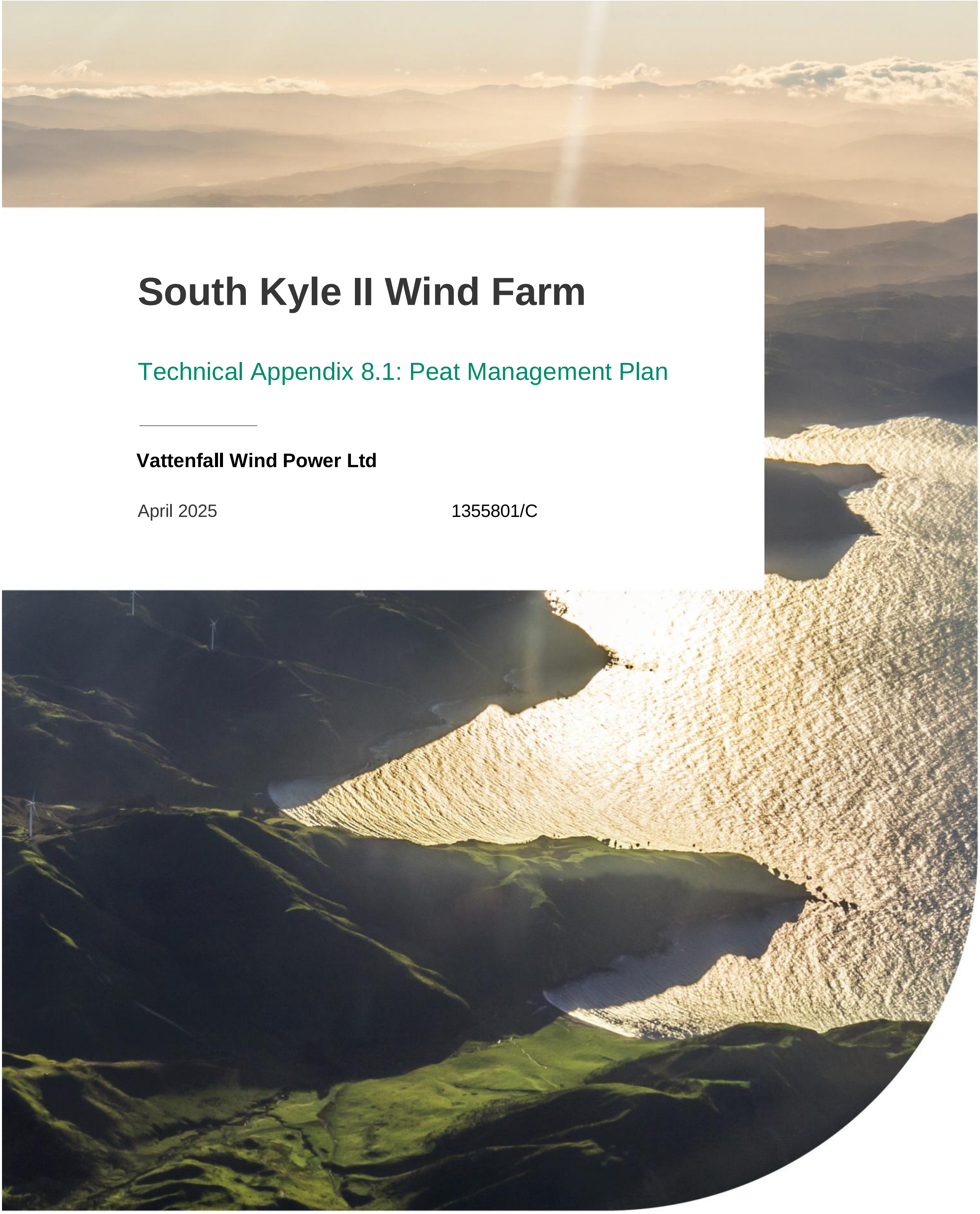

South Kyle II Wind Farm

Technical Appendix 8.1: Peat Management Plan

Vattenfall Wind Power Ltd

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Document history

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Contents

1. Introduction

This Peat Management Plan (PMP) provides information and guidance on the environmentally compliant re-use and management of excavated peat across the Proposed Development.

This document is a technical appendix to Chapter 8: Hydrology, Geology and Hydrogeology of the Environmental Impact Assessment Report (EIAR) and should also be read in conjunction with Technical Appendix 8.2: Peat Slide Risk Assessment (PSRA).

The information presented in this PMP should be used to inform the wider assessments carried out for the Proposed Development. The study has drawn on information collected as part of a peat study, including desk-based study followed by a phase one and phase two depth surveying exercise. The PMP estimates the total volumes of excavated peat likely to be produced by the Proposed Development and outlines the suitable reusable methods in line with the regulatory requirements and industry good practice methods.

This strategy should be adopted to allow peat to be managed in a sustainable manner, minimising excavation via the adoption of appropriate construction methods. Targeted and appropriate re-use of peat as part of the reinstatement works shall also be a primary construction.

1.1. Regulatory Requirements

This document addresses the following requirements in line with the Scottish Environment Protection Agency (SEPA) Regulatory Position Statement – Developments on Peatland (2017):

- Prevention – The best management option for waste peat is to prevent its production; and
- Re-use – Developers should attempt to re-use as much of the peat produced on site as possible.

