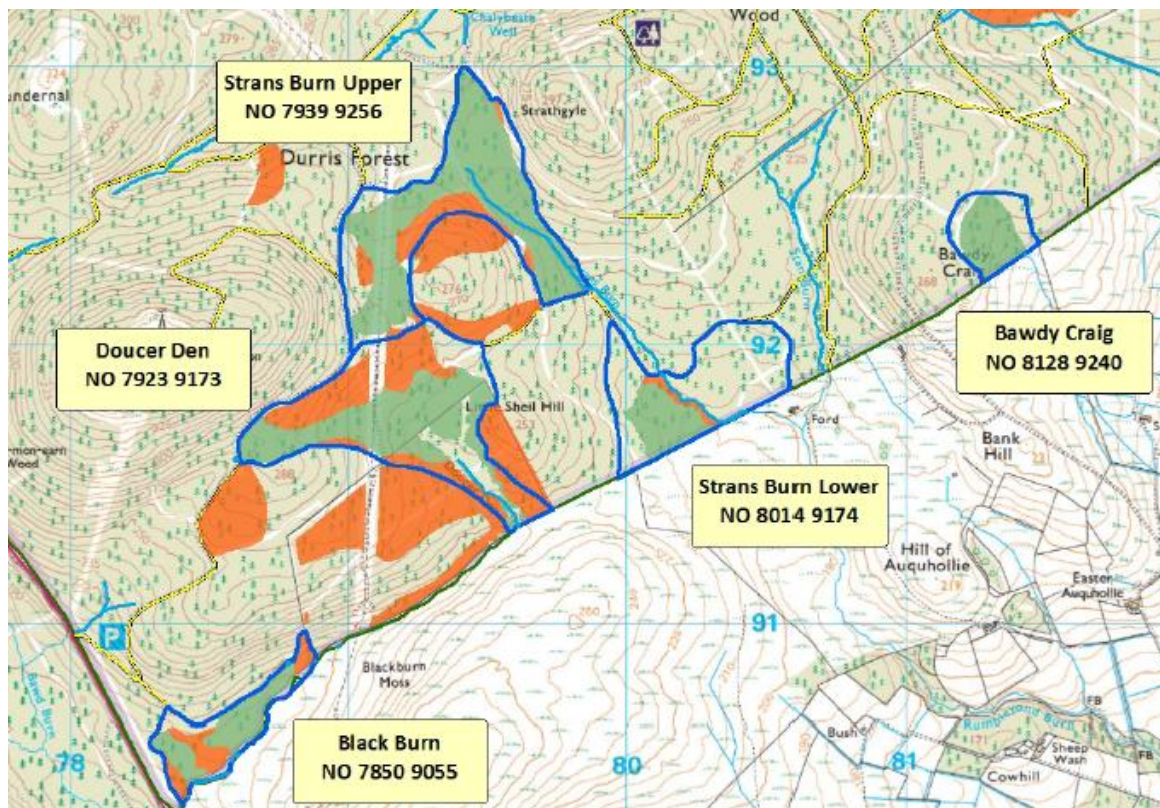
Reinstatement of temporary infrastructure and temporary working areas

- 4.4.3 Only temporary infrastructure and temporary working areas will be fully reinstated. Peat temporarily excavated from the footprints of these infrastructure components will be stored locally, with catotelmic (basal) and acrotelmic (upper) peat stored separately. Acrotelmic peat is often heavily disrupted by forestry activity, and may be difficult to extract in coherent turves during stripping, however, it still remains a more viable seedbank than catotelmic peat, and even if fragmented during extraction should be laid over the catotelmic peat to best encourage revegetation.
- 4.4.4 Under the proposals, only the crane hardstandings and wider working areas are anticipated to be temporary infrastructure. If, following ground investigations and post-consent detailed design, additional temporary infrastructure is required (such as cut & fill temporary access tracks instead of floating lengths), the same principle of separate stripping, storage and reinstatement of acrotelmic and catotelmic peat should be adopted. There would be no further implications for the peat mass balance, only a change in the quantity of temporary displacement.
- 4.4.5 If following post-consent ground investigation some lengths of floating track are discounted and must be replaced with permanent track, similar principles will apply with regard to stripping and storage of peat, however, this would generate a peat surplus that would require a robust plan to accommodate. It is recommended that any revisions to the peat balance following GI and detailed design, and any implications for reuse (including in additional areas yet to be identified) are clarified and agreed prior to any construction commencing, in order to ensure that a satisfactory outcome is identified for displaced peat soils.

