Appendix 10.2 Outline Peat Management Plan

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Introduction

1.1 This outline Peat Management Plan (PMP) document has been prepared for the construction of the Pencloe Wind Farm (the proposed development), the planning application boundary of which, at its closest point, is located about 2.5 km from the southern boundary of New Cumnock in East Ayrshire. The site is located in the Carsphairn Forest around Auchincally Hill and Milray Hill to the west of Glen Afton. Extensive commercial plantations owned by Forestry and Land Scotland cover the majority of the area.

1.2 This outline PMP supersedes Appendix 3 of the Addendum to the Original ES and the Outline PMP (**Original Appendix 10.5**). It has been prepared to take account of the amendments to the wind farm layout that are described in **Variation Chapter 4: Project Description**.

1.3 The proposed development application boundary covers an area of approximately 8.71 km^2 with access tracks leading to a revised scheme for a total of 19 turbines. The infrastructure of the revised layout is comprised of 5.59 km of existing tracks that will be upgraded and widened and 10.27 km of new tracks, 19 wind turbine locations, two construction compounds, a substation and three meteorological masts. The total area of the wind farm footprint final layout is 208,041m^2. The area of actual development footprint is smaller as the existing track is already present and covers an area of 191,264 m^2. The actual area of excavation will be larger than the infrastructure footprint due to the need to cut and fill depending on topography. Side slopes associated with the excavated infrastructure are assumed to require a 2 in 1 gradient for construction, where required.

1.4 The PMP will be further developed and implemented subsequent to the proposed development receiving consent from the Scottish Government. Further details and specific plans will be determined during the detailed design process and once further site investigations have been undertaken. These details will then be included in a detailed PMP as a part of the required Contractor's detailed Construction Environmental Management Plan (CEMP). The responsibility for the implementation of the PMP will be with the Principal Contractor (PC).

1.5 The PMP has been developed due to identification of the presence of peatland and peat habitats (including blanket bog, mire and heath) on the proposed development site (**Original Chapter 8: Non-Avian Ecology**) and should be read in conjunction with the Pencloe Peat Survey Report (**Variation Appendix 10.1**) and the Outline Habitat Management Plan (**Variation Appendix 8.5**).

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

1.7 The PMP addresses the management of peat during the construction period and the immediate restoration of the site once construction has been completed. In accordance with SEPA's Regulatory Position Statement (2010) Developments on Peat, as much peat as possible is reused on site.

Objectives

1.8 The PMP has been developed to demonstrate that peat has been afforded significant consideration during the construction phase of the proposed development should consent be granted. It aims to propose mitigation measures that will minimise any impacts and the long-term habitat restoration and management plans for key areas of the site that are designed to enhance the site (**Original Appendix 8.5: Outline Habitat Management Plan**).

1.9 The PMP outlines the overall approach of minimisation of peatland disruption that has been adopted. It aims to demonstrate that, where practical, all further opportunities to minimise peat disturbance and extraction will be taken.

1.10 The PMP seeks to identify that appropriate proposals to reuse surplus peat can be accommodated within the site layout, without significant environmental or health and safety implications, to minimise risk in terms of carbon release and human health.

Structure

1.11 The structure of the PMP is as follows:

- Legislation, policy, and guidance;
- Role of the peat management plan;
- Definition of peat, details of peatland characteristics and peat conditions on site;
- Avoidance and minimisation of peat disturbance;
- Peat balance between excavation and reuse on site of surplus peat;
- Peat excavation and handling methods / controls and temporary peat storage; and
- Reuse in infrastructure construction restoration.

1.12 Tables are included showing:

- a summary of depth of penetration probe data;
- a summary of interpreted peat depth at infrastructure areas;
- a summary of dimension and area details of the infrastructure;
- where excavated peat will be generated and the associated quantities;
- where excavated peat will be re-used and the associated quantities; and
- a summary of the peat extraction and re-use balance.

Legislation, Policy and Guidance for Peat Management

Legislation Policy and Guidance

1.13 When considered as part of a carbon landscape, peat has a capacity to act as a carbon sink. The management of peat therefore has implications for carbon emissions and climate change. There is a substantial body of legislation and guidance regarding climate change and carbon which is relevant to the management of peat including:

- The Kyoto Protocol (1997) and the Kyoto Protocol and National Accounting for Peatlands (2012);
- The UK Climate Change Act (2008);
- Carbon Landscapes and Drainage, 2012 'The Carbon and Water Guidelines', www.clad.ac.uk; and
- Forestry Commission, 2011, 'Forests and climate change: UK Forestry Standard Guidelines.