In general, the following guidance has fed into the design assumptions and subsequent selection of appropriate construction methods based on the distribution of peat depths across the site:

- Developments on Peatland: Guidance on the assessment of peat volumes, re-use of excavated peat and the minimisation of waste (A joint publication by Scottish Renewables, NatureScot, SEPA, Forestry Commission Scotland, 2012);
- Guidance on Developments on Peatland – Peatland Survey 2017. Scottish Government, NatureScot, SEPA;
- Floating Roads on Peat (Forestry Civil Engineering & SNH, 2010);
- Good Practice During Wind Farm Construction (A joint publication by Scottish Renewables, NatureScot, SEPA, Forestry Commission Scotland, 2019), Version 4; and
- Guidance on Design Principles for Renewable Energy Development on Peatland on the National Forests and Land (Forestry and Land Scotland, 2024), Version 1.

The document also considers the National Planning Framework 4 (NPF4), published in February 2023, and the approach to soils in Policy 5 detailed below:

> *a) Development proposals will only be supported if they are designed and constructed:*
>
> *i. In accordance with the mitigation hierarchy by first avoiding and then minimising the amount of disturbance to soils on undeveloped land; and*
>
> *ii. In a manner that protects soil from damage including from compaction and erosion, and that minimises soil sealing.*

b) Development proposals on prime agricultural land, or land of lesser quality that is culturally or locally important for primary use, as identified by the LDP, will only be supported where it is for:

i. Essential infrastructure and there is a specific locational need and no other suitable site;

ii. Small-scale development directly linked to a rural business, farm or croft or for essential workers for the rural business to be able to live onsite;

iii. The development of production and processing facilities associated with the land produce where no other local site is suitable;

iv. The generation of energy from renewable sources or the extraction of minerals and there is secure provision for restoration; and In all of the above exceptions, the layout and design of the proposal minimises the amount of protected land that is required.

c) Development proposals on peatland, carbon rich soils and priority peatland habitat will only be supported for:

i. Essential infrastructure and there is a specific locational need and no other suitable site;

ii. The generation of energy from renewable sources that optimises the contribution of the area to greenhouse gas emissions reductions targets;

iii. Small-scale development directly linked to a rural business, farm or croft;

iv. Supporting a fragile community in a rural or island area; or

v. Restoration of peatland habitats.

d) Where development on peatland, carbon-rich soils or priority peatland habitat is proposed, a detailed site specific assessment will be required to identify:

i. the baseline depth, habitat condition, quality and stability of carbon rich soils;

ii. the likely effects of the development on peatland, including on soil disturbance; and

iii. the likely net effects of the development on climate emissions and loss of carbon.

1.2. Scope & Purpose

This PMP provides a strategy to allow peat to be managed in a sustainable manner, minimising excavation via the adoption of appropriate construction methods as well as detailing targeted and appropriate re-use of peat as part of the reinstatement works. Central to this strategy is both minimising impacts on peatlands through avoidance and design, as well as striving to ensure the peatland system is capable of carbon sequestration.

This PMP addresses the regulatory principles set out in Section 1.1 by establishing the following objectives:

- Providing information on the geology and pedological setting of the Proposed Development Area using published data including previous assessment documents;
- Information on the peat conditions based the additional field surveys and ground investigations undertaken at the Proposed Development and assess its suitability for re-use;
- Information on the measures taken to avoid peat;
- Information on the elements of the Proposed Development that are likely to require peat extraction;
- An estimation of the peat volumes likely to be extracted at each element of the Proposed Development;
- An estimate of the peat volumes that are anticipated to be suitable for re-use in reinstatements and landscape tie-ins; and
- Information on control measures and appropriate management of the peat during handling and storage.

1.3. Peat Definition

Peat is an organic material formed by the accumulation of plant matter at various stages of decomposition, formed over potentially many thousands of years. The characteristics of peat vary widely depending on factors such as the nature of plant material that peat is derived from, the degree of decomposition, the type of peat bog and the quality of water sustaining the bog. In Scotland, the Scottish Government defines peat and deep peat as follows[1]:

- **Organo-soils (or peaty soils)**: soils with an organic horizon <0.5 m thick;
- **Peat**: soils with an organic horizon greater than 0.5 m in thickness and an organic matter content exceeding 60%; and
- **Deep peat**: a peat as defined above, with a depth greater than 1.0 m.

There are two distinct types of peat, termed acrotelmic and catotelmic peat. The interface between the two layers is controlled by the position of the water table. The upper layer of peat, the acrotelm, is typically fibrous and comprises the living and partially decomposed peat forming plant matter (vegetation). The thickness of the acrotelm is typically controlled by seasonal variations in the water table that creates cycles of aerobic and anaerobic conditions. The catotelm is situated below the minimum average depth of the water table resulting in permanent anaerobic decomposition of the plant matter and the formation of less fibrous, sometimes amorphous peat.

A key aim of the PMP is to encourage the functionality of the peatland system following reinstatement. Peat should only be re-used to create a suitable tie-in with surrounding vegetation and to reinstate adjacent ground which has been disturbed during construction. Peat must retain hydrological connectivity to remain functional.

2. Peat Condition

2.1. Site Description

The landscape within the Proposed Development Area is dominated by commercial forestry which is actively managed by Forestry and Land Scotland (FLS). The commercial forestry consists of various stages of growth with areas of fell, mature trees, and more recent planting works. The Proposed Development is also situated adjacent to the operational South Kyle Wind Farm.

