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Appendix 8.3

Peat Management Plan

Contents

A glossary and list of abbreviations is presented in Chapter 8: Geology, Hydrology and Hydrogeology of the EIAR.

8.1. INTRODUCTION

This Peat Management Plan (PMP) provides information and guidance on the environmentally compliant re-use and management of excavated peat across Daer Wind Farm (the Proposed Development) and should be read in conjunction with Chapter 8 of the Environmental Impact Assessment Report (EIAR).

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

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

Regulatory Requirements

This document addresses the following requirements in line with the Scottish Environment Protection Agency (SEPA) 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 possible.

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

- Developments on Peatland: Guidance on the assessment of peat volumes, re-use of excavated peat and the minimisation of waste (A joint publication by Scottish Renewables, Scottish Natural Heritage (SNH), SEPA, Forestry Commission Scotland, 2012);
- Guidance on Developments on Peatland – Peatland Survey 2017. Scottish Government, SNH, SEPA;
- Floating Roads on Peat (Forestry Civil Engineering & SNH, 2010); and
- Good Practice During Wind Farm Construction (A joint publication by Scottish Renewables, SNH, SEPA, Forestry Commission Scotland, 2019), Version 4; and
- Scottish Government, SNH, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland, on-line version only.

Limitations

The information presented in this report is based on the results of peat surveys carried out by Natural Power between 2019 and 2020. It is highlighted that whilst attempts have been made to collect peat depth and condition information, further investigations can be carried out as part of detailed site investigation (post consent). This process can provide further information across all infrastructure locations, which should be used to further refine the peat excavation and reuse volumes provided in this report.

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

8.2. SITE CONTEXT

The following section presents a summary of the high level hydrological and topographical information at the Proposed Development. Full details are provided within Section 8 of the Environmental Impact Assessment Report (EIAR), which this Technical Appendix supports. The Proposed Development is located in both Dumfries & Galloway and South Lanarkshire local authority areas, in the southern uplands of Scotland and will be located in an area of open moorland and commercial forestry.

Hydrology

Hydrologically, the Proposed Development spans two main hydrological networks; the Daer catchment (River Clyde) and upper Annan catchment. Figure 8.1 of the EIAR shows a hydrological overview of the Proposed Development. The morphology of the streams is typical of an upland moorland catchment, with medium-small channels with variable flow gradients that are often incised into the superficial geology. Riparian zones are typically water saturated grassland with banks ranging in stability.

The standard average annual rainfall (SAAR) for the Proposed Development has been derived from the FEH Web Service as ranging from 1,679 - 1,900 mm based on the Proposed Development catchments (CEH, 2020). To put this into context, rainfall in Scotland varies from under 800 mm per year on mainland eastern Scotland in areas such as Fife, to over 3000 mm on the mainland Western Highlands.

Walkover surveys to determine hydrology and ecology were undertaken in October to November 2019 and June to September 2020. Whilst extensive waterlogged areas are evident across the Proposed Development area, well defined springs at outcrop were noted to be generally absent.

Soils and Peat

The surface cover soil types present in the Proposed Development area are illustrated in Figure 8.4 Carbon Soils and Figure 8.5 Predominant Soils of the EIAR. As demonstrated within the figures, soils are generally peaty gleys, peaty podzols, peat, brown soils and mineral gleys. The soils are also classified under the NatureScot (2016) Carbon and Peatlands Assessment as predominantly Class 3 (vegetation cover does not indicate priority peatland habitat) and Class 5 (vegetation cover does not indicate peatland habitat) with small occurrences of Class 1 (soils which are considered to be of national importance).

The superficial geology is presented in Figure 8.3 Superficial Geology of the EIAR and shows assemblages of Quaternary tills, alluvium and organic peat accumulations. The glacial till deposits are also likely to underlay much of the peat deposits and typically comprise of a heterogenous mixture of clay, sand, gravel, boulders and maybe massive, with varying levels of consolidation. The overlying peat is generally shallow, being approximately ≤0.5 m for the majority of the Daer Land Portion, apart from along ridge crests and subdued topographic spurs such as north of Lamb Hill and Whiteside Hill. Some of the deeper valley bottom sections contain the deepest areas of peat such as in the basin west of the Black Burn. Coring undertaken as part of site investigation works at proposed turbine locations identified peat to be predominantly soft dark brown pseudo-fibrous wet peat becoming pseudo-fibrous to amorphous wet peat with further details are provided in Section 8.3.

Hydrogeology

According to the BGS Hydrogeological Maps of Scotland (BGS, 2020) the underlying Lower Palaeozoic Gala Group are recognised as a low productivity aquifer with little potential for groundwater storage and transport other than in cracks and joints associated with tectonic features or surface weathering. Low productivity aquifers do not widely contain groundwater in exploitable quantities; however, some bedrock formations can locally yield water supplies in sufficient quantities for private/domestic use. BGS permeability indices for the bedrock assemblages indicates that fracture flow is the predominant transmission mechanism, with minimum permeability being low to a maximum of low/moderate. The bedrock groundwater underlying the Proposed Development area is mapped part of two bedrock aquifer units under the SEPA River Basin Management Plan (RBMP). The East Dumfriesshire Groundwater is classified as have "good" overall status and the Leadhills Groundwater is classified as having "poor" overall status. In the case of the latter, the status is as a result of legacy mining and concomitant pollution of the aquifer.

