EAST POINT GEO
An ABL Group Company

Consulting Report

Appendix 8-2: Peat Management Plan Sandy Knowe Wind Farm Extension

Dumfries & Galloway
ERG

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1. INTRODUCTION

1.1. Background

ERG UK Holding Ltd (the Applicant) are seeking consent under Section 36 of the Electricity Act 1989 for construction of the Sandy Knowe Wind Farm Extension, Dumfries & Galloway (hereafter the 'Proposed Development').

The Proposed Development Footprint is the area within which the Proposed Development is located and lies approximately 4 km to the west of Kirkconnel, 6 km to the east of New Cumnock and adjoins the consented Sandy Knowe Wind Farm (under construction). The Proposed Development Footprint is focused to the south of the Nithsdale on the lower-lying northern slopes of hills which include High Cairn (553 m Above Ordnance Datum (AOD)) and White Hill (418 m AOD). Sandy Knowe Wind Farm is located to the immediate south-east of the Proposed Development Footprint. The main area of the extension comprises a western tier of four turbines (T25 to T28) and a northern pair of turbines (T29 and T30), to be linked to the existing Sandy Knowe Wind Farm by new access tracks (Plate 1.1). The application for the new turbines is to be accompanied by an application for extension in operational life of the consented scheme. Chapter 1: Introduction and Chapter 3: Description of Development of the EIA Report provide more information on the Proposed Development Site.

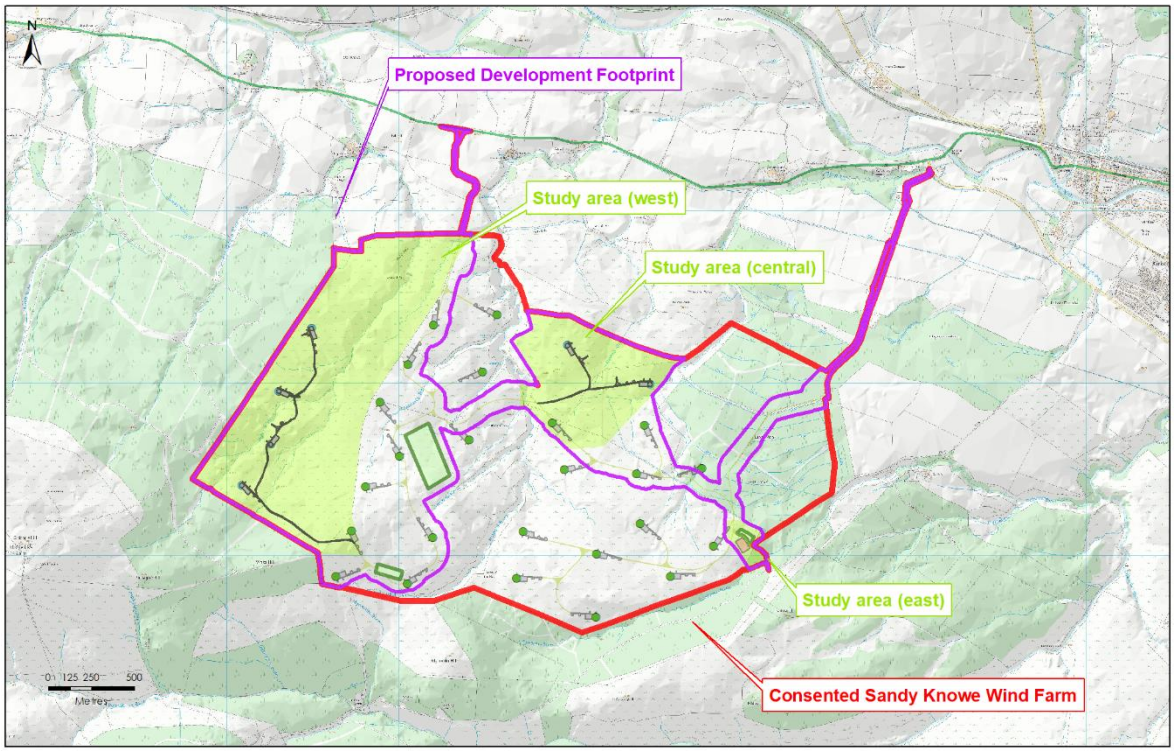

Plate 1.1 Proposed location of the Sandy Knowe Wind Farm Extension (the Proposed Development is shown in black and the consented development in grey; the study area is shown in light green)

The Proposed Development will comprise:

- Three turbines up to a maximum 125 m tip height and three turbines up to a maximum tip height of 149.9 m.
- Use of existing; consented / under construction access tracks.

