

## 9.0 Geology & Peat

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## 9. Geology & Peat

### 9.1. Introduction

- 9.1.1. This Chapter presents a summary of the existing baseline conditions present at the site in terms of geology, soils and peat. An appraisal of the potential impacts which might occur as a result of the Proposed Development has then been undertaken and any required measures to mitigate these impacts are identified. Industry standard good practice construction and management techniques which will be deployed are also presented along with a summary of the key findings.
- 9.1.2. The assessment has been undertaken by SLR Consulting Limited and has been overseen by a Technical Director who has more than 30 years' experience assessing similar developments with respect to potential impacts on geology and peat. A site visit has also been undertaken by SLR staff.
- 9.1.3. This Chapter is supported by a Technical Note (**see Appendix 9.1: Peat**) which assesses the depth, distribution and condition of peat, alongside the following figures:
- Figure 9.1: Soils
  - Figure 9.2: Superficial Geology
  - Figure 9.3: Peatland Classification, and
  - Figure 9.4: Bedrock Geology

### 9.2. Scope of Appraisal

- 9.2.1. This assessment is based on the description of the Proposed Development detailed in **Chapter 3: Description of the Proposed Development** and shown in **Figures 'Site Plan' and 'Site Plan Detail'**.
- 9.2.2. The Proposed Development will utilise existing access tracks which are part of the existing Limekiln Wind Farm site. No upgrades or construction works are required to use the access tracks, and they are therefore with respect to soils, peat and geology not considered in this appraisal.

#### Study Area

- 9.2.3. The study area is shown on **Figures 9.1 to 9.4** and includes a buffer of 500 m to all elements of the Proposed Development including the proposed BESS, proposed Substation Extension and the underground cable.

## Policy and Guidance

9.2.4. The assessment has been undertaken with respect to planning policy and general good practice guidance, including the following which are relevant to the geology and peat.

### Planning Policy

9.2.5. National Planning Policy Framework 4 (NPF4) provides planning guidance and policies regarding sustainable development, tackling climate change and achieving net zero. Policies relevant to this Chapter include:

- Policy 2 (Climate Mitigation and Adaptation); and
- Policy 5 (Soils).

9.2.6. In addition, The Highland Council (THC) Highland-wide Development Plan (HwDP) provides planning guidance on the type and location of development that can take place in the region. The HwDP presents policies of which the following are relevant to this assessment:

- Policy 28 – Sustainable Design;
- Policy 55 – Peat and Soils;
- Policy 60 – Other Important Habitats and Article 10 features; and
- Policy 62 – Geodiversity.

### Guidance

9.2.7. The following guidance is also applicable to the assessment:

- Scottish Government, Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (2017);
- Forestry Commission, Guidelines for the Risk Management of Peat Slips on the Construction of Low Volume/Low Cost Roads on Peat (2006);
- NatureScot, 2023, Advising on peatland, carbon-rich soils and priority peatland habitats in development management;
- A joint publication by Scottish Renewables, Scottish Natural Heritage (now NatureScot), Scottish Environment Protection Agency, Forestry Commission Scotland and Historic Environment Scotland, 2024, Good Practice during Windfarm Construction;
- Department of Environment, Food and Rural Affairs (DEFRA) Construction Code of Practice for the Sustainable Use of Soils on construction Sites (2011);

- DEFRA Good Practice Guide for Handling Soils (Ministry of Agriculture, Fisheries and Food (MAFF) 2000);
- SEPA Regulatory Position Statement - Developments on Peat (2010); and
- CIRIA, Ground Engineering Spoil: Good Management Practice CIRIA Report 179 (1997).

## Consultation

9.2.8. Pre-application advice was received from THC. **Table 9.1** summarises the key points relevant to geology and peat raised by this consultation.