Overlying the bedrock are quaternary sediments and organic peat accumulations which owing to the low permeability of the underlying bedrock, may host a shallow superficial aquifer. Alluvial or glacio-fluvial deposits with a high content of sand and gravel deposited by glacial meltwater rivers or post-glacial riverine processes will have the highest permeability but are mainly constrained to riparian zones. Conversely, where these sediments are interbedded with finer grained, lower permeability deposits such as silts and clays, water transmission will be more limited leading to highly heterogenous flow conditions. These glacial till type deposits are mapped intermittently across the proposed development area and are also likely to underly the peat. BGS permeability indices for the glacial till indicates that the predominant transmission mechanism will be a mixture of fracture/intergranular flow, with minimum permeability being low to a maximum of high/moderate. Minimum and maximum permeability indices for peat are very low and low respectively.

8.3. PEAT SURVEY RESULTS

Surveys have been carried out to investigate peat depth and extent across the Proposed Development. Peat depth information has been collated to support the volumetric calculations provided in this document and has subsequently been used to consider and minimise any potential impact on the peatland environment through the preparation of this document.

Investigations were undertaken to ensure a high resolution and focussed assessment maximises the understanding of the impacts of the project on the local peatland environment by improving the efficacy of the volumetric calculations provided in this document. The completion of a focussed assessment also provides the opportunity to microsite infrastructure away from areas of deeper peat.

Peat deposits can exist in one of three forms:

- Fibrous – non-plastic with a firm structure and is only slightly altered by decomposition;
- Pseudo-fibrous – peat in this form still has a fibrous appearance but is much softer and more plastic than fibrous peat. The change is due to more prolonged sub-mergence in airless water rather than to decomposition; and
- Amorphous – decomposition has destroyed the original fibrous vegetation structure such that it has virtually become organic clay.

Peat deposits can also be characterised into two layers:

- The 'acrotelm' is the upper layer and has a relatively high hydraulic conductivity and therefore has variable water content. This layer comprises of a thin surface layer of active vegetation; and
- The 'catotelm' is the lower layer, permanently below the water table, which has a small hydraulic conductivity and is often at a higher state of humification and lower tensile capacity.

In total, 3905 locations were surveyed for peat depth across the Proposed Development. The surveys consisted of completing phase 1 peat depth investigations across a 100 m gird of the Proposed Development Area to inform the design of infrastructure. Follow up surveys took place during August and September 2020 and involved the collection of peat cores and detailed phase 2 peat depth surveys at key infrastructure locations, as well as the collection of geotechnical information at turbines and other key infrastructure locations.

Table 8.3.1 provides a summary of the peat depths recorded during the peat surveys and an interpolated peat depth map (Figure 8.6 of the EIAR) shows the distribution of peat depths in relation to infrastructure elements.

Table 8.3.1: Peat Depth Summary

Peat Depth Range (m)	Results	% of points
<0.5	2224	57
≥0.5 - <1.0	1012	26
≥1.0 - <1.5	389	10
≥1.5 - <2.0	162	4
≥2.0	118	3
Total	**3905**	**100**

Source: Natural Power

Table 8.3.1 shows that the highest proportion (57 %) of recorded peat depths fell within the <0.5 m range, with the next highest proportion (26 %) within the ≥0.5 – <1.0 m range. The areas of deep peat (greater than 0.5 m) are largely located in the upper plateau areas across the Proposed Development, particularly across the east of the Proposed Development Area.

Peat depth measurements of less than 0.5 m have been categorised as peaty soils, with deep peat deposits being >0.5 m in depth. Therefore, where depths are less than 0.5 m, these will be excluded from final peat excavation calculations.

Cores were collected and analysed at 17 proposed turbine locations that were identified to be within deeper areas of peat from the initial 100 m grid peat survey. Cores were logged in accordance with the Von Post Scale of Humification and the results are presented in Table 8.3.2.

The results in Table 8.3.2 demonstrate that the peat deposits at the Proposed Development are generally characterised as soft, dark brown, pseudofibrous (occasionally amorphous), plastic, slightly spongy peat with Von Post classification codes ranging from H2 to H6.

Table 8.3.2: Von Post Classifications of peat cores across the Proposed Development

WTG ID	Peat Depth* (m)	Von Post degree of decomp.	Description
T1	0.2	-	No sample
T2	0.1	-	Brown organic soil
T3	0.6	H4	Soft dark brown pseudo-fibrous wet peat becoming pseudo-fibrous to amorphous wet peat
T4	0.4	H5	Rooty in upper 10cm amorphous lower 10cm lower organic content in lower 10cm
T5	0.3	-	No sample
T6	0.3	-	No sample
T7	0.4	-	No sample
T8	0.5	H2-H5	Soft dark brown pseudo-fibrous wet peat becoming pseudo-fibrous to amorphous peat. Lower moisture content towards base.