- New access tracks.
- Construction of turbine foundations and crane hardstandings.
- Underground cabling.
- A battery storage area.
- Use of an existing borrow pit for the excavation of on-site aggregate to be used in the construction of the Proposed Development and for peat reinstatement. Any extraction of aggregate will be within the existing boundaries of the Borrow pit (See Chapter 3 Project Description); and
- Reuse of two consented temporary storage compounds.

The spatial scope of the assessment within this report is restricted to the areas of undeveloped land around the Proposed Development (shown on Plate 1.1).

This Peat Management Plan (PMP) follows good practice guidance (Scottish Renewables & Scottish Environment Protection Agency (SEPA), 2012) on the assessment of peat excavation and reuse for wind farms in Scotland. The PMP was prepared in parallel with a Peat Landslide Hazard and Risk Assessment (PLHRA, Appendix 8.1) and is informed by peat depth probing undertaken by Atmos Consulting.

1.2. Scope of Work

The scope of the PMP is as follows:

- Summarise the design principles adopted for design of the wind farm with respect to peat soils, including the approach to peat characterisation and the identification of opportunities taken to minimise impacts on peatlands within the Proposed Development Footprint.
- Calculate the potential volumes of peat that may be excavated in association with wind farm construction, both acrotelmic and catotelmic peat.
- Identify and justify reuse of acrotelmic and catotelmic peat where it cannot be reinstated at source.
- Identify good practice measures to ensure excavated peat is stored safely and with minimal loss of function prior to its reinstatement.

The PMP follows the advice issued in SEPA's Scoping Opinion response dated 09/07/2021, which provides additional recommendations over and above published guidance.

1.3. Report Structure

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 Proposed Development Footprint and proposed wind farm infrastructure based on the scheme described in the main EIA chapters and on desk study review of site information.
- Section 4 describes the approach to and results of peat excavation calculations, and summarises opportunities for reuse of excavated peat soils within the Proposed Development Footprint.

- Section 5 provides general good practice measures and measures specific to the conditions at the Proposed Development Footprint.

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

2. CONTEXT TO PEAT MANAGEMENT

2.1. Peat as a Carbon Store

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.

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).

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 limit impacts on peat carbon stores at wind farm sites by avoiding peat, where possible, or minimising impacts where peat cannot be avoided. Where there are opportunities to improve peat condition, e.g. through restoration, and in so doing, help convert carbon sources into stores or sinks, this may also be facilitated by the peat management plan (usually in conjunction with a Habitat Management Plan).

2.2. Good Practice Guidance

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.

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 Environment Protection Agency, Forestry Commission Scotland, 2019).
- Developments on Peat and Off-Site Uses of Waste Peat, WST-G-052 (SEPA, 2017).
- Peatland Survey. Guidance on Developments on Peatland (Scottish Government, Scottish Natural Heritage and SEPA, 2017a).
- Peat Landslide Hazard and Risk Assessments, Best Practice Guide for Proposed Electricity Generation Developments (Second Edition) (Scottish Government, 2017).
- Carbon and Peatland 2016 Map (GIS) (Scottish Natural Heritage, 2016a).
- Carbon-rich Soils, Deep Peat and Priority Peatland Habitat Mapping, Consultation Analysis Report (Scottish Natural Heritage, 2016b).
- Scotland's National Peatland Plan - Working for our future (Scottish Natural Heritage, 2015a).
- Constructed Tracks in the Scottish Uplands, 2nd Edition (Scottish Natural Heritage, 2015b).

