TA6.1: Peat Management Plan

Ben Sca Redesign Wind Farm

Ben Sca Wind Farm Limited

Prepared by:

SLR Consulting Limited

No. 50 Stirling Business Centre, Wellgreen, Stirling,
FK8 2DZ

SLR Project No.: 405.064982.00001

14 March 2024

Revision: 2

Basis of Report

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1.0 Introduction

1.1 General

SLR Consulting Ltd (SLR) was commissioned by Ben Sca Wind Farm Limited (the Applicant) to undertake a Stage 1 Outline Peat Management Plan (PMP) for the proposed Ben Sca Redesign Wind Farm (hereafter referred to as the "Proposed Development"). The location of the Proposed Development is shown on **Figure 1.1** within the site red line boundary (hereafter referred to as "the site").

The Proposed Development is located approximately 2.5km southwest of Edinbane and 7km to the east of Dunvegan on the Isle of Skye.

The Proposed Development would comprise of nine wind turbines with associated infrastructure including access tracks, crane hardstandings, borrow pits, substation and temporary construction compounds.

Full details of the Proposed Development are provided in **EIA Report Chapter 1: Introduction and Project Description**.

1.2 Objectives

The Stage 1 PMP outlines the overall approach of minimising disruption to peatland, and it aims to ensure that all further opportunities to minimise peat disturbance and extraction would be taken during detailed design (Stage 2 PMP) and construction (Stage 3 PMP) of the development.

This PMP has been prepared using data collected on the site from 2018 to 2021, supplemented with additional peat survey data collected in 2023. If the Proposed Development is approved, this PMP would replace the previous PMP provided as Technical Appendix 10.2 in the EIA Report for the original Ben Sca Wind Farm development (SLR, 2020) which was consented in December 2020.

The PMP provides details on the approximate predicted volumes of peat that would be excavated during construction of the permanent infrastructure, the characteristics of the peat that would be excavated, and the principles of how and where this excavated peat would be stored, reused and managed.

Soils which are temporarily removed and stored within working corridors are not assessed in the PMP as they would be replaced, from where they were removed, on completion of the adjacent permanent construction works. The principles presented in Section 4.0, regarding the safeguarding of peat, their storage and placement, apply equally to both peat and soils from the working corridors and those removed from the footprint of permanent infrastructure.

The PMP has been developed to demonstrate that peat management and quantification has been afforded significant consideration during the construction phase of the Proposed Development.

1.3 Legislation and Guidance

The PMP has been compiled in accordance with the following legislation and best practice guidance:

- National Planning Framework for Scotland 4 (NPF4) (Scottish Government, February 2023);
- SEPA Regulatory Position Statement - Developments on Peat (Scottish Environment Protection Agency, 2010);

- Good Practice during Windfarm Construction, 4th Edition (Scottish Renewables, Scottish Natural Heritage (now NatureScot), Scottish Environment Protection Agency, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland Science and AEECoW, 2019);
- Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste (Scottish Renewables and SEPA, 2012);
- Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Scottish Government, January 2017);
- Floating Roads on Peat - Report into Good Practice in Design, Construction and Use of Floating Roads on Peat with reference to Wind Farm Developments in Scotland (Forestry Commission Scotland & Scottish Natural Heritage, 2010);
- The Waste Management Licensing (Scotland) Regulations 2011; and
- Developments on Peat and Off-Site Uses of Waste Peat (SEPA, 2017).

1.3.1 Requirements of National Planning Policy 4

The intent of Policy 5 (Soils) of National Planning Policy 4 (NPF4)[1] is "*to protect carbon rich soils, restore peatlands and minimise the disturbance of soils from development*".

The Policy states [5(a)] that development proposals should only be supported if they are designed and constructed:

- in accordance with the mitigation hierarchy by first avoiding and then minimising the amount of disturbance to soils on undeveloped land; and
- in a manner that protects soils from damage including from compaction and erosion, and that minimises soils sealing.

Further [5(c)] confirms that development proposals on peatland, carbon rich soils, and priority peatland will only be supported if they are:

- essential infrastructure and there is a specific locational need and no other suitable site;
- the generation of energy from renewable sources that optimises the contribution of the area to greenhouse gas emissions reductions targets;
- small-scale development directly linked to a rural business, farm or croft;
- supporting a fragile community in a rural or island area; or
- restoration of peatland habitats.

And [5(d)] confirms that where development on peatland, carbon-rich soils or priority peatland habitat is proposed, a detailed site specific assessment will be required to identify:

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

[1] Scottish Government (2023). https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2022/11/national-planning-framework-4-revised-draft/documents/national-planning-framework-4-revised-draft/national-planning-framework-4-revised-draft/govscot%3Adocument/national-planning-framework-4-revised-draft.pdf

Policy 5 also confirms that the site specific (above) assessment [5(d)] "*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. A peat management plan will be required to demonstrate that this approach has been followed, alongside other appropriate plans required for restoring and/ or enhancing the site into a functioning peatland system capable of achieving carbon sequestration*".

This stage 1 PMP considers the protection and safeguarding of peat and seeks to fulfil the requirements of Policy 5(d) with further detail on peatland habitat and peatland restoration provided in **Technical Appendix 5.3: Outline Habitat Management Plan**.