WTG ID	Peat Depth* (m)	Von Post degree of decomp.	Description
T9	1.1	H5	Light coloured slightly decomposed peat co taking lots of rooty plant material in upper 50 cm. Below, softer dark more humified peat with higher moisture content becoming less humified lighter peat with less moisture content
T10	0.6	H3-H5	Undecomposed peat, lots of plant material, low moisture content
T11	2.0	H5	Soft dark brown pseudo-fibrous wet peat becoming pseudo-fibrous to amorphous wet peat
T12	0.4	-	No sample
T13	0.4	H5	Rooty in upper 10cm amorphous lower 10cm lower organic content in lower 10cm
T14	0.2	-	No sample
T15	0.5	H5	Humified peat but still rooty material present. low moisture content
T16	0.3	-	No sample
T17	0.8	H4-H6	Soft dark brown fibrous becoming pseudo-fibrous wet peat at 0.4 m after which was amorphous wet peat

**Peat depth presented in Table 8.3.2 is determined from the core thickness. Depths presented here may differ from those used for calculations in later sections which use an average peat depth determined from Phase 2 surveying in the immediate vicinity of the turbine.*

Source: Natural Power

8.4. PEAT EXCAVATION & RE-USE

In order to quantify the volume of peat that may be excavated and re-used across the Proposed Development, the infrastructure layout has been analysed using a comprehensive peat depth dataset. The proposed 17 wind turbine layout has been appraised to obtain an estimate of the size and extent of the infrastructure footprint. The peat depth dataset comprises a total of 3905 individual peat probe points.

The volumetric analysis of excavated peat volumes incorporates the mean peat depths of existing survey data. Peat depth measurements of less than 0.5 m have been categorised as peaty soils, with deep peat deposits being >0.5 m in depth. Therefore, where depths are less than 0.5 m, these will be excluded from final peat excavation calculations.

The estimation of peat extraction and re-use volumes relies on a series of design assumptions that may vary on a small scale according to discrete changes in ground conditions. Volumetric calculations should be re-evaluated if more detailed intrusive site investigation data becomes available. Design assumptions with regard to the likely access track construction methods have also been taken.

The estimation of peat extraction and re-use volumes relies on a series of design assumptions that may vary on a small scale according to discrete changes in ground conditions. Volumetric calculations should be re-evaluated if more detailed intrusive site investigation data becomes available. Design assumptions with regards to the likely access track construction methods have also been taken. The design of the detailed site layout should be confirmed with a comprehensive site investigation.

There are elements of proposed infrastructure which are to be located on areas of potentially Class 1 peatland. NatureScot defines Class 1 peatland as “all vegetation cover indicates priority peatland habitat; all soils are carbon-rich soils and deep peat”. Micrositing of infrastructure will therefore take into account vegetation cover, peat depth, hydrology, and peat quality. Areas most strongly displaying evidence of Class 1 peatland will be avoided as far as reasonably possible during micrositing, considering all other constraints. Any micrositing will be carried out in conjunction with an Environmental Clerk of Works (ECoW).

Peat Handling Prior to Construction

The principles of appropriate handling of acrotelmic and catotelmic peat so that is suitable for reuse are presented in the points below. Fundamentally the intention is to minimise excavation volumes:

- Through the utilisation of all the data collected to date and ongoing throughout the construction process, the Principal Contractor will implement methods to minimise the volumes of excavated peat. Appropriate handling and storage of excavated materials will be undertaken such that their integrity and subsequent reuse is maintained;
- An Environmental Clerk of Works (ECoW) will be employed and prior to works commencing in each area, a walkover with engineers will be carried out to identify any areas of sensitive habitat or deep peat.
- The Principal Contractor will be required to ensure that excavated peat is reused on site in landscaping and re-profiling works, to minimise visual impacts and facilitate habitat and ecological restoration, improvement and enhancement; and
- The results of the ground investigation, including groundwater level information, should be assessed with respect to refining the peat stability assessment at infrastructure at highest risk. All pertinent control measures and mitigation measures should be revised, and their implementation supervised following the results of the ground investigation and construction design phase of works. Current stability mitigation measures are set out in Section 8.5 of this PMP.
- A programme of geotechnical inspections will be implemented during excavation works.

Excavation

Prior to any excavation, the Principal Contractor will produce a detailed method statement identifying where and how excavated peat will be used in reinstatement or landscaping works. Specific requirements for the excavation, handling, storage and reinstatement of peat will be outlined in the above method statement. The method statements will consider peat layering and the potential impacts on downstream hydrological receptors and also the potential for instability issues with the excavated material.