- Developments on Peatland: Guidance on the assessment of peat volumes, reuse of excavated peat and the minimisation of waste (Scottish Renewables and SEPA, 2012).
- 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).

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.

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.

iii. Demonstrate how excavated peat will be managed (ii and iii together comprising an assessment of the "peat and soil balance").

These activities are normally considered within a PMP, prepared as part of the Environmental Impact Assessment at the planning stage.

Given 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.

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.

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.

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.

Through the different stages of the project, the strategy should be to prevent disturbance to and losses of peat through appropriate reuse, wherever possible.

2.3. Approach for the Sandy Knowe Wind Farm Extension

The strategy for peat management for the Proposed Development follows SEPA's guidance for developments on peat and uses of waste peat (SEPA, 2017). The hierarchy is as follows:

- **Prevent** the creation of waste peat by minimising overlap of infrastructure with peat, where it is possible to do, and given other site and design constraints that may influence turbine locations and associated infrastructure (such as tracks).
- **Reuse** peat on site in construction, reinstatement or in restoration (restoring off-site will require environmental authorisation).
- **Recycle** as a soil substitute or for use in other works (where on-site or off-site use in restoration is not possible).
- **Dispose**, only if all other options have been explored and discounted.

At the Proposed Development, a combination of prevention and reuse has formed the peat management strategy. Outline details of this strategy are provided below, and full details of excavation and reuse proposals are provided in Section 4.

2.3.1. Prevent

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 (e.g. landscape visual impacts, hydrology, terrestrial ecology) and the practical requirements of wind farm construction (e.g. minimum turbine spacings, acceptable gradients for tracks / hardstandings).

In relation to the Proposed Development, much of the Proposed Development Footprint is covered in peat, and opportunities to avoid it altogether are very limited. However, specific design decisions to minimise peat impacts were as follows:

- The proposed link track between Turbine 7 of the consented Sandy Knowe Wind Farm and Turbine 25 (T1 at scoping) has been adjusted south to reduce overlap with a 1.0 – 2.0 m depth area.
- The proposed track between T26 and T27 (T2 and T3 at scoping) has been adjusted west to overlap with shallower peat.
- Proposed Turbine 27 (T3 at scoping) has been largely sited on organic soil, rather than peat (as it was at scoping).
- A section of floating track has been specified between T27 and T28 over the deepest area of peat crossed by the proposed infrastructure.

A second stage of Phase 2 peat probing was undertaken to support micro-siting of a design-chill layout onto shallower peat for the design-freeze. Full details of design changes from scoping, through design-chill to design-freeze are detailed in Table 3.1 of Chapter 3 of the EIAR.

2.3.2. Reuse

The primary reuse strategy for peat management is to use peat to enable full reinstatement of the borrow pit excavated for construction of the consented Sandy Knowe Wind Farm. Only organic soils and associated turfed soils will be used for tying infrastructure into the landscape. Reinstatement approaches are derived from the Good Practice guidance detailed in Section 2.1 and from wider good practice approaches developed as part of wind farm construction over the last few years. This is considered in further detail in Section 4.

2.3.3. Disposal

No peat disposal is anticipated as part of the application.

3. DESK STUDY

3.1. Site Overview

The Proposed Development Footprint lies on a northeast facing slope which falls from Polnagrie Hill and Mynwhirr Hill outside and to the south of the Proposed Development Footprint towards the A76 and River Nith to the north. Turbine 25, the uppermost of the western tier of turbines lies at 425 m, Turbine 28 (the lowest) at 345 m and Turbines 29 and 30 at 285 m and 275 m respectively (Figure 8.2.1).

The topography comprises a series of gentle benches and slightly steeper slopes that run along the contour and are dissected by watercourses that flow to the northeast (Plate 3.1).