1.3.2 Mitigation Hierarchy

SEPA[2,3] has published guidance regarding the mitigation hierarchy for developments on peat which is summarised below:

- Prevention – avoiding generating excess peat during construction (e.g., by avoiding peat areas or by using construction methods that do not require excavation such as floating tracks);
- Re-use – use of peat produced on-site in restoration or landscaping, provided that its use is fully justified and suitable;
- Recycling / Recovery / Treatment – modify peat produced on-site for use as fuel, or as a compost / soil conditioner, or dewater peat to improve its mechanical properties in support to re-use; and
- Storage – storage of peat up to a depth of 2 m is not classified as a waste and does not require authorisation from SEPA, however care must be taken to ensure that it does not cause environmental pollution.

Details of the design iterations to avoid areas of peat in accordance with the mitigation hierarchy are provided in the **EIA Report Chapter 1: Introduction and Project Description** and the **Planning, Sustainable Design and Access Statement**.

1.3.3 Definition of Peat

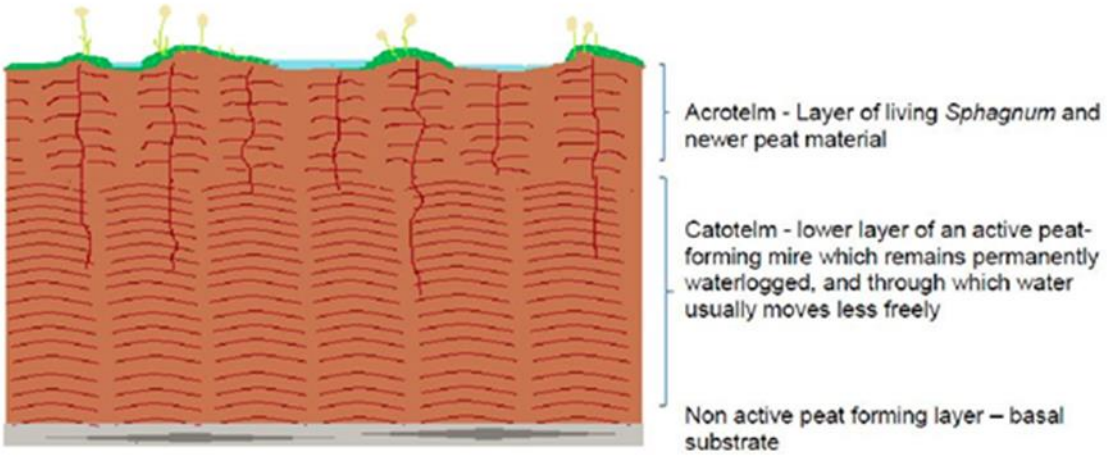
Peat is defined as a material consisting of the partially decomposed remains of plant material and organic matter preserved over a period in a waterlogged environment resulting in anaerobic conditions, with a depth >0.5m. Where the organic material is <0.5m depth then this is not defined as peat. This definition is supported by the following text presented in the following guidance;

- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland Section 3.3 which states that "*Peat soil is an organic soil which contains more than 60 percent of organic matter and exceeds 50cm in thickness."*
- Scottish Government. Scotland's Soils. Soil Survey of Scotland *"Peaty soils have an organic layer at the surface which is less than 50 cm thick"*
- The Macaulay Land Use Research Institute define shallow peat as having "*a prescribed depth of organic matter of 50 – 100 cm"*

[2] Scottish Environment Protection Agency. 2010. Regulatory Position Statement – Developments on Peat.
[3] Scottish Renewables, Scottish Environment Protection Agency. 2012. Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste.

Peat can be classed as two principal types, the acrotelm layer, and the catotelm layer as shown on **Plate 1-1**.

Plate 1-1: Drawing of two layered Structure of Active Bog Peatlands above Non-Active Peat



The acrotelm layer is found in the upper layer of peat where conditions are relatively dry and comprises living vegetation and partially decomposed plant material which can typically be <0.5m in thickness. Hydraulic conductivity in this layer tends to be higher in relation to distance from the water table. The thickness of the acrotelm layer varies depending on topography such as steepness of slope, peat hags, and hummocks. In particular, the acrotelm layer can be affected during periods of drought or as a consequence of drainage. Fibrous in texture, the acrotelm layer has some tensile strength and is generally considered to be stable for storage and re-use.

The catotelm layer is found under the acrotelm layer and comprises decayed plant material and organisms and is denser and with a very low hydraulic conductivity. The catotelm layer sits below the water table resulting in permanent anaerobic conditions. The catotelm layer can be amorphous and has lower tensile strength which may make it less suitable for storage and re-use.

2.0 Site Work

2.1 Peat Depth Survey

The surveys carried out followed best practice guidance for developments on peatland[4,5]. The surveys were undertaken across a number of phases on the dates listed below:

- Phase 1 May 2018;
- Phase 2 April 2019;
- Additional Phase 2 August 2021 (targeting layout of Ben Sca Wind Farm Extension);
- Additional Phase 2 September 2023 (targeting layout of Ben Sca Redesign Wind Farm); and
- Additional Phase 2 February 2024 (targeting updates to the layout of Ben Sca Redesign Wind Farm).

Phase 1 peat probing resulted in probing on a 100m grid to allow for initial assessment of the Proposed Development which was used in preliminary site layout designs. Phase 2 probing saw detailed probing undertaken across the proposed layout, focussing on access tracks, turbine locations and other site infrastructure.

Peat is generally defined as an organic soil in excess of 0.5m, if the soil is less than 0.5m, then it is considered peaty soil. The peat was found to vary across the Proposed Development in terms of thickness and coverage.