The principal requirements are outlined below;

- All excavations where required should be monitored and measures taken to prevent collapse and the destabilising of peat deposits adjacent to excavations;
- A system of daily reporting of excavations will be established during construction and utilised to monitor the geotechnical performance of slopes including peat, sub-soil and bedrock. This would be implemented and undertaken by a suitable, experienced and trained member of the site team;
- A system of daily reporting of excavations should be established during construction and utilised to monitor the geotechnical performance of slopes including peat, sub-soil and bedrock. This should be implemented and undertaken by a suitable, experienced and trained member of the site team;
- Where possible, areas of peat within the footprint of excavation will have the top layer of vegetation stripped off as turf prior to construction. When excavating areas of peat, excavated turves should remain as intact as possible. Peat turves will be stored to promote the retention of structure prior to use in reinstatement;

- Underlying catotelmic peat will then be removed and stored separately and kept damp;
- Excavated peat turves and catotelmic peat will be handled through careful excavation to reduce the risk for cross contamination between distinct horizons and to maximise the potential for reuse;
- Care will be taken when stripping and removing topsoil and peat turves and appropriate storage methods will be used on site, i.e. excavated material will be stored in separate horizons and turves will be placed on top of excavated peat to minimise desiccation and oxidation. They would be placed in a manner to maximise coverage in a "checkerboard" pattern; and
- Classification of excavated materials will depend on their identified re-use in reinstatement works. At this site it is anticipated that the material to be excavated will comprise peat (which may be sub-divided into amorphous peat (catotelmic), fibrous peat (acrotelmic)) and turf.

Design Assumptions

Detailed designs relating to proposed infrastructure (turbine foundations, access tracks, hardstands) are not considered within this Section. These details remain to be confirmed at the detailed design stage. It is highlighted that whilst access tracks are currently exclusively of excavated and replace ('cut') design, opportunities to float infrastructure will be explored following the completion detailed design.

Access Tracks – Excavation & Replacement

Excavate and replace ('cut') type construction of tracks, passing places and turning areas are proposed owing to the generally shallow nature of the peat and peat soils present within the Proposed Development Area. Opportunities to float access tracks across infrequent areas of deeper peat will be identified and incorporated into the design following detailed site investigation, post-consent.

The cut and fill construction method require the removal of soil deposits down to a suitable sub-grade layer within the superficial or bedrock geology. Excavated material is then reinstated carefully along access track landscaped verges on either side of the track or utilised in appropriate landscaping across the development infrastructure.

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 NatureScot (2017);

- 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;
- As part of this process, the most sensitive sections of the access track route shall be defined. This will include water crossings, flush zones, slopes 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;
- Where possible, the construction of the cut tracks shall avoid periods of wet weather (when soils and 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;
- The cut access track construction shall typically proceed in an uphill direction, thus allowing drainage to be managed with a greater degree of control. The access track side and cut-off ditches shall generally be 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 waterlogging and erosion;
- A progressive construction method shall typically be adopted whereby the cut track is excavated to a suitable formation and upfilled 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; and
- 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. Excavation, handling, storage and reinstatement of peat will follow the principles outlined in Sections detailed in this PMP.

Access Tracks – Dimensions

There is approximately 18.6 km of new access track required to link infrastructure within the Daer Land Portion of the Proposed Development Area. Proposed cut access tracks have been assumed to accommodate a 5 m running width, with drainage making up an additional 2 m, giving a total construction width of 7 m.

In addition to the on-site tracks, the proposed primary access route is ~19 km in length and utilises a predominantly existing track network from Beattock to the upper Annan catchment area. One short section of 400 m of new cut track will be required to link the Daer Land Portion to this access route. As only very limited works are expected on the proposed primary access, any peat generation as a result of minor drainage or cabling works can be used as part of reinstatement close to the point of origin and therefore only the 400 m section of new access track has been included within the calculations.

Turning areas and passing places have been omitted from excavation calculations 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.

Electrical cabling is typically laid in trenches adjacent to the access track network, which requires excavation, laying and backfilling. Peat generated from cable trenching is normally replaced at its point of origin and is therefore not considered as an excavation loss.

Turbine Foundations

During turbine construction, peat is generated by excavation to the substrate to accommodate the concrete foundation and for a working area surrounding the foundation footprint. The surface working area of the wind turbine foundation excavation has been assumed to be 25 x 25 m square excavation into which a reinforced concrete gravity base will be constructed. The excavation areas will therefore be 625 m^2 with a total working area of 841 m^2.

It should be noted that although excavation areas for crane pad areas and foundations will likely overlap, to provide a conservative assessment, peat volumes are calculated for both areas separately.

Excavation and handling methodologies as discussed above in the peat handling prior to construction and excavation sections will be employed particularly at turbines with deeper peat, namely at Turbine 11.

Crane Pads & Hardstands

The hardstand will be 20 m in width and 50 m in length equating to a permanent land take of 1000 m^2 and is the value which is used for excavation volume calculation. Additional excavation will be required for laydown areas, which are not included as part of this assessment as these areas will be reinstated following the completion of construction.

Additional & Ancillary Infrastructure

The proposed accessible ancillary infrastructure associated with the Proposed Development consists of four borrow pits, a substation construction compound and a temporary construction compound.

The estimations of the excavated peat volumes and any subsequent reinstatement have been calculated based on the design information available at the time of writing:

- 1 x Substation Compound: 100 m x 50 m (5,000 m^2);
  2 x Met Masts: 20 m^2:
- 1x temporary Construction Compound: 100 m x 50 m (5,000 m2); and
- 4x Borrow Pits (indicative working area):
  - BP1: 13,200 m^2;
  - BP2: 15400 m^2;
  - BP3:11300 m^2; and
  - BP4: 10100 m^2.

