# 9. Geology and Peat

## NON-TECHNICAL SUMMARY

The potential effects on geology and peat from the Lochluichart East BESS Proposed Development are assessed. The occurrence and characteristics of peat were identified through peat depth and ecological surveys. Effects from mining risks, designated sites and peat landslide hazard were scoped out.

The Site is located on the southern slopes of Beinn a Bhric, mostly between 170 and 140 m AOD. Land use is conifer and broadleaved plantation. The Site is underlain by Pleistocene glacial deposits comprising diamicton, gravel, sands and silts. These are underlain by NeoProterozoic crystalline psammite bedrock. BGS do not map any peat on site. Soils are poorly draining, periodically or permanently waterlogged, peaty gleyed podzols with dystrophic semi-confined peat and peaty gleys.

There are several deep pockets of peat on site, up to 3 m in depth, in the centre and along the northeast boundary with smaller peat areas in the east. The deep peat pockets are surrounded by areas of no peat and peaty soil. There is significant damage to the integrity and habitats of the peat pockets from the afforestation. Amongst the woodland, there is some actively eroding degraded blanket mire and wet heath, especially at the east around the proposed BESS compound and the eastern corridor towards the existing Corriemoillie Substation. The peat assessed is in Moderate condition and of Medium sensitivity.

Design has embedded peat avoidance. The BESS platform avoids peat except for part of the augmentation area and the access track has largely avoided deep peat. However, it has not been possible to fully avoid. No peat >1.0 m deep will be excavated. A peat management plan has been developed. This estimates the potential peat excavated at 1,112 $m^3$ with small direct loss of blanket mire and wet heath habitat. A Moderate adverse potential effect on peatland habitat, peat condition and carbon loss before mitigation is predicted and will occur during the construction phase only.

Mitigation has been developed to reuse all excavated peat in environmentally beneficial ways to protect its carbon. The peat management plan contains advice for management of peat during excavation, storage and reuse. A potential excavated peat reuse volume of 1,525 $m^3$ is assessed comprising: reinstatement of low verges alongside the track, and reinstatement of a two metre fringe around the other infrastructure when on peat. There is therefore more demand for peat than there will be peat excavated, and a peat balance is therefore achieved. In all cases, the peat will be emplaced and capped with turves and will take place only where hydrological and topographical conditions will support long-term peatland condition. With this mitigation, the Residual Predicted Effect on peatland habitat, peat condition and carbon loss is reduced to Low.

## 9.1. Introduction

### Objective

9.1.1. The objective of this chapter is to assess, as part of the planning application, the effects on geology and peat from the proposed construction of Lochluichart East Battery Energy Storage System (BESS) (hereafter referred to as the 'Proposed Development'). The project red line boundary (hereafter referred to as the 'Site') is located in Lochluichart within the Highland region,

### Scope

9.1.2. The scope of the assessment is to:

- Assess potential effects on the geology and peat during the site preparation, construction, operation and decommissioning of the Site;
- Identify which potential effects can be controlled through embedded mitigation in the design and which through best practice;
- Identify appropriate additional mitigation measures to either provide beneficial effects or minimise/avoid adverse effects; and
- Assess residual effects.

9.1.3. The assessment is primarily concerned with the Planning Application Area as shown in **Appendix 9.2 Peat Management Plan Figure 8 Final Site Layout**.

## 9.2. Project Description

9.2.1. The Proposed Development is fully described in Chapter 3. In summary it consists of a 36 MW BESS facility, access track(s) and an underground cable connecting the BESS and Corriemoillie 132 kV substation. There would also be ancillary permanent hardstanding, storm water and drainage system, and a temporary construction area. Associated activities are described in section 9.5.1 below.

9.2.2. The Site includes:

- A site access corridor beginning at the A832 in the southwest of the Proposed Development. This follows a pre-existing access track approximately 700 m in length that supports the forestry operations and which will be utilised for the Proposed Development;
- The main development area, between the existing access track and cable corridor, with dimensions 500 m east-west and up to 300 m north-south; and
- A 400 m eastern access corridor to the existing electricity substation.

## Supporting Documents and Figures

9.2.3. This Geology and Peat chapter should be read alongside Chapter 1: Introduction, Chapter 2: Site Description, Chapter 3: Description of Proposed Development, Chapter 6: Ecology, and Chapter 10: Hydrology and Hydrogeology.

9.2.4. The assessment is supported by the following Technical Reports:

- Appendix 9.1 Peat Survey Results
- Appendix 9.2 Peat Management Plan
- Appendix 9.3 Peat Landslide and Hazard Risk Assessment Figures
- Appendix 6.3 NVC Survey Report

9.2.5. The assessment is supported by the following figures from Appendix 9.2 Peat Management Plan:

- Figure 1 – BGS Superficial Soil Deposits
- Figure 2 – National Soil Map of Scotland
- Figure 3 – Carbon and Peatlands Map
- Figure 4 – Topsoil Organic Carbon Concentration
- Figure 5 – Interpolated Peat Depth;
- Figure 6 – Peat Depth Results
- Figure 7 – Peatland Condition Assessment
- Figure 8 – Final Site Layout

9.2.6. Also further figures from other reports:

- Appendix 6.1 Protected Species and UK Hab Survey Report
  - Figure 1 UK Hab Survey Results
- Appendix 6.3 NVC Survey Report
  - Figure 1 NVC Survey Results
  - Appendix A Target Notes and Photographs

9.2.7. Note that all figure references in this chapter refer to these reports.

## 9.3. Methodology

### Receptor Sensitivity

9.3.1. Receptor sensitivity is determined from the desk top baseline and site surveys. Receptors are affected depending upon whether the receptor is present and its condition(s). International, national and local standards and an appreciation of the relationship with relevant planning policy are considered. Sensitivity criteria for the three grades of sensitivity, High, Medium and Low are given in Table 9-1.