Thin peat was classed as being 0.5m to 1.5m thick, with deposits in excess of this being classed as thick peat. The thickness ranges used were intended to reflect the probability of instability associated with both peat slides (in thin peat) and bog slides. Where the probing recorded less than 0.5m thick, this has been considered to be an organic/peaty soil rather than peat.

Where surveys were undertaken by SLR, the thickness of the peat was assessed using a graduated peat probe, approximately 6mm diameter and capable of probing depths of up to 10m. This was pushed vertically into the peat to refusal and the depth recorded, together with a unique location number and the co-ordinates from a handheld Global Positioning System instrument (GPS). The accuracy of the GPS was quoted as ±2m, which was considered sufficiently accurate for this survey. All data was uploaded into a GIS database for incorporation into various drawings and analysis assessments.

Where the probing recorded less than 0.5m thick, this has been considered to be an organic/peaty soil rather than peat.

Where the peat probing met refusal on a hard substrate, the ‘feel’ of the refusal can provide an insight into the nature of the substrate. The following criteria were used to assess material:

- Solid and abrupt refusal – rock;
- Solid but less abrupt refusal with grinding or crunching sound – sand or gravel or weathered rock;
- Rapid and firm refusal – clay; or

[4] Scottish Renewables & SEPA (2012) ‘Developments on Peatland Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste’.
[5] Scottish Natural Heritage (SNH), SEPA, Scottish Government & James Hutton Institute. (2014)’ Peat Survey Guidance; Developments on Peatland: Site Surveys’.

- Gradual refusal – dense peat or soft clay.

2.2 Peat Depth Results

The results from all probing exercises listed above in Section 2.1 are detailed in the following sections and the peat depths **Figures 6.1.1 to 6.1.3**. Interpolation of peat depth was undertaken using the Inverse Distance Weighting (IDW) interpolation method.

A total of 3,032 peat probes were undertaken across all survey phases, with the results summarised in **Table 6.1A**.

Table 6.1A: Peat Probing Results

Peat Thickness (m)	No. of Probes	Percentage (of total probes undertaken on-site)
0 (no peat)	126	4.2
0 – 0.49 (peaty soil)	1373	45.3
0.50 – 0.99 (thin peat)	874	28.8
1.00 – 1.49 (thin peat)	318	10.5
1.50 – 1.99 (thick peat)	211	7.0
2.00 – 2.49 (thick peat)	67	2.2
2.50 – 2.99 (thick peat)	39	1.3
3.00 – 3.49 (thick peat)	17	0.6
3.50 – 3.99 (thick peat)	7	0.2
> 4.0 (thick peat)	0	0.0

2.3 Peat Condition

Much of the peat identified on the slopes of Ben Sca was fibrous – pseudo fibrous, where thicker peat was identified it is anticipated that there will be three zones within the peat bog, based on Von Post's scale of classification.

- a shallow fibrous zone will be identified (typically <0.5 m depth) ranging from H3-H5;
- an intermediate pseudo-fibrous zone (typically H5-H7); and
- an amorphous zone, generally ranging from H7-H9.

Where peat was visually identified onsite, it was generally exposed by streams and within hagged areas. These deposits were generally highly fibrous.

3.0 Potential Impacts on Peat During Construction

The initial construction phase will include soil and peat stripping and excavation activities associated with constructing of the wind farm infrastructure such as turbines, hardstandings, access tracks, compounds and borrow pits.

There are four main types of impact on peat which can occur during construction. These are:

- Loss of structural integrity and peat strength, due to stripping off or damaging the surface vegetation turf, excavation, handling and transporting peat (particularly wet, subsurface peat);
- Erosion and gullying, caused by exposure and desiccation of bare peat surfaces primarily caused by water erosion, due to surface runoff after rainfall;
- Contamination, caused by leaks, spillages or inappropriate laydown of materials; and
- Peat slide, caused by laying wet peat on top of wet peat, laying other heavy materials (including excavated mineral soil or other construction materials) on top of wet peat or by inappropriate stockpiling, such as attempting to create stockpiles of peat that are too high, without bunding, engineering or geotechnical support.

A range of methods and control measures are described below which are designed to prevent these impacts from occurring.

4.0 Peat Management

The infrastructure layout of the Proposed Development required to take account of a number of environmental and technical constraints. The layout sought to avoid areas of known or potential deep peat where possible, taking into account other environmental and technical factors such as ecology, ornithology, archaeology, hydrology, topography and existing infrastructure.

The Proposed Development has largely avoided areas where peat is >1m and efforts have been made through the iterative design process to minimise the footprint of site infrastructure requiring excavation on peat >0.5m as far as practicable.

Where peat >0.5m is present in areas of infrastructure are to be excavated, re-used or reinstated, the following good practice applies.

Where peat is to be re-used or reinstated with the intention that its supported habitat continues to be viable, the following good practice outlined in the sections below applies. It is proposed that these principles will be developed as part of a Stage 2 PMP assessment in agreement with SEPA following detailed site design.

4.1 Excavation

Excavated peat should be excavated as turves, including the acrotelm (surface vegetation) and a layer of adjoining catotelm (more humified peat) typically up to 500mm thick in total, or as blocks of catotelm; the acrotelm should not be separated from its underlying peat;

- the turves should be as large as possible to minimise desiccation during storage, though the practicalities of handling should be considered;
- contamination of excavated peat with substrate materials to be avoided at all times; and
- consider timing of excavation activities to avoid very wet weather and avoid multiple handling to minimise the likelihood of excavated peat losing structural integrity.

If possible, extract intact full depth acrotelm layers from the top surface of the peat deposit. This technique would maintain connectivity between the surface vegetation and the partially decomposed upper layers of the catotelm.