1.14 Other key documents relied upon to inform this outline PMP include:

- Scotland's National Peatland Plan Working for our future. Scottish Natural Heritage 2015;
- Best Practice Guidance to Planning Policy Statement 18 'Renewable Energy', August 2009;
- Good practice during wind farm construction (Scottish Renewables, SNH, SEPA & Forestry Commission Scotland, 4th Edition 2019);
- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland;
- SEPA Regulatory Position Statement – Developments on Peat. February 2010;
- Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste, Scottish Renewables, 17 January 2012;
- Forestry Civil Engineering and SNH (2010). Floating Roads on Peat: A Report into Good Practice in Design, Construction and Use of Floating Roads in Peat with particular reference to Wind farm Developments in Scotland.
- Forestry Commission (2012). Forests & Water Guidelines. 5th Edition. HMSO;
- Scottish Executive (2017) Peat Landslide Hazard and Risk Assessments. Best Practice Guide for Proposed Electricity Generation Developments. Second Edition; and
- Towards an assessment of the state of UK Peatlands, JNCC 2010.

Role of the Peat Management Plan

1.15 The PMP is intended to be a working document to be used throughout the key stages of the design, construction, operation, decommissioning and re-instatement phases of the proposed development as part of an overall Construction Environmental Management Plan (CEMP). These stages are outlined below.

Stage 1: Environmental Impact Assessment (EIA)

1.16 It is necessary to show how, through site investigation and iterative design, the proposed development has been designed to minimise, so far as reasonably practicable, the quantity of peat which will be excavated; that volumes of peat anticipated to be excavated by the proposed development have been considered; and how excavated peat will be managed. The overall aim is to minimise the impacts associated with excavation of peat by using the following hierarchy of design principles: prevent excavation; reduce volumes of peat excavated; and reuse excavated peat in a manner to which it is suited. This hierarchical approach comprises:

1. Calculation of estimated volumes of excavated peat and potential reuse volume requirements based upon the proposed site design / layout;
2. Determine whether there is likely to be negative or positive overall peat balance, and whether the generation of excess material can be avoided, and, if not, where reductions in the volumes of excavated materials may be achieved;
3. Site layout is refined to avoid areas of deeper peat and hence reduce carbon impacts of the project construction activities;
4. Record specific examples of how overriding principles of prevention and minimisation of peat disturbance are to be taken into account in the design of the site;
5. The assessment is to be consistent with and feed into the peat stability and carbon payback assessment; and
6. Identify limitations and make recommendations for further site investigation (post-consent) in order to steer detailed design and micrositing such that opportunities for further reductions in excavated peat volumes can be implemented where possible.

Stage 2: Post Consent / Pre-Construction

1.17 As part of the EIA it will have been demonstrated that, on the basis of the investigation and data gathered, it is likely that the excavated materials for the proposed development can be managed in an appropriate manner. The peat mass balance calculations may be further developed and refined post planning consent, and prior to the relevant works commencing, as a consequence of any further or more detailed ground investigation or survey works required to inform detailed design, or that may be required under planning consent conditions.

Stage 3: Construction Stage

1.18 Actual peat volumes excavated during construction will be recorded against the overall predicted volumes provided in Table 5 of this PMP. Within micrositing allowances, the alignment and design of tracks, hardstanding orientation and construction methods will be reviewed to avoid/minimise peat disturbance as much as possible in light of the more detailed information available once construction actually commences. A regular review and update of the peat mass balance table will be undertaken by the appointed Main Contractor and monitored by the Ecological Clerk of Works (ECoW) on site, and made available to regulators as required.

Peat Conditions

Definitions of Peat

1.19 Organic material less than 0.5 m depth is not defined as peat. This is in accordance with guidance from:

- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland states that 'Peat soil is an organic soil which contains more than 60 per cent of organic matter and exceeds 50 centimetres in thickness'; and
- The James Hutton Institute define shallow peat as having 'a prescribed depth of organic matter of 50 – 100 cm' (https://www.hutton.ac.uk/learning/exploringscotland/soils/organicsoils/); and
- The Scottish Forestry (previously known as Forestry Commission) use 45 cm as the critical depth for peat to occur (Understanding the GHG implications of forestry on peat soils in Scotland, 2010).