The topography of the Proposed Development Area is variable as it consists of hills and upland watercourses that form valleys. The Proposed Development features three main catchments: The River Nith, the River Dee, and the River Doon with multiple tributaries draining in these rivers.

Photographs illustrating the current conditions and land-use at the Proposed Development Area are presented below in Figure 2.1.

[1] Scottish Government (2017) Carbon rich soil, peat and peatland. 180319_definitions-of-carbon-rich-soil_agreed-text-for-website.pdf [accessed 16/05/2024]

Source: Natural Power

Figure 2.1: Photographs show the varying stages of commercial forestry across the Proposed Development Area.

2.2. Geology

In Section 8.6 of Chapter 8: Hydrology, Geology & Hydrogeology, the details relating to the geology can be found with bedrock geology presented in Table 8.13 and superficial geology presented in Table 8.14.

To summarise, the bedrock geology consists of sedimentary rocks, such as sandstone and siltstone, with igneous formations, both intrusive and extrusive, found across the Proposed Development Area. The superficial geology features peat, till, alluvium, and glaciofluvial deposits.

It should be noted that there are multiple inferred faults across the Proposed Development Area.

2.3. Field Surveys

Peat depth surveys were undertaken to inform the PMP and the PSRA provided with the EIAR. These comprised of 4,023 (no.) peat probes distributed across a Phase 1, 100 x 100 m grid, as well as Phase 2 (detailed) probing at a higher resolution (10 x 10 m) at infrastructure locations. The proposed new access tracks featured 50 m with 10 m and 20 m offsets.

The field surveys were conducted in August and December 2022 with further peat depth surveys occurring in June, July, and August 2023. Additionally, peat depth surveys were carried out in April and August 2024.

2.4. Peat Depth & Distribution

In Table 2.1, a summary of the peat depths recorded is presented with Figure 8.4, Volume 2a depicting the peat depth survey locations and an associated peat depth interpolation.

Table 2.1: Peat Depth Survey

Peat Depth Range	Number of Points in Range	% of Points
≤0.5	2105	43.1
>0.5 - ≤1	1721	35.2
>1 - ≤2	815	16.7
>2 - ≤3	229	4.7
>3	13	0.3
TOTAL	**4883**	**100%**

Source: Natural Power

The information in Table 2.1 and the interpolated peat depth map indicates that approximately half of the survey points within the Proposed Development Area are ≤0.5 m, with over 70% being <1.0 m. The most significant depths of peat within the Proposed Development Area are within the valley between Clawfin Hill, Benbrack, and Meikle Hill. These areas are illustrated visually in the peat depth interpolation figure (Figure 8.4: Interpolated Peat Depth, Volume 2a of the EIAR).

2.5. Peat Characteristics

The Peat Slide Risk Assessment[2] utilised peat probing and peat core samples and described the peat using the Von Post scale of humification and classified it as between H2 to H9. Peat is present across most of the site, with depth varying greatly, from none where bedrock outcrops or is close to the surface, to circa 4 m in the centre of flat boggy areas. The most significant depths of peat within the Proposed Development Area are found in the broad valley floors southeast of Clawfin Hill (southeast of T03), south of Meikle Hill (east of T06) and west of Benbrack (west of T04). Erosive features include occasional peat hags. Due to the presence of commercial forestry across most of the Site, it is difficult to identify other erosional or slope stability features.

3. Peat Management

3.1. Peat Management Principles

A hierarchy of peat management approaches is provided in Scottish Renewables and SEPA guidance (see Section 1.1) documents that recommend the following:

- **Prevention** – prevent or minimise peat excavation/disturbance through considered design that avoids or minimises wind farm infrastructure within areas of peat. Where avoidance is not possible, minimise excavation of peat using engineering solutions, such as floating roads.
- **Re-Use/Reinstatement** – re-use extracted peat close to its original location in the reinstatement or restoration of temporary infrastructure, road verges and borrow pits. Peat may also be used where appropriate to improve or restore peatland habitats.

[2] South Kyle II Wind Farm (2024) Peat Slide Risk Assessment, Document Number: 1365043

- **Recycle/Recover/Treat** – while the priority should always be to prevent and re-use peat on site there may be situations in which there may still be a surplus of excavated peat. Where demonstrated that it is suitable for use, peat may be blended, dewatered or treated to improve its properties to support re-use on site.
- **Temporary Storage** – store the peat temporarily during construction prior to re-use in on site reinstatement or restoration activities.

The design of the wind farm layout evolved throughout the assessment of the Proposed Development in response to consultations, desk studies, field surveys and technical assessments undertaken by a range of disciplines in support of the EIAR.

Additionally, the PMP has been produced with consideration to FLS guidance (see Section 1.1) that outlines the following **S.M.A.R.T.** approach:

- **S**pecific
  - Clearly identify the site, its access routes, constraints, areas to be excluded.
  - Define what is expected of each party to the plan;
- **M**easurable
  - Which areas are to be subject to site works, phasing, numbers of machines, storage areas etc.
  - What will successfully completed site works look like?
- **A**chievable
  - How will sufficient resources be made available in a timely manner?
  - Who will do what?
- **R**elevant
  - To the site for which the plan in being written and for the site's conditions, not mainly copied and pasted from another scheme or an EIA.
- **T**ime Bound
  - Sets out clear timeline for site works to start and finish, when monitoring will be conducted and when the plan will be reviewed and, if necessary, altered.

