APPENDIX 11.3: PEAT MANAGEMENT PLAN

1.1 Introduction

11.1.1 The Peat Management Plan (PMP) for the development provides information and guidance on the environmentally compliant re-use and management of excavated peat across the proposed Tangy IV Wind Farm.

11.1.2 The information presented in this plan has been used to inform the wider assessments documented in the main EIA Report chapters. The PMP as outlined in this document estimates the total volumes of excavated peat likely to be produced by the development and proposes reuse methods in line with regulatory requirements and best practice methods. Provided below is a list of the available information consulted to derive the peat volumes and to further identify appropriate re-use requirements.

- Environmental Impact Assessment Report, including the Outline Construction Environmental Management Plan (CEMP);
- Site survey data including detailed infrastructure peat probing and coring data. This integrated the classification of peat deposits across the site with characterisation of Von Post and terrain geomorphological mapping;
- Peat Slide Risk Assessment (Appendix 11.1 of the ES);
- Hydrological Assessment (Chapter 12 of ES) including information on peat land hydrological controls (e.g. grips, forestry drainage, peat pipes, hags and gullies, erosion state);
- Site Layout Design and design drawings provided in Chapter 5 of the EIA Report. This includes detail of proposed upgrade of cut, floating and reinstated access track track construction. The information additionally constraints indicative land-take areas for turbine foundations and hardstand areas during construction; and
- Borrow Pit Search Report (Appendix 11.2).

11.1.3 The peat management plan shall ensure peat deposits are managed in a sustainable manner which maximises the potential for minimising excavation via the adoption of appropriate construction methods as well as the targeted re-use of peat as part of the reinstatement works.

Regulatory Requirements

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

- **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 is possible.

11.1.5 The aspects of peat management outlined in this document are also based on the principles of the "Development on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and Minimisation of Waste", document published in 2012 jointly by Scottish Renewables and SEPA.

Limitations

11.1.6 The information presented in this report is based on the results of peat surveys carried out by Natural Power between September 2013 and June 2014. It is highlighted that whilst all attempts have been made to collect detailed peat depth and condition information, further investigations should be carried out as part of detailed site investigation (post consent). This process will provide further information across all infrastructure locations, which should be used to refine the peat excavation and reuse volumes provided in this report.

11.1.7 The PMP forms part of a site-specific Construction Environmental Management Plan (CEMP) and should be considered a live document throughout the planning and any future pre-construction phase 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 SNH (Scottish Natural Heritage) and SEPA or other engaged stakeholders.

1.2 Excavated Peat Volumes

11.1.8 To quantify the volume of peat that may be excavated and re-used across the development, the proposed wind farm layout has been analysed using a comprehensive peat depth dataset. The proposed 16 wind turbine layout has been appraised to obtain a preliminary estimate of the size and extent of the infrastructure footprint. The peat depth dataset comprises a total of 1,365 relevant peat probe points to the proposed layout. The peat depth data was collected across a multi-phase survey between September 2013 and June 2014:

11.1.9 The peat depth data has been processed into a peat depth contour map (Figure 11.6 & 11.14). The volumetric analysis of excavated peat volumes incorporates the mean peat depths recorded across each infrastructure element. Therefore, average peat depths have been assessed based on relevant data points as opposed to anomalous site wide averages.

11.1.10 The estimation of peat extraction and re-use volumes relies on several design assumptions that may vary on a small scale according to discrete changes in ground conditions. **Therefore, it should be highlighted that the peat volume estimates stated in this report are a preliminary indication and should be re-evaluated when more detailed intrusive site investigation data becomes available.**

11.1.11 Design assumptions with regard to the access track construction methods have also been taken from Chapter 5 of the EIA Report. SLR does not warrant these assumptions as a final engineering design for the wind farm. The design of the detailed site layout should be confirmed with a comprehensive site investigation.

Design Assumptions

Excavation & Replacement

11.1.12 Excavate and replacement (cut) type construction of tracks, passing places, turning areas and crane pads are proposed where peat depths are consistently shallower than 1.0m, along section of access track and where gradients are more than 1:10. This type of construction may also be adopted where there are cross slopes to be negotiated. The cut and fill construction method require the removal of peat deposits down to a suitable sub-grade layer within the superficial or bedrock geology. Excavated peat is then accommodated along access track landscaped verges on either side of the track or utilised elsewhere in landscaping across the development infrastructure.

11.1.13 Excavate and replacement track construction sequences shall be designed in accordance with local ground conditions and following a detailed site investigation. A general good practice construction sequence has been provided below and has been adapted and informed by SNH Guidance, (2005):

1. The route of the cut / fill access track shall be marked out on the ground well ahead of the construction activity. This will allow for advanced checks of any newly developed or unforeseen constraints.
2. As part of this process, the most sensitive sections of the access track route shall be defined. This will include water crossings, peat hags, and steep slopes. These defined zones shall become established management zones where specific mitigation measures and construction techniques shall be implemented to minimise impacts during the construction phase.
3. Where possible, the construction of the cut tracks shall avoid periods of wet weather (when peat deposits are particularly susceptible to deformation and when there is an increased risk of run-off carrying unacceptable levels of sediment. Similarly, the construction of access tracks

shall, where possible, avoid periods of very dry weather; when there is a high risk of excavated and exposed peat soils drying out.

4. The cut access track construction shall typically proceed in an uphill direction, thus allowing better drainage control. The access track side and cut-off ditches shall be generally constructed first. It shall be ensured that these discharge to a suitable buffered watercourse in line with hydrological assessment and relevant drainage controls. It shall be important to ensure that surface water run-off is directed away from the track formation layer. This will act to reduce disturbance by the prevention of water-logging and erosion.
5. A progressive construction method shall typically be adopted whereby the cut track is excavated to a suitable formation and up-filled to the track running surface. Following this, the newly constructed track verges will be restored with peat and vegetation from the next advancing section of track under construction. The sequence of excavation, up-fill and restoration will be managed to minimise the time between excavation and restoration as far as is practicable.
6. Plant machinery shall work where practicable from the section of access track most recently completed. The re-use of peat turves and peat from newly excavated sections onto the verges of the most recently completed section of track will act to reduce the overall disturbance of excavated peat. Excavators with long reach arms are also beneficial in reducing vehicle manoeuvres over peat deposits.