1.20 Peat can therefore be classified as organic material over 0.5 m in depth.

1.21 Peat can be separated into three main layers: acrotelmic (the upper living layer), catotelmic (the middle to lower layer) and occasionally amorphous (lower layer) peat:

- Acrotelmic peat is the living layer of the peat including the peat turf or turf being a thin, floating vegetation mat layer. The acrotelm is generally found within the top layer of peat (often less than 0.5 m) depending on the degree of decomposition and fibrous nature of the peat (approximately H1 to H6 on the Von Post classification scale). The acrotelm is generally of high permeability, decreasing with depth. The water table fluctuates in this layer and conditions vary from aerobic to anaerobic. Material may be fibrous or pseudofibrous (plant remains recognisable), spongy, and when excavated strength is lost but retains integral structure and can stand unsupported when stockpiled >1 m.
- Catotelmic peat is the dead layer of peat found deeper than acrotelmic peat which has some remnant plant structures. Material has high water content and is permanently below the water table (saturated) therefore organic matter decomposes anaerobically. Some plant structures may be recognisable but are highly humified losing most of their characteristics (approximately H6 to H9 on the Von Post classification scale) and strength. Water flow through the catotelm is slow unless peat structures such as sink holes or peat pipes are present.
- Amorphous peat is highly decomposed organic material where all recognisable plant remains are absent (approximately H9 to H10 in the Von Post classification scale). These deposits are dark brown to black in colour, plastic, are low tensile strength and are unable to stand unsupported >1 m when stockpiled.

Peat Conditions on Site

Desk Based Review

1.22 The site was assessed for peat vegetation through desktop review of maps and plans and a number of site walkovers by ecologists and hydrologists; and also intrusive site investigation in terms of extensive peat depth probing and coring across the wind farm site and access track routes.

1.23 A large proportion of the proposed development is underlain by a relatively thin and discontinuous layer of peat, with areas of blanket bog and much degraded peat due to afforestation and drainage. There are areas where bedrock is exposed at surface and others where peat has infilled hollows and is relatively deep in places. Most of the areas of peat have been forested.

Peat Surveying Methodology

1.24 To obtain a detailed understanding of the spatial and depth distribution of peat and its properties, a series of tasks have been completed which include:

- Peatland habitat mapping (undertaken by Quadrant Scotland and SKM/Jacobs);
- Depth penetration probing in a 200 m grid over the entire wind farm site;
- Depth penetration probing in a 100 m grid where the 200 m grid identified peat;
- Higher frequency of depth penetration probing at all infrastructure and track locations where peat was interpreted based on the 100m grid at appropriate spacing:
    - Track – every 50 m with 10 m offset to either side of track;
    - Turbine base and crane hardstanding – 10 m grid around the turbine and crane hardstanding; and
    - 10 m grid for all other infrastructure with at least one row of probes outside of the proposed footprint.
- Coring in two campaigns with a total of 289 cores obtained within the infrastructure footprint;
- Development of a depth of penetration map to indicate the maximum depth of probe penetration at all investigation points across the site;
- Development of an interpreted maximum depth of peat contour map to indicate the potential peat depth based on the depth penetration probing results and verified by coring;
- Examination of the variability of the depth of the acrotelm, the thickness of the catotelm and the thickness of amorphous peat if present;
- Calculation of the maximum potential peat volumes that will be removed due to excavation for infrastructure based on the depth penetration probing results; and,
- Examination of areas where peat will be reused to allow calculation of reuse volumes.

Peat Surveys

1.25 The majority of the Application site is used for commercial forestry with areas of mature trees and new plantation coups. The existing access tracks were therefore used to gain access to the site. Several historical borrow pits were observed on the site adjacent to the existing access tracks.

1.26 Survey work was originally undertaken in 2013 and 2014 by SKM/Jacobs on 200 m and 100 m grids to identify peat character in order to minimise overall carbon losses and avoid damaging valuable active peat forming habitats. A preliminary peat depth contour plan was then constructed.

1.27 In May 2015, additional peat probing and coring was undertaken by Fluid Environmental Consulting (Fluid) focused on the infrastructure footprint to enable the layout to be refined (**Appendix 2 of the 2015 FEI**). Probing and coring was undertaken at a high frequency grid system (10 m grid around the turbine bases, 20 m across the crane hardstandings and other infrastructure and every 50 m along the proposed access tracks with a probe in the centre and one at 10 m distance either side). A total of 2,455 peat probes were undertaken along with a total of 289 cores.

1.28 In April 2019 further peat probing was undertaken by Fluid to increase the frequency of probing in all locations to comply with the latest guidance (Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland) and to obtain data due to refinements of the infrastructure layout (**Variation Appendix 10.1: Peat Survey Report**). A total of 809 additional probe locations were surveyed.

1.29 In total over all campaigns a total of 3,433 probe locations and 289 core locations have been surveyed.

Peat Survey Results

1.30 In general, the peat probing across the majority (65%) of the proposed infrastructure footprint was found to be between 0 and 0.5 m in depth indicating a mixture of organic soils or soft mineral soil rather than peat.