**Table 9-1: Sensitivity Criteria**

| Sensitivity | Definition | Criteria |
|---|---|---|
| High | Attribute has a high quality and rarity on a National or International scale | Average peat depth >1 m;<br>Peat is classified as Class 1 or 2 importance as shown on SNH Carbon and Peatland Map (2016);<br>Pristine or active peat bog hydrological units;<br>Peat Landslide Hazard Risk Assessment shows High to Moderate Risk of peat landslides;<br>Geological designations/features; and<br>Areas of High Development Risk, Shafts, adits and shallow mine workings on site due to historic mining |
| Medium | Attribute has a high quality and rarity on a regional scale | Average peat depth >0.5 m;<br>Peat is classified as Class 3 to 5 as shown on SNH Carbon and Peatland Map (2016);<br>Peat body hydrological unit which could recover to pristine status;<br>Peat Landslide Hazard Risk Assessment shows Low risk of peat landslides; and<br>Regionally important geological designations/features. |
| Low | Attribute has a low quality and rarity on local scale | Average peat depth <0.5 m;<br>No peat present within the sub catchment;<br>No peat shown on SNH Carbon and Peatland Map (2016);<br>Peat Landslide Hazard Risk Assessment shows no risk of peat landslides; and<br>No geological designations/features. |

### Magnitude of Effect

9.3.2. Table 9-2 provides generic guidance as to the magnitude of any potential effect on a receptor within the assessment of the Study Area.

**Table 9-2: Magnitude of Effect – Generic**

| Magnitude of Effect | Definition |
|---|---|
| Substantial | Total loss of or major alteration to key elements or features of the pre-development conditions, such that the post-development character or composition of the feature would be fundamentally changed. |
| Medium | Loss of or alteration to key elements or features of the pre-development conditions, such that the post-development character of the feature would be partially changed. |
| No change | Minor alteration from pre-development conditions. |
| Low | No or unquantifiable change to pre-development conditions. |

9.3.3. Specific magnitude of potential hydrology and hydrogeology effects is evaluated through a mixture of professional judgement and standards with reference to some or all of the criteria listed in Table 9-3.

**Table 9.3: Impact Magnitude Criteria**

| Receptor | Substantial | Medium | Low |
|---|---|---|---|
| Peat | Direct or indirect loss of more than 10% deep peat without reuse on site.<br>Long-term alteration to extent, structure and/or hydrology of peat bodies.<br>High peat landslide likelihood. | Direct or indirect loss of >5% of deep peat without reuse on site.<br>Alteration to extent, structure and/or hydrology of peat bodies resulting in localised largely temporary changes.<br>Moderate peat slide risk likelihood. | Loss of minor volumes <1% of deep peat.<br>Minor or no alterations to peat hydrology.<br>Low peat landslide likelihood. |
| Relevant Statutory Designation | Disturbance or loss of cited features of peat or other geological features of nationally designated sites, e.g. SAC, SSSI. | No harm to the integrity of peat or geological features of designated sites. Minor harm to Regional or local sites. | No disturbance or loss to peat or geological designated sites. |
| Mining Risk | Site in High Risk Development Area.<br>Current or historic shallow mine workings or mine entries recorded on site.<br>Risk of shallow unrecorded mine workings. Risk of mine gas and subsequent migration of voids to the surface. (CA1) | Site in High Risk Development Area. No recorded current or historic mine workings or mine entries.<br>Low but unproven risk of mine gas.(CA1) | Not in High Risk Development Area. (CA1) |

## Prediction and Evaluation of Effects

9.3.4. The assessments have been split into the three development phases as each phase has the potential to give rise to different effects:

- Construction - generally temporary/short-term effects that occur during construction;
- Operation – longer term effects resulting from the use of the Proposed Development; and
- Decommissioning - Effects arising from the removal of infrastructure and restoration.

9.3.5. Predicted effects of the Proposed Development on the geology and peat are a function of magnitude of effects and receptor sensitivities. The assessment of effect takes into account effect duration and nature, e.g. whether:

- Short (construction), medium or long-term;
- Direct or indirect;
- Reversible or permanent;
- Adverse, neutral or beneficial; and
- Whether the effects occur in isolation, are cumulative or interactive.