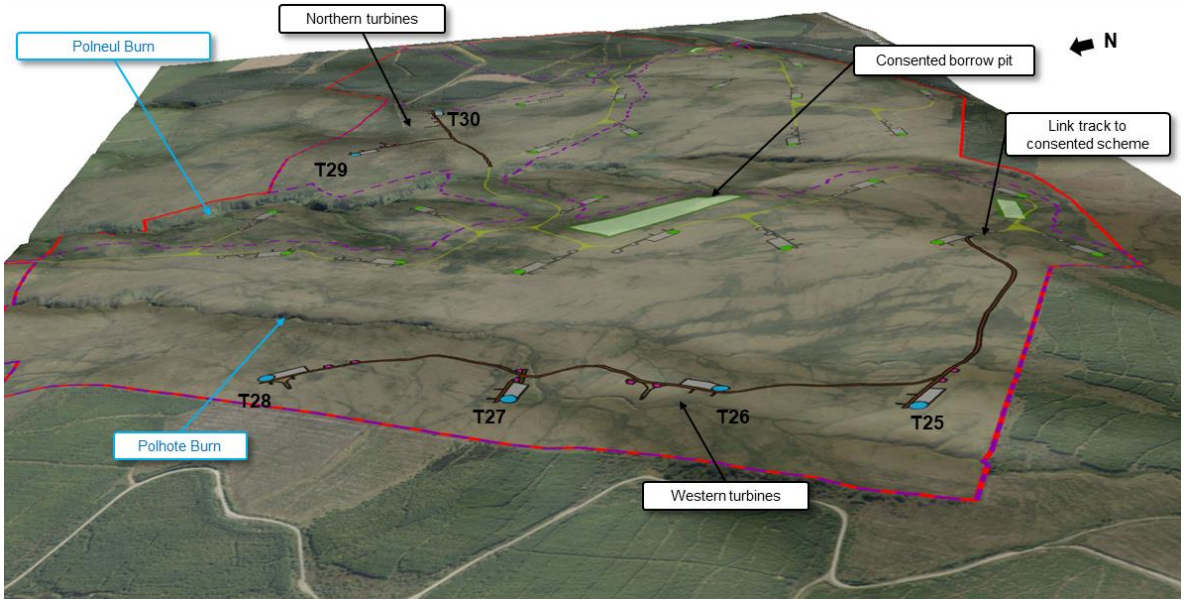

Plate 3.1 Perspective view of site (consented scheme shown in green)

Slope angles gentle (2.5-5.0°) to moderate (5.0-7.5°) in the northern half of the Proposed Development Footprint under the western tier of turbines and moderate to steep (up to 15°) over the southern half of the western area (Figure 8.2.2). Turbines 29 and 30 are on a much gentler broad ridge at a lower elevation. Slopes are very steep on the gully and valley sides above Polhote and Polneul Burns.

3.2. Peat Depth

Peat depth probing was undertaken using a phased approach in line with Scottish Government (2017) guidance, comprising a 100 m Phase 1 grid in March 2021 and more detailed infrastructure-specific Phase 2 grids, the latter comprising 25 m grids for hardstandings and 50 m spacings with 10 m offsets along proposed access tracks. Coring was undertaken at each turbine location. Phase 1 probing was undertaken to inform the design chill layout, which was subsequently modified in an attempt to minimise impacts on peat, with a set of Phase 2 probing undertaken in December 2021 to inform the design-freeze (final) layout.

- In total, 621 locations were probed across the Proposed Development.
- The mean peat depth was 0.79 m across the Proposed Development Footprint, with a maximum recorded depth of 4.5 m.

Interpolation of peat depths was undertaken in the ArcMap GIS environment using an inverse distance weighted approach. This approach was selected because it preserves recorded depths at each probe location, unlike some other approaches (e.g. kriging), is computationally simple, and minimises 'bullseye' effects. The approach was selected after comparison of outputs with three other methods (natural neighbour, kriging and TIN).

The peat depth model is shown on Figure 8.2.3 with probing locations superimposed. Comparison of the peat depth model with the layout indicates that proposed turbines and hardstandings avoid the deepest peat across the Proposed Development Footprint, however, due to the numerous watercourses and in order to minimise water crossings, tracks have necessarily been routed in areas of deep peat. In practice, there are relatively few opportunities to avoid deep peat at the Proposed Development Footprint and floating may only have been more widely achievable by running numerous spur tracks along contour to each turbine, increasing the overall track length, land take and number of water crossings.