Restoration

- 4.4.6 It is assumed that all peat under each 7.3 m x 7.3 m leg foundation footprint will be permanently excavated. The total volume of permanently excavated peat is estimated to be 592 m³, which is small in total in comparison to many infrastructure schemes developed in peatland areas. It is recommended that this peat is used locally to improve the surface condition of peat underlying felled areas of the existing conifer plantation. Felled areas are likely to retain their ridge and furrow surface morphology following felling, and without remedial work, ridges will continue to dry out and oxidise.
- 4.4.7 Following discussion with FLS, an opportunity has been identified to support objectives of the Durris (Forest) Land Management Plan (LMP) 2024-2034 by reusing peat adjacent to the Proposed Development in areas where it has the potential to deliver the best outcomes for peatland in proximity to the Proposed Development. Restoration proposals will be subject to agreement but it is proposed that the following areas are used:
- Strans Burn Upper Peatland Restoration Area – north of Tower N77; and
 - Strans Burn Upper Peatland Restoration Area – north of Tower N78.
- 4.4.8 These locations are overlapped by the LOD and will therefore be directly accessible from temporary infrastructure proposed to access the OHL during construction. They are therefore also local to the peat being excavated, minimising transport distance and providing opportunity for direct (single handled) transfer to its point of end use. An excerpt of the LMP with Strans Burn Upper annotated is shown on **Plate 13.4.5: Strans Burn Upper restoration area (excerpt of Figure E.6: Assessed Peatland Restore and Restock Map), the Proposed Development alignment runs alongside the existing OHL (hashed line extending north from Blackburn Moss below.**

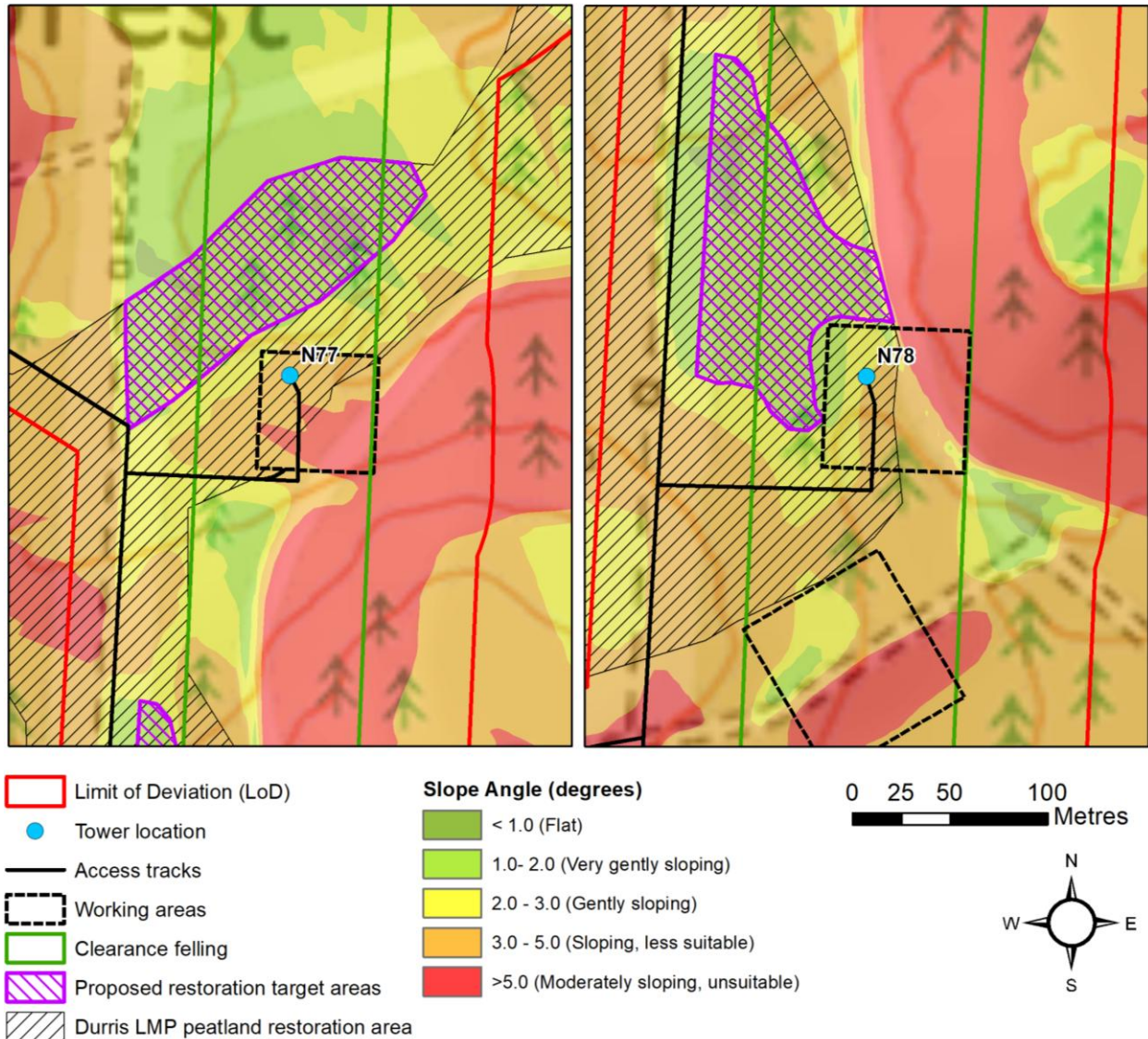
Plate 13.4.5: Strans Burn Upper restoration area (excerpt of Figure E.6: Assessed Peatland Restore and Restock Map), the Proposed Development alignment runs alongside the existing OHL (hashed line extending north from Blackburn Moss