1.31 Of the 3,433 locations probed a total of 2,058 probes (60%) recorded depths of 0.5 m or less, 1,031 probes (30%) recorded depths of penetration between 0.5 m and 1.0 m, and 344 probes (10%) recorded depths of penetration >1.0 m. The average depth of penetration across the entire site based on all probes undertaken was 0.56 m.

1.32 Inspection of the subsurface formation extracted in cores indicated the presence of organic soils and mineral rich soils including silts and clays rather than peat in areas across the site where probe penetration depths was shallow (up to 0.5 m depth). As depths of 0.5 m or less are not classified as peat this does not impact on the interpretation of likely peat depth across the site, or the volume of peat that will be extracted.

1.33 Two cores (<1% of all cores) recorded soft grey clay below or interbedded with the peat deposits indicating, in these cases, the depth of penetration recorded by the probe over-estimated the peat depth, and overestimation was minor (0.2 m and 0.3 m). The material cored was soft with little strength and therefore allowed probe penetration. In this instance the calculated peat volume to be excavated would be an overestimate, and therefore would be considered to be a conservative estimate if other probes have encountered this formation.

1.34 The peat depth distribution across the infrastructure footprint was developed using ArcGIS spatial analysis to provide a peat depth contour plot.

1.35 The total area of the proposed development footprint is approximately 20.8 ha (including the footprint of the existing forestry tracks).

Table 10.2.1: Peat Depth Distribution across Infrastructure (includes existing track)

Depth range (m)	Area (m^2)	% of infrastructure footprint
0 to 0.5 (no peat)	136,750	65.7
>0. 5 – 1.0	64,275	30.9
>1.0 – 1.5	6,457	3.1
>1.5 – 2.0	487	0.23
>2.0	72	0.03
Total	**208,041**	**100%**

1.36 Discounting the already existing tracks the new infrastructure footprint is approximately 19.1 ha.

Table 10.2.2: Peat Depth Distribution across Infrastructure (excludes existing track)

Depth range (m)	Area (m^2)	% of infrastructure footprint
0 to 0.5 (no peat)	122,510	58.9
>0. 5 – 1.0	61,958	29.8
>1.0 – 1.5	6,237	3.0
>1.5 – 2.0	487	0.23
>2.0	72	0.03
Total	**191,264**	**100%**

1.37 Across the majority, 58.9%, of the area of infrastructure, the peat depth is less than 0.5 m in depth and therefore not considered to be located on peat deposits. A total of 29.8% of the infrastructure is located on peat between 0.5 m and 1.0 m, classified as peat but not as deep peat. Deep peat, probe depths greater than 1.0 m, was only identified at 3.26% of the infrastructure. Areas of deeper peat are infrequent and tend to occur mainly in small pockets. These results clearly show that there is limited peat on site and other surveys have identified that it is in a degraded condition.

1.38 A total of 6.9 ha of the infrastructure (33%) is therefore located on peat, of which 0.7 ha (3.26%) is located on deep peat.

Coring Information from Previous Investigations

1.39 The deepest depth penetration probes were located within areas of low topographical gradient on saddles, plateaus or within valleys surrounding watercourses. The peat survey identified the acrotelm and catotelm within the peat across the site, although acrotelm was very thin in many locations. Von Post test values that would be associated with amorphous peat, H9 or H10, were only encountered in shallow deposits that were not classified as peat (depths <0.5 m).

1.40 An acrotelm layer (fibrous material present) was encountered at all coring locations and varied in thickness between 0.02 m and 0.15 m with an average thickness of 0.06 m across the site.

1.41 Many of the cores within peat recorded very thin acrotelm layers as the ground conditions had been repeatedly disturbed by forestry activities and the growth of a vegetative top layer is limited by the forestry canopy. In these locations a relatively bare soil with pine needles covering the thin acrotelm was observed over the catotelm.

1.42 Catotelm peat was encountered in all of the cores with peat depths of 0.5 m or greater. The thickness of the catotelm layer varied between 0.45 m and 2.45 m with an average of 0.9 m across the entire site where peat was present.

1.43 These values have been used in calculations of volumes of peat across the site where the peat contour map indicates that peat is present (e.g. >0.5 m probe depth).

Habitat Conditions

1.44 Habitat mapping was undertaken by Quadrant Scotland and SKM / Jacobs and is detailed within **Original Chapter 8: Non-Avian Ecology**. The site is dominated by coniferous plantation woodland with much planted on drained moorland which includes both deeper peat and shallow peat or mineral soils. The areas of deeper peat are likely to have supported blanket bog prior to afforestation and blanket bog still remains in open areas. Peat and peatland species are rare within the forestry, although areas of bog and flush occur within woodland rides. There are also areas of acid, neutral and marshy grassland, dense bracken, dry dwarf shrub heath, wet dwarf shrub heath and open water.