3.3. Peat Geomorphology and Condition

Satellite imagery available as an ArcGIS Basemap layer was used to interpret and map features within the Proposed Development Footprint. Additional imagery from different epochs available on both Google Earth™ and bing.com/maps was also referred to in order to validate the satellite imagery interpretation. The resulting geomorphological map (Figure 8.1.4, Appendix 8.1) was subsequently verified during two site walkovers undertaken in September 2020 and October 2021 by a Chartered Geologist / peatland geomorphologist with over 20 years' experience of assessing peat landslides.

Review of site conditions indicated that much of the Proposed Development Footprint comprises relatively intact planar peat, and although there are numerous drains cut into the peat deposits, ground conditions are sufficiently wet and drain gradients sufficiently shallow (being cut oblique to or along contour) that they have recovered and appear to be relatively ineffective. Further, there are no cuttings to restore, no eroded gullies to be blocked, and no bare peat areas to reinstate.

The Carbon and Peatland 2016 Map indicates the Proposed Development Footprint to comprise primarily Class 3 soils. Phase 1 habitat and NVC surveys undertaken across the Proposed Development Footprint indicate that the majority of the peatland to be wet modified bog, with no M19 or M17 communities reported.

3.4. Drainage

The Proposed Development Footprint is relatively heavily drained, with over 41 km of drains mapped from satellite imagery. While they are relatively clear on these images, they were frequently difficult to locate on the ground, particularly in the large flushed areas below spring lines in the mid slopes.

There are no opportunities to use surplus peat in drain reinstatement, as the drains are typically partially or fully vegetated or of insufficient dimensions to accommodate translocated peat material.

3.5. Land Use

There are no land uses within the Proposed Development Site suitable for peat reuse, however, the borrow pit excavated to construct the consented Sandy Knowe Wind Farm can only be partially reinstated with surplus material from that scheme, and therefore there are opportunities to realise its full reinstatement with materials from the Proposed Development.

4. PEAT EXCAVATION AND STORAGE

4.1. Excavation calculations

The majority of infrastructure comprising the Proposed Development will require full excavation of the peat or soils underlying the infrastructure footprints during construction (EIAR Chapter 3: Description of Development). However, some infrastructure is not required post-construction (secondary boom assemblies, blade laydowns and turning heads) and the peat excavated from these areas will be directly reinstated. In this section, the following terms are used to describe groundworks associated with peat / soil and wind farm infrastructure:

- **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.
- **Restoration:** the use of excavated materials to improve the quality of land areas that are considered degraded through mechanisms other than associated with wind farm construction (e.g. through cutting or erosion); the term is not used to describe reinstatement activities at infrastructure.

Excavation volumes have been calculated as the product of the average peat depth under each footprint (derived from the peat model) and the indicative footprint area (detailed for each infrastructure type below). For peat depths 0.5 - 1.0 m, sideslopes of 1:1 have been assumed beyond the infrastructure footprints, and for depths >1.0 m, sideslopes of 2:1 have been assumed, in both cases increasing the infrastructure footprint. For each infrastructure item, the upper 0.3m of the peat profile is assumed to be acrotelm and any remaining depth is assumed to be catotelm. A 0.3m 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.

Soils less than 0.5m in depth are assumed to be organic (or other) soils other than peat and are classed as 'soil' for the purposes of this assessment.

4.1.1. Turbines, hardstandings, secondary crane pads and blade lay downs

Each turbine location will comprise a circular turbine foundation (c. 25m diameter), a main hardstanding overlapping half the foundation diameter (c. 25 m x 62.5 m), boom assembly area (c. 15 m x 10 m) and hardstand working areas (14.5 m x 2 m). All footprints will be fully excavated to substrate and replaced with coarse aggregate, but only main hardstandings are proposed to be permanent for routine maintenance and decommissioning.

Chapter 3 Description of Development and Figure 3-5 describes the indicative turbine installation area.

