Appendix 11.2 Outline Peat Management Plan

Contents

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1 Introduction

1.1 This Outline Peat Management and Restoration Plan (PMP) document has been prepared by ITPEnergised (ITPE) on behalf of the Applicant for the construction of the Proposed Development, located in the Cumberhead Forest in South Lanarkshire. This will be by updated to a Detailed PMP by the Applicant and the contractor following pre-construction site investigation works, and will be agreed with SLC, SEPA and NatureScot.

1.2 The site comprises largely commercial forestry plantation with localised areas of open moorland. The infrastructure of the Proposed Development comprises 21 wind turbines and associated crane hardstanding and laydown areas, one permanent substation and associated energy storage compound, two temporary construction compounds and a temporary laydown area, two meteorological masts, and three borrow pit search areas. With respect to access, the development would include approximately 8.8 km of new access tracks (of which approximately 410 m would be floated over deep peat if, following detailed site investigations, deep peat cannot be avoided by micro-siting), and 1.5 km of existing track that would be upgraded and straightened. Additionally, approximately 27.3 km of existing road, leading from the M74 to the main site area, will be used with little or no requirement for upgrading.

1.3 Of the above-noted 25.9 km of existing road, a stretch of approximately 1.4 km is part of the proposed Douglas West Extension wind farm, anticipated to be constructed before the Proposed Development and therefore considered as existing track. However, if the Douglas West Extension project is not consented or constructed before the Proposed Development, then this 1.4 km stretch would be constructed as new track. It is noted, however, that no peat was recorded by peat depth surveys along this proposed stretch of track. Further discussion on this proposed stretch of track is provided in Appendix 3.3.

1.4 The design of the Proposed Development has been undertaken as an iterative process to avoid areas of deep peat as much as possible to limit peat excavation and to limit the potential for peat slide, as presented in Chapter 2: Site Selection and Design, and Chapter 11: Hydrology, Hydrogeology and Geology.

1.5 The PMP provides details on the approximate predicted volumes of peat that would be excavated during construction, 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. This PMP would be further developed and implemented subsequent to the Proposed Development receiving consent. Further details and specific plans would be determined during the detailed design process and once further pre-construction site investigations have been undertaken. These details would then be included in a detailed PMP as part of the detailed Construction Environment Management Plan (CEMP). The responsibility for the implementation of the PMP would be with the Principal Contractor.

1.6 The potential volumes of peat extracted and re-used has been calculated based on an area specific or infrastructure specific basis using a modelled peat contour plan developed on high-density probing surveys where excavations would be undertaken. This has allowed high levels of confidence in the estimation of the volumes of peat that would be excavated and that would then require appropriate re-use.

2 Objectives

2.1 The 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 and construction of the development.

2.2 The PMP has been developed to demonstrate that peat has been afforded significant consideration during the construction phase of the Proposed Development, should consent be granted. It aims to

propose mitigation measures that would minimise any impacts and the long-term habitat restoration and management plans.

2.3 The PMP seeks to identify that appropriate proposals to re-use the surplus peat can be accommodated within the Proposed Development and associated Habitat Management Plan (HMP) proposals (presented in outline in Appendix 7.5), without significant environmental or health and safety implications, to minimise risk in terms of carbon release and human health.

Layout

2.4 The layout of the PMP is as follows:

- summary of relevant policy and guidance;
- definition of peat, details of peatland characteristics and peat conditions at the site;
- potential impacts on peat and an overview of peat excavation principles;
- estimate of peat volumes to be excavated and reinstated;
- classification of the peat characteristics present at the site;
- peat excavations and handling methods/controls and temporary peat storage; and
- reuse in infrastructure construction restoration and habitat management proposals.

2.5 Tables are included showing:

- a summary of peat depth data;
- locations and quantities of excavated peat that would be generated, with summary information on interpreted peat depth, dimension and area details of the infrastructure areas;
- locations and available volumes for re-use of excavated peat; and
- a summary of the peat extraction and re-use balance.

3 Policy and Guidance for Peat Management

3.1 This PMP has been compiled in accordance with the following policy and best practice guidance:

- Good Practice during Windfarm Construction (Scottish Renewables, SNH, SEPA & Forestry Commission Scotland, 4th Edition 2019);
- Guidance on Developments on Peatland: Site Surveys (Scottish Government, Scottish Natural Heritage and SEPA, 2017);
- SEPA Regulatory Position Statement – Developments on Peat (SEPA, 2010);
- 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, 2017); and
- Developments on Peat and Off-Site Uses of Waste Peat (SEPA, 2017).