Information not available at this stage of the Proposed Development would be considered in an updated and detailed Peat Management Plan post-consent.

3.2. Construction Activities & Effects

The following construction activities will require the stripping of peat and peaty soils down to the underlying substate and formation level of the infrastructure:

- Cut access tracks;
- Wind turbine or substation foundation excavations;
- Crane pads;
- Cable trenches;
- Temporary borrow pit excavation; and
- Removal of overburden to facilitate further borrow pitting.

Other construction activities that have the potential to disturb peat include:

- Trafficking of plant and machinery over areas underlain by peat and peaty soils;
- Laydown of materials (including excavated peat and mineral soils) on peat or peatland vegetation; and

- Reinstatement of peat and peaty soils and/or other revegetation activities to reinstate or tie pre-construction peatland habitats into the Proposed Development.

These activities have the potential to cause a range of effects during construction and operation including the loss of integrity and vegetation, drying, erosion, oxidation, interruption of peatland hydrology as well as loss of function.

3.3. Minimising Peat Excavation

The Proposed Development was designed through an iterative approach informed by field surveys and constraints mapping, with peat being a significant factor. The proposed positioning of turbines and alignment of access tracks has sought to minimise the need for peat excavation in the first instance. In this regard, the Proposed Development has prioritised the use of existing tracks, or where geo-technical constraints allow, the use of floating track construction.

3.4. Proposed Re-Use

In line with NPF4 and associated good practice guidance, the primary design aim is to avoid peat and therefore peat excavation. However, due to engineering, logistical, and/or to avoid other environmental constraints, the placement of infrastructure on peat is unavoidable. Therefore, the Proposed Development must minimise the effects of disturbance through design and mitigation, namely reinstatement of peat that allows it to remain part of the peatland system and not for it to degrade and lose function as a means of carbon sequestration.

The principal requirements are outlined below:

- All excavations where required, should be monitored and measures taken to prevent collapse and the destabilising of peat deposits adjacent to excavations;
- A system of daily reporting of excavations will be established during construction and utilised to monitor the geotechnical performance of slopes including peat, sub-soil and bedrock. This would be implemented and undertaken by a suitable, experienced and trained member of the site team;
- Where possible, areas of peat within the footprint of excavation will have the top layer of vegetation stripped off as turf prior to construction. When excavating areas of peat (acrotelmic), excavated turves should remain as intact as possible. Peat turves will be stored to promote the retention of structure prior to use in reinstatement;
- Underlying catotelmic peat will then be removed and stored separately and kept damp;
- Excavated peat turves and catotelmic peat will be handled through careful excavation to reduce the risk of cross contamination between distinct horizons and to maximise the potential for reuse;
- In areas of fell forestry brash and stumps may be present within the peat. An outline strategy for handling peat in these areas is discussed separately below in Section 3.4.1;
- Care will be taken when stripping and removing organo-soil and peat turves and appropriate storage methods will be used on site, i.e. excavated material will be stored in separate horizons (acrotelmic and catotelmic) and turves will be placed on top of excavated peat to minimise desiccation and oxidation. They would be placed in a manner to maximise coverage in a “checkerboard” pattern; and
- Classification of excavated materials will depend on their identified re-use in reinstatement works. It is anticipated that the material to be excavated will comprise peat (which may be sub-divided into amorphous peat (catotelmic), fibrous peat (acrotelmic)) and turf.

3.4.1. Forestry & Peat

As a result of previous experience, is likely that the peat turves and excavated material have already been distributed and compromised. In such scenarios, the peat and woody debris is part of a ‘broken system’ and therefore where possible, good practice shall be utilised, although this may not be feasible/achievable in the handling of excavated material across previously forested areas of this site and should be noted at this stage.

The Construction Environmental Management Plan (CEMP) will provide details on the management of forest residues, brash and stumps, however a summary is provided below in the context of peat handling;

- Brash Material;
  - The ground disturbance associated with attempting to remove brash could lead to significant damage including exposing peat to increased erosion and desiccation. Forest Research[3] publication Guidance on site selection for brash removal states that brash removal on peaty sites can lead to increased turbidity and siltation of watercourses. Brash also provides both physical soil protection and a nutrient source for the forestry following rotation. Accordingly in areas which are to be replanted, the brash will be retained in situ as a nutrient source following standard forest management practice.
  - Within the construction footprint brash will be removed utilising a standard timber forwarder, this brash will be transported to outwith the footprint of the Proposed Development Area where it will be utilised within the future replanting area to reinforce brash matt extraction routes, or if sufficient brash is already in situ in this location, the excess brash from the construction footprint will be comminuted (broken down) on site and dispatched to enter the biomass supply chain.
- Stumps;
  - At this stage it is assumed that stumps will be left in situ as per the guidance contained in the Forestry Commission Research[4] except where they will be removed for infrastructure footprints. Where stumps are removed during construction activities, they will be comminuted onsite and the resulting biomass material will enter the biomass supply chain.

3.4.2. Peat Re-Use Assumptions

Table 3.1 presents how peat would be successfully re-used / reinstated at the Proposed Development and provides assumptions for the Peat Mass Balance in Section 4.