**Table 9.1: Consultation Response**

Consultee	Response	Comment
THC Pre-application report February 2025	The proposal is located around 2-3 km to the east of the Caithness and Sutherland Special Area of Conservation (SAC) and East Halladale Special Site of Scientific Interest (SSSI), both of which are protected for blanket bog. NatureScot do not consider there is any hydrological connectivity between the application site and the SAC/SSSI. NatureScot advise there is no likely significant effect with regard to the SAC and no predicted impacts to the SSSI blanket bog.	Noted.
THC Pre-application report February 2025	SEPA is generally supportive of the locations for the laydown area (adjacent to the substation) and BESS (reinstated temporary construction area) in areas previously disturbed by development. Both areas also have existing access, which is also welcome.	Noted.

<p>THC Pre-application report February 2025</p>	<p>The submission should include a layout drawing at a usable scale showing all permanent and temporary infrastructure, with extent of excavation required. The plan should include the peat depth survey showing peat probe locations, colour coded using distinct colours for each depth category. This must include adequate peat probing information to inform the site layout in accordance with the mitigation hierarchy in NPF4, which may be more than that outlined in the Peatland Survey – Guidance on Developments on Peatland (2017).  In this case it would be helpful to show which areas are previously restored and which areas have not previously been disturbed; it should be demonstrated as far as possible that previously disturbed areas and areas of deeper peat are avoided as much as possible.</p>	<p>Peat probing was completed as part of the Limekiln Wind Farm Resubmission application.  A site walkover was also completed as part of this assessment to confirm the distribution and condition of peat at the Proposed Development, details of which are discussed in <b>Appendix 9.1</b>.</p>
<p>THC Pre-application report February 2025</p>	<p>An Outline Peat Management Plan (PMP) should be prepared.</p>	<p>As discussed in <b>Appendix 9.1</b> it is confirmed here is no requirement for an outline PMP as the proposed BESS and cable route lies on mineral soils whilst the proposed Substation Extension lies on made ground which has is formed of a complex mix of peat soils, mineral soil and rock fragments.  Best practice measures regarding handling of soils are included in <b>Section 9.6</b>.</p>
<p>THC Pre-application report February 2025</p>	<p>In this case we are content that a Peatland Condition Assessment is not required.</p>	<p>Noted.</p>
<p>THC Pre-application report February 2025</p>	<p>Contaminated Land have no comments to make on this application.</p>	<p>Noted.</p>

### 9.3. Methodology

- 9.3.1. An initial desk study has been undertaken to determine and confirm the baseline characteristics of the study area by reviewing available information relating to geology and peat to ensure a contemporary assessment is prepared.
- 9.3.2. In addition to the Limekiln Wind Farm application<sup>1</sup>, the following sources of information have been consulted in order to characterise the baseline conditions of the study area:
- OS 1:50,000, 1:25,000 and 1:10,000 scale mapping data;
  - NatureScot SiteLink<sup>2</sup>
  - James Hutton Institute, National Soil Map of Scotland (1:250,000)<sup>3</sup>
  - British Geological Survey (BGS) Onshore Geoindex<sup>4</sup>
  - Scottish Natural Heritage (now NatureScot) Carbon and Peatland 2016 map<sup>5</sup>
- 9.3.3. A detailed site walkover was undertaken by SLR in May 2025, to verify the information that was collected during the desk and baseline study and assess peat presence at the site.
- 9.3.4. An appraisal of potential impacts was then undertaken and where required mitigation measures or safeguards identified.

### 9.4. Baseline Conditions

- 9.4.1. This section outlines the baseline geology, soils and peat within the study area.

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<sup>1</sup> Limekiln Wind Farm Resubmission (2016) ECU Reference EC00005269

<sup>2</sup> NatureScot, SiteLink, available online at <https://sitelink.nature.scot/map> [Accessed June 2025]

<sup>3</sup> James Hutton Institute, National Soil Map of Scotland (1:250,000 scale), available online at <https://soils.environment.gov.scot/> [Accessed June 2025]

<sup>4</sup> British Geological Survey, Onshore Geoindex, available online at <https://mapapps2.bgs.ac.uk/geoindex/home.html> [Accessed June 2025]

<sup>5</sup> Scottish Natural Heritage (now NatureScot) (2016) Carbon and Peatland 2016 map, available online at <https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/> [Accessed June 2025]

## Site Setting

- 9.4.2. The site is located on an existing wind farm and forestry site, with the site entrance located some 200 m east of Reay. The proposed BESS site is presently comprised of felled and unfelled forestry, and the proposed Substation Extension site is presently comprised of felled forestry land to the north of the existing Limekiln Wind Farm Substation.