Floating Access Tracks

11.1.14 Floating type construction of access tracks is proposed where peat depths are consistently deeper than 1.0m. Slope geometry has also been taken into account with floating track construction considered unsuitable across gradients in excess of 1:10 (6o) and along adverse cross slopes. Reference is also made to the Peat Stability Risk Assessment (Appendix 11.1) in which peat slide risk and proposed construction methods have been discussed in detail. The floating construction design leaves the peat deposit in place and utilises a construction of layered geo-grid, geo-textiles and aggregate fill, which is placed over the peat deposits. This system forms a ‘floating’ platform to spread the construction loads over the peat. A comprehensive description of this construction method is presented by Forestry Commission Engineering (FCE) & Scottish National Heritage (SNH), (2010). This sequence of construction may need to be adapted to localised ground conditions that may only become fully evident following a detailed site investigation:

1. Mark out the alignment of the road and install advance drainage ahead of construction where necessary.
2. Clear the intended floating road area of major protrusions such as rocks, trees, down to ground level leaving any residual stumps and roots in place.
3. Leave the local surface vegetation and soils in place if possible. In many cases the existing vegetation and root system may be the strongest layer in the system providing increased tensile strength at surface, and care shall be taken to preserve the integrity of this layer.
4. Any local hollows or depressions along the route alignment shall be in-filled with a suitable lightweight fill such as tree brash, logs or a combination of lightweight fill and suitable materials. Similarly, a brash mat and fascines (bundles of brash material) may be adopted to form the initial surface across uneven ground surface.
5. Broken vegetation surfaces such as peat hags and very wet areas with high fines content, may need to be covered with a separator grade geo-membrane to prevent contamination of the aggregate layers. This geotextile may be covered with a thin regulating layer of aggregate prior to installing the main geo-grid.
6. Geo-grids shall be placed by hand along the alignment of the road, directly onto the prepared area. Each grid section shall overlap adjacent sections using a simple overlapping arrangement generally in accordance with the relevant manufacturer’s specification. A minimum transverse overlap is normally set at 400mm. This overlap may be increased where necessary, depending

on the amount of displacement and transverse tension caused by un-even terrain and taking the manufacturer's recommendations into account.

7. Place the first layer of aggregate material onto the geo-grid, this shall be a suitable 'well graded material' that will be able to achieve a sound interlock with the geo-grid. The final specification of the aggregate grading shall be dictated by the chosen geo-grid mesh size. Care shall be taken to avoid damage to the geo-grids.
8. The degree of compaction required will be dictated by the local ground conditions along the route alignment. Across exceptionally soft areas of peat there may be a requirement not to apply mechanical vibratory compaction and instead rely on compaction of aggregate through trafficking of wheels and tracks of the construction plant alone.

Access Track Dimensions

11.1.15 Proposed cut access track excavations have been assumed to accommodate a 6m running width with 0.5m additional width on either side as a permanent verge. An additional allowance for 1.6m for a permanent drainage ditch is also considered. This provides a total assumed width of 8.6m (as per EIA Report Figure 5.4).

11.1.16 Turning areas and passing places have been omitted from this analysis as it is assumed that any peat excavated as part of their construction would be accommodated along the periphery of these infrastructure elements, used to form landscaped verges.

Foundations and Hard-standing Dimensions

11.1.17 The permanent land take area of the combined wind turbine foundation excavation and hard stand areas has been assumed to be a total of 1,750m2. This dimension has been assumed based on the indicative turbine foundation depicted on EIA Report Figure 5.3. The peat volume calculations assume a batter angle to the base of excavation of 45o for an equivalent square area of 1,750m2. This is a conservative assumption as a number of the foundations may be constructed using a different design. Detailed design may also allow for a smaller foundation footprint. The final formation level for the wind turbine foundation is also dictated by the local ground conditions. These shall be only defined following a detailed site investigation.

11.1.18 Where suitable formation layers are identified at a shallower level, there may be scope to reduce the foundation working area. The geotechnical performance of the formation layer shall also input into the design dimensions of the gravity foundations.

11.1.19 The final design chosen for the wind turbine foundations shall be informed by a detailed intrusive site investigation carried out during a post consent phase. Particularly important will be the underlying depth of superficial glacial deposits and the quality of the rock mass beneath each wind turbine location. The requirement for a detailed site investigation and design analysis, out-with the scope of this peat management; dictates that the option of foundation piling can only be fully considered during the pre-construction phase.

Ancillary Infrastructure

11.1.20 Four borrow pit locations have been accounted for within the peat volume calculations. GIS analysis of the area of borrow pit workings indicated within the Borrow Pit Search Report (Appendix 11.2) have been considered in the calculations.

11.1.21 The following temporary and permanent infrastructure locations have also been incorporated into the assessment in line with Chapter 5 of the EIA Report:

- Temporary Construction Compound (100x100m) – 10,000m2;
- Temporary Construction Lay Down Area (100x100m) – 10,000m2;
- Operations Building and Compound (26 x 36m) – 936m2;
- Substations (1 new 1 existing retained) 2 areas (40 x 65m) – 2600m2 each; and
- Met Masts (10x10m) base plus 600m2 crane pad for three locations.

Peat Deposits

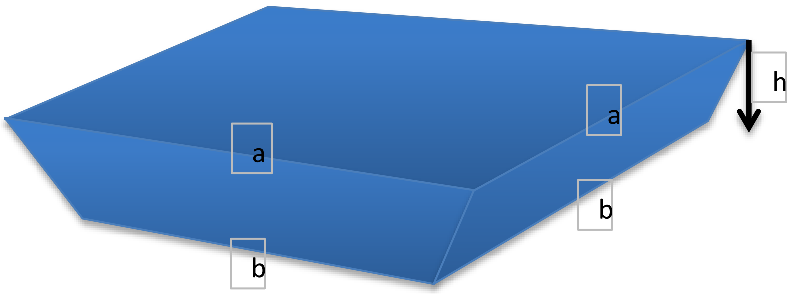
11.1.22 The peat deposits encountered across the development have been assessed in detail. Chapter 11 (Geology, Soils & Hydrogeology) provides a comprehensive account of the peat in its recorded distribution and material properties. Further detail on the peat environment has also been provided in the Peat Stability Assessment (Appendix 11.1). Figure 11.6 depicts the macro scale depth distribution of peat across the site.

Excavated Peat Volumes

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

11.1.24 The following sequence of tables provides a summary of the indicative peat extraction volume calculation for each infrastructure element. The relevant design assumptions are also confirmed within each table. The geometry of the volumetric calculations is set out in detail below. For square excavation volume calculations, the volume of a truncated square pyramid has been used with the following expression as shown in Plate 1 below:

Plate 1: Volume of a Truncated Square Pyramid (approximates excavation of a square volume)



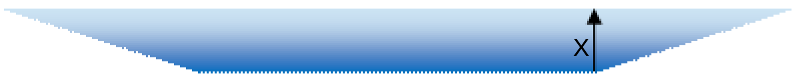
Volume = 1/3 (a^2 + ab + b^2) x h

Where: a = surface width of working area; b = (a – 2h) ; h = mean peat depth

Source: *Natural Power*

11.1.25 For excavation and replacement (cut) access track construction the volume of a trapezoid has been adopted as depicted in Figure 2 below.