- 4.4.9 The Strans Burn Upper (SBU) area is 20 ha in total, however only gently sloping or flat areas are likely to be suitable for peat translocation. A 5 m DTM has been used to identify slopes <2° within the SBU area. There are two distinct areas which meet this criteria, one immediately adjacent to and north of Tower N77 and one immediately adjacent to and north of N78.
- 4.4.10 At N77, much of the more gently sloping area lies within the proposed felling corridor for the Proposed Development. The area within the felling corridor and within the LOD is c. 0.69 ha (6,850 m²).

4.4.11 At N78, the restoration area is bounded on the east by an existing forest ride, and defined in the west by the treeline, immediately outside of which the access track is proposed for N78. This area also lies within the LOD and is c. 0.66 ha (6,662 m²). Both areas are shown on **Plate 13.4.6: Strans Burn Upper restoration areas – Left (N77), Right (N78)** below.

Plate 13.4.6: Strans Burn Upper restoration areas – Left (N77), Right (N78)



4.4.12 The Durris LMP shows the SBU area to comprise *Calluna vulgaris* and *Eriophorum vaginatum* bog (heather and cotton grass), the former indicative of drier peatland and the latter wetter areas. It is possible that with peat translocation to this area, the area can be made wetter (with deeper peat) and possibly suitable for *Sphagnum* seeding.

4.4.13 The proposed approach is based on ongoing trials being conducted on FLS land in the Achairn Forest, Caithness which utilise translocated peat from a wind turbine location to reinstate a felled area on gentle slopes. The sequence of restoration is as follows:

- trees should be felled as close to ground level possible, ideally using shears;
- stumps should be flipped, drilled or punched through the peat surface (depending on peat depth);
- treated areas should then be cross-tracked to smooth the surface (removing macro-topography that would otherwise encourage drying of raised areas); and
- peat excavated from the foundation footprints should be distributed over the smoothed areas, catotelmic peat placed first and acrotelmic peat thereafter.