4.2 Storage

The following good practice applies to the storage of peaty soils/peat:

- stripped materials should be carefully separated to keep peat and other soils apart;
- to minimised handling and haulage distances, excavated material should be stored local to the site of excavation or end point of restoration;
- peat turves should be stored in wet conditions or irrigated in order to prevent desiccation (once dried, peat would not rewet);
- stockpiling of peat should be in large volumes to minimise exposure to wind and sun (and desiccation), but with due consideration for slope stability, but should not exceed 1m in height to maintain stability of stockpile;
- stockpiles should be isolated from watercourses or drains with appropriate bunding to minimise pollution risks;
- excavated peat and topsoil stored separately, should be stored to a maximum of 1 m thickness;

- stores of non-turf (catotelm) peat should be bladed off to reduce the surface area and desiccation of the stored peat; and
- peat storage areas should be monitoring during periods of very wet weather, or during snowmelt, to identify early signs of peat instability.

4.3 Temporary Storage

Any peat to be removed during construction would require a temporary storage area near to the construction works/area of re-use. Where peat cannot be transferred immediately to an appropriate restoration area, short-term storage would be required. In this case, the following good practice applies:

- peat should be stored around the infrastructure perimeter at sufficient distance from the cut face to prevent overburden induced failure;
- local gullies, diffuse drainage lines (or very wet ground) and locally steep slopes should be avoided for peat storage; and
- drying of stored peat should be avoided by irrigation or by seeding (although this is unlikely to be significant for peat materials stored less than 2 months).

For longer term storage requirements (e.g. at turbines, borrow pits and compounds), the following good practice applies:

- peat generated from excavations should be transported directly to its allocated restoration location, to minimise the volume being stockpiled with the possibility of drying out;
- stores of catotelmic peat should be bladed off to reduce their surface area and minimise desiccation;
- where transport cannot be undertaken immediately, stored peat should be irrigated to limit drying and stored on a geotextile mat to promote stability; and
- monitoring of large areas of peat storage during wet weather or snowmelt should be undertaken to identify any early signs of peat instability.

4.4 Transport

The following good practice applies to transport:

- movement of turves should be kept to a minimum once excavated, and therefore it is preferable to transport peat planned for translocation and reinstatement to its destination at the time of excavation; and
- if Heavy Goods Vehicles (HGVs)/dump trucks that are used for transporting non-peat material are also to be used for peat materials, measures should be taken to minimise cross-contamination of peat soils with other materials.

4.5 Handling

Following refinement of the excavated peat soils model, a detailed storage and handling plan should be prepared as a detailed PMP forming part of the detailed Construction and Environmental Management Plan (CEMP) (an outline of which is provided as **Technical Appendix 1.1**), including:

- best estimate excavation volume at each infrastructure location (including peaty soils, peat volumes split into area/volume of ‘acrotelm’ or ‘turf’, and volume of catotelm);

- volume to be stored locally and volume to be transferred directly on excavation to restoration areas elsewhere (e.g. disused quarries, borrow pits or peatland habitat restoration areas) in order to minimise handling;
- location and size of storage area relative to infrastructure foundations/areas and natural peat morphology / drainage features; and
- irrigation requirements and methods to minimise desiccation of excavated peat during short term storage.

These parameters are best determined post-consent in light of detailed ground investigation with the final design areas for each element of infrastructure.

4.6 Restoration

Restoration techniques should be undertaken in accordance with the principles detailed in 'Restoration Techniques Using Peat Spoil from Construction Works', EnviroCentre and SEPA (2011)[6]. During restoration, the following best practice should also be followed:

- carefully evaluate potential restoration sites, such as borrow pits for their suitability, and agree that these sites are appropriate with the Environmental Clerk of Works (EnvCoW), landowners and relevant consultees;
- undertake restoration and revegetation or reseeding work as soon as possible;
- where required, consider exclusion of livestock from areas of the Proposed Development undergoing restoration, to minimise impacts on revegetation; and
- as far as reasonably practicable, restoration should be carried out concurrently with construction rather than at its conclusion.

4.7 Monitoring and Inspection

There would be frequent, routine and regular inspections of peat in all stockpiles and temporary storage areas as part of the PMP audit process. Inspections would assess in situ peat physical conditions, integrity of containment and temporary drainage conditions, and they would seek to confirm that stockpile design and management was adequate to prevent erosion and peat slide. These inspections would take place weekly during stockpile creation and storage.

Should any problems be observed during regular visual inspections of peat stockpiles, this would invoke implementation of an appropriate corrective action which would be recorded and monitored for effectiveness. Types of corrective actions would include, but would not necessarily be limited to; modification of temporary drainage, additional or modified bunding, incorporating of sediment fencing if required, light re-grading to correct any areas of surface erosion, etc.

Regular, frequent inspections of peat conditions during construction and restoration phases of work would be carried out by the Geotechnical Engineer and EnvCoW as follows:

- peat surface, peat profile and peat consistency conditions would be carried out as part of ground investigations prior to the start of construction. This information would provide detailed information on the baseline conditions for each part of the infrastructure footprint;

[6] SEPA (2011). Restoration Techniques Using Peat Spoil from Construction Works. Report Number 4468.

- restored peat conditions would be inspected immediately after restoration to ensure that the methods detailed in the PMP had been correctly implemented and to inform any corrective actions should they be required; and
- the physical condition of peat would be retained as carefully as possible both at the peat storage and the peat restoration stages. This is particularly important for vegetation establishment.