Table 3.1: Proposal for Peat Re-use / Reinstatement

Infrastructure Component	Proposed Strategy for Re-Use/Reinstatement
Turbines	• Turbine foundations would be overlain by a suitable ballast material. • Acrotelmic peat and turves (where present) would be re-used on the surrounding batter slopes (width ~6 m) to ensure suitable tie-in with the surrounding vegetation and habitat. • The use of catotelmic peat will be where it will connected to the water table (lower sections of the slope) and would still require to be covered with acrotelmic peat / turves.
Crane pads	• In accordance with good practice guidance (see Section 1.1) the crane pads would not be reinstated but retained to allow for future turbine maintenance. • The crane pad batter slopes shall be reinstated with peat on sides not adjoining the access track or turbine (width ~6 m). Catotelmic peat would be used in lower slope sections, where it is more likely to be connected to the water table. The slope angle would be suitably low (1 in 4 to 1 in 6) to reduce run-off rate and encourage infiltration.

[3] Forest Research. 2009. Guidance on site selection for brash removal.

[4] Forest Research. 2011. Environmental effects of stump and root harvesting.

Infrastructure Component	**Proposed Strategy for Re-Use/Reinstatement**
Blade laydown areas & temporary areas	• It is assumed that blade laydown areas or other temporary areas adjacent to the crane pad are temporary and would be completely reinstated after construction. • Temporary areas would be reinstated by removing the previously placed engineering fill and then placing catotelmic peat from temporary peat stores to a thickness similar to the pre-existing depth (as determined by pre-construction peat depth data) that also ties into the local topography without creating topographic highs. • The low infiltration capacity of the underlying subsoil and bedrock and careful placement of catotelmic peat on flattened areas adjacent to the permeant crane pads should ensure the successful reinstatement of catotelmic peat in these areas. Where the creation of an edge is unavoidable, these should be sealed with turves to retain moisture within the reinstated peat.
New cut access tracks	• The verges of new cut access tracks will be reinstated to ensure visible tie-in with surrounding vegetation and habitat but also to ensure stability and functionality of the re-used peat. • The reinstatement area will be ~6 m wide along either side of the track and ~1 m high. • The use of catotelmic peat will only be where it will be in contact with the water table (lower sections of the slope) and would still require to be covered with acrotelmic peat / turves.
Substation & Battery Storage Area	• The Substation and Battery Storage Area verges shall be reinstated with peat on sides not adjoining the access track. • Acrotelmic peat or turves may be used to dress cut slopes (if present) to minimise dewatering of effects in upgradient areas.
Borrow Pit	• Current borrow pit area is the existing quarry that will remain open beyond construction and will not be reinstated with peat.
Cable trenches	• All peat excavated for cable trenches would be reinstated in the excavation after cable installation has been completed. • Catotelmic peat reinstated in cable trenches would be beneath the water table and would be covered with acrotelmic peat.
Temporary construction compounds	• The temporary construction compound would be reinstated with peat following completion of construction. • Due to the longevity of this temporary infrastructure element, it is likely that peat excavated from the footprint (if required) would be re-used elsewhere to enable more rapid reinstatement.
It should be noted that final reinstatement dimensions *may vary due to the local topography.*	

Where peat depths are <0.5 m in thickness at specific infrastructure locations, a minimum of 0.5 m of peat shall be used for reinstatement and will strive to safeguard the functionality of the peat.

3.4.3. Suitability for Re-Use

The characteristics of the excavated peat (e.g. fibrosity and water content) determines its suitability for re-use with the wettest most amorphous peat generally being the least suitable. The peat encountered on site is variable with Von Post classifications between H2 and H9, generally becoming increasingly decomposed within the deeper peat deposits.

For the purpose of this PMP, it has been assumed that the top 0.5 m will be acrotelmic peat consisting of fibrous peat and the surface vegetation. The following assumptions have been made with regard of the characteristics of the peat and the intended suitable reuses at the Proposed Development.

- **Actrotelmic peat / peat soils** – when stripped with the vegetation, intact turves of acrotelmic peat or peaty soils will be suitable for surface reinstatement, dressing back and tying in infrastructure to the surrounding vegetation and habitats.
- **Fibrous catotelmic peat** – most suitable for reinstatement beneath the replaced acrotelm. It may also be used as a surface layer with careful site selection and management to control erosion and encourage vegetation recovery (e.g. seeding, translocation of vegetation and fencing to deter deer grazing).
- **Amorphous peat** – peat of this type will only be suitable for reinstatement of excavations beneath a surface vegetation layer. The peat may also be used in the restoration of the borrow pit beneath an acrotelmic layer to create conditions which will support development of a mire habitat. However, the volume of amorphous peat that will require removal is anticipated to be small given that infrastructure has avoided deep peat where possible.

Where peat stripped at infrastructure footprints contains significant volumes of residual forest materials, such as brash or stumps, efforts will be made to minimise mixing and consequential damage to the peat. However, it is acknowledged this may not be possible in every instance and the presence of residual forest materials may reduce the peat's suitability for reinstatement. Nonetheless, handling of peat containing residual forest materials will follow good practice and will aim to be reused in a way to maximise its reinstatement potential.

4. Peat Mass Balance

4.1. Introduction

The estimate of excavated peat volume has been completed following a desk-based appraisal of the Proposed Development layout supplemented by digital terrain analysis. There has been further refined spatial analysis of the peat depth data set using GIS software.

Information on infrastructure footprints were defined by the Applicant and are presented accompanying the assessment information.

Depths recorded to be greater than 0.5 m are considered to be peat, with the upper 0.5 m being acrotelmic peat and depths beyond 0.5 m considered to be catotelmic peat.

