2.0 Baseline Conditions

2.1 Definition of Peat

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

The Scottish Government Peat Landslide Hazard Best Practice Guide (2017) uses the following Joint Nature Conservation Committee (JNCC) report 455 'Towards an Assessment of the State of UK Peatlands' definition for classification of peat deposits:

- Peaty (or organo-mineral) soil: a soil with a surface organic layer less than 0.5 m deep;
- Peat: a soil with a surface organic layer greater than 0.5 m deep which has an organic matter content of more than 60 %; and
- Deep Peat: a peat soil with a surface organic layer greater than 1.0 m deep.

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

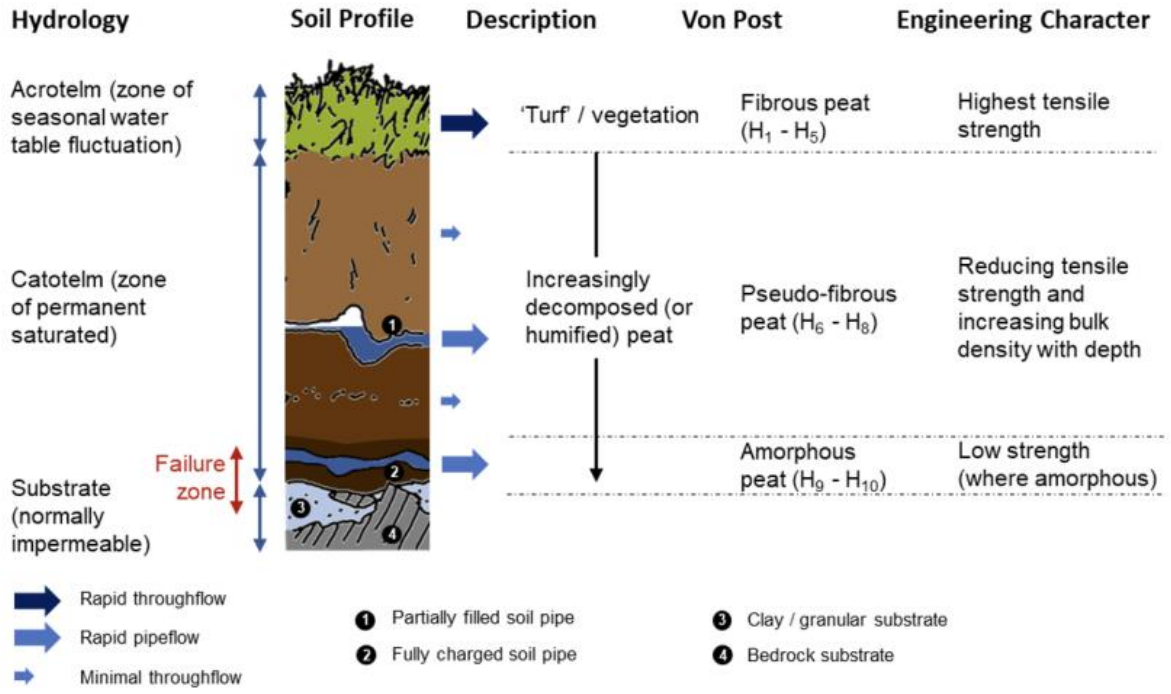
Lindsay[10] defined two main types of peat bog, raised bog and blanket bog, which are prevalent on the West coast of Europe along the Atlantic seaboard. In Britain, the dominant peatland is blanket bog which occurs on the gentle slopes of upland plateaux, ridges and benches and is predominantly supplied with water and nutrients in the form of precipitation. Blanket peat is usually considered to be hydrologically disconnected from the underlying mineral layer.

There are two principal types of peat in a near natural peatland (see **Plate 1 below**):

- The upper (acrotelm) layer in which the water table fluctuates, which is fibrous and comprises plant roots etc. The acrotelm is relatively dry and has some tensile strength and its thickness typically ranges from 0.1 m to 0.6 m deep.
- The lower (catotelm) layer, which is saturated, sitting permanently below the water table. The catotelm layer is highly decomposed, generally becoming more amorphous/liquid in nature and losing structure with increasing depth. The structure of catotelmic peat tends to disrupt completely on excavation and handling.

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

Plate 1 - Typical Peat Profile[11]



The acrotelm is the fibrous surface to the peat bog[12], typically less than 0.6m thick, which exists between the growing bog surface and the lowest position of the water table in dry summers.

For geotechnical purposes the degree of decomposition (humification) can be estimated in the field by applying the 'squeezing test' proposed by von Post and Grunland[13] (1926) and as shown in Plate 1. The humification value ranges from H1 (no decomposition) to H10 (highly decomposed). The extended system set out by Hobbs[14] provides a means of correlating the types of peat with their physical, chemical and structural properties.

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

2.2 Topography

From review of OS mapping, the topography across the proposed development is typical of the Ochil Hills, consisting largely of undulating hills with moderate to steep slopes.

The ground elevation within the site is at approximately 142m AOD near Blackford where the proposed development is accessed from the A9 near Longfauld and then increases in elevation as the access track climbs up to 268m AOD at the junction of the access to Carim Lodge. The access track then climbs steeply, rising to 520m AOD at Little Corum and into the main turbine areas located on the hill tops and plateau with the highest point within the

11 Mills, A.J. and Rushton, D. 2023. A risk-based approach to peatland restoration and peat instability. NatureScot Research Report 1259.

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

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

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

application boundary located adjacent to the south eastern boundary at a height of 677m AOD at Ben Buck.

Photo 1: View facing northwest from NGR NN 88705 03148, showing undulating open moorland, taken on 03/10/2023.

Photo 2: View facing east from NGR NN 88220 01788, showing areas of peat hagging, taken on 03/10/2023.