4.8 Specific Mitigation

There are a number of ways in which detailed design and construction activities can be specified to minimise impacts on peatlands. The following section outlines briefly the likely mitigation required to minimise impact, based on the re-use of peat specific to key elements of the Proposed Development.

4.8.1 Turbines

Wind turbine foundations represent permanent excavation, and the primary mitigation measure is to locate the wind turbines to avoid the areas of deepest peat, thereby reducing excavated volumes.

4.8.2 Hardstandings

Crane hardstanding areas are required throughout the lifespan of the Proposed Development to aid maintenance, retrofitting and decommissioning activities for the safe operation of the wind turbines. The permanent hardstanding areas would be retained, however sections of the hardstanding areas designated for temporary use would be reinstated post-construction. **Figure 1.12** shows which areas would be used as temporary laydown areas.

4.8.3 Access Tracks

There is guidance[7,8] available to support access track design in peatlands. Guidance is generally focused on excavated tracks and is summarised below.

Based on the avoidance of significant areas of deep peat with tracks all typically present on peat <1.0m and only limited sections of track on very localised areas of peat >1.0m then it is anticipated that all tracks, would be excavated tracks.

Excavated tracks require complete excavation of soil/peat to a competent substrate. Excavated tracks would generally be undertaken where peat depths are less than 1m. This peat/soil would require storage ahead of re-use elsewhere within Proposed Development. Good practice guidance relates mainly to drainage in association with excavated tracks:

- trackside ditches should capture surface water (within the acrotelm) before it reaches the road;
- interceptor drains should be shallow and flat bottomed (and preferably entirely within the acrotelm to limit drawdown of the water table);
- any stripped peat turves should be placed back in the invert and sides of the ditch to assist regeneration and prevent erosion to the peat and wash out that could occur; and

[7] Scottish Renewables, Scottish Natural Heritage, Scottish Environmental Protection Agency, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland, AEECoW (2019)., Good Practice During Wind Farm Construction. 4th Edition.
[8] Scottish Natural Heritage, Forestry Commission (August 2010)., Floating Roads on Peat

- culverts and cross drains should be installed under excavated tracks to maintain subsurface drainage pathways (such as natural soil pipes or flushes). Discharge from constructed drainage should allow for as much diffuse dispersion of clean (silt free) water as possible while minimising disturbance to existing peatland as far as possible. Silt mitigation measures would be incorporated into all constructed drainage as per the requirements of the CEMP.

Although excavation is normally undertaken in peat of minor thickness (< 1.0m), there is a possibility of minor slippage from the cut face of the peat mass. Accordingly:

- free faces should be inspected for evidence of instability (cracking, bulging, excessive discharge of water or sudden cessation in discharge); and
- where significant depths of peat are to be stored adjacent to an excavation, stability analysis should be conducted to determine Factor of Safety (FoS) and an acceptable FoS adopted for loaded areas.

Regular routine monitoring should be scheduled post-construction to ensure that hydrological pathways and track integrity have been suitably maintained.

4.8.4 Compound Areas

Temporary compounds would be fully re-instated following completion for the construction phase.

In relation to permanent compounds, these would be used for maintenance activities associated with the ongoing operation of the Proposed Development. Therefore, the following good practice guidance applies to restoration of permanent construction compounds outwith the inundation areas:

- peat stripped from compound areas would not be stored higher than 1m and could require to be seeded in the short term to prevent drying out, if stored for long residence times;
- stripped turves are used for final restoration, however where turves are insufficient or vegetation regeneration requires reseeding, temporary fencing may be considered around compound areas undergoing restoration in order to prevent grazing; and
- the choice of seed mix for reseeding should be appropriate to the ecological and hydrological conditions of the restored compound location and surrounding habitats and should be advised by the EnvCoW.

4.8.5 Cable Trenches

Cable trenches either require peat excavation specifically for this purpose, or they can be constructed within landscaping of shoulders adjacent to tracks which is considered appropriate for the Proposed Development. Good practice guidance is as follows:

- utilise peat shoulders for cable lays where possible to minimise peat excavations specifically for this purpose, in this case, peat shoulders should be 1.0 to 1.5m thick;
- where cable trenching is constructed adjacent to a road, ensure the trench is backfilled to prevent void filling by material migration;
- minimise time between excavation of the cable trench and peat reinstatement, preferably avoiding excavation until the electrical contractor has cables on-site ready for installation; and
- avoid incorporating substrate materials in the excavation, to minimise contamination of the peat to be reinstated. Replace excavated materials sequentially.

4.8.6 Borrow Pits

Peat may be re-used within borrow pits for the purpose of their restoration provided the method of re-use is consistent with the environmental reinstatement objectives of the Proposed Development and presents no residual risks from pollution of the environment or harm to human health. Key issues for borrow pit restoration are:

- prevention of desiccation and carbon losses from peat used in the restoration;
- development of complete vegetation cover through emplacement of peat turves or seeding with an appropriate species; and
- fencing where required, to exclude grazing stock and to encourage vegetation establishment.

5.0 Estimation of Peat Volumes

Table 6.1B provides an estimate of peat volumes to be excavated and re-used during the construction of the infrastructure identified in **Table 6.1B** as being located within an area of peat >0.5m. The excavated volumes do not include organic and soft mineral soils <0.5m and these will be included in the materials management plan for the development. The peat excavation and re-use volumes are detailed for each infrastructure element in **Annex 6.1A**.