Figure 1: Volume of an Access Track Excavation Based on A Trapezoid



Volume = (x * ((8.6 + (8.6-2x)) / 2)) * Length of access track

Where X = mean peat depth along access track section; 8.6m Assumed width as per Figure 5.4 allowing for running surface, verges and drain.

The following series of data tables provides the estimates peat volumes based on the scale of proposed development.

Table 1: Wind Turbine Locations Peat Volumes

Key Assumptions for Volume Calculation:

Volume of Excavated Peat based on Permanent land-take area of turbine foundation and crane hard stand areas equal to 1,750 m^2 based on Figure 5.3 of the EIA Report. This has been used in the volumetric calculation based on figure 1 above and using average peat depth at each turbine location.

Turbine ID	Average Peat Depth Turbine & Hard-standing	Total Peat Extraction Volume (m^3)
T1	0	0
T2	0	0
T3	0.1	174
T4	1.5	2437
T5	0	0
T6	0.8	1345
T7	0.6	1019
T8	0.8	1264
T9	2.8	4266
T10	1.6	2587
T11	1	1665
T12	0.3	517
T13	1	1665
T14	0.2	346
T15	1.8	2882
T16	1.8	2882
Total Peat Extraction (m^3)		**23,048**

Table 2: Access Track – Peat Volumes

Volume of Excavated Peat based on proposed access track detail depicted in Figure 5.4.

Calculation based on Figure 2 above using average peat depth along each discrete length of proposed access track.

Calculation for upgrade of existing forestry and Tangy I/II tracks assumes widening from 3m to an assumed permanent width of 8.6m as per EIA Report Figure 5.4.

Access Track Section	Average Peat Depth (m)	Assumed Width at surface (m)	Approximate Length (m)	Type of Track Construction	Total Peat Extraction Volume (m^3)
Track Spur to T16	1.0	8.6	175	Cut	2081
Access track to Proposed Laydown Area	0.3	8.6	338	Cut	1404
Access Spur to T2	0.1	8.6	78	Cut	40
Access Spur to T2	0.1	8.6	15	Cut	13
Access Spur to T3	0.3	8.6	76	Cut	296
Access Spur to T3	0.6	8.6	15	Cut	116
Access Spur to T4	0.2	8.6	45	Cut	87
Access track to Substation	0.6	8.6	243	Cut	1877

Access Track Section	Average Peat Depth (m)	Assumed Width at surface (m)	Approximate Length (m)	Type of Track Construction	Total Peat Extraction Volume (m^3)
Access T14 to T13	0.7	8.6	594	Cut	4730
Access Spur to T13	0.8	8.6	85	Cut	820
Access T13 to T12	0.6	8.6	881	Cut	6397
Access Spur to T10	0.7	8.6	144	Cut	1160
Access Spur to T10	0.8	8.6	15	Cut	145
Access Substation to T9	0.5	8.6	364	Cut	2301
Access Spur to T8	0	8.6	157	Cut	0
Access Spur to T8	0	8.6	15	Cut	0
Access T8 to T7	0.5	8.6	538	Cut	3206
Access T4 to T5	0.2	8.6	551	Cut	1468
Access spur to T5	0	8.6	15	Cut	0
Access track T6 to T7	0.5	8.6	140	Cut	915
Access track T9 to T8	0.7	8.6	432	Cut	3592
Access track T11	1	8.6	117	Cut	1398
Access to Permanent Met Mast (T1)	0.0	8.6	229	Cut	74
Access to Permanent Met Mast (T4)	0.2	8.6	116	Cut	295
Access to Permanent Met Mast T3	0.5	8.6	96	Cut	597
Total Peat Extraction 'Cut' Tracks (m3)					**33,012**
Track to Borrow Pit C	0.3	3	414	Upgrade Existing Track (Construction)	0
Track to Borrow Pit B	0.0	3	79	Temporary Construction Track	0
Entrance to Proposed Construction Compound	0.1	8.6	642	Existing Upgrade	268
Compound to Turbine T1	0.1	8.6	175	Existing Upgrade	87
Proposed Construction Compound to	0.1	8.6	152	Existing Upgrade	164

Access Track Section	Average Peat Depth (m)	Assumed Width at surface (m)	Approximate Length (m)	Type of Track Construction	Total Peat Extraction Volume (m^3)
Operations Building					
Access track to T2	0.1	8.6	288	Existing Upgrade	263
Access track spur to T3 Intersection	0.1	8.6	209	Existing Upgrade	207
Access track spur to T3	0.2	8.6	303	Existing Upgrade	545
Access track to T4	0.5	8.6	368	Existing Upgrade	1508
T3 Intersection to Access track Spur T4	0.2	8.6	264	Existing Upgrade	474
Access track spur to T14	1.0	8.6	220	Existing Upgrade	1630
Access track to T4	0.2	8.6	258	Existing Upgrade	361
Access track to T6	1.6	8.6	210	Existing Upgrade	2278
Access track to T6	1.9	8.6	172	Existing Upgrade	2082
Access Spur to T1	0.0	8.6	53	Existing Upgrade	0
Access to Permanent Met Mast T3	0.2	8.6	154	Existing Upgrade	290
Access Spur to Borrow Pit A	0.7	8.6	98	Existing Upgrade	526
Total Peat Extraction Existing Upgrade Tracks (m^3)					**10,684**
Access Spur to T15	1.8	7.7	209	Floating Track	0
Access Spur to T15	1.8	7.7	15	Floating Track	0
Access Spur to T16	1.4	7.7	222	Floating Track	0
Access Spur to T16	2	7.7	15	Floating Track	0
Access T11 to T10	1.5	7.7	549	Floating Track	0
Access track to T6	1.5	7.7	142	Floating Track	0
Access track T6 to T7	2.0	7.7	147	Floating Track	0
Access track to T9	1.5	7.7	148	Floating Track	0
Access track T15	2.2	7.7	143	Floating Track	0
Access track T15	1.3	7.7	131	Floating Track	0
Access track T11	1.2	7.7	201	Floating Track	0
Access track spur T10	2.1	7.7	62	Floating Track	0
Total Peat Extraction Floating Tracks (m^3)					**0**

Access Track Section	Average Peat Depth (m)	Assumed Width at surface (m)	Approximate Length (m)	Type of Track Construction	Total Peat Extraction Volume (m^3)
Total Peat Extraction – All Access Tracks					**43,696**

Table 3: Potential Borrow Pit Locations – Peat Volumes

11.1.32 Volume of Excavated Peat based on working area of proposed borrow pits presented in the Borrow Pit Search Report (Appendix 11.2 of EIA Report).