1.45 Blanket bog occurs on flat gently sloping ground throughout the site and can still be found along even the narrowest forestry rides. The following NVC communities make up the blanket bog habitat within the site:

- M17 *Trichophorum cespitosum – Eriophorum vaginatum* blanket mire;
- M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire; and
- M20 *Eriophorum vaginatum* blanket and raised mire.

1.46 Blanket mire (M17b *Trichophorum cespitosum – Eriophorum vaginatum*), occurs within the large open area of blanket bog west and north of Struther's Brae. It is restricted to drier areas having undergone erosion in the past and occurs on hagged peat with un-vegetated faces and areas of bare peat on the surface. This type of blanket mire has no great cover of Sphagnum. Although the bare peat surfaces show signs of trampling by deer and the M17b vegetation is dry and unfavourable on top of the hags, some recovery has taken place in the hag bottoms, as indicated by the presence of the M2 *Sphagnum cuspidatum/ Sphagnum fallax* bog pool community.

1.47 Blanket mire (M19a *Calluna vulgaris – Eriophorum vaginatum*, the *Erica tetralix* sub-community), represents the blanket bog of the highest quality within the Application site. It occurs in some forestry rides, notably around Yarngallow's Knowe. The highest quality blanket bog is found around the large open area just west and north of Struther's Brae. Here, an undulating terrain with large areas of deep peat, supports much M19a vegetation.

1.48 Blanket and raised mire (M20a *Eriophorum vaginatum*, the species-poor sub-community), represents the poorest of the blanket bog and is present along forest rides.

1.49 Acid flush is frequent throughout the non-forested areas of the Application site, where it can be found in association with M23 rush-pasture along watercourses and in association with blanket bog along forestry rides. Flush and spring habitats within the Application site are composed of M6 *Carex echinata – Sphagnum fallax/denticulatum* mire.

1.50 Heath habitats are widespread across the Application site but occur at relatively low abundance. They are typically associated with shallow (<0.5 m) peat soils and mainly occur next to bog habitats or on steeper slopes by watercourses. NVC communities include:

- H12 *Calluna vulgaris - Vaccinium myrtillus* dry heath and
- M15 *Trichophorum cespitosum - Erica tetralix* wet heath.

1.51 Marshy grassland is very common throughout the Application site, mainly alongside the open watercourses and also alongside forestry tracks. It also occurs, to a lesser degree, within forest rides which predominantly comprises modified blanket bog. NVC communities include:

- M23 *Juncus effusus/acutiflorus – Galium palustre* rush-pasture and
- M25 *Molinia caerulea – Potentilla erecta* mire.

Peat Characteristics

1.52 The peat profile at Pencloe comprises light brown to dark red brown amorphous, plastic to slightly fibrous peat beneath the present-day root mat. Much of the peat body at the Application site has been extensively disturbed by afforestation or agricultural improvement and this has resulted in significant disturbance to the natural water table within the peat and the acrotelmic horizon. A network of man-made drainage channels is present across the site, which in turn discharge to natural watercourses. These man-made ditches are considered to have dewatered the peat over time. Active, natural subsurface drainage pipes in the peat profile appear absent over much of the Application site.

1.53 Samples of peat were observed in the field as part of the peat depth probing programmes and descriptions noted with respect to its characteristics, including fibre content, decomposition and moisture content. Laboratory testing on properties of the peat profile displayed bulk densities in the range of 0.98 mg/m^3 to 1.00 mg/m^3, moisture contents ranging from 414% to 859% of dried matter and total organic carbon content ranging from 39.1% to 55%. These values are typical for peat. The Factual Report and an Interpretive Report (**Original Appendices 10.1a and 10.1b**) on peat slide risk assessments provide greater detail on the surveys undertaken in 2013 and 2014.

1.54 Cores were taken during May 2014 from 172 locations and in May 2015 in 118 locations (focusing on infrastructure locations) and were assessed for soil structure and other subsurface characteristics. The acrotelm thickness measured in the core samples ranged from 0 to 0.3 m with an average thickness of 0.06 m. It was also noted that across much of the survey area the peat profile was recorded as dry.

1.55 The Von Post test was also carried out at core locations. Von Post scores for the acrotelm ranged between H1 and H7, with an average of H3. A score of H3 is defined by Ekono (1981) (1981) as *'Very slightly decomposed peat which, when squeezed, releases muddy dark brown water, but from which no peat is passed between the fingers. Plant remains are still identifiable, and no amorphous material present.'* This effectively means that there is no amorphous peat in category H4. H scores of 5 or more begin to have amorphous material, with significant amorphous material occurring at scores of H7 and above.