## Designations

- 9.4.3. Review of the NatureScot SiteLink<sup>2</sup> indicates that there are no geological or peat designated sites within the study area.
- 9.4.4. As discussed in **Table 9.1**, the Caithness and Sutherland Special Area of Conservation (SAC) and East Halladale Special Site of Scientific Interest (SSSI), both of which are designated for their blanket bog habitats, are located approximately 2 km west of the Proposed Development. NatureScot do not consider there is any hydrological connectivity between the application site and the SAC/SSSI. NatureScot advise no likely significant effect with regard to the SAC and no predicted impacts to the SSSI blanket bog as a consequence of the Proposed Development. They are not considered further in this appraisal.

## Soils

- 9.4.5. An extract of 1:250,000 National Soil Map of Scotland<sup>3</sup> is shown on **Figure 9.1** and illustrates that site is underlain by three main soil types; mineral podzols along the northern extent of the existing access track, peaty podzols to the north west, including the proposed substation extension, and peat to the south east, including the proposed BESS site. The majority of the proposed underground cable route is shown to be underlain by peaty podzols.

## Peat and Superficial Geology

- 9.4.6. An extract of BGS superficial deposit mapping<sup>4</sup>, as shown on **Figure 9.2**, indicates that majority of the proposed underground cable route and the proposed BESS is underlain by glacial till deposits of the Thormaid Till Member, which is made up of a diamicton with clasts of Caledonian igneous and Moine metamorphic rocks. Peat superficial deposits are shown in the northern extent of the Proposed Development, including the proposed substation extension.
- 9.4.7. Areas of alluvium are recorded along banks of the unnamed tributary of the Achvarasdal Burn to the north of the proposed BESS site and the existing access track is shown to be underlain by glacial till of the Reay Burn Formation and Thormaid Till Member.
- 9.4.8. Peatland classification mapping<sup>5</sup> (shown on **Figure 9.3**), indicates that the majority of the Proposed Development including the existing substation and proposed BESS are underlain by Class 1 peatland. These are described as potentially nationally important carbon-rich soils, deep peat and priority peatland habitat in areas likely to be of high conservation value.
- 9.4.9. A small extent of the proposed underground cable route is also shown to be underlain by Class 2 peatland, which are also considered to be potentially nationally important carbon-rich

soils, deep peat and priority peatland habitat with conservation value and restoration potential.

9.4.10. A site walkover survey was conducted by SLR staff in May 2025 to assess the presence of peat underlying the Proposed Development, which is discussed in full in **Appendix 9.1**. In summary it has shown that:

- the proposed BESS and proposed cable route lie within shallow mineral soils rather than peat and no Class 1 peatland is found within these areas;
- the proposed substation extension is located within an area of made ground comprising a mixture of bedrock, mineral soils and peat soils rather than Class 1 peatland; and
- examination of the Peat Landslide Hazard Risk Assessment (PLHRA) which accompanied the wind farm planning application confirmed a negligible risk of peat landslide.

### Bedrock Geology

9.4.11. An extract of the BGS bedrock and linear features geology mapping is shown in **Figure 9.4**. The northern extent of the Proposed Development, including the proposed substation extension, is underlain by igneous rocks of the Strath Halladale Granite which comprises biotite granites.

9.4.12. The southern extent of the Proposed Development, including the majority of the proposed underground cable and the proposed BESS is underlain by sedimentary rocks of the Tobaieach Conglomerate member.