For the construction compound, due to the temporary nature of the works, only the top soil will be stripped and replaced with terram and crushed rock placed, therefore no peat extraction will be required. For the purposes of this document it is also assumed that the borrow pits across the Proposed Development will be restored up to the peat depth recorded at each location.

Peat used in the reinstatement of borrow pits will be hydrologically connected to the surrounding peatland. This can be achieved by restoring borrow pits to a depth of peat similar to surrounding conditions. This will also be facilitated by the low permeability of the underlying bedrock and replaced superficial overburden, which will also encourage water saturation.

There will be no uncontrolled opening of borrow pits within the Proposed Development. Borrow Pits 1 to 4 will be opened in sequence to minimise unnecessary disturbance and excavation of peat.

Excavation Volumes

The estimate of excavated peat volume has been completed following a desk-based appraisal of the proposed wind farm layout supplemented by digital terrain analysis. There has been further refined spatial analysis of the peat depth data set using GIS software. According to latest statutory guidance peat soil is an organic soil which contains more than 60 per cent of organic matter and exceeds 50 centimetres in thickness. Therefore, for the purposes of these calculations, and as a result of the information collected on site, depths recorded to be less than 0.5 m are considered to be peaty soils. Depths recorded to be greater than 0.5 m are considered to be peat, with the upper 0.5 m being acrotelmic peat and depths beyond 0.5 m considered to be catotelmic peat.

The following sequence of tables (Table 8.3.3 to Table 8.3.6) provides a summary of the indicative peat extraction volume calculation for each infrastructure element. The relevant design assumptions are also confirmed within each table.

Table 8.3.3: Wind Turbine Foundations (Working area = 841 m^2)

WTG ID	Mean Peat Depth (m)	Peat Excavation Volume (m^3)		Total Peat Excavation Volume (m3)
		Acrotelmic Peat	Catotelmic Peat	
1	0.55	421	43	463
2	0.19	0	0	0
3	0.58	421	63	484
4	0.22	0	0	0
5	0.33	0	0	0
6	0.34	0	0	0
7	0.42	0	0	0
8	0.79	421	240	661
9	0.67	421	140	560
10	0.34	0	0	0
11	1.31	421	679	1099
12	0.50	0	0	0
13	0.49	0	0	0
14	0.75	421	212	632
15	0.64	421	117	537
16	0.32	0	0	0
17	0.63	421	107	527
	Total	**3368**	**1601**	**4963**

Source: Natural Power

Table 8.3.4: Crane Pads & Hardstands (Working Area = 1000 m^2)

WTG ID	Mean Peat Depth (m)	Peat Excavation Volume (m^3)		Total Peat Excavation Volume (m^3)
		Acrotelmic Peat	Catotelmic Peat	
1	0.55	500	51	551
2	0.19	0	0	0
3	0.58	500	75	575
4	0.22	0	0	0
5	0.33	0	0	0
6	0.34	0	0	0
7	0.42	0	0	0
8	0.79	500	286	786
9	0.67	500	166	666
10	0.34	0	0	0
11	1.31	500	807	1307
12	0.50	0	0	0
13	0.49	0	0	0

WTG ID	Mean Peat Depth (m)	Peat Excavation Volume (m³)		Total Peat Excavation Volume (m³)
		Acrotelmic Peat	Catotelmic Peat	
14	0.75	500	252	752
15	0.64	500	139	639
16	0.32	0	0	0
17	0.63	500	127	627
	Total	**4000**	**1903**	**5903**

Source: Natural Power

Table 8.3.5: Site Access Tracks (Running width = 7 m)

Track Section	Approx. Length (m)	Mean Peat Depth (m)	Peat Excavation Volume (m³)		Total Peat Excavation Volume (m3)
			Acrotelmic Peat	Catotelmic Peat	
Turbine 1 to Turbine 2	865	0.47	0	0	0
Turbine 2 to Turbine 3	841	0.49	0	0	0
Turbine 3 to Turbine 4 Spur	526	0.78	1841	1048	2889
Turbine 4 Spur	704	0.35	0	0	0
Turbine 4 Spur to Turbine 5	523	0.40	0	0	0
Turbine 5 to Main Access	1846	0.49	0	0	0
Main Access to Turbine 6 Spur	680	0.43	0	0	0
Turbine 6 Spur	513	0.37	0	0	0
Turbine 6 Spur to Turbine 11	1138	0.50	0	0	0
Turbine 11 to Turbine 10	881	0.80	3084	1844	4927
Turbine 10 to Turbine 9	705	0.61	2468	533	3001
Turbine 9 to Turbine 8	665	0.82	2328	1476	3804
Turbine 8 to Turbine 7	760	0.79	2660	1535	4195
Southern Spur to T12 Spur	516	0.34	0	0	0
Turbine 12 Spur	670	0.73	2345	1091	3436
Turbine 12 Spur to T13 &14 Spur	332	0.54	1162	85	1247
T13 and T14 Spur	881	0.70	3084	1228	4311
T13 &14 Spur to T15 Spur	1283	0.79	4491	2603	7094
T15 Spur	951	0.49	0	0	0
T15 Spur to T16	994	0.40	0	0	0
Turbine 16 to Turbine 17	1460	1.08	5110	5946	11056
L3 Met Mast Spur	147	1.32	515	842	1357
L2 Met Mast Spur	229	0.84	802	541	1343
BP3 Spur	162	0.33	0	0	0
BP4 Spur	399	0.33	0	0	0
Primary access route new section	400	0.49	0	0	0
		Total	**29890**	**18772**	**48660**