- 4.4.14 It is recommended that peat excavation, storage and reinstatement are undertaken by a specialist forest-to-bog restoration contractor rather than the Balance of Plant (BoP) contractor, as the machine skills required for peat manipulation are different to those for construction. All movement and storage of peat should be overseen by the ECoW to ensure that displaced materials do not dry out during storage and remain viable for reinstatement.
- 4.4.15 Based on the calculations for Scenario 3, c. 592 m³ of peat are expected to be permanently excavated from the tower foundations for towers N77 and N78. Reuse depths trialled at Achairn Forest to-date have been 0.15 m and 0.30 m. At these depths, up to 3,946 m² (c. 0.4 ha) or 1,973 m² (c. 0.2 ha) could be restored using peat derived from the foundation locations. The depth used and placement of the peat would depend on:
1. **The condition of the understorey vegetation in the target locations** – surface (acrotelmic) peat provides the best medium for recolonisation of bog vegetation. If the existing understorey vegetation is of good quality, then use of this peat at the surface would take precedence over catotelmic peat from the foundation locations, and the understorey turves would merit stripping from the target locations before catotelmic peat is placed, with the turved understorey blocks replaced on top.
 2. **The availability of acrotelmic peat from the foundation locations** – there are eight foundations in total across the two towers, with a combined footprint of c. 426 m² of acrotelmic peat (c. 128 m³ assuming a 0.3 m depth).
 3. **The local hydrological conditions within each target location** – locally wetter areas will be better placed to receive peat than drier, slightly higher standing areas – this may only become clear post-felling.
 4. **The existing depth of peat within each target location** – areas of shallower peat or organic soil (if present) may benefit more than areas already showing as containing deep peat.
- 4.4.16 Local seedstock may be required to support revegetation if acrotelmic peat holds insufficient vegetation to form a vegetated surface, and once planted, monitoring would be required to ensure full revegetation and prevention of oxidation.
- 4.4.17 Based on reuse as described above, it is anticipated that all peat excavated from the locations N77 and N78 could be used to good effect in supporting peat restoration with Durris, and therefore a peat balance can be achieved.

4.5 Peat Balance

- 4.5.1 A peat mass balance is achievable, primarily because only limited volumes of peat are being excavated. As noted, any increase in temporary infrastructure to facilitate construction at towers N77 and N78 would involve a short-term increase in local storage but no change in the ultimate peat mass balance.

4.6 Recommended Storage Locations

- 4.6.1 Where possible, in order to avoid multiple handling of peat, excavated materials will be transported directly to their point of reuse. Where this is not possible, for example due to construction phasing eg a requirement to temporarily store adjacent to foundation working areas prior to reinstatement, storage will be required locally. In these cases, it is important to ensure peat is stored safely with minimal risk of instability of stored materials while they are kept in good condition prior to reinstatement.
- 4.6.2 Because felling will have taken place prior to tower construction, it is recommended that the ground preparations outlined in **Section 4.4** are undertaken prior to excavation for the tower foundations, enabling direct translocation of materials to the reinstatement locations.
- 4.6.3 **Section 5** provides general good practice advice on peat excavation, storage and reuse, which applies to the three assessed tower locations, and that would apply more widely to any other locations in which was identified post-consent.

5 GOOD PRACTICE

5.1 Background

- 5.1.1 Good practice measures in relation to peat excavation and reuse are now generally well defined following a number of years of practice (at wind farm sites) across the UK and Ireland. In Scotland in particular, there is an increasing body of experience relating to peat restoration, facilitated by Peatland Action (Scottish Natural Heritage, 2017)⁵. As a result, there are a number of specialist contractors who have experience in the planning, design and implementation of peat restoration works in the Scottish uplands. A key step in delivering the restoration proposals described above is identification of appropriate contractors to implement the restoration plans at each location.
- 5.1.2 The sections below outline good practice measures related to excavation and handling, storage, and reinstatement and restoration of peat in association with wind farm construction.

5.2 Excavation and Handling

- 5.2.1 The following good practice measures are proposed for excavation and handling:
- a minimum thickness of 0.3 m of acrotelmic peat or turved organic soil should be excavated where sufficient soil is present; where less than 0.3 m is present, the full depth of soil and surface vegetation should be excavated;
 - excavation and transport of peat/soil shall be undertaken to avoid cross-contamination between soil horizons (eg organic soil and underlying mineral soil/substrate);
 - where possible, cross-tracking of plant over undisturbed vegetation should be minimised, and excavated materials transported to their storage locations along constructed track;
 - if working is required away from constructed roads/tracks, the use of long reach excavators should be encouraged in order to minimise cross-tracking;
 - if landscaping of road/track margins is required for temporary works, it is preferable for vegetated organic soils to be used for this purpose rather than acrotelmic peat (which should be stored); and
 - wherever possible, double handling of peat should be minimised (in particular for catotelmic peat) by direct transport of materials to their point of storage.