9.4.13. An inferred fault is noted between the two bedrock units which has a northeast to southwest trend.

## 9.5. Embedded Mitigation and Good Practice Measures

### Embedded Mitigation

9.5.1. It has been shown that areas of priority peatland and deep peat are not present within the Proposed Development footprint. The superficial geology and bedrock geology are common regionally and no geological or peat designated sites are noted within the study area.

9.5.2. Further the Proposed Development has been located within previously disturbed ground.

### Good Practice Measures

9.5.3. The Proposed Development will be constructed and operated in accordance with industry good practice guidance including that detailed in **Section 9.2**, and which includes the following commitments.



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## Construction Environmental Management Plan

- 9.5.4. A contractual management requirement of the successful Principal Contractor would be the development and implementation of a comprehensive and site-specific Construction Environmental Management Plan (CEMP). This document would detail how works would be managed in accordance with all commitments and mitigation detailed in the Environmental Appraisal, statutory consents and authorisations, and industry best practise and guidance. It is expected the existing and approved CEMP for the wind farm would be used as the basis for a revised CEMP for the Proposed Development.
- 9.5.5. The Proposed Development would be subject to detailed design prior to construction which would be informed by further site investigation that would include geotechnical analysis to ensure the stability of the Proposed Development and thereby safeguard soils and geology.

### Safeguarding Soils and Geology

- 9.5.6. Soils excavated during the construction phase would be kept on site and used for landscaping and reinstatement of temporary construction areas. The following best practice measures would be detailed in the site CEMP in order to safeguard soils:
- any soils temporarily stockpiled would be managed in accordance with best practice so that their value is not degraded;
  - works would be scheduled to avoid, when possible, periods of heavy rain and vehicular movement shall be planned to avoid saturated ground conditions;
  - soils would be protected from temporary heavy vehicular movement from placement of ground protection mats or above ground tracks (underlain by a geotextile);
  - stationary plant left for long periods would be parked on formal track / compounds so as to avoid potential of soil compaction;
  - all temporary tracks would be removed upon completion of works;
  - soils excavated to form the cable route would be used to backfill the cable trench in the order they were excavated;
  - all works would be supervised by an Ecological Clerk of Works (ECoW); and
  - localised measures including silt fencing would be used to manage runoff shed from areas where soils are disrupted so as not to locally impair water resources and protect sensitive receptors.

## 9.6. Assessment of Potential Impacts

- 9.6.1. Without appropriate design and controls, construction of the Proposed Development has the potential to impair geology and peat such as:

- over compaction of soils caused by the use of heavy machinery on site;
- structural deterioration of soil materials during excavation, soil handling, storage and replacement;
- erosion and loss of soils during soil handling, storage and replacement;
- disturbance and loss of deposits of peat;
- ground instability (including peat slide risk) and contamination; and
- an adverse effect on geological setting from pollution, fuel, oil, concrete or other hazardous substances;

### Soils and Geology

- 9.6.2. It has been shown that the soils at the site have no particular rarity value and subject to best practice with regard to stripping, handling and reinstatement they can be safeguarded and be beneficially reused during restoration of temporary working areas. With careful management of soils and adoption of industry best practice, their value would not be impaired as a result of the Proposed Development.
- 9.6.3. The bedrock deposits are common regionally and have no specific rarity value. The superficial deposits at the site are also common regionally. The Proposed Development would not degrade the value of the bedrock or superficial deposits.

### Peat Resources and Peat Slide Risk

- 9.6.4. It has been shown (see **Appendix 9.1**) that the Proposed Development is either underlain by made ground, which has previously been disturbed or mineral soils.
- 9.6.5. It is therefore considered that any impacts to peat can be avoided.

## 9.7. Summary

- 9.7.1. Existing soil and geological conditions have been confirmed by a desk based assessment and verified by a site visit.
- 9.7.2. A commitment has been made to use good practice construction techniques that would safeguard geology, soils and peat. Subject to the adoption of these, no effects on geology or peat have been identified during the construction or operation phases of the site life.