9.3.6. Effects will be defined as:

- Negligible – no discernible deterioration or improvement to the existing environment;
- Minor (positive or negative) – where the Proposed Development will cause a small improvement (or deterioration) to the existing environment;
- Moderate (positive or negative) – where the Proposed Development will cause a noticeable improvement (or deterioration) to the existing environment; and
- Major (positive or negative) – where the Proposed Development will cause a substantial improvement (or deterioration) to the existing environment.

9.3.7. Table 9.4 shows the matrix for predicted effect assessment between the magnitude and the sensitivity or importance of the receptor.

**Table 9-4: Predicted Effect Assessment Criteria**

| Receptor Sensitivity Importance | Magnitude of Effects | | | |
|---|---|---|---|---|
| | Substantial | Medium | Low | No change |
| High | Major | Major | Moderate | Negligible |
| Medium | Major | Moderate | Minor | Negligible |
| Low | Moderate | Minor | Negligible | Negligible |
| No importance | Minor | Negligible | Negligible | Negligible |

## 9.4. Definitions, Legislation and Guidance

### Definitions

9.4.1. Peat is the partially decomposed remains of plants and soil organisms which have accumulated at the surface of the soil profile. SEPA adopt the Joint Nature Conservation Committee (JNCC) report 445 *Towards an Assessment of the State of UK Peatlands* definitions of peat for Scotland where:

- Peaty (or organo-mineral) soil is a soil with a surface organic layer less than 0.5 m deep;
- Peat is a soil with a surface organic layer greater than 0.5 m deep which has an organic matter content of more than 60%;
- Deep peat is a peat soil with a surface organic layer greater than 1.0 m deep. (There is however, a lack of consistent definition of 'deep peat'. At present, NatureScot use the term 'deep peat' to describe all peat, regardless of depth).

9.4.2. Scotland's *National Peatland Plan* also encompasses organic soil less than 50 cm, which can support typical peatland vegetation (SNH, 2015a).

9.4.3. The structure of an active peatland typically comprises a thin surface layer of living vegetation (the acrotelm) overlying a usually thicker layer of well decayed and humified peat, comprising the consolidated remains of former surface vegetation (the catotelm). Where there are no discernible plant remains the peat is known as amorphous. Below the peat is the basal substrate; mineral soil, mineral superficial deposit or bedrock.

9.4.4. The acrotelm is the upper aerobic layer of active peat and consists of living and partially decayed plant material. It is very fibrous and contains plant roots etc. Acrotelmic peat is relatively dry and has some tensile strength. It typically has a higher hydraulic conductivity than underlying peat. Strictly it is defined with relation to distance to the water table. Acrotelm thickness varies with topography - such as hummocks peat hags, hollows - and with time, especially in drought periods or when it is drained. The acrotelm is not always present, especially when peat is no longer active and where there has been afforestation on peatland.

9.4.5. The catotelm comprises peat layers which sit beneath the acrotelm and consists of decayed and humified material. Catotelmic peat is dense with a very low hydraulic conductivity. It has high water content and tends to have very low tensile strength. It is less cohesive than the acrotelm and tends to disrupt on excavation and handling. Strictly, catotelmic peat is permanently anaerobic and anoxic because the catotelm is permanently below the water table.

### National Planning Framework 4

9.4.6. Policy 5 (Soils) of the *National Planning Framework 4* (NPF4) aims to 'protect carbon rich soils, restore peatlands and minimise the disturbance of soils from development'. Under NPF4 peatland is defined as 'the presence of peat soil or peaty soil types. This means that

"peat-forming" vegetation is growing and actively forming peat or it has been grown and formed peat at some point in the past'.

9.4.7. Under NPF4 development proposals on peatland, carbon rich soils and priority peatland will only be supported in limited number of scenarios such as essential infrastructure where there is a specific locational need and no other suitable site.

9.4.8. Where development on peatland, carbon-rich soils or priority peatland habitat is accepted, a detailed site-specific assessment is required, which under Policy 5(d) should include:

- The baseline depth, habitat condition, quality and stability of carbon rich soils;
- The likely effects of the development on peatland, including on soil disturbance;
- The likely net effects of the development on climate emissions and loss of carbon.

9.4.9. Policy 5(d) also states that the site-specific assessment 'should inform careful project design and ensure, in accordance with relevant guidance and the mitigation hierarchy, that adverse impacts are first avoided and then minimised through best practice'.

### SEPA Guidance

9.4.10. SEPA has a statutory duty to ensure that where peat is generated during construction, it is stored, re-used, treated or disposed of correctly, which can require an environmental authorisation. SEPA published guidance (SEPA, 2017) states that the preferred management option for excavated peat is the prevention of its production, by seeking to minimise peat excavation and disturbance. Where this is unavoidable, developers should attempt to reuse as much of the peat produced on-site as possible, following justifiable and environmentally beneficial methods.

### NatureScot Guidance

9.4.11. Nature Scot published guidance (2023) to help NatureScot staff provide developers, planning authorities and Scottish Government with consistent advice on the assessment of effects of any development proposals on peatland, carbon-rich soils and priority peatland habitat. It informs NatureScot understanding, including additional NPF4 Policy guidance and outputs from the Peat Expert Advisory Group. A key NatureScot focus will be on helping to ensure that development is designed and constructed to follow the mitigation hierarchy set out in NPF4 and that, in addition, biodiversity enhancement is delivered through peatland restoration.