5.3 Storage

- 5.3.1 The following good practice measures are proposed for storage:
- eliminate storage where possible by single handling from the point of excavation to a location of reuse;
 - if storage cannot be avoided, minimise storage time by taking a holistic approach to excavation and restoration such that catotelmic peat (in particular) is used as soon as possible after excavation;
 - store excavated acrotelmic and catotelmic peat separately during excavation works, which will be undertaken by an experienced contractor specialising in peat groundworks and restoration;
 - acrotelmic peat and turved soil blocks should be stored turf side up to prevent damage to vegetation;
 - storing in areas of minimal gradient where 'runoff' or drainage away from the point of storage is minimised (these areas will also satisfy to avoid areas of lower stability);
 - fewer, larger stores will be preferable to a greater number of small stores, since the total potential area of drying surface will be less;
 - where storage is required in the medium term, preparing the peat to minimise the surface exposed to drying (eg through blading off of catotelmic peat and use of appropriate cover to minimise moisture loss);
 - the Ecological Clerk of Works (ECoW) should work with an appointed Geotechnical Engineer (GE) to review the placement and condition of stored peat;
 - storage areas should be outside any area identified in the PLHRA as of 'Moderate' or greater likelihood (see **Volume 5, Appendix 13.6: Peat Landslide Hazard and Risk Assessment (PLHRA)**) and should be more than 50 m away from watercourses, away from sensitive habitats and away from the edge of excavations;

- peat and soil stores should be appropriately banded to prevent risks from material instability and prevent runoff of sediment and water from the stockpiles;
- the condition of the excavated peat, in particular its moisture content, should be regularly monitored and local water utilised to periodically 'refresh' stored peat and prevent desiccation; and
- a Sustainable Drainage System (SuDS) should be implemented to control water and sediment loss during storage (this also applies to reinstated areas, see below).

5.4 Reinstatement and Restoration

5.4.1 The following good practice measures are proposed for reinstatement and restoration:

- where possible, turves and underlying catotelmic peat should be reinstated at the locations from which they were removed;
- any bare peat exposed at the surface of a reinstated area should be seeded with a seed mix or translocated vegetation appropriate to the locality;
- where insufficient turves are available to full cover reinstated soils, a checkerboard pattern of turf blocks should be used, with turf squares no less than 1 m² to act as seed points interspersed amongst the bare areas;
- reinstated ground levels should tie in with the surrounds, and any bulking up should be avoided by tamping down soils and turves; and
- if appropriate, temporary fencing may be required to enable vegetation to establish following reinstatement works and prevent damage by livestock, deer or rabbits.

5.5 Monitoring

5.5.1 During construction, monitoring should be undertaken in any areas where peat is stored, as follows:

- regular visual inspection of the outer peat surface of any stored peat to identify any evidence for drying or cracking;
- regular coring of stored peat to log the moisture content of stored peat (using the von Post scale to monitor changes in moisture content for peat on the outside and within the peat mound);
- clear specification of an action plan in response to these observations, including modifications to coverings, implementation of watering, or construction of temporary berms to retain water in the storage footprint; and
- acceleration of re-use for vulnerable stores if so identified.

5.5.2 Key to the success of the strategy for peat management will be careful monitoring of the post-construction works and any restoration activities. A monitoring programme should be initiated once restoration and peat reinstatement works have been completed, and should include:

- review of % vegetation cover and vegetation composition in areas of bare peat that have been reinstated or in any areas that have been seeded (due to a lack of available turved material);
- review of stability of deposits in their new locations; and
- fixed point photography in order to aid review over a series of monitoring intervals.

5.5.3 If required, mitigation recommendations should follow from the monitoring and include:

- specification of seeding appropriate to the target vegetation or stabilisation with geotextile if revegetation is not occurring naturally (which will assist re-wetting and retention of moisture contents); and
- construction of wood dams (or equivalent) if any creep of peat soils is evident at any restored location.

5.5.4 Monitoring should be carried out for a minimum of five years after construction and reinstatement works have concluded.