1.56 For the catotelm, Von Post scores ranged between H2 and H10, with an average of H7. A score of H7 is defined as *'Highly decomposed peat. Contains a lot of amorphous material with very faintly recognizable plant structure. When squeezed, about one-half of the peat escapes between the fingers. The water, if any is released, is very dark and almost pasty.'* In terms of reuse, consideration has to be given to the increasingly amorphous and plastic nature of that catotelm with Von Post scores of H7 and above.

Avoidance and Minimisation of Peat Disturbance

Avoidance

1.57 The infrastructure layout has been designed to avoid and minimise the impact on blanket bog habitats. In practice this has been undertaken by avoiding the deepest peat, which is normally where the best quality blanket bog habitats occur and are to some extent preserved. The three design elements aimed at minimising effects on blanket bog systems have been incorporated:

- Avoiding the deepest peat with tracks and turbines;
- Staying where possible to the outer edge of blanket bog systems; and
- Skirting around them rather than cutting across them where possible.

1.58 The proposed infrastructure layout shows that only 3.26% of the revised layout for the proposed development is located on deep peat (>1 m depth).

Further Minimisation

1.59 The disturbance of peat by the construction of the tracks, crane hardstandings and turbine foundations and other infrastructure will be minimised as much as practicably possible, taking into account the other constraints to the development, in order to try and reduce any peat waste on site and reduce potential carbon losses from the peat excavation process.

1.60 Throughout the construction process, the appointed Main Contractor (and / or Designer) will look to minimise the volumes of excavated peat. As far as possible, appropriate handling and storage of excavated materials will be undertaken such that their integrity and subsequent reuse is not jeopardised.

1.61 It is anticipated that an Ecological Clerk of Works (ECoW) will be appointed for the scheme that will:

- Identify areas of sensitive habitat;
- Clearly mark sensitive habitats near to construction areas and make the Principal Contractor aware of the sensitivity of peat habitats and inform all sub-contractors;
- Walk the areas affected by the proposed development with engineers before construction commences;
- Authorise minor movement of infrastructure within the micrositing available where impact can be reduced; and
- Monitor that any micrositing does not result in movements into more sensitive habitats and deep peats unless unavoidable.

1.62 Although every effort has been made to map and identify sensitive habitats as thoroughly as possible, adjustment within the micrositing limits is likely to allow further improvements to avoid particularly sensitive pockets of habitat. Therefore, the ECoW will walk the site with engineers before construction commences, pointing out areas of sensitive habitat and identifying where impact can be reduced by minor movement of infrastructure within the micro-siting available. These areas will be clearly marked with post and tape. The ECoW will also ensure that any micro-siting does not lead to movements into more sensitive habitats

1.63 Further measures to minimise peat disturbance will be incorporated in the development and construction process. The principles of the waste hierarchy (outlined above) will be adhered to in order to:

- Avoid and/or minimise production of excavated peat;
- Reuse, where possible, excavated peat on site in landscaping and re-profiling works, to minimise visual impacts and facilitate habitat, ecological and hydrogeological restoration, improvement and enhancement; and
- Avoid waste peat being sent for disposal, recovery and/or reuse off site.

1.64 All contractors will be made aware of the sensitivity of peat and wetland habitats and the ECoW will clearly mark sensitive habitats near to construction areas. Contractors will be required to work within the narrowest practical construction corridor when working in or near areas of peat.

1.65 All plans and method statements will be accompanied by justification of the final design and/or construction methods identified by the Main Contractor, including reasons for discounting alternative methods. This is required in order to demonstrate that all avenues for avoiding hydrological disruption and reducing the disturbance and excavation of peat have been considered.

Excavation and Reuse Volume Estimates and Reuse Requirements

Peat Excavation Assumptions

1.66 The infrastructure for the proposed development and dimensions used in the peat balance calculations are summarised in **Table 10.2.3.** The infrastructure areas and excavation calculations are based on the proposed development GIS shape files provided plus the following assumptions:

- Only infrastructure areas where the peat depth is >0.5 m are considered to contribute to the excavation volumes and the reuse volumes.

Excavated Tracks

- Tracks will be excavated to the base of the peat and then built up with stone. Where peat is present it is considered that the running surface of the track will be below the adjacent ground level, therefore the excavation will be widened by 1 m on one side to allow a drain to be incorporated alongside the track. In additional the side slopes will be excavated on a 2in1 gradient.