11.1.33 Calculation based on Figure 1 above which approximates the borrow pit working area to a square truncated pyramid excavation in order to estimate the initial peat strip.

Borrow Pit ID	Average Peat Depth (m)	Indicative Working Area (m^2)	Total Peat Extraction Volume (m^3)
Borrow Pit A	0.1	11,900	1,190
Borrow Pit B	0.0	19,150	0
Borrow Pit C	0.2	20,000	4,000
Borrow Pit E	0.1	19,550	1,950
Total Peat Extraction (m3)			**7,140**

Table 4: Ancillary Infrastructure – Peat Volumes

11.1.34 Volume of excavated peat based on Chapter 5 of the EIA Report discussing the detailed site layout.

11.1.35 Calculations based on Figure 1 above for a square excavation incorporating average peat depth at each discrete infrastructure location.

Location ID	Average Peat Depth (m)	Indicative Working Area (m^2)	Total Peat Extraction Volume (m^3)
Temporary Construction Compound	0.25	10,000	2,488
Temporary Lay-down Area	0.55	10,000	5,440
Operations Building and Compound	0.4	936	365
New Substation	0.5	2,600	1,230
Met Masts x3	0.3	2,100	621
Total Peat Extraction (m^3)			**10,143**

1.2.3.1 Peat Extraction Volume Summary

11.1.36 Table 5 below provides a side wide indicative value of the total volume of excavated peat required as part of the construction phase of development.

Table 5: Total Peat Extraction (Indicative) Site Wide

Construction Element	Peat Extraction Volume (m^3)	Indicative Acrotelm Volume (m^3) 63%	Indicative Catotelm Volume (m^3) 37%
Wind Turbine Foundations & Hardstand	23,048	14,520	8,528
New Access Tracks	33,012	20,798	12,214

Construction Element	Peat Extraction Volume (m^3)	Indicative Acrotelm Volume (m^3) 63%	Indicative Catotelm Volume (m^3) 37%
Upgrade of Existing Access Tracks	10,684	6,731	3,953
Potential Borrow Pit Locations	7,140	4,498	2,642
Ancillary Infrastructure	10,143	6,390	3,753
TOTAL	**84,027**	**52,937**	**31,090**
TOTAL (including 25% bulking factor)*	**105,034**	**66,171**	**38,863**

*Notes*after Trenter*, (*2001*)

11.1.37 The assessment of the distribution of acrotelmic and catotelmic peat has been derived from peat core data acquired from across the proposed turbine locations. Examination of the Von Post classification has provided a framework for determining the typical peat layer structure in terms of relative thickness of acrotelm and underlying catotelmic peat.

11.1.38 Von Posts classification of H7 and greater was set for the indicator of catotelmic peat. This is peat material which is strongly decomposed 'muddy peat' with indistinct plant structure. Table 6 below provides the analysis of each core record and then equates this to a site wide ratio which has been adopted in the peat volume calculations above.

11.1.39 The acrotelm and catotelm describe two distinct zones within the peat deposits that can be a key control on the hydrological regime. Catotelmic peat generally persists below groundwater level within the peat. As a result, decomposition state is higher and hence the Von Post class (H7) of decomposition has been used as an indicator of the catotelm peat zone.

11.1.40 Due to the forestry activity across the site, the hydrological regime within the peat has been intensely modified. An overriding feature is a heterogeneously drained peat mass, which through the dense network of cut forestry drains, peat has become dried and desiccated preserving a lower degree of humification whilst in other areas surface ponding of water is prevalent. The peat is understood to be severely degraded from the surface with the upper acrotelmic layer generally showing no signs of active growth at the time of survey. It is postulated that this condition is due to a dense layer of wood fibres associated with the thick forestry canopy cover. This was also reflected in the upper layer of peat cores which contained a high abundance of wood fibres.

11.1.41 In discrete, areas highly decomposed peat was encountered from the surface. This has been attributed to areas of previous high groundwater levels, draining and repeated wetting of the peat surface leading to degradation in the thin vegetation layer and in turn to bare exposed peat. Through continued weathering this has taken on the material properties of catotelmic peat. Principally very highly decomposed and of reduced permeability. In such situations the low permeability peat at surface is compartmentalised from deeper layers which have been protected from surface water action and weathering. These deeper layers have in some cases been logged as lower humification class and effectively behave as acrotelmic peat with increased fibrous strength and an ability to transmit groundwater within the peat mass. This was particularly evident at locations T9 and T15. Table 6 below provides a summary of Von Post classification from peat cores collected across the site.

Table 6: Acrotelm and Catotelm – Von Post Indicator of Acrotelm and Catotelm Peat

Location	Depth (m)	Von Post Classification	Acrotelm / Catotelm Designation Based on Peat Core	% of peat mass Acrotelm or Catotelm for each cored location
WTG 1	0	N/A	N/A	N/A
WTG 2	0	N/A	N/A	N/A
WTG 3 (Core 1)	0.1	[H4]	Acrotelm	100%
	0.2	[H4]		
WTG 3 (Core 2)	0.1	[H2]	Acrotelm	100%
	0.2	[H2]		
WTG 4 (Core 1)	0.1	[H5]	Acrotelm	25%
	0.4	[H8]	Catotelm	75%
WTG 4 (Core 2)	0.1	[H6]	Acrotelm	50%
	0.2	[H7]	Catotelm	50%
WTG 4 (Core 3)	0.1	[H7]	Catotelm	100%
	0.6	[H7]		
	0.7	[H7]		
WTG 5	0	N/A	N/A	N/A
WTG 6 (Core 1)	0.1	[H4]	Acrotelm	100%
	0.6	[H4]		
	0.7	[H4]		
WTG 6 (Core 2)	0.1	[H5]	Acrotelm	100%
	0.35	[H5]		
WTG 6 (Core 3)	0.1	[H4]	Acrotelm	100%
	0.6	[H6]		
	1.1	[H6]		
	1.5	[H6]		
WTG 7 (Core1)	0.1	[H5]	Acrotelm	100%
	0.6	[H5]		
	0.8	[H5]		
WTG 7 (Core 2)	0.1	[H1]	Acrotelm	100%
WTG 7 (Core 3)	0.1	[H5]	Acrotelm	100%
	0.6	[H5]		
WTG 9 (Core 1)	0.10	[H8]	Catotelm	100%
	0.60	[H7]		
	1.10	[H7]		
WTG 9 (Core 2)	0.10	[H6]	Acrotelm	100%
	0.60	[H6]		
	1.10	[H6]		