It should be noted that this assessment has not accounted for excavation volumes of glacial sub-soils or weak bedrock material which may be deemed unsuitable for incorporation into foundations and hardstand elements.

Where factors which contribute to the bulking of the peat deposit are mitigated, the total volumes of excavated peat may be reduced through:

- Reduction of peat handling with re-use of peat undertaken as close as possible to the excavation site; and
- Maintaining the integrity of the excavated peat deposits through timely re-vegetation and preservation of the surface hydrology systems.

4.2. Estimation of Excavated Peat Volumes

The activities which would generate volumes of peat are as follows:

- Formation of cut track which would involve the removal and temporary storage of turves, as appropriate, followed by excavation down to formation level. The running width of the track is 8.5 m. The excavation footprint includes drainage and the need for batters;
- Construction of the turbine foundation and crane hardstandings, which would require the excavation of peat and subsoil to expose underlying bedrock or other suitable founding stratum, and in some cases excavation of rock to form a suitable level platform for construction. The depth of the excavation in superficial soils would be dependent on the ground conditions and depth to bedrock, but it has been assumed that the full depth of peat would be excavated from the full development area of each turbine, hardstanding, and associated excavation footprint modelled by the project civil engineer. The modelled extent for crane pad and turbine excavations footprints is ~8,530 m^2. Of the ~8,530 m^2, there will be ~2,900 m^2 of permanent infrastructure whilst the rest of the construction area being temporary and thus fully reinstated at the end of construction. Therefore, only ~2,900 m^2 is considered within the excavation calculations;
- Excavation of trenches for underground cabling between the turbines and the substation, which would be up to 3 m wide and approximately 1.2 m deep. These would be carefully reinstated with the stored peat once the cables have been laid. No peat excavation volumes for cable trenches are presented as it is assumed that all excavated peat will be re-used during cable reinstatement;
- Construction of the battery storage area and the substation, located near the existing New Cumnock electricity substation, feature a combined footprint of ~18,000 m^2. These infrastructure elements are permanent; and
- The temporary construction compounds near the proposed substation and battery storage area are located on an existing hardstanding area associated with the South Kyle I Wind Farm, however this will be expanded so the entire footprint will be considered in the calculations (~15,000 m^2). However, this will only be used during the duration of the construction and will be fully reinstated once construction is complete and has been discounted from the calculations as it is not permanent infrastructure.

4.3. Peat Excavation

The following sequence of tables (Table 4.1 to 4.3) provide a summary of the indicative peat extraction volume calculation for each infrastructure element. Table 4.4 provides a summary of total peat extractions from the Development.

Table 4.1: Wind Turbine Foundations & Crane Hardstands (Excavation Area = ~2,900 m^2)

Wind Turbine No.	Mean Peat Depth (m)	Peat Excavation Volume (m^3)		Total Peat Excavation Volume (m^3)
		Acrotelmic Peat	Catotelmic Peat	
T1	1.01	1,450	870	2,320
T2	0.50	0	0	0
T3	1.60	1,450	3,828	5,278
T4	0.47	0	0	0
T5	0.69	1,450	145	1,595
T6	0.43	1,450	696	2,146
T7	0.84	1,450	725	2,175
T8	0.84	1,450	1,566	3,016
T9	0.64	1,450	145	1,595
T10	0.67	1,450	580	2,030
T11	0.51	1,450	232	1,682
	Total	**13,050**	**8,787**	**21,837**

Source: Natural Power (2024)

Table 4.2: Cut Access Tracks (Excavation Width For Cut Tracks = 8.5 m)

ID	Track Segment Description	Mean Peat Depth (m)	Peat Excavation Volume (m^3)		Total Peat Excavation Volume (m^3)
			Acrotelmic Peat	Catotelmic Peat	
1	T1 to T3	0.71	2,444	1,026	3,470
2	T2 to Junction of T1/T3	0.83	1,275	842	2,117
3	T3 to Junction T5/11	0.80	3,613	2,168	5,780
4	T6 to Junction	0.85	1,190	833	2,023
5	Junction to T11	0.65	4,038	1,211	5,249
6	T11 to T4	0.47	0	0	0
7	T7 to T8 to existing SK1 track	0.67	6,503	2,211	8,713
8	T9 track to existing	0.56	2,210	265	2,475
9	T10 track to existing	0.73	2,380	1,095	3,475
10	T5 to Junction	0.37	0	0	0
		Total	**23,651**	**9,650**	**33,302**

Source: Natural Power (2024)

Table 4.3: Ancillary Infrastructure & Borrow Pit

Infrastructure	Construction Footprint (m^2)	Mean Peat Depth (m)	Peat Excavation Volume (m^3)		Total Peat Excavation Volume (m^3)
			Acrotelmic Peat	Catotelmic Peat	
Borrow Pit	75,940	0.00	0	0	0
Substation & Battery Storage Area	18,000	0.37	0	0	0
		Total	**0**	**0**	**0**

Source: Natural Power (2024)

Table 4.4: Summary of Likely Peat Extraction

Construction Element	Peat Extraction Volume (m^3)		Total Peat Extraction Volume (m^3)
	Acrotelmic Peat	Catotelmic Peat	
Wind Turbine Foundations & Crane Hardstands	13,050	8,787	21,837
Access Tracks	23,651	9,650	33,301
Ancillary Infrastructure	0	0	0
Total Peat Excavation (m^3)	**36,701**	**18,437**	**55,138**

Source: Natural Power (2024)

4.4. Peat Re-Use Volumes

Peat re-use volume calculations have been completed exercising the reinstatement criteria presented in Table 3.1. Table 4.5 summarises the potential reinstatement and re-use volumes for acrotelmic and catotelmic peat at the Proposed Development.