### Forestry and Land Scotland (FLS) Guidance

9.4.12. FLS requires that peat generated on its land must be carefully managed in accordance with environmental and land management objectives. The reuse of peat should be limited to demonstrably effective and environmentally beneficial applications. In line with FLS guidance (FLS, 2024), reuse of peat is only acceptable where hydrological and topographical conditions can support long-term habitat restoration or creation, ensuring the peat remains

permanently saturated and regains peat-forming functionality. Reuse for landscaping, reinstatement, or road verges are not considered appropriate unless it clearly contributes to peatland restoration outcomes. Excess peat that cannot be reused under these criteria is likely to be classed as waste and must be disposed of accordingly, in line with regulatory requirements.

## 9.5. Environmental Baseline

### Consultation

9.5.1. In March 2025, an EIA screening request was submitted to Highland Council to establish whether a formal EIA was required for the Proposed Development. In April 2025, the planning authority issued a formal EIA screening opinion which confirmed that an EIA was not required.

9.5.2. Following a pre-application meeting, advice was issued for the project on 08 April 2025 by The Highland Council, (Ref 24/05054/PREMAJ). The relevant advice on the Geology and Soils chapter are given in Table 9-5 below.

**Table 9-5: Pre-Application Advice on Geology and Peat**

| Information | Comment |
|---|---|
| The proposal's impact on peat resources, (amongst other aspects) within the site are of particular concern. | The impact on peat resources is addressed in this Chapter and a low residual predicted impact is predicted |
| The application should demonstrate that all residual effects on the matters raised in this report are brought to within acceptable limits through mitigation. | This is demonstrated in Predicted Effects (1.5), Additional Mitigation (1.6) below |
| Policy 5 (Soils) of NPF4 (2023): It is noted from the Pre-application Meeting that there are a few pockets of deep peat within the proposed site which needs to be taken into consideration into the peat assessment. The parts of this policy are (a), (c) and (d) are directly relevant to the proposal and to comply with them, the pre-applicant needs to support their application with appropriate site-specific assessment. | Peat habitat and depth surveys were carried out and reported in Chapter 6 and below. |
| Policy 55 (Peat and Soils) of HwLDP (2012): The pre-applicant in any future application should demonstrate how they have avoided unnecessary disturbance, degradation or erosion of peat and soils. They must also support their application with a Peat Management Plan to demonstrate how the impacts have been mitigated and minimized, particularly in cases where development on peat is clearly unavoidable. | The avoidance, mitigation and minimisation of unnecessary disturbance, degradation or erosion of peat and soils is discussed below in 1.5.2. 1.5.3 and 1.6, |
| SEPA welcome that peat probing has been undertaken and used to inform the draft layout. SEPA take the opportunity to highlight that peat condition assessment will also be required and should be used to ensure that the layout does not encroach into any near natural or natural peat habitats. | Peat probing results including peat condition are presented and assessed below and in Appendices. |

## Data Sources

9.5.3. Table 9-6 outlines the data sources consulted in addition to the Technical Report Appendices and other chapters identified in Section 9.1.4 above.

**Table 9-6: Data Sources**

| Information | Sources |
|---|---|
| Proposed site development layout | Client map |
| OS | 1:25,000 Online mapping, accessed from Bing maps June 2025 |
| Priority peatland, carbon and deep peat | NatureScot, 2016. The Carbon and Peatland 2016 map https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/ (accessed February 2025) |
| Peat depth | Atmos Peat Survey Report |
| Soils | Scotland's Soils (2023) National soil map of Scotland. Available online at: https://soils.environment.gov.scot/maps/soil-maps/national-soil-map-of-scotland/ Accessed June 2025 |
| Geology | BGS GeoIndex (onshore). Available online at: https://www.bgs.ac.uk/mapviewers/geoindex-onshore/ (Accessed June 2025). |
| Designated Sites | NatureScot SiteLink : https://sitelink.nature.scot/home Accessed June 2025 |

## Surveys

9.5.4. Peatland habitats and condition were assessed via:

- A UKHab survey (**Appendix 6.1**) was also completed for the Site which recorded habitat types and characteristic vegetation. Field notes and photographs were taken to describe characteristic habitats and features of ecological interest and.further identified peatland habitats.
- An NVC survey (**Appendix 6.3**) for the main Site was carried out in April 2025. This classified and mapped homogenous stands and mosaics of vegetation and attributed NVC communities. Field notes and photographs of key habitats were also taken.

9.5.5. Peat depth surveys on the main Site and access track were carried out as follows:

- An initial partial peat survey was carried out in November 2023 on a 25-50 m grid covering parts of the Site resulting in a total of 72 survey points.

9.5.6. A comprehensive peat probing survey of the current red line boundary (excluding the eastern forest corridor) was undertaken in January 2025. It comprised 362 survey points (see **Appendix 9.1**):

- High resolution 10 $m^2$ probe grids at two potential BESS construction areas;
- Lower resolution 50 $m^2$ probe locations in other areas;
- 3 probes every 25 m on a 120 m stretch of the existing access track from the A832 and on the proposed new access track route on the main site.