Location	Depth (m)	Von Post Classification	Acrotelm / Catotelm Designation Based on Peat Core	% of peat mass Acrotelm or Catotelm for each cored location
	1.80	[H6]		
WTG 9 (Core 3)	0.10	[H8]	Catotelm	10%
	0.60	[H6]	Acrotelm	90%
	1.10	[H6]		
WTG 10 (Core1)	0.1	[H7]	Catotelm	
	0.6	[H7]		100%
	0.8	[H7]		
WTG 10 (Core2)	0.1	[H8]	Catotelm	
	0.6	[H8]		100%
	0.8	[H8]		
WTG 10 (Core3)	0.1	[H7]	Catotelm	
	0.6	[H8]		100%
	0.8	[H8]		
WTG11 (Core 1)	0.1	[H8]	Catotelm	100%
	0.6	[H8]		
	0.8	[H8]		
WTG11 (Core2)	0.1	[H8]	Catotelm	100%
	0.6	[H8]		
	1.1	[H8]		
	1.6	[H8]		
	2.1	[H8]		
WTG 11 (Core3)	0.1	[H7]	Catotelm	100%
	0.6	[H7]		
	0.9	[H7]		
WTG12 (Core1)	0.1	[H6]	Acrotelm	25%
	0.4	[H9]	Catotelm	75%
WTG12 (Core2)	0.1	[H8]	Catotelm	100%
	0.3	[H8]		
WTG 13 (Core1)	0.1	[H5]	Acrotelm	100%
	0.6	[H5]		
	1.1	[H5]		
	1.2	[H5]		
WTG 13 (Core2)	0.1	[H8]	Catotelm	100%
	0.6	[H8]		
	0.9	[H8]		
WTG 13 (Core3)	0.1	[H6]	Acrotelm	100%
	0.6	[H6]		

Location	Depth (m)	Von Post Classification	Acrotelm / Catotelm Designation Based on Peat Core	% of peat mass Acrotelm or Catotelm for each cored location
	1.1	[H6]		
	1.6	[H6]		
	1.9	[H6]		
WTG14 (Core1)	0.1	[H5]	Acrotelm	100%
	0.2	[H5]		
WTG14 (Core2)	0.1	[H4]	Acrotelm	100%
	0.3	[H4]		
WTG14 (Core3)	0.1	[H4]	Acrotelm	100%
	0.6	[H4]		
	1.1	[H4]		
	1.6	[H4]		
	1.7	[H4]		
WTG15 (Core1)	0.1	[H6]	Acrotelm	100%
	0.6	[H4]		
	1.1	[H4]		
	1.6	[H4]		
	1.8	[H4]		
WTG15 (Core2)	0.1	[H5]	Acrotelm	100%
	0.6	[H4]		
	1.1	[H4]		
	1.6	[H4]		
	2.1	[H4]		
WTG15 (Core3)	0.1	[H8]	Catotelm	10%
	0.6	[H5]	Acrotelm	70%
	1.1	[H6]		
	1.4	[H8]	Catotelm	20%
WTG16 (Core1)	0.1	[H6]	Acrotelm	100%
	0.6	[H6]		
	1.1	[H6]		
	1.6	[H6]		
	1.8	[H6]		
WTG16 (Core2)	0.1	[H6]	Acrotelm	100%
	0.6	[H6]		
	1.1	[H6]		
	1.5	[H6]		
WTG16 (Core3)	0.1	[H6]	Acrotelm	100%
	0.6	[H6]		

Location	Depth (m)	Von Post Classification	Acrotelm / Catotelm Designation Based on Peat Core	% of peat mass Acrotelm or Catotelm for each cored location
	1.1	[H6]		
	1.6	[H6]		
	1.8	[H6]		
Note: where strongly decomposed Von Post values are present at surface this is attributed to surface water or ponding.				
Average Percentage of Acrotelm from Peat Cores (All Turbine Locations)				**63%**
Average Percentage of Catotelm from Peat Cores (All Turbine Locations)				**37%**

11.1.42 The average distribution for acrotelmic peat, determined across the peat core survey indicates acrotelmic peat properties are slightly more abundant. This is in line with a peat mass where lower Von Post values reflect a relatively free draining / dried condition. This confirms the model for a modified and artificially drained forestry peat land. This has not accelerated decomposition of the peat mass in the recent past. Where Von Post values are consistently high this may be an indicator of a more static groundwater regime which has allowed a higher degree of decomposition within the peat mass. A side wide determination has been applied as a result of the discretised nature of the recorded peat classifications. This is based on the samples and classified peat cores (further reported in Appendix 11.1).

11.1.43 A bulking factor of 25% has been added to the total volume of peat extraction. It is reported by Trenter, (2001) that a range of bulking factors between 25 and 45% can be expected for peat. The bulking or effective volume increase of the peat occurs over the process of excavation, transport and replacement. The magnitude of the bulking factor will depend upon site specific ground conditions and the physical properties of the excavated peat. A primary factor will be in the amount of handling which the excavated peat deposits experience.

1.3 Re-use Volumes of Excavated Peat

11.1.44 To estimate the volume of peat that could be re-used as part of construction and restoration, an indicative estimate has been calculated based on best practice and past project experience. Table 7 below provides an approximate total volume of peat that could be accommodated across the site. This estimate has incorporated the predicted volumes of both acrotelmic and catotelmic peat. The following assumptions salient to the re-use of excavated peat are highlighted below:

Wind Farm Infrastructure Restoration Assumptions

11.1.45 **The uppermost 0.5m** of excavated peat at all turbine and ancillary infrastructure locations will be accommodated in the finishing and landscaping of each respective infrastructure element for the construction land take areas (Chapter 5 of ES). For existing access track proposed to be reinstated it is assumed 0.4m depth of peat could be placed across areas which currently occupy peat land;

11.1.46 In the construction of floating access track there will be the opportunity to **accommodate approximately 2m^3 of peat per linear metre** in the creation of low angle landscaped verges that will seek to provide visual continuity between the access track and the surrounding peat land.

11.1.47 In the construction of cut access track there will be the opportunity to accommodate 1m3 of peat per linear metre. In the upgrade of existing access tracks will accommodate 0.5m3 of peat per linear metre.

11.1.48 This is in line with Good Practice in Design, Construction and use of Floating Roads on Peat, (2010). ES Figure 5.4 provides an indication as to the dimensions and form of the landscaped verges for floating access tracks.

11.1.49 The final construction thickness of the floating track construction will be a function of the local ground conditions, including geotechnical properties of the peat, hydrology and design load requirements. An indicative range of 0.5 – 0.8m has been indicated as a typical thickness for upland wind farm floated access tracks, (FCE & SNH, 2010). The depth of peat on the landscaped verge would therefore be a function of the total depth of floating track. It would be a priority for the landscaped verge only to re-instate the track edge and any disturbed peat along the corridor of the access track. No undisturbed peat shall be smothered by the landscaping. Landscaped verges should be lowered by 0.2m below the running surface of the access track is to ensure any surface water can drain naturally, and diffusely where it arises. This shall aid in maintaining hydrology within the peat and prevent it oxidising and drying out. This approach is taken to provide visual continuity between the raised infrastructure and surrounding peat land while maintaining important hydrological and drainage conditions.