- Other excavated tracks will have a running surface above ground level and therefore will just require drainage. Where this drainage is within peat it is assumed the drain will be 1.5 m wide at surface and 0.75 m deep in the form of a V.

Construction Compounds

- Construction compound 2 is not on peat. Construction compound 1 will be excavated to the base of the peat (average depth of 0.53 m) and side slopes will be excavated on a 2in1 gradient. Drains will be installed on all sides of the compound with dimensions of 1.5 m wide at surface and 0.75 m deep in the form of a V.

- It is assumed that the hardcore comprising the construction compound 1 will be removed at the end of the construction period to allow peat reinstatement.

Substation

- The substation will be excavated to the base of the peat and then built up with stone above ground level. Drains will be installed on all sides of the substation with dimensions of 1.5 m wide at surface and 0.75 m deep in the form of a V.

Turbine Foundations

- Turbine foundations will be backfilled with concrete. The areas outside of this footprint will have sloped sides, 2 in 1 gradient, for construction. Where these adjoin the crane hardstanding they will be filled with hardcore as they will form part of the crane hardstanding. Where these adjoin the surrounding habitat, they will be backfilled with the material removed.

- Drains will be installed on the side of the turbine foundations not connected to the crane hardstandings with dimensions of 1.5 m wide at surface and 0.75 m deep in the form of a V.

Crane Hardstandings

- The excavated crane hardstanding areas will need to be level and therefore some cut and fill is likely. It is therefore assumed that slope will be excavated along half of the perimeter on a 2 in 1 gradient to ground level.

- Drains will be installed on the sides of the upgradient sides of each crane hardstanding with dimensions of 1.5 m wide at surface and 0.75 m deep in the form of a V.

Borrow Pits

- Drains will be installed on all sides of the each borrow pit with dimensions of 1.5 m wide at surface and 0.75 m deep in the form of a V.

Met Masts

- Met mast 1 has no peat. Met masts 2 and 3 will be excavated to the base of the peat and slopes will be excavated along half of the perimeter on a 2 in 1 gradient to ground level. Drains will be installed on all sides of the met mast base with dimensions of 1.5 m wide at surface and 0.75 m deep in the form of a V.

1.67 The proposed development's infrastructure and dimensions used in the peat balance calculations are summarised in **Table 10.2.3**

Table 10.2.3: Infrastructure Description and Dimensions

Infrastructure	Dimensions	Area (m^2)
Turbines	24m diameter	8,569
Crane hardstanding (section closest to turbine base)	Irregular shape	50,280
Construction Compound 1	50 m x 100 m	4,931
Construction Compound 2	50 m x 100 m	5,146
Substation	50 m x 100 m	4,993
Met Mast and hardstanding 1	~25 m x ~25 m	624
Met Mast and hardstanding 2	~25 m x ~25 m minus track section	569

Infrastructure	Dimensions	Area (m^2)
Met Mast and hardstanding 3	~25 m x ~25 m	625
Borrow Pit 1	Irregular shape	1,634
Borrow Pit 2	Irregular shape	22,659
Borrow Pit 3	Irregular shape	18,986
Borrow Pit 4	Irregular shape	1,178
Borrow Pit 5	Irregular shape	4,944
Existing track to be widened to 5 m	~2,132 m x 5 m (excludes existing track of 3m width)	4,255
Existing track to be widened to 4 m	~3,458 m x 4 m (excludes existing track of 3m width)	3,459
Existing track	5,590 m x 3m	16,776
New track for construction traffic (5 m)	9,295 m x 5 m	54,409
New track for construction traffic (4 m)	190m x 4m	756
New track for Forestry (4 m)	788 x 4m	3,254
Total		**208,047**

1.68 It is assumed that any peat excavated for cable trenches is stored adjacent to the trench while the track is laid and then replaced, therefore this volume is not applicable to the excavated volume.

Excavated Volumes

1.69 Peat excavation volumes associated with the project have been calculated using the GIS package ArcGIS based on the following data and assumptions:

- A contour map of assumed peat depth based on interpolation of values from probing across the site;
- Dimensions of the proposed areas for excavation for site infrastructure based on the layout shape files provided;
- An estimated acrotelm depth of 0.06 m across infrastructure area where peat (>0.5 m organic soil) is present based on the peat core data;
- An estimated catotelm thickness of the average depth of the peat minus the acrotelm (0.06 m) across infrastructure areas where peat is present, and based on the peat core data;
- An absence of amorphous peat; and,
- An assumption that the probe depth is representative of the actual depth of the peat (validated by a spatial coverage or cores).