9.5.7. An Interpolated peat figure was prepared (**Appendix 9.1, Figure 5**) showing peat probe locations and 0.5 m interpolated peat depth intervals.

### Topography, land use and habitats

9.5.8. The Site has an area of 19.5 ha. It is located approximately 300 m north of Loch Luichart, circa 5 km west northwest of Garve in Highland region, and sits immediately north of the A832.

9.5.9. The Site lies on the southern slopes of Beinn a Bhric. The elevation falls from 190 m AOD in the north down to 123 m AOD at the A832, with the main site between 170 and 140 m AOD. The eastern corridor forest ride is at circa 145 m AOD. The Site is relatively steep in the north, south and southeast with the centre of the Site where the BESS is located, being generally flatter, as shown by the slope analysis figure (**Peat Management Plan, Appendix 9.2, Figure 4**).

9.5.10. According to the extended Phase 1 habitat and the NVC and UKHab surveys, the majority of the Site consists of conifer and broadleaf plantations of various age classes and some open patches of degraded blanket mire and wet heathland. Parts of the forestry plantation are in the process of being felled. The southwest access corridor is mostly on improved acid grassland which is heavily grazed. The eastern corridor is a forest ride classed as wet heathland.

## 9.6. Geology

9.6.1. The bedrock Formation belongs to the Neoproterozoic Morar Group, part of the Wester Ross Supergroup. This is an ancient sequence of sedimentary rocks that have been subjected to a series of tectonic and metamorphic events since their deposition. They lie unconformably on the Archean to Paleoproterozoic basement of the Lewisian complex.

9.6.2. The Formation immediately underlying the Site is Crom Psammite Formation. This is described by BGS as micaceous to quartzitic psammite interbedded with varying amount of pelite. Psammite is metamorphic rock that originates from sandstone and which characteristically is composed mainly of quartz, with varying amounts of feldspar and other minerals. Pelite is also metamorphosed, but from fine-grained sedimentary rock, i.e. mudstone or siltstone. The 1:625,000 BGS Hydrogeological Map describes the bedrock here

as 'Morar Group: Low productivity aquifer, small amounts of groundwater in near surface weathered zone and secondary fracture.'

9.6.3. There is a small linear finger of later, but still very early, Carn Chuinneag and Inchbae Augen Gneiss (amphibolite) extending into the centre of the Site. Amphibolite is a metamorphic rock that contains amphibole, especially hornblende and actinolite, as well as plagioclase feldspar, but with little or no quartz, possibly derived from plutonic intrusions and subsequently metamorphosed. The 1:625,000 BGS Hydrogeological Map describes this as 'Unnamed Igneous Intrusion, Neoproterozoic, Low productivity aquifer, small amounts of groundwater in near surface weathered zone and secondary fractures,

9.6.4. Superficial deposits across the Site are mapped by BGS as Pleistocene glacial deposits: diamicton, gravel, sands and silts. BGS divide Glacial deposits into two classes, proglacial and glacigenic deposits. Proglacial deposits include all sediments deposited by meltwaters in the proglacial environment. Glacigenic deposits are sediments laid down within or under glacier ice or deposited by an ice sheet. They have a very variable lithology. Diamictons are terrigenous sediment that is unsorted to poorly sorted and contains particles ranging in size from clay to boulders, suspended in an unconsolidated matrix of mud or sand.

9.6.5. BGS Superficial geology maps do not show any peat deposits within the Site. The nearest BGS mapped peat deposits are south and east of Corremoillie Substation, as seen on **Figure 1 BGS Superficial Soil Deposits.** Typically, BGS only map peat >1 m thick. It is common for site specific peat surveys to identify deep peat within areas that have been mapped by the BGS as being dominated by diamictons. BGS mapping of peat is not considered definitive and is superseded by site specific peat depth probes and cores.

## Soils

9.6.6. Two soil types for the Site are shown on **Figure 2 (Appendix 9.2)** Scotland's Soils website. The main access track from the A832 in the southwest is on humus-iron podzols with peaty gleyed podzols. The soil type changes at the main area, to peaty gleyed podzols with dystrophic semi-confined peat with peaty gleys.

9.6.7. Gley soils are poorly draining soils which are under periodic or permanent waterlogging. In these conditions, the subsoil experiences a lack of oxygen within the pore space. Consequently under these anaerobic conditions the insoluble iron oxides are reduced chemically and the ferric iron is changed to ferrous iron. Minerals with iron in the ferrous form impart a grey or bluish-grey colour to the subsoil.

9.6.8. Where surface wetness is a feature throughout the year, as is likely here, the horizons are generally rich in organic matter, often intergrading into peat deposits. This is confirmed by **Figure 4 (Appendix 9.2)** Topsoil Organic Concentration which shows the Site and the wider area is dominated by organic soil (<35%).