4 Peat Conditions

Definitions of Peat

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

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

Peat Conditions at the Site

Desk Study

4.2 A desk study has been undertaken to review published geological conditions, based on British Geological Survey (BGS) mapping, the SNH Carbon and Peatlands Map (2016), and aerial photography.

Site Survey

4.3 Following on from the desk study, field surveys were undertaken, to measure the peat depth and provide additional observations relating to slopes, general topography and ground cover. Peat survey work undertaken at the site is summarised below and further detail is provided in Appendix 11.1: Peat Slide Hazard and Risk Assessment.

4.4 Two stages of 'Phase 1' peat survey works were undertaken, focusing on the vicinity of proposed turbine and new infrastructure locations, which had been devised as part of a design iteration process taking account of a range of physical and environmental constraints, including desk study findings relating to peat. It was considered appropriate to diverge from the relevant guidance on peat surveys (Guidance on Developments on Peatland - Site Surveys (2017), which recommends a 100 m grid of peat probe locations as an initial high-level survey strategy across an entire development site), due to the likelihood of substantial historical peat disturbance at the site, the considerable physical restrictions on accessing areas of dense forestry, the re-use of substantial existing forest road infrastructure, and the other established technical and environmental constraints guiding the layout iteration process. This 'Phase 1' survey process was dynamic, in that areas of survey were extended as appropriate where deep peat was identified, to seek opportunities for re-siting infrastructure in shallower peat areas.

4.5 Following completion of Phase 1 surveys, the site design was further reviewed, and changes were made to avoid or minimise siting infrastructure on areas of deeper peat. A 'design chill' was arrived at, and Phase 2 surveys were subsequently undertaken, comprising detailed surveys at each proposed turbine and hardstanding location, along all proposed new access tracks, and at other proposed infrastructure locations including the site substation, met masts, construction compounds, laydown area, and borrow pit search areas.

4.6 Peat sampling was undertaken using a hand auger, at proposed turbine and infrastructure locations. Samples retrieved from hand augering were examined to provide additional information and understanding of the nature of peat at varying depths and locations. Selected peat samples, from locations where peat depth greater than 0.5 m was recorded, were dispatched to Envirolab laboratory and tested for moisture content, bulk density, and carbon content.

4.7 Consultation was maintained with SEPA throughout the peat survey programme, to set out the proposed survey strategy, provide preliminary findings, and seek feedback. Although the above survey approach does diverge from the relevant guidance for the reasons set out above, it was agreed with SEPA that the surveys were appropriate and suitable for informing site design and assessment work.

4.8 It should be noted that the Stage 1 survey identified relatively shallow peat across much of the site. Although it has been possible to avoid siting most infrastructure on deep peat (>1 m), it has not been feasible to entirely avoid all localised instances of deeper peat, while taking account of other

technical and environmental constraints and delivering sufficient capacity to ensure a commercial viable renewable energy generation development project.

Peat Survey Results

4.9 The peat depth survey identified areas of deep peat concentrated around the central, low-lying valley between Nutberry Hill and Standingstone Hill, the far north of the site, and the far southwest. The remaining areas surveyed were found to have peat depths generally less than 0.5 m, therefore defined as peaty soil.

4.10 Peat thicknesses recorded at the site, from Stage 1 and Stage 2 surveys combined, are summarised in Table 1.

Table 1 – Distribution of Peat Depth Recorded at the Site

Peat Depth Interval (m)	Number of Occurrences	% of Probes
Nil	7	0.5
0.01 to 0.5	435	31.9
0.51 to 1.00	555	40.7
1.01 to 1.50	199	14.6
1.51 to 2.00	92	6.8
2.01 to 2.50	45	3.3
2.51 to 3.00	24	1.8
3.0 or more	5	0.4
Total	**772**	**100**

4.11 Laboratory testing results from samples of peat taken during peat depth surveys identified moisture contents generally within or slightly below the typical values for peat of 85 to 95% for half of the 12 samples, while moisture contents were well below this range in the other half. Carbon contents were recorded as being substantially below the typical value of 55% for peat in the same six samples which exhibited low moisture contents. This suggests that materials in at least some areas of the site may be considered peaty or organo-mineral soils, rather than peat.