Source: Natural Power

Table 8.3.6: Ancillary Infrastructure & Borrow Pits

WTG ID	Mean Peat Depth (m)	Peat Excavation Volume (m³)		Total Peat Excavation Volume (m³)
		Acrotelmic Peat	Catotelmic Peat	
Substation	0.51	2500	50	2,550
Met Mast L2	0.68	10	4	14
Met Mast L3	0.53	10	1	11
Borrow Pit 1	0.48	0	0	0
Borrow Pit 2	0.30	0	0	0
Borrow Pit 3	0.12	0	0	0
Borrow Pit 4	0.26	0	0	0
	Total	**2520**	**55**	**2,575**

Source: Natural Power

The sequence of tables in the Appendices (Table 8.3.3 to Table 8.3.5) provides a summary of the indicative peat extraction volume calculation for each infrastructure element. Table 8.3.6 below provides a summary of total peat extractions from the proposed development.

Table 8.3.7: Total Peat Extraction (Indictative)

Construction Element	Peat Excavation Volume (m³)		Total Peat Excavation Volume (m³)
	Acrotelmic Peat	Catotelmic Peat	
Wind Turbine Foundations	3,364	1,600	4,964
Crane Pads & Hardstands	4000	1,903	5,902
On-site Access Tracks	29,890	18,772	48,658
Ancillary Infrastructure	2,520	55	2,575
Total Peat Excavation (m3)	**39,774**	**22,330**	**62,099**

Source: Natural Power

Re-use Volumes of Excavated Peat

In order to estimate the volume of peat that could be re-used as part of construction and restoration, Natural Power has applied their experience from the construction management of wind farms across an array of upland peat sites. Table 8.3.8 below provides an approximate total volume of peat that could be accommodated across the site. The following additional design assumptions salient to the re-use of excavated peat are highlighted below:

- The uppermost 0.5 m of excavated peat at all infrastructure locations will be accommodated in the finishing and landscaping of each infrastructure element;
- For the turbines foundations the peat re-use potential is considered to be within the excavation area around the protruding concrete foundation to a depth of 0.5 m;
- For crane hardstand areas and the substation compound it is assumed that peat can be used for reinstatement around the two peripheral edges to a height of 0.5 m with a batter extending up to 3 m;
- Batter slopes of reinstated verges must be considered in a manner that maintains slope stability, local topography and hydrology. The final design of the reinstated verges and batter angles will be agreed with SEPA as part of the detailed design, with reuse volumes below based on batters with a depth of 0.5 m and width of up to 2 m. Ideally a batter slope of 1:4 would be required to maintain stability but the reinstatement values provided are indicative for the purposes of this assessment and will vary according to the prevailing ground conditions. Similar widths are considered for dressing the track edges of floating tracks to allow for visual continuity between the track and surrounding peatland.
- Within the borrow pits, it is estimated that depths ranging from 0.1 m – 0.5 m, subject to individual recorded peat depths at each borrow pit, can be accommodated as part of the reinstatement work. This suitability will be determined as part of the detailed design and planning condition process and also consider any potential impact on local habitats;
- This approach is once again taken to provide visual continuity between the raised infrastructure and surrounding peatland, while maintaining important hydrological and drainage conditions. This assumption has been carried forward into the estimates for re-use of peat (Table 8.3.8);
- The finishing and landscaping of the access tracks will be extended to a region of 2 m either side of the running length;
- The formulation of a detailed construction method statement shall incorporate detailed construction design and sequencing for the reinstatement purposes that will allow refinement of the excavation volumes presented in this document. These plans shall draw on detailed site investigation information gathered prior to the commencement of construction; and
- Appropriate signage shall also be considered to warn about potentially soft ground hazards. The safety measures shall be maintained for as long as the hazard remains, which may be several years following construction. Typically, vegetation re-growth and natural stabilisation of the wetland areas would be anticipated within approximately two years following reinstatement. Ongoing periodic monitoring of the progress of restoration would be required to ensure fencing is maintained until the wetland is fully established.

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. Where the catotelmic peat becomes separated appropriate measures shall be in place to ensure this material is stabilised prior to re-use. This will be verified by a suitably qualified geotechnical engineer.

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.