Borrow Pit Restoration Assumptions

11.1.50 When considering the borrow pit excavations the principles of the relevant guidance of the re-use of excavated peat and the minimisation of waste has been consulted (Scottish Renewables, SNH, SEPA, Forestry Commission Scotland, 2012). Across the borrow pit areas, unconsolidated peat may be used at depths of up to 2m as part of the borrow pits' reinstatement works. The geometry of the borrow pit shall be such that retention of shallow groundwater once restored will prevent the peat drying out. Surface vegetation and acrotelmic peat layers shall be used to finish the restored surface of the borrow pits.

11.1.51 Due to the likely steep sided nature of the borrow pits it has been assumed that initial backfilling would be with superficial overburden deposits. This would raise the base of the borrow pits to an adequate level and geometry onto which peat can be placed to achieve the final restoration profile. As a result, the complete working area of the borrow pits would not be covered with re-used peat of a consistent depth.

11.1.52 The peat volume calculations have therefore conservatively allowed for the placement of up to 2m of peat over 75% of the borrow pit working areas. Potential Borrow Pits BPC and BPE have been selected only for this purpose as these are deemed to be within the peat land terrain units.

11.1.53 The formulation of a detailed construction method statement undertaken pre-construction shall incorporate construction design and sequencing for the proposed restoration of borrow pit areas. These plans shall draw on detailed site investigation information gathered as part of the pre-construction phase of works. The design of borrow pit floor levels and restoration profiles shall be depending on the depth of superficial deposits and the quality of rock recorded across the proposed borrow pit locations. The natural sequence of glacial deposits and peat shall be maintained throughout restoration.

11.1.54 Surface vegetation and acrotelmic peat layers shall be used to finish the restored surface of the borrow pits. Natural regeneration of this vegetation is the preferred option. However, reseeding may be required and is described in Section 1.5. below.

Restoring Peat Structure

11.1.55 During the excavation and re-use of peat deposits the two-layered structure of the 'acrotelm' and underlying 'catotelm' shall be preserved as far as is practicable. This approach will aid in the successful re-vegetation and prevent drying and desiccation of the peat. Appendix 11.1 provides a comprehensive account of the peat material classification based on core samples taken across proposed turbine locations.

Restoration Volume Estimate

Table 7: Estimate of Peat Re-Use Volumes

Construction Element	Peat Extraction Volume (m^3)	Peat Re-use Volume & Class (m^3)	Surplus (+) or Spare Capacity (-) (m^3)
Turbine Foundations & Hardstand	23,048	17,615 (Acrotelm)	+5,433
New Access Track	33,012	9,257 (Acrotelm)	+23,755
Upgrade of Existing Tracks	10,684	3,902 (Acrotelm)	+6,782
Potential Borrow Pit Locations (BPC, BPE)	7,140	59,250 (Catotelm / Acrotelm)	-37,298
Ancillary Infrastructure	10,143	9,450 (Acrotelm)	+693
Reinstatement of Access Tracks	0	2,563 (Acrotelm)	-2563
Reinstatement of Existing Hardstand Areas	0	7,360 (Acrotelm)	-7360
TOTAL (Note:*Including 25% Bulking Factor)	**105,034m^3***	**109,397**	**4,363 (Spare Capacity for Re-Use)**

11.1.56 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. The estimate is that there is approximately 109,400m3 of capacity for excavated peat to be accommodated in the construction of the wind farm and utilised in the finishing and landscaping across all infrastructure elements. This figure is based on re-use of peat in circumstances where there is an identified and suitable use.

11.1.57 The assessment clearly indicates that the total excavated acrotelmic peat (66,200m3) will be sufficient for the complete reinstatement at proposed and existing infrastructure locations. The excavated catotelmic peat (38,900m3) where suitable will be accommodated within borrow pit restoration areas. It is highlighted that catotelmic peat where correctly and sensitively handled can retain sufficient internal strength to be suitable for a wide variety of reinstatement applications. There is predicted to be sufficient remaining acrotelmic peat (~16,000m3) for surficial restoration of the borrow pit restoration areas. Therefore, it can be shown that the total volume of excavated peat is predicted to be balanced across all restoration areas with spare capacity as reflected in Table 7 above. It is reiterated that the assessment is a preliminary estimate based on the presented assumptions. The level of spare capacity for re-use of peat is considered to be within an acceptable range and can be further refined with detailed ground investigation and construction management planning.

11.1.58 Comparing the total volume of re-usable peat with total volumes of excavated peat, allowing a bulking factor of 25% there is indicated to be no excess or waste peat predicted with all areas of required restoration suitably accommodated. Where factors which contribute to the bulking of the peat deposit are mitigated the total volume of excavated peat may be reduced further through:

- Reduction of peat handling with re-use of peat undertaken as close as possible to the excavation site;
- Maintaining the integrity of the excavated peat mass including preservation of the surface acrotelm layer as far as is practicable; and
- Prevent the drying and desiccation of excavated peat deposits through timely re-vegetation and preservation of the surface hydrology systems.

11.1.59 It is highlighted that this forecast strongly relies upon borrow pit and existing infrastructure restoration as a means of re-using excavated peat.

Temporary Peat Storage

11.1.60 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, (2012).

11.1.61 The temporary storage of excavated peat shall seek to minimise disturbance of deposits by minimising haul distance between temporary peat storage sites and re-use areas. In general, it shall be a priority to avoid a single site dedicated temporary peat storage area. A progressive construction method which re-cycles peat through excavation and timely re-instatement in a continuous process shall be adopted for the construction of access tracks, hardstand areas and foundation elements. However temporary infrastructure elements shall require storage of peat prior to re-instatement at the end of the construction phase.

11.1.62 For the temporary construction compounds, and, borrow pit areas it is proposed that stripped peat and superficial deposits are temporarily stored in stockpiles / bunds adjacent and surrounding each infrastructure site. The exact areas identified for temporary storage shall only be defined following a detailed site investigation.

11.1.63 Surrounding these areas, the peat stability, drainage and pollution prevention mitigations shall be appraised as part of the detailed construction method statement. In general areas of deep peat (>1.5m) shall be avoided for dedicated temporary storage areas. It would 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.

11.1.64 In temporary storage areas; peat shall be stored on geo-textile matting which acts as a protective barrier to the underlying soils and vegetation. The geo-textile shall be designed to prevent ingress of groundwater and erosion and de-stabilisation of the base of the stored peat. Peat shall be stored to a maximum depth of 1m with the peat turfs stored separately from underlying peat. The peat turfs or vegetation layer shall be stored in a single layer.