4.12 Full details of the peat depth survey, together with a Peat Slide Risk Assessment, are provided in Appendix 11.1.

5 Potential Impacts on Peat During Construction

5.1 The initial construction phase for wind energy projects will often include soil and peat stripping and excavation activities associated with constructing the foundations for turbine bases, crane pads,

access tracks, control compound and substation, temporary construction compounds, and borrow pits.

5.2 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.

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

6 General Excavation Principles

6.1 The Proposed Development design required to take account of a number of environmental and technical constraints. The design 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, watercourse stand-off buffers, topography, telecommunications links, and efficient operation of the turbines. Where it has not been possible to site infrastructure in areas of <1 m of peat due to these other factors, efforts have been made to minimise the footprint of site infrastructure on deep peat as far as practicable.

6.2 The result is that most infrastructure has been sited outside areas of deep peat, as summarised below:

- Based on the average depth of peat recorded by probes at each proposed turbine location, four turbines are sited on 'peaty soil' rather than peat, i.e. average peat depth less than 0.5 m thick. Four further turbines are sited on areas where average peat depth is only marginally greater than 0.5 m (less than 0.6 m).
- All other turbines except T7 are sited on peat recorded at depths between 0.5 m and 1.0 m, therefore defined as peat, but not deep peat.
- T7 is sited on deep peat, with the average thickness recorded at 1.12 m. The T7 hardstanding (and all other turbine hardstandings) are located on areas with average peat depth less than 1.0 m. T7 and its hardstanding were sited with careful consideration of other constraints, including a 50 m buffer around a minor watercourse to the north, steep slopes, and the requirement to maintain adequate spacing between turbines. Following detailed pre-construction site investigations, there may be an opportunity to micro-site the turbine in order to reduce the volume of peat requiring excavation.
- All other infrastructure elements (met masts, compounds, substation and energy storage, and borrow pit search areas) are sited on areas with peat depth less than 1.0 m.
- All proposed new track sections are sited on areas with peat depth less than 1.0 m except for two short stretches noted below.
    - The stretch of new track from the existing track, westward to T11, crosses an area with average peat depth of 1.3 m. This stretch of track was routed to access T11 from an existing track and therefore make best use of existing infrastructure, following the land contours, and avoiding pockets of even deeper peat immediately north and south. T11 itself, where this stretch of track leads, was

sited on the shallowest peat identified in this vicinity (<0.5 m), taking account of other constraints and required spacing between turbines.

- The short stretch of new track required to straighten a sharp bend in the existing track west of met mast 2 crosses a limited stretch of deep peat (average depth 2.1 m). No other suitable options for routing new track in the vicinity could be identified, and it was considered preferable to make use of the existing track and only require this short stretch of new/straightened track, rather than building a longer stretch of new track on peat potentially nearly as deep. Micro-siting would be subject to findings from detailed pre-construction site investigation works and advice by the geotechnical engineering supervisor during construction works.

6.3 During the construction of the Proposed Development, all reasonable measures will be taken to avoid or minimise excavations and minimise disturbance to peat and peatland habitats.

6.4 Ground disturbance areas around excavations will be kept to a minimum and will be clearly defined on-site. Access to working areas during construction will be restricted to specified routes, comprising constructed tracks.

6.5 Cable routes will in general follow access tracks. Any peat excavated will be replaced. Therefore, this has not been included within the excavation volumes; however, it will still need to be managed on-site and the details of this will be provided within the Detailed PMP for the Proposed Development, which will be prepared by the Applicant and the contractor and agreed with SLC, SEPA and NatureScot.

6.6 Peat and topsoil excavated at the temporary construction compounds and temporary laydown area will be stored and also reinstated. Therefore, peat generated from these areas has not been included within the excavation volumes; however, it will still need to be managed on-site. The details of site-specific storage methodology and locations will be provided within the Detailed PMP, which will be produced following preconstruction investigative works at site.

6.7 Stretches of existing track will require widening, which will entail excavation of peat, where present, along the widening corridor. However, it is reasonable to assume that excavated peat can be used for restoration locally i.e. road verges along the widened track. Therefore, peat generated from road widening has not been included within the excavation volumes; however, it will still need to be managed on-site.