2.3 Geology

2.3.1 Artificial Ground

Based on the information available from the BGS Geoindex[15], no made ground deposits are present across the site.

2.3.2 Superficial Geology

A review of the BGS Geoindex[15] indicates that peat is the most common superficial deposit mapped across the site. There are localised areas of glacial till (Devensian) primarily situated on slopes and valleys.

In addition, there are areas of the site that are shown to be absent of any superficial deposits, particularly areas with steep slopes where bedrock may be exposed and in the north where the main access track and area of plantation forestry are located.

Figure 10.1.3 details the superficial geology BGS mapping across the site.

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

Photo 3: Peat deposits with underlying glacial till substrate, taken at NGR NN 88137 01873.

2.3.3 Bedrock Geology

A review of the BGS Geoindex[15] indicates that site is predominantly underlain by the Ochil Volcanic Formation which consists of lava flows and volcaniclastic rocks. This unit is predominantly comprised of andesites and basalts, with localised areas of volcanic conglomerates and trachyandesites. The northern area of the site is underlain by the Sheriffmuir Sandstone Member. This formation is comprised of early Devonian sandstones with minor mudstone units. Several dykes are noted primarily within the east of the site, described as North Britain Siluro-Devonian Calc-Alkaline Dyke Suite.

Figure 10.1.4 details the bedrock geology BGS mapping overlaid across the site.

2.4 Peatland Classification

The Scottish Government Carbon and Peatland Map 2016[16] indicates that the upland areas within the main areas of the site where the turbines and access track are located are predominantly underlain by Class 1 Peat. The new section of access track from Carim Lodge prior to Little Corum is located on mineral soils and some Class 5 peatland. There are other more localised areas of Class 2, 3, 4 and 5 mostly located adjacent to watercourses.

Class 1 and 2 peatland are considered nationally important carbon-rich soils, deep peat and priority peatland habitat. These types of peatland are likely to be of high conservation value.

[16] Scottish Government, Carbon and Peatland Map 2016, Available online at: map.environment.gov.scot/soil_maps/

2.5 Peat Condition Survey and Assessments

2.5.1 Previous Assessments

SLR have been provided with two previous assessments that have recorded peatland condition across the site, the findings are summarised below.

2.5.1.1 Peatland Restoration Feasibility Report - 2019

A Peatland Restoration Feasibility report[17] was undertaken by Central Environmental Surveys (CES) in 2019. The report conducted by CES assesses a number of areas that were featured within this report. The report undertaken by CES has the following conclusions which align with the finding of this report and the NVC report[16]:

- Area of extensive peat hagging east of Blairdenon Hill that extends to the west of Ben Buck.
- Peat panning was flagged within CES report highlighting revegetation in some areas.
- Effect of extensive historic grazing and current grazing pressures mentioned.
- Limited anthropogenic drainage noted in the CES report within shared areas with this report, drainage mapped to the west outside the site boundary.
- Hagged gulleys are described as being colonised by acid grassland (low mineral soils) with hummocks and limited sphagnum moss being present.

2.5.1.2 Peatland Condition Appraisal - 2024

A Peatland Condition Appraisal [18] was undertaken by Botanaeco and published in 2024. This peatland condition assessment reported that the site was in modified condition due to the extent of historic erosion and ongoing grazing.

2.5.2 SLR Peat Condition Surveys

A peat condition assessment was undertaken as part of **Technical Appendix 8.1: UK Habitat Classification (UKHab) and National Vegetation Classification (NVC) Report[19].** The Peat Condition Map is detailed on **Figure 8.1.3** and recorded the peat condition to typically comprise modified blanket bog with a localised area of drained blanket bog located in the north east of the site.

Further surveys of physical peat condition was undertaken by SLR during the peat depth surveys with the results of the physical peat condition survey provided on **Figure 10.2.6** and detailed below.

2.5.3 Near Natural Features

No near natural features were observed within the proposed development from aerial imagery and during site surveys. The entire area has been primarily modified by intensive sheep grazing. Across the southern area of the proposed development there are extensive 'All-Terrain Vehicle' (ATV) tracks. There are also ATV tracks recorded in the northern area of the proposed development.

17 Peatland Restoration Feasibility Survey, Central Environmental Surveys (2019)

18 Windburn Wind Farm – Peatland condition appraisal, Botanaeco.05/01/2024. Final 1.0

19 Chapter 8: Terrestrial Ecology - Technical Appendix 8.1: UK Habitat Classification (UKHab) and National Vegetation Classification (NVC) Report

Photo 4: ATV tracks trending north to south. Taken from NN 87987 03459 facing north.

Photo 5: Revegetation at base of peat hagg with bare substrate. Taken from NN 88135 01876 facing south.

2.5.4 Artificial Drainage

The site does not contain any anthropogenic drainage directly within the areas of proposed infrastructure. The access track to the south of the site was observed to be acting as a drainage ditch with surface runoff utilising the track. This track trends north to south.

2.5.5 Peatland Erosion Features

There are extensive areas of peat erosion across the site (peat haggs, peat gullies, peat pans, bare substrate and micro-erosion). Peat haggs of up to 3m were mapped during site surveys at varying stages of degradation. Active revegetation was observed on some areas of peat haggs and peat pans. Peat pans were mapped between areas of peat haggs and erosion gulleys. Micro-erosion was mapped in the north with limited peat deposits typically present in this area.

Figure 10.2.6 records the peat erosional features across the site with bare peat, hagged and vegetated gulleys being mapped.

Photo 6: Peat hagging and regeneration to the north of Turbine 3. Taken from NN 88138 01210 facing southwest.

Photo 7: Peat Pan to the east of Turbine 6. Taken from NN 87737 01716 facing south.