Re-use Volume Estimate

Table 8.3.8: Estimate of peat re-use volumes

Construction Element	Peat Excavation Volume (m^3)	Potential Peat Re-use Volume (m^3)	Surplus (+) or Capacity (-) (m^3)
Wind Turbine Foundations	4964	10125	-5161
Crane Pads & Hardstands	5902	1562	+4340
Access Tracks	48658	28,607	+20,052
Ancillary Infrastructure	2575	25,407	-22,833
Total	**62,099**	**65,701**	**-3,601**

Source: Natural Power

Comparing the total volume of re-usable peat with total volumes of excavated peat, there is indicated that the Proposed Development has the capacity to accommodate an additional 3,601 m^3 of peat. Therefore, it is anticipated that all excavated peat can be re-used within the Proposed Development[1].

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

- Reduction of peat handling with re-use of peat undertaken as close as possible to the excavation site;
- 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.

Temporary Storage

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

The temporary storage of excavated peat shall seek to minimise disturbance of deposits by minimising haul distance between temporary peat storage sites and re-use areas. Stored peat would also be covered with the turves in a manner to maximise coverage. 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 shall be adopted. However, some elements may require storage of peat prior to re-instatement at the end of the construction phase.

The areas and locations identified for temporary storage shall be identified only after site investigation, felling operations and a full topographic survey. Determining factors are associated with the peat stability, sensitive receptors, drainage and pollution prevention. Areas of deeper peat (>1.5 m) and sensitive areas including GWDTE 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

[1] Whilst these calculations indicate a deficit of peat may exist related to the potential for re-use across the Development, it its emphasized that reinstatement would be proportionate, with reinstatement practices reflecting the surrounding environment.

sites. Furthermore, it may be necessary to undertake further peat stability calculations based on finalised placement of temporary peat storage areas.

Owing to the position of the site within an upland setting, with a relatively high SAAR (Section 8.2.1) it is anticipated that watering the stored peat through natural precipitation will be sufficient for the peat to remain damp, thus preventing drying out and desiccation and allowing the vegetation layer and seed bank to be sustained. This is an important element in the restoration of 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, of which may need to be undertaken by a suitably qualified geotechnical engineer. During prolonged dry spells artificial wetting could be undertaken, however this will be done under the agreement and supervision of the ECoW and Principal Contractor with appropriate mitigation in place to ensure the protection of the stored peat, as well as any nearby receptors such as watercourses or GWDTE.

Limitations of Assessment

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.

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

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, September 2015).

Interpolated peat depth maps (Figure 8.6: Peat Interpolation) illustrate the peat depth across the site, thus giving an indicative assessment of the peat depths at various infrastructure locations. As this 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 sections.

8.5. REINSTATMENT METHODOLOGIES

Prior to commencing the construction excavation works, consideration will be given to methods for handling and holding the excavated materials, particularly peat. Haulage distances for the excavated material will be kept to a minimum, in order to reduce the potential impact on the peat 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. The following paragraphs discuss the reinstatement measures that can be adopted for the main infrastructure components associated with the development.

Access Tracks

Where cut and fill tracks are required in areas of peaty soils, it is recommended that turves should be ‘rolled back’ to allow for the bank to be cut at an appropriate angle, then rolled back over to cover the exposed cut face. 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.

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 practicable, to give the seed bank and vegetation the best chance of an early regeneration. Where reasonably practicable, turves and topsoil will be matched to the adjacent habitat.

If storage is required, the soils will be correctly stored. This provides the seedbank and vegetation the best chance of early regeneration. If temporary storage of excavated materials is required, then material will be stored safely, and the method of storage will be reasonably minimised in order to reduce areas of additional disturbance. If soils are to be stored for any length of time, then these designated areas will be agreed with the ECoW prior to the storage of any material. Consideration will also be given to periodically wetting the vegetation layers during prolonged dry spells in order to prevent desiccation (see section 8.6.4.2 for more details).

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.

Care will also be taken to minimise excessive material being 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 where 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.

During the construction works, in areas where the spreading of seed rich materials or natural re-growth are considered to be impractical, not plausible or ineffective, then consideration should be given to re-seeding methods. The seed type and mix will be agreed by NatureScot and the Local Planning Authority (the seed bank mix will be of local native species). If vegetation re-establishment is observed to be failing during the post-construction monitoring stage, the potential for using re-seeding methods will be considered and discussed in consultation with NatureScot and the local planning authority.

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 in a checkerboard pattern on top of stockpiled peat;
- For track reinstatement peat 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 practical to minimise turf drying i.e. reinstatement can take place whilst track construction continues;
- Peat 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;
- Natural regeneration of vegetation is the preferred option for reinstatement and restoration, however, if required, following consultation with SNH, re-seeding using a native species mix may be considered; and
- Lateral water loss from track edge peat "cliffs" will be minimised. This can be achieved through appropriate re-profiling and reinstatement of the track verges at an angle that blends into the surrounding landscaping as well as placing vegetated turves onto the verges. Consideration will be given to the placement of turves in a checkerboard fashion should there be insufficient turves available. This will be considered in greater details as part of the detailed track design.

Cable Trenches

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 consider adjacent construction activities which may disturb any reinstatement works already carried out.

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. 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.