## 9.7. Peat

9.7.1. The SNH Carbon and Peatlands Map shown in **Figure 3 (Appendix 9.2)** classes the Site as Class 5, defined as 'peat soils, which are carbon-rich and deep, with no peatland vegetation present'. The SNH map is only a high-level predictive tool which provides an indication of the likely presence of peat, at a coarse scale. The ecology and peat surveys generally confirm this

9.7.2. Of the 362 peat probe points taken:

- 231 (64%) <0.5 m, i.e. peaty soils
- 131 (36%) >0.5 m, i.e. peat, of which
  - 79 (22%) 0.5 - 1.0 m
  - 36 (10%) 1.0 - 2.0 m
  - 14 (4%) 2.0 – 3 m
  - 2 (<1%) 3 3.5 m

9.7.3. Peat occurrence on Site is relatively sporadic as seen on **Figure 5 (Appendix 9.2)**, Interpolated distribution of peat soils on Site. The deepest peat, up to 3 m, is in the centre and along the northeast Site boundary of the main Site. There are smaller peat areas in the west and south of the main site and a few areas in the east. These deep peat pockets are surrounded by areas of no peat and peaty soil.

9.7.4. Depth probes on the access track from the A832 until it enters the main site are all less than 0.5 m in depth. The area for the BESS station has <0.5 m peat probe depths.

9.7.5. As there is no peat mapped on BGS, it is assumed that the peat is sitting on the variable surface of the Glacial deposits which are mapped across the site. Most of the peatland is either covered in forest with forest rides, or has recently been felled **(Figure 7 (Appendix 9.2),** Peatland Condition Assessment).

9.7.6. The ground disturbance from forestry planting and felling, and associated lowering of water levels has caused significant damage to the peat. This has resulted in drying and cracking of the peat and loss and damage to the active acrotelm and the upper catotelm layer, and the loss of peat forming species.

9.7.7. There are small areas of modified wet heath (NVC: M15) on the eastern corridor and around the BESS compound. Degraded blanket mire (NVC: M17b and M19a) is also present in the east, on the forest rides in the north east and in the north and east of the BESS compound. These have patches of Sphagnum mosses and some exposed peat and tend to occur in areas of particularly damp and/or waterlogged ground with bog pools or mires. Both these habitats are typical acidic nutrient-poor habitats of humid, peaty character and at least seasonally waterlogged conditions with impeded drainage.

9.7.8. Peat is actively eroding, as shown by both flat and bare exposed peat, and peat hags, in the west and in the north and east of the proposed BESS compound. These peatlands are described in the OHMP as in Moderate condition. Chapter 6: Ecology reports mall direct losses of some bog habitat (179m$^2$ of M17, 292m$^2$ of M19), and of wet heath (18f 13m$^2$ of M15).

## Designated Sites

9.7.9. There are no statutory designated sites with qualifying geological or peat features within 2 km of the proposed development site.

## Mining History

9.7.10. There is no history of coal or other mining on the Site. The only records held by BGS are of several nearby local quarries. One is immediately northeast of Corriemoillie Substation, and one south of the Substation on the A832. These are likely to be local aggregate borrow pits.

## Receptor Sensitivity

9.7.11. Receptor sensitivities are assigned in Table 9-7. Designated Site, geology other than peat, and mining receptors are scoped out. The remaining receptors are assessed with respect to the foregoing baseline findings and the sensitivity criteria in Table 9-1.

**Table 9-7: Receptor Sensitivity**

| Receptor | Sensitivity | Reason |
|---|---|---|
| Carbon rich peat, and peat soils and peat hydrology | Medium | Average peat depth is >0.5 m.<br>Classed as Class 5 peatland on SNH Carbon and Peatland Map (2016).<br>The main area is largely forested plantation. Therefore the peat structure and particularly the acrotelm are likely to be very damaged or absent.<br>However this does represent a significant source of carbon sequestration.<br>There is a low risk of peat landslide hazard. |
| Peat Landslide Hazard | Low - negligible | Although there are areas of 'Low' to 'Moderate' likelihood of a peat slide under natural conditions within the Site, based on the calculated risks (shown on **Figure 9.3.10 in Appendix 9.3**), site-wide good practice measures are considered to be sufficient to manage and mitigate any construction induced instability risks. |
| Geology | Low | Superficial and bedrock deposits are regionally common and have no rarity value.<br>No geologically or peat designated sites within 2 km. |
| Mining | Low | No record of mining which could present a Risk. |

| | | |
|---|---|---|
| Designated Sites | Low | No designated sites with geology or peat qualifying features within 2 km. |
| Geology (other than peat and soils) | Low | No geology sensitive receptors nearby. |

## Predicted Effects

9.7.12. This section assesses and predicts the potential effects of the Proposed Development on the following sensitive receptors, as identified in Table 9-7 above:

- Carbon rich peat, peat soils and peat hydrology;

9.7.13. Peat Landslide Hazard, historic mining legacy issues, and designated sites with geological or peat qualifying characteristics are scoped out as sensitive receptors.

9.7.14. Those activities which have the potential to cause effects on the sensitive receptor, and the type of potential effect are identified in section 9.5.1. The assessment takes into account embedded mitigation in design and standard best practice measures, as identified in sections 9.5.2 and 9.5.3.