7 Estimation of Peat Volumes to be Excavated

7.1 The construction period for the Proposed Development would be approximately 18 months on-site. The programme, phasing and nature of construction activities are described in Chapter 3: Proposed Development. Those activities which would generate volumes of peat are as follows:

- establishment of the temporary construction compounds and component laydown area, which would include stripping of topsoil and peat and careful stockpiling of the material for later reinstatement in accordance with the CEMP which would be prepared in advance by the appointed Principal Contractor;
- formation of cut track (as shown on Figures 1.3 and 3.7 of the EIA Report), which would involve the removal and temporary storage of turves, as appropriate, followed by excavation down to formation level;
- construction of the turbine foundations 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;

- 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; and
- construction of the permanent substation and energy storage compound and two permanent met masts.

7.2 Table 2 below provides an estimate of peat volumes to be excavated, as well as assumptions used in developing the estimates. It also provides an estimate of volumes of acrotelmic and catotelmic peat to be disturbed, with further information on the classification of materials provided below Table 2.

Table 2 – Calculated Peat Volumes to be Excavated

Infrastructure	Length (m)	Area (m^2)	Peat depth (m)	Total Volume (m^3)	Acrotelm (m)	Catotelm (m)	Volume Acrotelm (m^3)	Volume Catotelm (m^3)	Assumptions
T1 - base	N/A	707	0.99	697.74	0.40	0.59	282.74	415.00	Includes excavation of turbine foundation to base. Assumes 30m diameter, excavation of turbine foundation to base.
T2 - base	N/A	707	0.64	454.51	0.40	0.24	282.74	171.77	
T3 - base	N/A	707	0.93	658.93	0.40	0.53	282.74	376.19	
T4 - base	N/A	707	0.55	391.46	0.40	0.15	282.74	108.71	
T5 - base	N/A	707	0.67	475.93	0.40	0.27	282.74	193.18	
T6 - base	N/A	707	0.30	212.06	0.30	0.00	212.06	0.00	
T7 - base	N/A	707	1.12	791.68	0.40	0.72	282.74	508.94	
T8 - base	N/A	707	0.64	452.39	0.40	0.24	282.74	169.65	
T9 - base	N/A	707	0.85	599.27	0.40	0.45	282.74	316.53	
T10 - base	N/A	707	0.78	550.43	0.40	0.38	282.74	267.69	
T11 - base	N/A	707	0.22	152.89	0.22	0.00	152.89	0.00	
T12 - base	N/A	707	0.41	292.36	0.40	0.01	282.74	9.61	
T13 - base	N/A	707	0.50	353.92	0.40	0.10	282.74	71.18	
T14 - base	N/A	707	0.60	424.11	0.40	0.20	282.74	141.37	
T15 - base	N/A	707	0.80	565.49	0.40	0.40	282.74	282.74	
T16 - base	N/A	707	0.65	460.80	0.40	0.25	282.74	178.06	
T17 - base	N/A	707	0.45	317.24	0.40	0.05	282.74	34.49	
T18 - base	N/A	707	0.51	361.42	0.40	0.11	282.74	78.67	
T19 - base	N/A	707	0.92	653.63	0.40	0.52	282.74	370.89	
T20 - base	N/A	707	0.85	601.75	0.40	0.45	282.74	319.00	
T21 - base	N/A	707	0.55	388.77	0.40	0.15	282.74	106.03	