11.1.65 A system of watering the stored peat and turfs / vegetation shall be in place to ensure that the peat remains damp and prevents drying out and desiccation. The vegetation layer and seed bank shall therefore be sustained. This is an important element in the restoration of infrastructure, 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. This may need to be undertaken by a suitably qualified geotechnical engineer.

Limitations of Assessment

11.1.66 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 development layout and peat depth data averaged across discrete areas of the 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. Where total volumes have been stated these have been rounded to the nearest 100m3 in order not to convey a false accuracy.

11.1.67 The accuracy of these predictions may be improved though detailed site investigation (post consent). It is therefore important that the Peat Management Plan remains a live document throughout pre-construction and construction phases and is encapsulated within the wider

Environmental Management Plan. The peat management plan and volumetric assessments can be updated as more accurate information becomes available.

11.1.68 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, Scottish Natural Heritage, Scottish Environmental Protection Agency, Forestry Commission Scotland, 2012);
- Floating Roads on Peat (Forestry Civil Engineering & Scottish Natural Heritage, 2010); and
- Good practice during wind farm construction (A joint publication by Scottish Renewables, Scottish Natural Heritage, Scottish Environmental Protection Agency, Forestry Commission Scotland, Version 3, 2015).

11.1.69 Figure 11.6 illustrates the peat depth across the site, thus giving an indicative assessment of the peat depths at various infrastructure locations. As will be discussed in the following sections, the excavated peat and peaty soils across the site can be used in a variety of scenarios including dressing side slopes on the roads; backfill over turbine bases; and infill of artificial drainage. These further details on the best practice measures to re-use the excavated peat and peaty soils at the development are discussed in the following section.

1.4 Reinstatement Methodologies

11.1.70 Prior to commencing the construction excavation works, consideration will be given to methods for handling and holding the excavated materials, particularly peat or peaty soils. Haulage distances for the excavated material will be kept to a minimum, in order to reduce the potential impact on the peat/soil structure. Peat has the potential to lose structural integrity upon excavation particularly when double handled or moved around the site. Peat handling can also increase the bulking factor of the material which has the overall effect of increasing the volume of peat which will need to be re-used across the site (Table 6.) The following paragraphs discuss the reinstatement measures that can be adopted for the main infrastructure components associated with the development.

Access Tracks

11.1.71 During track excavation works, where possible the vegetated top layer of material, which holds the seedbank, will be stripped and carefully set to the side of the worked area for re-use in the re-profiling and track verge reinstatement works (Photograph 1). The vegetative layer will be stripped as whole turves and will be set aside vegetation side up.

Photo 1: Effective turf management

11.1.72 If cut and fill tracks are required in areas of peat or remnant peat habitat, then reinstatement will involve laying subsoil peat on the cut batters and then placing peat turves and clods on top of this. Reinstatement will be completed as soon as possible following construction to minimise the risk of turf drying. Restoration will be carried out as track construction progresses (Photo 2).

Photo 2: Example of floating track verge reinstatement whilst access track construction continues

11.1.73 In order to obtain the best results, the previously stripped soils, vegetated layers or turves will be brought back over the verges of constructed tracks within as short a time period as reasonably possible, to give the seed bank and vegetation the best chance of an early regeneration (Photograph 3). Where possible, turves and topsoil will be matched to the adjacent habitat.

Photo 3: Example of good track reinstatement with heather turves re-established

11.1.74 Where practical, if storage is required, the layers will be correctly stored in their respective soil/peat horizons, i.e. in the layers that they were stripped in, so when reinstated they can be put back in the correct order. This also provides the seedbank and vegetation the best chance of early regeneration. If temporary storage of excavated materials is required, then such material will be stored safely, and the method of storage will not lead to any areas of additional disturbance. If materials are to be stored for any length of time, then these designated areas will be agreed prior to the storage of any material. Consideration will also be given to periodically wetting the vegetation layers to prevent drying out. If this method is implemented, any runoff will be dealt with appropriately and will not be allowed to discharge into any adjacent watercourses unless treated.

11.1.75 Materials used for the construction process will not be used on the track edges unless it is being used for re-profiling purposes, to tie in with the adjacent topography. Peat and peaty soils will only be used to re-profile or finish off the edges of the track or where construction has damaged the surface layer. To re-establish vegetation in these areas as quickly as possible peat or peaty soil turves will be utilised wherever practical.

11.1.76 The soil and peat material that is utilised for the track edge reinstatement will not be spread too thinly. If the material is spread too thinly then there is a tendency for it to dry out and crack, particularly during prolonged dry periods. This subsequently means that the soil/peat material will be unstable because the root system has not had an opportunity to establish. This is very much dependent upon the time of year that the work is taking place and also the altitude. These factors affect the growing performance of the vegetated turf. Early reinstatement will be undertaken as this provides for the most beneficial results.

11.1.77 Care will also be taken to ensure that excessive material is not used during the re-profiling and reinstatement of the track verges. In addition, excess peat will also not be used for reinstatement of track edges as it can lead to the additional loss of habitat, by smothering the existing adjacent vegetation and preventing re-growth of the vegetation next to the tracks. The addition of excessive materials, may cause instability at the track edges and increase the risk of the creation of sediment laden runoff and lead to potential carbon losses.

11.1.78 The fundamental aspects of track reinstatement are summarised as follows:

- Consider haulage methods and specified storage locations in relation to areas being worked. Haulage distances to storage locations will be minimal;
- Vegetated turves and topsoil will be stripped with care and stored correctly i.e. separated in horizons and vegetation stored vegetation side up;
- For track reinstatement peat/peaty soil will be placed back in the correct horizon order and topsoil containing the seed bank will be on the top. If vegetated turves have been previously stripped, then these will be placed on top to maximise vegetation growth potential;
- Reinstatement of verges will be completed as soon as possible to minimise turf drying i.e. reinstatement can take place whilst track construction continues; and
- Peat/peaty soil will not be spread too thinly during verge reinstatement in order to prevent cracking/drying out and excessive amounts of peat will also not be used as this can lead to unstable surfaces, effect drainage, loss of habitat via smothering of adjacent vegetation and create sediment laden runoff.

Cable Trenches

11.1.79 The reinstatement and storage of any excavated materials for the cable trenches will involve replacement of previously stripped soils, vegetated layers or turves. Timing of trench reinstatement works will also take into account adjacent construction activities which may disturb any reinstatement works already carried out.

11.1.80 The amount of time between the excavation of the trench and subsequent reinstatement following cable laying will be minimised as much as practically possible. The reason for this is that the longer the stripped turves are stored for the more they will degrade and become unsuitable for successful reinstatement. The optimum scenario for the cable trench works will be to ensure that no cable trenches are excavated until the electrical contractor has their cables ready for installation on site. Reinstatement will take place as soon as possible, trenches which are left open for a long period of time will have a tendency, to act as conduits for surface water runoff, thus potentially leading to increased sediment loading due to erosion. This could potentially affect the sites watercourses and lead to the occurrence of a pollution event.