The permanently excavated volumes for turbines and main hardstandings are based on each infrastructure footprint multiplied by the average peat depth determined from detailed infrastructure probing (see 8.2.3) with additional take for sideslopes. Temporarily excavated volumes for the blade laydowns and boom assemblies are calculated in the same way.

Table 4.1 shows associated excavation volumes.

4.1.2. Access tracks

Access tracks comprise a 5.5 m wide running surface and will be primarily constructed as cut and fill track due to the gradients present on site. Seven turning heads are proposed, all of which will be permanently excavated. A single section of floating track (c. 100 m) has been specified between T27 and T28. Floating tracks involve no excavation, and therefore no peat is generated from this element of site infrastructure.

4.1.3. Cable trenches

Cable trenches are to be excavated within the existing footprint of the proposed access tracks and therefore peat disturbed in this activity is already considered within the track calculations.

4.1.4. Construction compound(s)

Consented construction compounds for the consented Sandy Knowe Wind Farm will be used during construction of the Proposed Development, and therefore there is no additional peat to be excavated for this type of infrastructure.

4.1.5. Substation

The consented Sandy Knowe Wind Farm substation will be the connection point for the extension, and since no upgrades are required to accommodate this, there will be no additional peat excavated.

4.1.6. Peat excavation summary

The excavated peat volumes for all infrastructure, based on detailed probing, infrastructure footprints and construction methodology, are shown in Table 4.1. Volumes are separated into acrotelmic and catotelmic peat. Figures are quoted to 1 m^3 to avoid rounding errors leading to inaccurate totals in later tables rather than to imply accuracy of calculations to 1 m^3.

Based on these calculations:

- 778 m^3 of acrotelm and 1,440 m^3 of catotelm will be temporarily excavated prior to being directly reinstated at the point of excavation.
- 5,280 m^3 of acrotelm and 13,462 m^3 of catotelm will be permanently excavated and require reuse.

A total of 18,742 m^3 of peat will require reuse at locations other than the immediate point of excavation.

Infrastructure	Type of Excavation	Excavation Volume (m^3)		
		Acrotelm	Catotelm	Total
Access Tracks*	Permanently excavated	4,176	12,152	16,327
Turbine foundations	Permanently excavated	293	421	714
Main hardstandings	Permanently excavated	1,191	1,658	2,849
Permanent excavation total		**5,659**	**14,231**	**19,890**
Blade laydowns	Temporarily excavated	70	90	160

Turning heads	Temporarily excavated	447	829	1,276
Boom assemblies	Temporarily excavated	261	521	782
Temporary excavation total		**778**	**1,440**	**2,218**
Total peat excavation		**6,436**	**15,671**	**22,108**

* Note that there are small sections of temporary access track at T26 and T27 but that these are treated as permanent excavations in these calculations

Table 4.1 Peat excavation volumes for all infrastructure

4.2. Reuse

Excavated peat will be re-used in two ways:

1. Reinstatement of temporary excavations for infrastructure.
2. Reinstatement of the Sandy Knowe Wind Farm borrow pit.

4.2.1. Reinstatement of temporary excavations

Temporary excavations comprise those for the boom assemblies, blade fingers and turning heads. Peat will be stored locally, separated into acrotelmic and catotelmic peat, and reinstated in reverse order to the sequence of excavation, with acrotelmic turves placed over catotelm.

Temporary storage and reinstatement will apply to 778 m^3 (acrotelm) and 1,440 m^3 of catotelm (2,218 m^3 in total).

4.2.2. Reinstatement of the Sandy Knowe borrow pit

The remaining 19,890 m^3 of excavated peat will be reinstated in the consented Sandy Knowe borrow pit.

Details of the borrow pit restoration will depend on the final geometry of the borrow pit, which has been consented for up to 2 m of peat reinstatement (Roadbridge, 2021a). The Borrow Pit Restoration Plan for the consented scheme states that:

- Following reinstatement of overburden (non peat soils), a clay liner will be installed for moisture retention followed by catotelmic and then acrotelmic peat reinstatement, with turfed blocks as the top layer.
- Temporary cutoff drains around the borrow pit perimeter installed to ensure safe working will be infilled post-reinstatement to enable the peat to re-wet.
- Slope levels within the pit will be designed to be appropriate to retain peat in a hydrated condition.
- If any bare areas remain, these will be seeded with a seed mix appropriate to the location and setting, and agreed with the ECoW (who will have full oversight of the reinstatement works).