## Activities

9.7.15. The activities which could give rise to potential effects are:

### Construction

- Anticipated to take between 6-12 months.
- Approximately 400 m of new access track, 5 m wide, constructed of crushed rock.
- Cut and fill earthworks across the BESS compound area (115 m by 70 m) to create a suitable level development platform, formed of crushed rock laid on permeable membranes.
- Augmentation area hardstanding, 50 m by 30 m, of crushed rock with a temporary construction compound located within.
- Installation of 33 kV underground cable to connect the BESS to Corriemoillie Substation;
- Stockpiling and exposure of soils and peat;
- SuDS system including an attenuation basin on the access track and below the BESS;
- No borrow pits are anticipated. Aggregate will be sourced from local quarries and transported to the site.

### Operation

- Use of BESS - permanent use with periodic repowering proposed.
- Use of access tracks.
- Maintenance of BESS, access tracks and cables.
- Permanent drainage.

Decommissioning

- Removal of all structures and major equipment;
- The upper sections of foundations will be removed to a depth which will permit the continuation of current land use practices;
- Reinstatement of BESS compound;
- New on-site access tracks will be removed and the affected area reinstated;
- All underground cables will be de-energised;
- Temporary stockpiling of soils and peat.

### Embedded Mitigation

9.7.16. High-level peat avoidance by the Site infrastructure was carried out in accordance with the NPF4 mitigation hierarchy. This is evident on **Figure 5 (Appendix 9.2)**, the Interpolated Peat Depth Plan, which is overlain with site infrastructure.

- The area for the BESS station has avoided deep peat deposits and sits on peaty soil <0.5 m. thick.
- The access track within the main site was routed to avoid the deep peat pockets and, as far as possible is located on peaty soils.
- The proposed new length of track and the augmentation area are the only areas where peat (>0.5 m) will be excavated.
- No areas of peat >1.0 m will be excavated.

9.7.17. Whilst the incorporation of these measures in design has helped to reduce the magnitude or likelihood of some potential effects occurring, it was not possible to avoid all potential effects.

### Best practice Mitigation

9.7.18. There is a wealth of experience and guidance related to best practice for developments in peat to avoid adverse effects. Those which will be adopted as standard include the Statutory and General Guidance identified in Legislation and Guidance section 1.3 above and further identified in the References section 1.8 below. Additionally, the following best practice mitigation is recommended:

- Construction Environmental Management Plan (CEMP), to be prepared post submission.
- Ecological / Environment Clerk of Works (ECOW), who will be appointed by the Developer.

### Predicted Effects on Peatland Habitat, Peat Condition and Carbon Loss

9.7.19. Potential effects on peat leading to deterioration in peatland habitat, peat condition and carbon loss are:

- Direct loss of carbon rich peat from excavation;

- Indirect loss of carbon rich peat due to changes in saturation hydrology from adjacent excavations which is crucial to the integrity of carbon storage in peat changes to the hydrology of the peat causing further.

9.7.20. Given the relatively sporadic occurrence of peat, it was possible to take specific embedded design decisions to minimise peat impacts as much as possible, as described in 1.5.2 above. It was however not possible to avoid it altogether.

9.7.21. There will be very little no resulting requirement for peat excavation at the BESS, but there will be some peat excavation at the augmentation area which will also be used as a temporary construction compound. The majority of the access track crossing the site is mostly on peaty soil, but unavoidably will cross the edge of several small areas of deep peat, on peat between 0.5 and 1.0 m.

9.7.22. Due to the isolated nature of the peat pockets, and the degradation already caused to the peatland by afforestation, it is considered that there will be a negligible indirect effect on peat.

9.7.23. It is assumed that installation of the underground cable from the BESS to the substation will be neutral in terms of peat loss. The underground cable peat will be carefully stripped, stored and replaced as soon as possible in accordance with the peat management activities in the Peat Management Plan (PMP).

9.7.24. In terms of direct peat disturbance, there are three areas of peat excavation. The area and volumes of excavated peat are shown in Table 9-8 below. In total there will be a maximum potential excavated volume of peat of 1112 $m^3$.

**Table 9-8: Peat Excavation volumes**

| Infrastructure | Area of Peat excavated ($m^2$) | Volume of peat excavated ($m^3$) |
|---|---|---|
| Access track | 598 | 356 |
| Compound | 116 | 766 |
| **Sub Total** | **714** | **1122** |

9.7.25. The magnitude of the potential effect on peat, following the criteria in Table 9-3 is therefore assessed at Medium. The sensitivity of peat, following the criteria in Table 9-1, is also assessed as Medium. The peatland condition is assessed as Moderate, **(Figure 7**). The potential effects on peat will occur during Construction and will be a combination of permanent and temporary. This results in a Moderate Predicted Effect.

9.7.26. During Operation there will be no further change to the peat resource conditions other than those set during construction or additional mitigation. The magnitude of the predicted effect is No Change. Consequently, the predicted effect during operation is Negligible.

9.7.27. Decommissioning likewise will not alter the status of peat any further. The magnitude will be No Change. The predicted effect is Negligible.