11.1.81 The type of vegetation used for reinstatement will not differ from the adjacent area. The fundamental aspects of cable trench reinstatement are summarised as follows:

- Cable trenches will be constructed to the relevant detailed design specifications;
- The majority of cable trenches will be constructed adjacent to access tracks, i.e. reducing construction impacts on virgin ground;
- Scheduling of cable trenches will be considered in conjunction with access track construction, i.e. track verges will not be reinstated and then disturbed again for cable trench works;
- Stripping, storage and reinstatement of excavated materials will be as per the information presented in Section 4; and
- Time between trench excavations and reinstatement will be as short as possible to reduce the potential for stored turf layers to dry out and decompose. In addition, if excavations are left open for any length of time they tend to act as conduits for surface water runoff.

Wind Turbine Foundations

11.1.82 Where practical the peat turves and topsoil will be stored around the perimeter of the foundation excavation, as shown in Photo 4. A plan showing where the material is to be stored will be created prior to the works commencing. In areas where storage of the peat turves or excavated material adjacent to the works is not possible, then the material will be taken to the nearest agreed storage areas as soon as possible.

Photo 4: Excavated material stockpiled around the perimeter of the foundation excavation

11.1.83 The turbine foundations will be backfilled with the excavated material. Not all excavated material will be suitable for backfilling or reinstatement. The material unsuitable for backfilling and reinstatement will be taken to its final agreed location as soon as possible in order to reduce the risk of a pollution event or contamination of adjacent land or stockpiles. The previously stripped and stored soils, and vegetated layers or turves will then be spread over the disturbed area, caused by turbine foundation construction. Where turbine bases are constructed in peat, reinstatement will involve laying subsoil peat on the backfilled area and then placing the vegetated peat turves on top. Reinstatement will be carried out as soon as practically possible following completion of foundation construction to minimise the risk of turves/vegetated layers drying out.

The fundamental aspects of turbine foundation reinstatement are summarised as follows:

- Construction works will be carried out to the detailed specification of the turbine foundation design however excavations will be kept to a minimum to reduce the amount of peat excavated;
- Stripping, storage and reinstatement of excavated materials will be as per the information provided in Section 4;
- A detailed plan of where excavated material will be stored will be created;
- Subsoil/peat will be spread over the backfilled area during reinstatement. Peat turves will then be placed on top to encourage natural re-growth of the vegetation; and
- Time between turbine foundation excavation and reinstatement will be as short as possible in order to reduce the potential for stored turf layers to dry out and decompose.

Crane Hard Standing

11.1.84 As detailed within the “Good practice during wind farm construction” document (2013), reinstatement of the crane pads will not occur:

- Re-use of crane pads following construction is higher than previously estimated;

- In the past crane pads have been reinstated using a layer of peat following construction. On many sites this layer has been stripped back within 2-3 years of operation to allow maintenance works to take place; and
- When the peat is stripped back, it mixes with the stone from the hard standing, thus contaminating the peat/peaty soil layer and making it unsuitable for re-use for reinstatement.

11.1.85 Due to the requirement for hard standings to remain in place, and use of crane pad areas during maintenance activities, levels of vegetation re-growth are liable to be low if crane hard standings are covered.

11.1.86 The area around the crane pad and any exposed batters will be reinstated with previously stripped soils, vegetated layers and turves, using the same methods to those described for track reinstatement in section 4 of this document. The fundamental aspects of crane hard standing reinstatement are summarised as follows:

- Crane pads will not be reinstated – in line with best practice; and
- Stripping, storage and reinstatement of excavated materials will be as per the information presented in Section 4, this will however, only be in relation to the area around the crane pad and any exposed batters.

Ancillary Infrastructure

11.1.87 All temporary construction areas will be removed and reinstated as quickly as possible following construction. Following removal of temporary site accommodation, storage, equipment and materials, all areas will then be reinstated. The hard-standing surface will be lifted prior to re-soiling to aid with drainage and re-generation. Installation of a geo-grid base/geotextile during construction of the compound would help to facilitate removal of the hard standing if this is required.

11.1.88 The reinstatement will involve re-profiling/landscaping to ensure that the reinstated area blends in with the surrounding area. Suitable materials i.e. topsoil, and peat will then be replaced over the area in appropriate horizons i.e. in the correct order (Photo 9). The material used for the reinstatement works (often that which was excavated for the temporary construction area), will be stored and managed adjacent to the temporary construction areas but away from watercourses and other sensitive receptors.

11.1.89 It is highly probable that the temporary construction areas, such as the site compound will only be required for the duration of the construction period. Therefore, it is unlikely that any stripped turves would be suitable for reinstatement, as the vegetation would have decomposed if stored for any length of time. Vegetation will therefore be allowed to regenerate naturally. Natural regeneration could take several years and is dependent upon the type of adjacent vegetation and the altitude of the location. Re-seeding will be considered if required (Section 1.5 below). In addition, temporary fencing of the areas to prevent grazing by deer will also be considered in order to help accelerate the re-vegetation process. The fundamental aspects of temporary construction reinstatement are summarised as follows:

- Areas will be re-profiled/landscaped to ensure they blend in with the surrounding area;
- Topsoil/peat will then be spread over the area in its appropriate horizons;
- Material used for the reinstatement will be stored appropriately where practical adjacent to the temporary construction area; and
- Stripped turves may dry out due to the length of time they are stored (compound required for duration of construction period) therefore will not be suitable for reinstatement.

Photo 5: Example of temporary compound reinstatement

1.5 Reseeding and Monitoring

11.1.90 Natural regeneration of vegetation is the preferred option for reinstatement and restoration.

11.1.91 During the construction works, in areas where the spreading of seed rich materials or natural re-growth are considered impractical, ineffective, or where re-establishment of vegetation is observed to be failing, consideration will be given to re-seeding methods.

11.1.92 Where additional re-seeding is deemed necessary by the ECoW, a suitable seed mix will be agreed with SNH and the local planning authority.

11.1.93 Restoration and any seeding progress will be monitored by the ECoW throughout the works and in the first growing season post-construction. If deemed necessary by the ECoW, further re-seeding may take place post-construction (within 2 years of end of construction works).

11.1.94 The success of construction and the subsequent re-use of peat across the site will be monitored to ensure that effects on the peat land environment are appropriately understood and subsequently reduced via any remedial works that may be required (although not expected).

11.1.95 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 water quality monitoring strategy will also be implemented.

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Web Resources

http://www.bgs.ac.uk/

http://www.sepa.org.uk