Table 4.5: Summary of Likely Peat Reinstatement

Construction Element	Peat Re-Use Volume (m^3)		Total Peat Re-Use Volume (m^3)
	Acrotelmic Peat	Catotelmic Peat	
Wind Turbine Foundations & Crane Hardstands	3,554	1,777	5,331
Access Tracks	39,300	3,930	43,230
Ancillary Infrastructure	540	270	810
Total Peat Re-Use (m^3)	**43,394**	**5,977**	**49,371**

Source: Natural Power (2024)

Table 4.6: Estimate of Peat Balance (Excavation versus Re-Use Volumes)

Construction Element	Peat Excavation Volume (m^3)	Potential Peat Re-Use Volume (m^3)	Surplus (+) or Capacity (-) (m^3)
Wind Turbine Foundations & Crane Hardstands	21,837	5,331	16,506
Access Tracks	33,302	43,230	-9,928
Ancillary Infrastructure	0	810	-810
Total	**55,139**	**49,371**	**+5,768**

Source: Natural Power (2024)

Comparing the total capacity for peat re-use with total volume of excavated peat, it is indicated that the Proposed Development will not have sufficient capacity to accommodate all excavated peat on site. **Note:** due to the surplus of peat, site layout may be subject to change to reduce surplus volume.

During post-consent, there are several opportunities to reduce this excess of peat, including layout optimization by relocating infrastructure out of peat-rich areas, micrositing within the 50-meter allowance into shallower peat zones, and further peat data collection to aid in infrastructure placement. Additionally, geotechnical investigations can suggest alternative engineering solutions such as low volume excavation for crane pads and further track sections, and alternative engineering techniques could be explored to reinstate borrow pits to greater depths. There is also the possibility of utilising excess peat in bog habitat restoration, as detailed in Technical Appendix 6.3: Outline Biodiversity Enhancement and Restoration Plan (document reference 1350336). Restoration of bog habitats is proposed on an area of 59.70 ha of degraded bog to the south west of the Site Boundary at Benbrack Hill. While the current layout does not have sufficient capacity for peat reinstatement, careful management and handling, along with the outlined post-consent options, have the potential to balance the peat mass and eliminate excess peat.

On the basis of the peat balance calculations provided, measures for the recycling, other recovery and disposal of waste peat are therefore not required.

It should be recognised that this PMP provides an outline of the potential re-use opportunities and peat mass balance for the Proposed Development. It should therefore be updated after the detailed design / Balance of Plant (BoP) tender stage once the final infrastructure locations are known, and a contractor has been appointed. The final PMP should be updated in accordance with Stage 3 of the development process and should form the basis against which the site will be monitored by the ECoW and BoP Construction Manager.

5. Good Practice Control Measures

5.1. Introduction

The purpose of this section of the PMP is to detail how the management of peat will be controlled and to specify how peat will be protected and peat integrity conserved throughout all stages of the construction works.

Where possible during detailed design the excavated peat volumes will be minimised by micro-siting wind farm infrastructure to avoid areas of deeper peat.

Where peat excavation is unavoidable care must be taken when handling, transporting and stockpiling peat to protect the peat structure and strength as far as possible.

Where possible the movement of peat over long distances will be minimised and peat will be stored locally for re-use as soon as possible. Furthermore, double handling will be avoided as much as possible and a robust planning and monitoring programme will be developed to ensure that peat and mineral soils are not mixed.

5.2. Minimising Unnecessary Disturbance

The acrotelmic layer of the peat contains the living matter what protects the underlying catotelmic peat from drying and erosion. Therefore, it is important that measures are taken to avoid ripping up or rutting of the surface peat. In addition, unnecessary trafficking and appropriate scale plant will be used, such as 360° diggers rather than bulldozers to minimise any unnecessary compaction.

An access plan following the consented access track routes will be developed and physically demarcated. The plan and demarcated route will provide a designated controlled route and a permissible corridor within which service vehicles and plant can operate prior to peat and topsoil stripping. The purpose of this is to protect in-situ peat in areas that will not be affected by the Proposed Development layout and prevent unnecessary damage. The plan will also consider other constraints identified in the EIAR.

Access routes and working areas will be clearly delimited throughout the construction phase to ensure that peat compaction and damage in areas not directly involved in the works will be avoided. The construction works will be phased to ensure that peat is stripped in each part of the Proposed Development site ahead of the mineral substrate.

5.3. Excavation Methods

Peat excavation and handling will be in accordance with industry best practice. Excavated peat should be excavated as turves, including the acrotelm (surface vegetation) and a layer of adjoining catotelm (more humified peat), typically up to 500 mm thick in total, or as blocks of catotelm; the acrotelm should not be separated from its underlying peat.

Wherever possible, a 360º excavator will be used to strip the widest peat turves possible, with their vegetation intact. Ideally the turves should be a minimum of 0.5 m thickness and with an area up to a maximum of ~1m^2. However, the depth and scale will depend on the depth, consistency and condition of the peat at each location and the plant used for stripping.