Infrastructure	Length (m)	Area (m^2)	Peat depth (m)	Total Volume (m^3)	Acrotelm (m)	Catotelm (m)	Volume Acrotelm (m^3)	Volume Catotelm (m^3)	Assumptions
T1 hardstanding	N/A	1500	0.81	1207.65	0.40	0.41	600.00	607.65	Assumes 50m x 30m hardstanding, excavation depth full depth of peat.
T2 hardstanding	N/A	1500	0.35	526.95	0.35	0.00	526.95	0.00	
T3 hardstanding	N/A	1500	0.88	1326.15	0.40	0.48	600.00	726.15	
T4 hardstanding	N/A	1500	0.66	988.80	0.40	0.26	600.00	388.80	
T5 hardstanding	N/A	1500	0.55	828.30	0.40	0.15	600.00	228.30	
T6 hardstanding	N/A	1500	0.37	553.20	0.37	0.00	553.20	0.00	
T7 hardstanding	N/A	1500	0.98	1467.75	0.40	0.58	600.00	867.75	
T8 hardstanding	N/A	1500	0.75	1122.90	0.40	0.35	600.00	522.90	
T9 hardstanding	N/A	1500	0.64	961.50	0.40	0.24	600.00	361.50	
T10 hardstanding	N/A	1500	0.80	1203.60	0.40	0.40	600.00	603.60	
T11 hardstanding	N/A	1500	1.00	1500.00	0.40	0.60	600.00	900.00	
T12 - hardstanding	N/A	1500	0.78	1172.70	0.40	0.38	600.00	572.70	
T13 - hardstanding	N/A	1500	0.35	519.90	0.35	0.00	519.90	0.00	
T14 - hardstanding	N/A	1500	0.56	838.95	0.40	0.16	600.00	238.95	
T15 - hardstanding	N/A	1500	0.68	1026.45	0.40	0.28	600.00	426.45	
T16 - hardstanding	N/A	1500	0.43	640.50	0.40	0.03	600.00	40.50	
T17 - hardstanding	N/A	1500	0.87	1300.65	0.40	0.47	600.00	700.65	
T18 - hardstanding	N/A	1500	0.95	1417.95	0.40	0.55	600.00	817.95	
T19 - hardstanding	N/A	1500	0.98	1472.25	0.40	0.58	600.00	872.25	
T20 - hardstanding	N/A	1500	0.70	1046.10	0.40	0.30	600.00	446.10	
T21 - hardstanding	N/A	1500	0.50	748.50	0.40	0.10	600.00	148.50	
Substation compound	N/A	6000	0.69	4153.20	0.40	0.29	2400.00	1753.20	Assumes 60m x 100m compound area, excavation depth full depth of peat.
Met mast 1	N/A	625	0.77	479.00	0.40	0.37	250.00	229.00	Assumes 25m x 25m base, excavation depth full depth of peat.
Met mast 2	N/A	625	0.75	467.50	0.40	0.35	250.00	217.50	

Infrastructure	Length (m)	Area (m^2)	Peat depth (m)	Total Volume (m^3)	Acrotelm (m)	Catotelm (m)	Volume Acrotelm (m^3)	Volume Catotelm (m^3)	Assumptions
BP - South	N/A	15082	0.92	13890.52	0.40	0.52	6032.80	7857.72	Assumes no more than 50% of each borrow pit search areas will actually be excavated, full depth of peat to be excavated.
BP - West	N/A	11917	0.86	10285.56	0.40	0.46	4766.80	5518.76	
BP - North	N/A	10021.5	0.67	6680.33	0.40	0.27	4008.60	2671.73	
Track Section A	452	2,260	0.94	2113.10	0.40	0.54	904.00	1209.10	Assumes 5m width.
Track Section B	235	1,175	0.69	810.75	0.40	0.29	470.00	340.75	
Track Section C	343	1,715	0.82	1408.19	0.40	0.42	686.00	722.19	
Track Section D	204	1,020	0.53	539.27	0.40	0.13	408.00	131.27	
Track Section E	286	1,430	0.84	1201.06	0.40	0.44	572.00	629.06	
Track Section F	549	2,745	0.78	2132.87	0.40	0.38	1098.00	1034.87	
Track Section G	473	2,365	0.46	1082.70	0.40	0.06	946.00	136.70	
Track Section H	317	1,585	0.62	985.71	0.40	0.22	634.00	351.71	
Track Section I	378	1,890	0.69	1304.10	0.40	0.29	756.00	548.10	
Track Section J	Assume this stretch will be floated.								
Track Section K	867	4,335	0.99	4291.65	0.40	0.59	1734.00	2557.65	
Track Section L	Assume this stretch will be floated.								
Track Section M	626	3,130	0.56	1767.82	0.40	0.16	1252.00	515.82	
Track Section N	141	705	0.37	258.03	0.37	0.00	258.03	0.00	
Track Section O	175	875	0.27	239.40	0.27	0.00	239.40	0.00	
Track Section P	310	1,550	0.84	1306.03	0.40	0.44	620.00	686.03	
Track Section Q	884	4,420	0.68	2994.11	0.40	0.28	1768.00	1226.11	
Track Section R	950	4,750	0.65	3093.68	0.40	0.25	1900.00	1193.68	
Track Section S	658	3,290	0.50	1651.25	0.40	0.10	1316.00	335.25	
Track Section T	902	4,510	0.61	2739.83	0.40	0.21	1804.00	935.83	
Total				**97603.2**			**53,210.7**	**44,392.4**	

Classification of Excavated Material

7.3 There are two distinct layers within peat, the upper acrotelm and the lower catotelm. The acrotelm is the fibrous surface to the peatland, which exists between the growing peat surface and the lowest position of the water table in dry summers.