The table also demonstrates the following:

- the avoidance of areas of peat where possible through design;
- re-use of the excavated materials outwith the inundation area is utilised where possible;
- any excavation and re-use is undertaken in line with updated industry good practices and guidance; and
- limitations and further considerations.

Table 6.1B: Peat Excavation Balance Assessment- Infrastructure Located on Peat

Method	Volume of Excavated Peat Soils (m^3)	Opportunity for Avoidance or Minimisation of Excavated Material	Re-use Requirements	Mitigation Hierarchy Adherence	Limitations and Considerations
Permanent Access Track (Excavated) Total length of the excavated tracks would be approximately 4.34km with an average peaty soils depth of 0.6m.	12,967	The access track route has been subject to a number of design iterations to avoid thicker peat and steep slopes. Where possible track width would be minimised. The peat along the proposed excavated tracks on the site is fibrous – pseudo fibrous and does not exhibit thick catotelmic peat. The peat is generally fairly dry and reasonably well drained. There are some areas of thick catotelmic peat on the route of the site access tracks; however these areas would utilise floated access tracks to minimise disturbance of the peat.	13,026m^3 of excavated peat and soil could be used along access tracks. Verge restoration and visual screening, particularly along access track. Sections of the route may require cut and fill and these slopes would require restoration to minimise visual impact.	Avoidance and re-use of excavated peat. Avoidance was first level of screening to avoid areas of deeper peat. Routing has been planned on thinner peat or peaty soils where possible. The layout design has been guided by constraints which highlight ecological, hydrogeological and geomorphological - all of which identify the peat areas to avoid	Requires detailed ground investigation to fully characterise ground conditions.
Permanent Hardstanding 9 No. with an average excavation area of 2,313m^2 including turbine foundation.	11,369	Hardstanding locations have been influenced by the turbine design iterations to avoid thicker peat and steep slopes.	At crane hardstandings topsoil would be stripped keeping top 200mm of turf intact. This would be stored adjacent to the base working area and would be limited to 0.5m height.	Avoided areas of thick peat for turbine crane pads to minimise removal of excessive materials. Orientation of crane hardstandings to be designed following detailed ground investigation, to avoid constraints and further	Requires detailed ground investigation to fully characterise ground conditions.

Method	Volume of Excavated Peat Soils (m^3)	Opportunity for Avoidance or Minimisation of Excavated Material	Re-use Requirements	Mitigation Hierarchy Adherence	Limitations and Considerations
				minimise requirement for peat excavation.	
Temporary Hardstanding 9 No. with an average excavation area of 1,718m^2.	9,385	Hardstanding locations have been influenced by the turbine design iterations to avoid thicker peat and steep slopes.	At temporary crane hardstandings materials would be re-used to reinstate working areas and for appropriate landscaping.	Avoided areas of thick peat for turbine crane pads to minimise removal of excessive materials. Orientation of crane hardstandings to be designed following detailed ground investigation, to avoid constraints and further minimise requirement for peat excavation.	Requires detailed ground investigation to fully characterise ground conditions.
Substation with an approximate area of 1,050m^2 and 0.62m thickness of peat.	588	The proposed substation compound would largely be located on peaty soils adjacent to the proposed access tracks.	98m^3 of excavated peat would be re-used on site to reinstate working areas and for appropriate landscaping.	Avoided siting substation on thick peat areas where possible.	Requires detailed ground investigation to fully characterise ground conditions.
Two Construction Compounds with an approximate area of 8,000m^2 and 0.54m thickness of peat.	4,373	The proposed construction compounds would largely be located on peaty/glacial soils adjacent to the proposed access tracks.	450m^3 of excavated peat would be re-used on site to reinstate working areas and for appropriate landscaping.	Avoided siting construction compound on thick peat areas where possible.	Requires detailed ground investigation to fully characterise ground conditions.
Borrow Pits – BP1, BP2 and BP3	5,618	Borrow pits have been subject to several design iterations, to avoid deep peat where possible.	23,379m^3 of excavated peat from elsewhere on-site could be used to	Site selection avoided areas of peat for borrow pits, identified sites on bedrock or close to	Current calculations are based on conservative re-use and based on

Method	Volume of Excavated Peat Soils (m^3)	Opportunity for Avoidance or Minimisation of Excavated Material	Re-use Requirements	Mitigation Hierarchy Adherence	Limitations and Considerations
			restore the proposed borrow pits.	minimise removal of excessive materials.	the use of all borrow pits.
Peatland Restoration	0	-	300m^3 of excavated peat from elsewhere on-site could be used within peat restoration areas.	-	-
Total Excavated	**45,482m^3**	**Total Re-use**	**48,052m^3**		

6.0 Waste Classification

This section of the Stage 1 PMP includes the method for dealing with peat which could potentially be classified as waste (only if the above volumes estimate significant quantities of catotelmic peat, which cannot be re-used).

Table 6.1C outlines where those materials that are likely to be generated on-site, fall within the Waste Management Licensing (Scotland) Regulations 2011.

Based on the results presented in **Table 6.1C**, it has been concluded that all of the materials to be excavated on-site would fall within the non-waste classification as the peat would be re-used on-site. Based on a detailed probing exercise and visual inspection of the peat, it is predominantly found to be fibrous and fairly dry within the top metre before becoming slightly more pseudo-fibrous with depth.

The majority of the excavated peat is therefore entirely re-useable as it is predominantly fibrous and easily re-used on-site. Areas of extensive deep peat have been avoided by design, where possible.