The turves should be as large as possible to minimise desiccation during storage. Contamination of excavated peat with substrate materials should be avoided. Consideration should also be given to the timing of excavation activities to avoid very wet weather and multiple handling to minimise the likelihood of excavated peat losing structural integrity. If possible, extraction should be of intact, full depth, acrotelm layers from the top surface of the peat deposit. This technique will maintain connectivity between the surface vegetation and the partially decomposed upper layers of the catotelm.

For the laying of electrical cables, it is anticipated that the cable trench will be excavated by stripping surface peat and laying the turves separately to catotelmic peat temporarily on a geotextile mat to protect the underlying vegetation. Where required, the mineral soils should be segregated from the peat and also placed on a barrier material prior to reinstatement.

5.4. Temporary Storage & Stockpiles

Consideration for the storage of peat has been undertaken with input gathered from the Scottish Renewables Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and Minimisation of Waste.

The temporary storage of peat for long durations should be avoided where possible to minimise drying, weathering and erosion of the peat. Where possible the peat should be transported from the point of extraction to its re-use or reinstatement location. However, there are likely to be instances during construction where the peat will need to be temporarily stored prior to re-use or reinstatement (e.g. near the turbine for later reinstatement of the turbine base).

Stored peat would also be covered with turves in a manner to maximise coverage. In general, it shall be a priority to avoid a single site temporary peat storage area. A progressive construction method which re-cycles peat through excavation and timely re-instatement shall be adopted. However, some elements may require storage of peat prior to re-instatement at the end of the construction phase.

The peat will be temporarily stored in the following general arrangement:

- Peat stripped to construct new cut access tracks will be re-used as the construction progresses. The intact surface turves (where present) will be placed on roadside verges during construction and will not need to be stored elsewhere;
- At turbines, crane pads, laydown areas and the construction compound peat will be temporarily stored in designated locations as close to the original location as possible;
- At the borrow pits, peat will be stripped and temporarily stored as close as possible;

Determining factors are associated with the peat stability, sensitive receptors, drainage and pollution prevention. Areas of deeper peat (>1.0m) and sensitive areas including Groundwater Dependent Ecosystems (GWDTE) shall be avoided for dedicated temporary storage areas.

It will be a priority to ensure that a future detailed site investigation provides information on the suitability of these temporary peat storage areas including the topographic profile, groundwater regime, and geotechnical properties of deposits underlying the temporary storage sites. Furthermore, it may be necessary to undertake further peat stability calculations based on finalised placement of temporary peat storage areas.

Should any problems be observed during regular visual inspections of peat stockpiles, this would invoke implementation of an appropriate corrective action.

Owing to the geographical position of the site with consequentially high rainfall, it is anticipated that watering the stored peat through natural precipitation will be sufficient for the peat to remain damp, thus preventing drying out and desiccation and allowing the vegetation layer and seed bank to be sustained. This is an important element in the restoration of the landscape, providing continuity with surrounding local vegetation upon reinstatement. For the duration of the temporary storage, it shall be necessary to periodically monitor the condition of the stored peat and ensure the stability is maintained should be undertaken by a suitably qualified geotechnical engineer. During prolonged dry spells artificial wetting could be undertaken, however, this will be done under the agreement and supervision of the ECoW and Principal Contractor with appropriate mitigation in place to ensure the protection of the stored peat, as well as any nearby receptors such as watercourses or GWDTE.

6. Monitoring & Inspection

The success of construction and the subsequent re-use of peat across the site will be monitored by the ECoW to ensure that effects on the peatland environment are appropriately understood and subsequently reduced via any remedial works that can be undertaken. The details of any required monitoring would be discussed and agreed with SEPA, NatureScot and the Local Planning Authority prior to commencement. Appropriate monitoring is important to:

- Provide reassurance that established in-place mitigation and reinstatement measures are effective and that the site is not having a significant adverse impact upon the local and/or wider environment;
- Indicate whether further investigation is required and, where pollution is identified or unsuccessful reinstatement, the need for additional mitigation measures to prevent, reduce or remove any impacts on the environment; and
- Understand the long-term effects of the site on the natural environment.

Due to the nature of the construction activities and the possibility that such works can increase the volume of dissolved and particulate matter from entering the natural drainage network a robust hydrological monitoring strategy will be implemented.

A reinstatement monitoring strategy can also be implemented, where surveys can be carried out to monitor the success of peat re-use and subsequent reinstatement. Complimentary to the hydrological monitoring highlighted above and best practise geotechnical monitoring, the success of vegetation reinstatement can provide an insight into the effects of the wind farm on the local environment. Full details of the environmental monitoring strategies will be finalised following consultation with SEPA, NatureScot and the Local Planning Authority.

7. Disclaimer

The PMP should be considered a live document throughout the planning process and any future pre-construction phases of works. As such, additional information can be incorporated following the results of detailed site investigations carried out prior to construction, as well as from any discussions with SEPA or other engaged stakeholders throughout the development process.

The peat extraction and re-use volumes are intended as a preliminary indication. The total peat volumes are based on a series of assumptions for the infrastructure layout and peat depth data averaged across discrete areas of the Proposed Development. Such parameters can still vary over a small scale and therefore local topographic changes in the bedrock profile may impact the total accuracy of the volume calculation.

The accuracy of these predictions may be improved though further detailed site investigation (post consent). It is therefore important that the PMP remains a live document throughout pre-construction and construction phases and is encapsulated within a wider CEMP. The PMP and volumetric assessments can be updated as more accurate information becomes available.

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