Peat excavation calculations for the consented Sandy Knowe Wind Farm indicate that approximately 35,000 m^3 of peat has been generated and is due to be reinstated in the borrow pit. This figure is based on as-constructed survey data from December 2021 (Roadbridge, 2021a) and supersedes estimates in the PMP (Roadbridge, 2021b), which estimated slightly larger volumes. Additional volumes of peat are not expected to be excavated in future phases of the Sandy Knowe Wind Farm Construction programme.

Distributed across the c. 31,500 m^2 area of the pit suitable for reinstatement, this is equivalent to an average depth of c. 0.9 m. The consented depth of reinstatement is 2m as per the PMP for Sandy Knowe Wind Farm, and therefore c. 1.1 m depth remains available for reinstatement using peat from the Proposed Development.

Table 4.2 shows reuse volumes based on the descriptions above:

Location	Type of restoration	Restoration Areas and Volumes	
		Area (m^2)	Volume (m^3)
Borrow Pit D	Acrotelm (turfed blocks c. 0.3 m thick overlying catotelm)	18,864	5,659
Borrow Pit D	Catotelm (overlying clay liner)	17,599	14,231
	Totals	n/a	19,890

Table 4-1 Peat reuse areas and volumes for all infrastructure

Based on the volume and area of acrotelm available, there is sufficient acrotelm available to provide a continuous vegetated surface over c. 18,864 m^2. Given that this will be emplaced subsequent to peat from the consented scheme, it is recommended that this area is left available to accommodate the Sandy Knowe Extension peat excess. If this area is underlain by catotelmic peat excavated for the Proposed Development, then the average depth of catotelmic peat underlying the acrotelm will be 0.75 m, taking the combined depth of acrotelm and catotelm to c. 1.05m.

Across both schemes, the combined peat volume (c. 35,000 m^3 + 19,890 m^3) would equate to c. 1.95 m of peat, i.e. less than the consented depth limit (2 m).

4.3. Peat balance

Calculations in the preceding section indicate that there is sufficient accommodation space within the consented Sandy Knowe Wind Farm borrow pit to accommodate the surplus peat generated during construction of the wind farm, and therefore there is a peat mass balance for the Proposed Development.

4.4. Proposed storage locations

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 e.g. 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. Section 5 provides good practice advice on peat storage.

5. GOOD PRACTICE

5.1. Background

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). 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 reinstatement plans at each location or to provide advice to the construction contractors prior to reinstatement.

Given the reliance of the Proposed Development on reinstatement works carried out for the consented wind farm, it is proposed that a revised Borrow Pit Restoration Plan is prepared prior to construction of the extension, with updated target ground levels and a revised mass balance.

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

The following good practice measures are proposed for excavation and handling:

- A minimum thickness of 300 mm of acrotelmic peat or turfed organic soil should be excavated where sufficient soil is present; where less than 300 mm 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 (e.g. 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).
- 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

The following good practice measures are proposed for storage:

- Eliminate storage where possibly by single handling from the point of excavation to a location of reuse.
- If storage cannot be avoided, minimise storage time by taking an 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 turfed 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 (e.g. through blading off of catotelmic peat and use of appropriate cover to minimise moisture loss).
- The 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 likelihood or greater or medium risk or greater (see Appendix 8.1), 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 bunded 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.
- 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

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 m^2 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.
- 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

During construction, monitoring would 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.
- Acceleration of re-use for vulnerable stores if so identified.

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 would be initiated once restoration and peat reinstatement works have been completed, and would be anticipated to 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 turfed material).
- Review of stability of deposits in their new locations.
- Fixed point photography in order to aid review over a series of monitoring intervals.

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).
- Construction of retention structures if any creep of peat soils is evident at any reinstated location.

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

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