7.4 Peat soil generally below 0.5 m to up to 1 m in depth is classified as the catotelm, moderately decomposed with a high fibrous content and moderate water content. There are various stages of decomposition of the vegetation as it slowly becomes assimilated into the body of the peat.

7.5 The excavation volumes of acrotelm and catotelm presented in Table 2 are based on a simple assumption of the upper 0.4 m of peat being acrotelm and any deeper peat being catotelm.

7.6 It should be noted that laboratory testing results from samples of peat taken during peat depth surveys identified moisture contents generally within or slightly below the typical values for peat of 85 to 95% for half of the 12 samples, while moisture contents were well below this range in the other half. Carbon contents were recorded as being substantially below the typical value of 55% for peat in the same six samples which exhibited low moisture contents (taken from the proposed locations of T2, T4, T5, T13, T15 and T16). This suggests that materials in at least some areas of the site may be considered peaty or organo-mineral soils, rather than peat. The assumption of all peat deeper than 0.4 m at the site being catotelm is therefore considered to be quite conservative, with much of the volume of peat to be excavated actually likely to be drier, denser, exhibiting higher shear strength, and with lower carbon content than catotelmic peat. It should, however, be noted that the state of decomposition will increase as depth increases.

8 Peat Management Measures

Peat Protection Ahead of Soil Stripping

8.1 The development layout has already taken into account constraints relating to sensitive areas, including ecological, ornithological and archaeological receptors as well as geology/peat characteristics. The Proposed Development layout, including working areas and access track routes, would be marked on an Access Plan and would be demarcated on the ground as appropriate. Off-road tracking of heavy plant would not be permitted outside the marked area.

8.2 The Access Plan and the route of the access tracks would 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 the Access Plan would be to protect in situ peat in areas that are not affected by the development and to prevent unnecessary vehicle and plant tracking across these areas. The following rules would apply to the Access Plan:

- There would be no vehicle access to site areas outside the area marked on the Access Plan and demarcated as appropriate on the ground;
- There would be no stopping of vehicles outside the area marked on the Access Plan;
- Servicing or refuelling activities would only take place within clearly designated areas within the Access Plan, identified in the CEMP; and
- Laydown of materials (either construction materials or waste materials) would take place only within designated areas within the Access Plan. There would be no laydown, unless identified in the construction drawings, of any type of materials either within the access route corridors or anywhere outside of designated areas. All laydown areas not already considered would be subject to a peat slide risk assessment prior to their designation.

8.3 Access routes and working areas would be clearly delimited throughout the construction phase to ensure that peat compaction and damage in areas not directly involved in the works would be

avoided. The construction works would be phased to ensure that peat was stripped in each part of the site ahead of mineral subsoil (if present).

Handling of Excavated Material

8.4 Excavation of soils would be undertaken in such a manner as to avoid cross-contamination between distinct acrotelmic and catotelmic horizons, where possible and if applicable (i.e. where catotelmic peat is present). The different horizons would be kept and stored separately for use at a later date.

8.5 During and after excavation, the storage, haulage and reuse of excavated material would be planned to minimise material movement around the site. Where possible, immediate reuse is preferred to temporary storage. For example, excavated peat to form access tracks will be used to form verges alongside the new tracks, thereby minimising the need for stockpiling and storage. The detailed construction works programme, setting out excavation and reuse proposals for each element of the build, will be set out by the Principal Contractor but will adhere to the principles presented in this PMP and the Outline CEMP (Appendix 3.1).

8.6 Turves would be stripped and handled with care and stored with the vegetation side upward, such that damage to the living vegetation mat would be prevented or minimised as far as possible.

8.7 To ensure the minimum amount of damage to peat during stripping activities, strict procedures would be adopted for heavy plant access, stripping and handling/transport of surface, intact, peaty turf, and subsurface wetter peat (where present). Antecedent moisture conditions are critical for this and peat stripping, and handling would not take place if there are heavy rainfall conditions.