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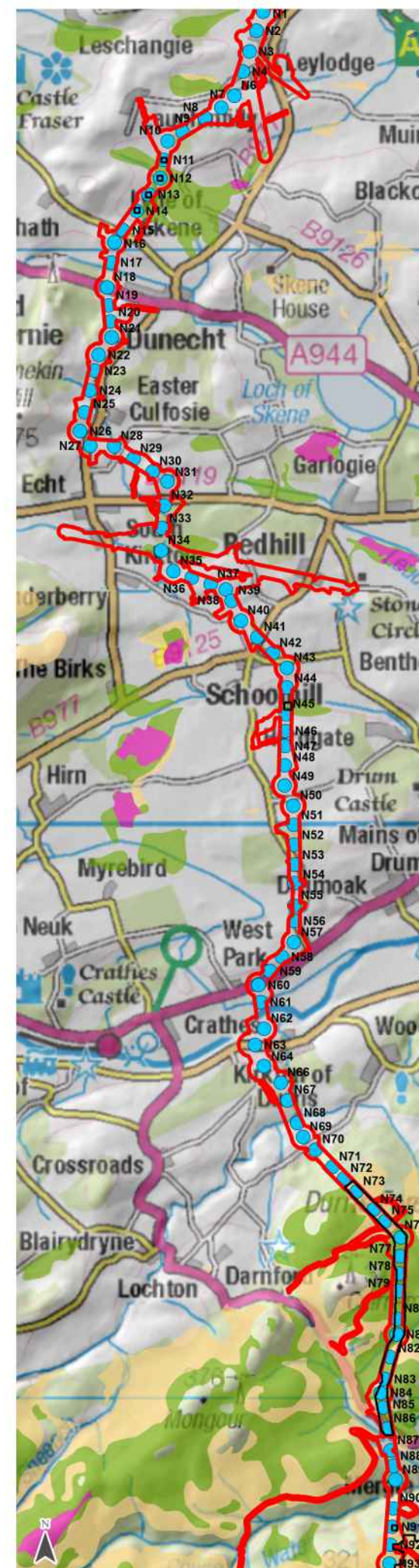
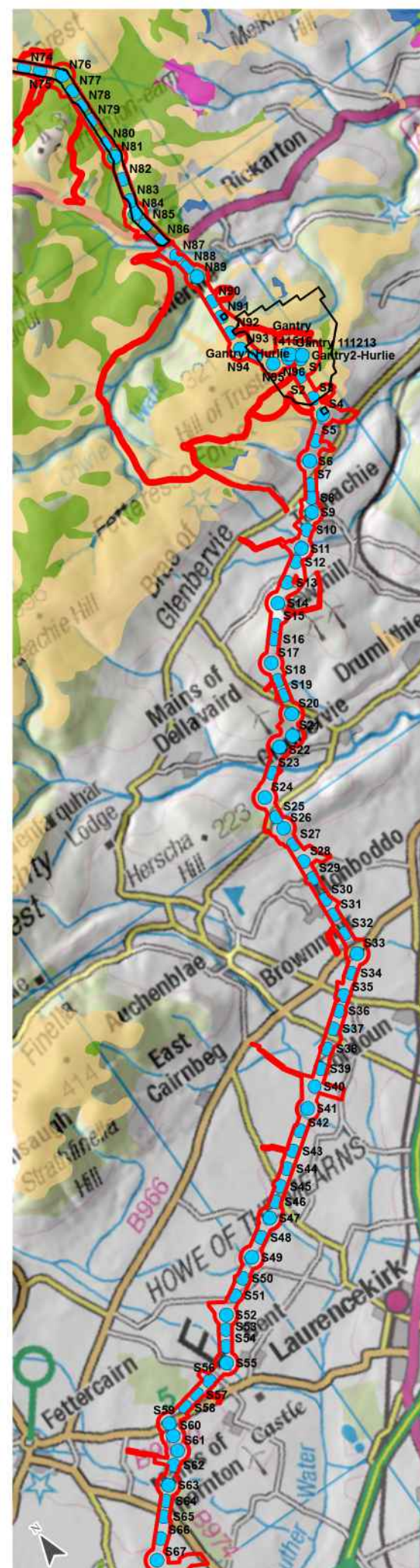
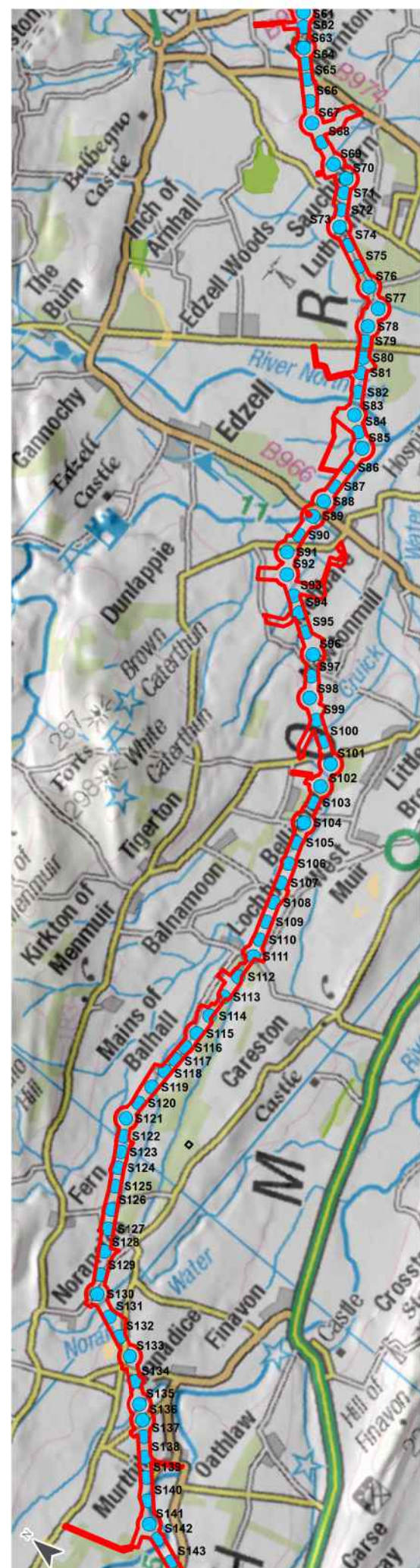
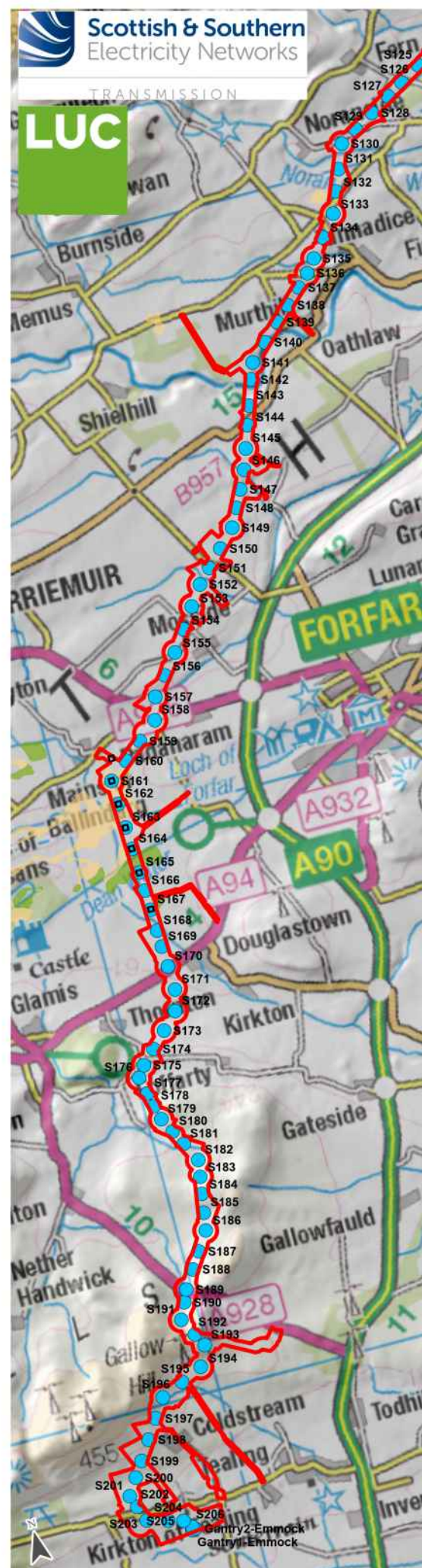
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- Proposed Development Limit of Deviation
- Tower Location
- Carbon and Peatland (2016) Map
- Class 1
- Class 2
- Class 3
- Class 4
- Class 5
- Peat Probing Locations

Scale @ A3: 1:100,000
0 0.5 1 2 3 4 5 km



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Project No: LT455
Project: Kintore to Tealing 400kV Overhead Line

Title:
Figure 13.4.1 Screening of peat over OHL route

Drawn by: RH Date: 23/04/2025
Drawing: 01