The type of vegetation used for reinstatement will not differ significantly 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;
- Most cable trenches will be constructed adjacent to access tracks, i.e. reducing construction impacts on virgin ground;
- As a general principal, reinstated areas will be not be re-disturbed. This will be avoided where practical though not always possible due to construction sequencing;
- Stripping, storage and reinstatement of excavated materials will be as per best practice;
- Time between trench excavations and reinstatement will be planned to reduce the potential for stored turf layers to dry out and decompose; and
- Natural regeneration of vegetation is the preferred option for reinstatement and restoration.

Wind Turbine Foundations

Where practical the peat turves and topsoil will be stored around the perimeter of the foundation excavation. A plan showing where the material is to be stored will also 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.

The turbine foundations will be backfilled with the excavated material. Not all excavated material will be suitable for backfilling or reinstatement. 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 and to permit adequate temporary works. Excessive peat excavation will be minimised.
- Stripping, storage and reinstatement of excavated materials will be as per best practice;
- 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;
- Time between turbine foundation excavation and reinstatement will be planned to reduce the potential for stored turf layers to dry out and decompose; and
- Natural regeneration of vegetation is the preferred option for reinstatement and restoration.

Crane Pads & Hardstands

Reinstatement of the crane hardstands will not occur due to the following factors:

- Re-use of crane hardstands following construction is higher than previously estimated;
- In the past crane hardstands 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 hardstanding, thus contaminating the peat layer and making it unsuitable for re-use for reinstatement.

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

The area around the crane hardstand 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.

Ancillary Infrastructure

With the exception of the substation, 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 temporary hardstanding 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 hardstanding if this is required.

The reinstatement will involve reprofiling/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. 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.

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 and is therefore likely to be used in suitable locations as part of reinstatement elsewhere in the Development. As such, vegetation will 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. In the event that re-seeding is required, the seed type and mix will be agreed in consultation with NatureScot and the local planning authority. 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 is 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;
- Stripped turves may dry out due to the length of time they are stored (compound required for duration of construction period) therefore will be used in suitable locations elsewhere in the Development; and
- Natural regeneration of vegetation is the preferred option for reinstatement and restoration. However, if required, following consultations with NatureScot, re-seeding using a native species mix will be considered.

Borrow Pits

Borrow pit reinstatement will be undertaken as soon as possible following the completion of material extraction and will comprise of the replacement of superficial deposits in a manner to mimic the surrounding superficial geological sequence. Peat will be placed on top up to a depth of 0.5 m for Borrow Pits 1 to 4 and will be covered with turves. Reinstatement of borrow pits will ensure that drainage and material management techniques will follow those prescribed within this Peat Management Plan.

The fundamental aspects of borrow pit reinstatement are summarised as follows:

- Stored peat will be placed in suitable locations as determined by a geotechnical engineer and agreed with the ECoW. The engineer and ECoW will be responsible for monitoring the stability and quality of the peat throughout storage;
- A perimeter cut off drain shall be excavated ~10 m away from the proposed working face prior to overburden stripping. This shall reduce the surface water accumulation within the borrow pit excavation and safeguard against sediment loaded run-off;
- Vegetated turves (i.e. the upper most vegetated topsoil / peat layer) shall be stripped from the excavation in a progressive movement up the slope as the excavation extends. Turves will be stripped and stored separately. Turves shall not be used to form peripheral bunds. Peat will be monitored by the ECoW to determine if additional wetting is required during extended dry periods;
- All overburden, except peat, shall be stored in peripheral bunds around the working area. The stability of soil bunds will be monitored with no storage onto in-situ peat deposits deeper than 0.5 m. This will be reviewed by an experienced geotechnical engineer throughout the development and construction of the borrow pit. The bund shall also provide screening to the area whilst the excavation is taking place;
- Any peat excavated shall be stored separately from overburden. Peat shall not be used to form peripheral bunds. Stored peat will be stockpiled with side slopes not exceeding 1:2.5 and shall not exceed 1m in height. The placement area for the material shall be on flatter ground, at a suitable location and will be assessed and confirmed as suitable for loading by a suitably experienced and qualified geotechnical engineer and agreed with the ECoW. Turves should be placed (upright) over the peat storage mounds to act as a temporary surrogate growing site for the turves while construction progresses, as well as protect the peat stores from drying out and from run-off and erosion;
- The proposed borrow pit restoration would be to generate a rough vegetated slope profile grading into the existing ground level. The quarry faces would be reinstated to blend with the existing topography as much as possible and made safe;
- Backfilling would be completed using superficial overburden placed to an adequate level and geometry onto which topsoil/ peat can be placed to achieve a final restoration profile;
- Peat from the site would then be used to form the final surface of the restored borrow pit excavation. Retained turves should be reinstated in a checkerboard pattern across all exposed areas of peat to maximise surface area to achieve quick restoration;
- Perimeter cut off drains shall also be infilled with peat to ensure natural water levels in the peat are restored;
- The restoration may not take place immediately following completion of the borrow pit. Rather this shall be completed within the construction period of the wind farm;
- The final design of the borrow pit restoration proposals will be assessed to ensure long term stability and informed by a suitably qualified geotechnical engineer and ECoW with the support of a hydrologist as may be required; and
- All restoration works shall be carried out under the supervision of the ECoW.

8.6. MONITORING

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

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

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

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

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