Table 6.1C: Excavated Materials – Assessment of Suitability

Excavated Material	Indicative Volume on Site by % of total excavated soils	Is there a suitable use for material	Is the Material required for use on Site	Material Classified as Waste	Re-use Potential	Re-use on Site
Turf (Surface layer of vegetation and fibrous matt)	35	Yes	Yes	Not classified as waste	Yes	Outwith the inundation area only. Would be re-used in reinstatement of access track verges, cut and fill verges, road verges, side slopes and check drains. Peripheral embankments of infrastructure and restoration of borrow pit. Peatland Restoration.
Acrotelmic and Catotelmic peat	60	Yes	Yes	Not classified as waste	Yes	Outwith the inundation area only. Would be re-used in reinstatement of access track verges, cut and fill verges, road verges, side slopes and check drains. Peripheral embankments of infrastructure and restoration of borrow pits. Peatland Restoration.
Amorphous Catotelmic Peat (amorphous material unable to stand unsupported when stockpiled >1m)	5 Very limited as it has been avoided by design.	Potentially	Potentially *	Potentially if not required as justifiable restoration of habitat management works	Limited	If peat does not require treatment prior to re-use it can be used on-site providing adequate justification and method statements are provided and approved by SEPA. If it is unsuitable for use without treatment then it may be regarded as a waste. However every attempt to avoid this type of peat has been incorporated into the design.

*Such uses for this type of material are limited, however there may be justification for use in the base of borrow pits to maintain waterlogged conditions and prevent desiccation of restored area and in some habitat management works such as gully or ditch blocking where saturated peat is required to mimic mire type habitats and encourage establishment of sphagnum.

7.0 Conclusion

This Stage 1 PMP presents a pre-construction assessment of the expected peat extraction and reuse volumes associated with the works phase of the construction of the Proposed Development. The PMP also provides the guiding principles which would be applied during the construction of the Proposed Development.

Through a process of continued design refinement (focused on minimising peat excavation volumes) and adoption of best practice working methods, the development is expected to achieve an overall peat balance. Thus, all excavated material would be required for reuse as part of the works and no surplus peat is anticipated.

The figures detailed within this report are to be considered indicative at this stage. The total peat volumes are based on a series of assumptions for the layout of the Proposed Development and the results of multiple phases of peat probing. Such parameters can still vary over small scale areas and therefore topographic changes in the bedrock profile could impact the total accuracy of the volume calculations.

The various calculations presented here would be updated and expanded upon as part of detailed design works, taking account of pre-construction site investigations and micrositing, to confirm actual quantities of arising peat. The Applicant would achieve an actual balance between arising peat and reinstatement by prioritising the areas for reinstatement, following advice from the project EnvCoW and Geotechnical Engineer. It is anticipated that a detailed, construction phase PMP would be developed, and maintenance and updating of this plan in conjunction with a Geotechnical Risk Register. The implementation of the detailed PMP would ensure a robust commitment to excavating, storing and reinstating peat in a manner that follows best practice and ensures the protection of peat throughout the construction and post-construction phases.

Figures

TA6.1: Peat Management Plan

Ben Sca Redesign Wind Farm

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SLR Project No.: 405.064982.00001