9.7.28. These predicted effects are summarised in Table 9-9.

**Table 1-9: Predicted Effect**

| Predicted Residual Effect | Sensitivity | Magnitude | Effect | | |
|---|---|---|---|---|---|
| | | | Construction | Operation | Decom |
| Peatland habitat, peat condition and carbon loss | Medium | Medium | Moderate | Negligible | Negligible |

## Cumulative

9.7.29. The combined effects of several development schemes may, on an individual basis, be unimportant but, cumulatively, have a greater effect. However, as the peat occurrence at the Site is sporadic and not part of a larger peat body, cumulative effects have been discounted.

## Additional Peat Mitigation

9.7.30. Additional mitigation was sought to reduce the Moderate Predicted Effect on peat, following the mitigation hierarchy set out in NPF4 and recommended by NatureScot and SEPA,

## Micrositing

9.7.31. A micro-siting allowance of 25 m is requested for the new section of the access track required to be constructed as part of the Proposed Development. This will allow the ECOW equipped with peat probe and corer, to avoid any unnecessary disturbance of peat.

## Peat Reuse

9.7.32. In accordance with SEPA and FLS guidance, it is planned to reuse all excavated peat in environmentally beneficial ways and methods, both to protect its carbon and to support reinstatement and enhancement of existing peatland habitats and wetlands. All excavated peat reuse will be carried out on-site.

9.7.33. The following reuse opportunities have emerged.

- Excavated peat will be used for reinstatement and landscaping of low verges alongside the tracks. This is in accordance with stated good practice in the SNH and FCE Guidance (2010).
- Excavated peat will be used for site reinstatement of a two metre fringe around the other infrastructure where on peat or peaty soil. This will be done by dressing off the disturbed edges of infrastructure and enable the revegetation of associated bare earthworks. It is

anticipated that there will be an average peat use depth of 0.5 m across the footprint of these earthworks.

9.7.34. In all cases, the peat will be emplaced such as to raise peat wetness and groundwater levels within the peat body returning it to a more natural state. The reuse of excavated peat will take place only where hydrological and topographical conditions will support long-term peatland habitat restoration. This will ensure the peat remains permanently saturated and regains peat-forming functionality.

9.7.35. The peat fringe reinstatements will be tied in and tapered with any existing in-situ peat along the margins. All peat reinstatement areas will be capped with turves or reseeded rapidly to promote revegetation and prevent erosion. Measures to maintain the integrity of these deposits and prevent deterioration during handling and storage are detailed within the PMP.

9.7.36. From these opportunities, there is a potential peat demand on site for re-instatement of 1525 $m^3$.

## Peat Management Plan

9.7.37. A Peat Management Plan (PMP) to address peat excavation and reinstatement requirements has been prepared. It contains advice for management of peat during excavation, storage and reuse. It will be implemented under the overall control of an ECOW during construction. The above details have been summarised from the PMP.

## Residual Effects

9.7.38. The peat reuse demand on Site of 1525 $m^3$ is such that the maximum predicted volume of peat excavation of 1112 $m^3$ can be beneficially reused. The reuse demand is therefore greater than the excavation volume/areas and there would be no residual peat.

9.7.39. Although the sensitivity of peat remains Medium, the Magnitude of any Residual Predicted Effect is reduced to Low in accordance with the criteria in Table 1-3. The Residual Predicted Effect on peatland habitat, peat condition and carbon loss in accordance with the criteria in Table 9.4 is also reduced to Low and is summarised in Table 9-10.

**Table 9-10: Residual Predicted Effect**

| Predicted Residual Effect | Sensitivity | Magnitude | Effect | | |
|---|---|---|---|---|---|
| | | | Construction | Operation | Decommission |
| Peatland habitat, peat condition and carbon loss | Medium | Low | Low | Negligible | Negligible |

## References

FLS (2024). FLS Guidance on design principles for renewable energy development on peatland on the National Forests and Land.

Joint Nature Conservation Committee (JNCC) (2011). Report 445 Towards an Assessment of the State of UK Peatlands definitions of peat for Scotland.

NatureScot (2022). Peatland ACTION Technical Compendium: Procedural and technical requirements for peatland restoration in Scotland. NatureScot. Available at: https://www.nature.scot/doc/peatland-action-technical-compendium

NatureScot (2023) Advising on peatland, carbon-rich soils and priority peatland habitats in development management June 2023 Revised: November 2023. Available at https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-management

Peatland Action online, https://www.nature.scot/sites/default/files/2023-02/Guidance-Peatland-Action-Peatland-Condition-Assessment-Guide-A1916874.pdf

Scottish Natural Heritage (2015) Scotland's National Peatland Plan

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

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

Scottish Government, Scottish Environment Protection Agency, Scottish Natural Heritage and The James Hutton Institute (2014) *Guidance on Developments on Peatland – Site Surveys*. Online version only

Scottish Renewables and SEPA, Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste, (2012); online at https://www.gov.scot/publications/assessment-of-peat-volumes-reuse-of-excavated-peat-andminimisation-of-waste-guidance

SEPA, Guidance WST-G-052 version 1 (2017), Developments on Peat and Off-Site Uses of Waste Peat, (supersedes SEPA Regulatory Position Statement https://www.sepa.org.uk/media/287064/wst-g-052-developments-on-peat-and-off-site-uses-of-waste-peat.pdf