8.8 Peat stripping and excavation would generally follow the methodologies recommended for mineral soil by MAFF (2000) and Defra (2009). However, peat is a very different material from mineral topsoils and subsoils. For example, it is recognised that subsurface wet peat lacks strength and its consistency in many cases is that of a slurry. Hence, the stripping and excavation method(s) to be used in each part of the site would be agreed in advance with the Environmental Clerk of Works (ECoW) and Geotechnical Engineer, taking account of the recorded peat depths and characteristics both from surveys undertaken to date, and from detailed pre-construction site investigation works.

8.9 Wherever possible, a 360^{o} excavator would be used to permit stripping of large-scale peat turves, with their vegetation intact. Ideally these should be a minimum of 0.5 m deep and up to 1 m^{2}. However, the depth and scale would depend on the depth, consistency and condition of the surface peat at each location and the plant used for stripping. Where practicable, the largest possible turves that allow for the turves to remain intact would be stripped. This assists in maintaining the structural integrity of each excavated turf.

Temporary Storage

8.10 Temporary storage may be required where material is not needed for immediate reinstatement. Best practice measures for temporary and permanent peat storage during construction would be followed, in accordance with guidance including Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste (Scottish Renewables and SEPA, 2012).

8.11 To minimise handling and haulage distances, where possible, excavated material would be stored local to the site of excavation and/or local to the end–use site where it would be required for re-profiling, landscaping or structural purposes. The exact storage locations would be agreed with the Geotechnical Engineer and ECoW prior to commencement of the main phase of works. Details would be provided on a plan to accompany the PMP and relevant Method Statements, for agreement with NatureScot and SEPA.

8.12 Any temporary peat storage locations would be appropriately located and designed to minimise impact to sensitive habitats and species, prevent risks from material instability and runoff into watercourses.

8.13 Stripped materials would be carefully separated to keep peat and other soils apart and stored in appropriately designed and clearly defined separate piles. Peat would be excavated as turves which

would be as large as possible (see Paragraph 8.9) and kept wet in order to minimise desiccation during storage.

8.14 Stockpiles would be isolated from any surface drains and a minimum of 50 m away from watercourses, and stockpiles would not be located on areas of deep peat, in order to avoid peat slide risks associated with additional loading. Stockpiles would include appropriate bunding to minimise any pollution risks where required. Excavated topsoils would be stored on geotextile matting to a maximum of 1 m thickness.

8.15 The maximum height of any peat stockpiles would be carefully controlled in accordance with peat slide risk assessment considerations and nature of the material being stored, under the supervision of the ECoW and Geotechnical Engineer. Turf would be stockpiled separately. Peat would not be stockpiled for more than six months, unless otherwise agreed with SEPA.

8.16 Turves would be stored turf side up and would not be allowed to dry out. The condition of stored turves would be monitored by the ECoW.

9 Estimation of Peat Volumes to be Reinstated

9.1 Excavated peat from the construction process will be reused in the following ways:

- Reinstatement of temporary infrastructure (temporary construction compound, temporary laydown areas);
- Appropriate landscaping and bunding of new infrastructure e.g. track sides, turbine base batters, and substation compound batter;
- Reinstatement of the borrow pit excavation areas;
- Use in restoration of peatland habitat at the proposed Habitat Management Plan areas as required and appropriate, i.e. for drain-blocking to raise the water table and promote restoration of bog habitat.

9.2 More information on the above-noted peatland restoration proposals is provided in the outline Habitat Management Plan, Appendix 7.5.

9.3 Table 3 shows estimated volumes of peat that can be used to reinstate infrastructure and provide appropriate landscaping, in line with the current best practice listed above. This also provides an indicative breakdown of estimated volumes of acrotelmic and catotelmic peat.