Annex 6.1A Excavated Materials Calculations

TA6.1: Peat Management Plan

Ben Sca Redesign Wind Farm

Ben Sca Wind Farm Limited

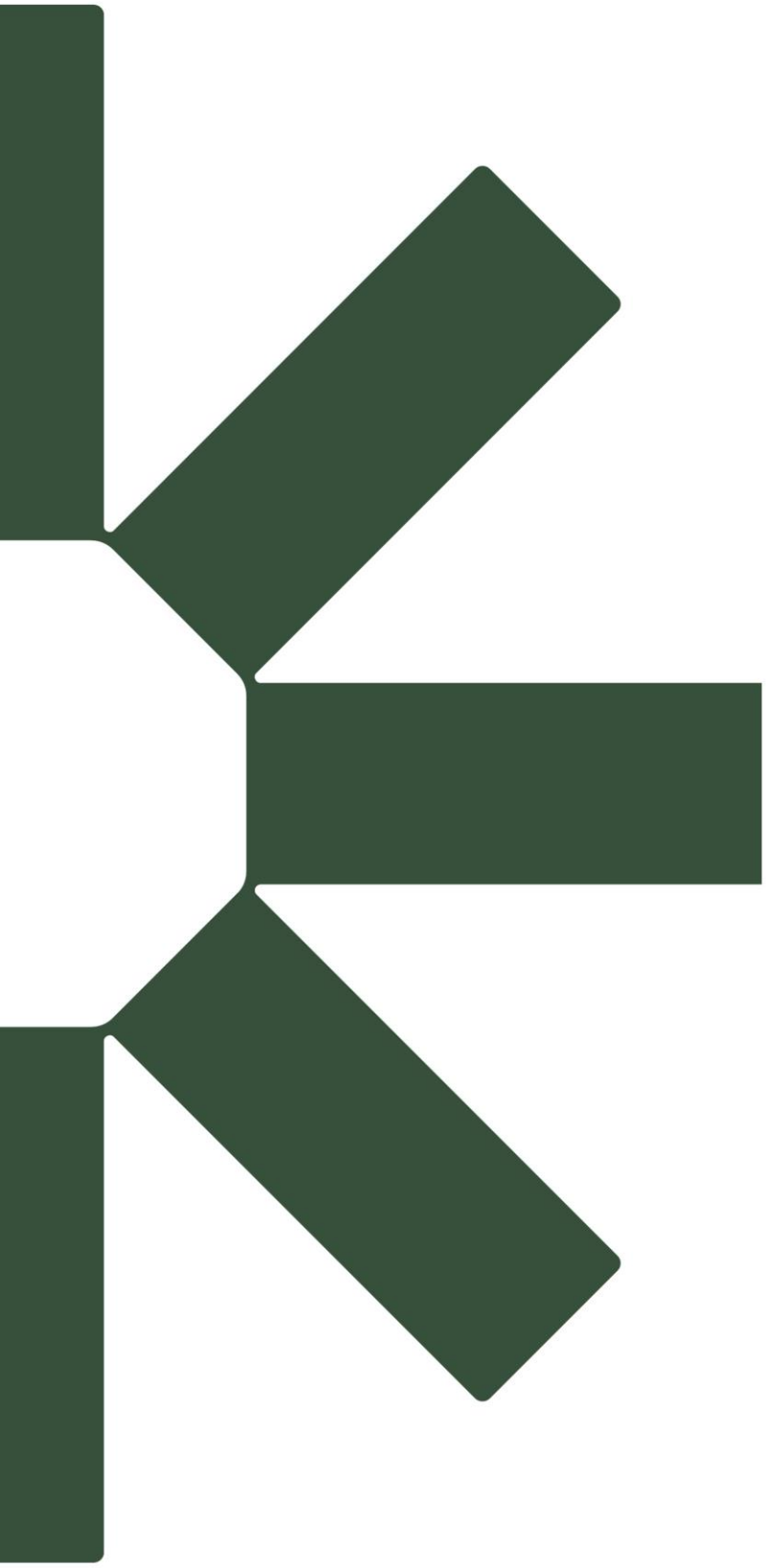
SLR Project No.: 405.064982.00001

14 March 2024

Annex A - Excavated Materials Calculator

Infrastructure	Length (m)	Width (m)	Area (m^2)	Average Depth (m)	Number	Total Excavated Volume Peat (m^3)	Length (m)	Width (m)	Area (m^2)	Average Depth (m)	Number	Total Re-use Volume of Peat (m^3)	Notes
New Track - Excavated	4342	5		0.60	1	12967	4342	3		0.50	2	13026	
Existing Track	1784	5				0						0	No excavations required.
New Track - Floated	167	5				0						0	No excavations required.
Substation	35	30	1050	0.56	1	588	130	1.5		0.50	1	98	
Construction Compound 1	100	50	5000	0.56	1	2789	300	1.5		1.00	1	450	
Construction Compound 2			3000	0.53	1	1584						0	
BS-01 - Crane Hardstanding - permanent			2313	0.21	1	477	125	2.0		0.50	1	125	Turbine foundation included in permanent hardstanding area.
BS-02 - Crane Hardstanding - permanent			2313	0.24	1	559	125	2.0		0.50	1	125	Turbine foundation included in permanent hardstanding area.
BS-03- Crane Hardstanding - permanent			2313	0.41	1	939	125	2.0		0.50	1	125	Turbine foundation included in permanent hardstanding area.
BS-04 - Crane Hardstanding - permanent			2313	0.45	1	1036	125	2.0		0.50	1	125	Turbine foundation included in permanent hardstanding area.
BS-05 - Crane Hardstanding - permanent			2313	0.84	1	1937	125	2.0		0.50	1	125	Turbine foundation included in permanent hardstanding area.
BS-06 - Crane Hardstanding - permanent			2313	0.69	1	1599	125	2.0		0.50	1	125	Turbine foundation included in permanent hardstanding area.
BS-07 - Crane Hardstanding - permanent			2313	0.86	1	1999	125	2.0		0.50	1	125	Turbine foundation included in permanent hardstanding area.
BSX-01 - Crane Hardstanding - permanent			2313	0.68	1	1574	125	2.0		0.50	1	125	Turbine foundation included in permanent hardstanding area.
BSX-02 - Crane Hardstanding - permanent			2313	0.54	1	1250	125	2.0		0.50	1	125	Turbine foundation included in permanent hardstanding area.
BS-01 - Crane Hardstanding -temporary			1718	0.12	1	205						205	
BS-02 - Crane Hardstanding - temporary			1718	0.25	1	423						423	
BS-03- Crane Hardstanding - temporary			1718	0.17	1	297						297	
BS-04 - Crane Hardstanding - temporary			1718	0.93	1	1602						1602	
BS-05 - Crane Hardstanding - temporary			1718	1.16	1	1998						1998	
BS-06 - Crane Hardstanding - temporary			1718	1.00	1	1713						1713	
BS-07 - Crane Hardstanding - temporary			1718	0.64	1	1107						1107	
BSX-01 - Crane Hardstanding - temporary			1718	0.84	1	1449						1449	
BSX-02 - Crane Hardstanding - temporary			1718	0.34	1	591						591	
Turning Head 1			1699	0.55	1	934	205	1.5		0.50	1	154	
Turning Head 2			634	0.39	1	247	188	1.5		0.50	1	141	
Borrow Pit 1	63	41	2628	0.26	1	683			2628	1.50	1	3942	
Borrow Pit 2			3584	0.54	1	1935			3584	1.50	1	5376	
Borrow Pit 3	125	75	9374	0.32	1	3000			9374	1.50	1	14061	
Peatland Restoration						0			600	0.50	1	300	
						45482						**48052**	

Total Excavated Volume (m^3)	**45482**
Total Re-use Volume (m^3)	**48052**
Net Balance (m^3)	**-2571**



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