Table 3 - Calculated Restoration Volume Available for Reuse of Excavated Peat

Infrastructure	Total Area (m^2)	Average Depth (m)	Total Volume (m^3)	Max Catotelm depth (m)	Remainder (acrotelm) (m)	Volume Catotelm (m^3)	Volume Acrotelm (m^3)	Assumptions
Turbine - base batters	2968.9	1.00	2968.88	0.70	0.30	2078.21	890.66	Assumes base circumference of 94.25m x 1m high (average) x 1.5m wide. Acrotelm (turves) for upper 0.3m.
Hardstanding landscaping batters	10080.0	0.50	5040.00	0.20	0.30	2016.00	3024.00	Assumes 3m wide batter x 1m high at highest end, grading down to ground level (0.5m average height). Acrotelm (turves) for upper 0.3m.
Substation landscaping batter	480.0	1.00	480.00	0.70	0.30	336.00	144.00	Assumes base circumference of 320m x 1m high x 1.5m wide

Infrastructure	Total Area (m^2)	Average Depth (m)	Total Volume (m^3)	Max Catotelm depth (m)	Remainder (acrotelm) (m)	Volume Catotelm (m^3)	Volume Acrotelm (m^3)	Assumptions
Cut Track Verges	45795.0	0.50	22897.50	0.20	0.30	9159.00	13738.50	Verge either side of 9.159km of new cut and floating tracks. Assumes 2.5m wide verge x max. 1m high, grading down to ground level. Acrotelm (turves) for upper 0.3m.
Borrow Pits	37020.5	2.00	74041.00	0.70	1.30	25914.35	48126.65	Assumes maximum fill of 2m, across maximum 50% of borrow pit areas. Maximum of 0.7m catotelm given likely high water content and low strength.
Total volume of excavated peat that could be reused			97603.2			44392.4	53210.7	
Total reinstatement volume available for reusing excavated peat			105427.4			39503.6	65923.8	
Remaining Excavated Peat			-7824.2			4888.9	-12713.1	

9.4 The calculations provided above illustrate that there are clearly sufficient opportunities to utilise the total volume of excavated peat for reinstatement on-site following methods described in best practice guidance. The calculations suggest that there could be a small excess of excavated catotelmic peat. Given the conservatisms employed in assumptions regarding acrotelmic and catotelmic peat, and the opportunities to micro-site infrastructure away from deeper peat following detailed pre-construction site investigations, it is considered that an excess of excavated catotelm is very unlikely to be realised in practice, and there will be sufficient opportunity to reuse all excavated peat in site restoration.

9.5 It should also be noted that these calculations do not include for the potential use of peat in proposed habitat management measures.

10 Monitoring and Inspection

10.1 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.

10.2 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.

10.3 Regular, frequent inspections of peat conditions during construction and restoration phases of work would be carried out by the Geotechnical Engineer and ECoW 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.
- 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.
- The physical condition of peats would be retained as carefully as possible both at the peat storage and the peat restoration stages. This is particularly important for vegetation establishment.

11 Conclusion

11.1 This PMP provides the guiding principles which would be applied to the detailed PMP for the Proposed Development. The detailed PMP would be prepared for agreement with SLC, SEPA and NatureScot and would form part of an overarching CEMP.

11.2 This PMP addresses the following peat-related issues:

- the volumes of peat that are predicted to be excavated;
- the capacity to reuse the peat on-site for landscaping and peatland restoration;
- peat handling and temporary storage; and
- restoration and monitoring of peatland habitat.

11.3 The calculations provided above illustrate that there are sufficient opportunities to utilise arising peat for reinstatement on-site and potentially for habitat management measures if required and appropriate, following methods described in best practice guidance.

11.4 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 micro-siting, 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 ECoW and Geotechnical Engineer. It is anticipated that a detailed, construction phase PMP would be conditioned, and maintenance and updating of this plan in conjunction with an updated geotechnical (peat) risk register by a Geotechnical Engineer would also be conditioned.

11.5 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. The detailed PMP and the CEMP for the Proposed Development would also include detailed Construction Method Statements and a 'live' Geotechnical Risk Register. These documents and the associated management and monitoring onsite would ensure the active consideration and protection of peat in all aspects of the construction process.

12 References

Joint Nature Conservation Committee. (2011). Towards an Assessment of the State of UK Peatlands.

NERC. (2012). Geology of Britain. Available at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html Accessed most recently in May 2020.

Scottish Government, SNH and SEPA. (2017). Guidance on Developments on Peatland - Site Surveys.

Scottish Natural Heritage (2016). Carbon and Peatland Map.

Scottish Renewables and SEPA (2012).Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste

Scottish Renewables, SNH, SEPA & Forestry Commission Scotland (2019). Good Practice during Windfarm Construction, 4th Edition

SEPA (2010). SEPA Regulatory Position Statement – Developments on Peat.

SEPA (2017). Developments on Peat and Off-Site Uses of Waste Peat.