1.70 The contoured surface of the peat created has been used to determine the average depth of peat under the excavation footprint of all proposed infrastructure and therefore the total volume of peat to be excavated as well as the volume of acrotelmic, catotelmic and amorphous peat. This data is presented in **Table 10.2.4.**

1.71 The peat volume estimates have been calculated to take into account proposed development and the table also provides clarification on the reuse options (on-site uses), dimensions and other assumptions used to generate these conservative and preliminary volume estimates.

1.72 At this stage of development, and based on the location of site infrastructure in relation to peat depth and site topography, it is calculated that the excavation of 65,300 m^3 of peat will be required. **Table 10.2.4** gives details of the estimates of peat excavations.

Table 10.2.4: Excavated Volumes for All Infrastructure

Infrastructure	Volume of peat excavated (m^3) – footprint of infrastructure only	Volume of peat excavated (m^3) – slopes and drains	Total volume of peat excavated (m^3)	Volume of acrotelm peat excavated (m^3)	Volume of catotelm peat excavated (m^3)
Turbine 1	155	31	186	18	168
Turbine 2	0		0	0	0
Turbine 3	330	43	373	29	344
Turbine 4	102	30	132	13	119
Turbine 5	292	37	330	31	299
Turbine 7	0		0	0	0
Turbine 8	67	25	92	10	81
Turbine 9	56	26	82	9	73
Turbine 10	0		0	0	0
Turbine 11	7	26	33	5	28
Turbine 12	49	28	76	9	67
Turbine 13	31	27	57	8	50
Turbine 14	182	33	215	21	193
Turbine 16	195	32	227	22	205
Turbine 17	61	27	88	10	77
Turbine 18	433	56	489	31	459
Turbine 19	6	27	33	5	28
Turbine 20	379	48	427	31	397
Turbine 21	0		0	0	0
Crane hardstanding 1	456	172	629	63	566
Crane hardstanding 2	1,004	196	1200	98	1,102
Crane hardstanding 3	539	173	712	76	636
Crane hardstanding 4	110	134	244	53	191

Infrastructure	Volume of peat excavated (m^3) – footprint of infrastructure only	Volume of peat excavated (m^3) – slopes and drains	Total volume of peat excavated (m^3)	Volume of acrotelm peat excavated (m^3)	Volume of catotelm peat excavated (m^3)
Crane hardstanding 5	1,358	221	1579	129	1,450
Crane hardstanding 7	458	158	616	57	559
Crane hardstanding 8	422	155	577	66	511
Crane hardstanding 9	1,024	189	1213	108	1,105
Crane hardstanding 10	346	150	496	60	436
Crane hardstanding 11	1,597	233	1831	145	1,685
Crane hardstanding 12	147	166	312	43	269
Crane hardstanding 13	189	157	346	45	301
Crane hardstanding 14	2,128	301	2429	157	2,272
Crane hardstanding 16	687	169	857	81	776
Crane hardstanding 17	1,654	249	1903	137	1,765
Crane hardstanding 18	466	171	637	64	573
Crane hardstanding 19	812	187	998	100	898
Crane hardstanding 20	817	177	995	85	910
Crane hardstanding 21	618	157	775	85	690
Construction Compound 1	1,233	83	1316	112	1,204
Construction Compound 2	0	0	0	0	0
Substation	2,463	186	2650	174	2,476
Met Mast 1	0	0	0	0	0
Met Mast 2	435	102	537	40	498
Met Mast 3	78	78	156	19	138

Infrastructure	Volume of peat excavated (m^3) – footprint of infrastructure only	Volume of peat excavated (m^3) – slopes and drains	Total volume of peat excavated (m^3)	Volume of acrotelm peat excavated (m^3)	Volume of catotelm peat excavated (m^3)
Borrow Pit 1	0	32	32	10	22
Borrow Pit 2	0	130	130	40	90
Borrow Pit 3	6,039	35	6075	523	5,552
Borrow Pit 4	0	29	29	9	20
Borrow Pit 5	0	70	70	22	49
New Track for construction traffic (excavated 5m)	21,663	8,163	29,826	2671	27,155
New Track for construction traffic (excavated 4m)	67	26	93	12	81
Existing Track (widened to 5m)	0	0	0	0	0
Existing Track (widened to 4m)	610	657	1,266	174	1,093
Forestry Track (4m)	1,285	670	1,955	175	1,780
Total	**51,051**	**14,274**	**65,325**	**5,884**	**59,441**

1.73 The total calculated excavation volume estimates are:

- Total volume of peat which will be excavated = ~65,300 m^3;
- Total volume of acrotelm which will be excavated = ~5,900 m^3; and
- Total volume of catotelm which will be excavated = ~59,400 m^3.

1.74 These values are estimates based on the available data and the above assumptions.

1.75 In order to determine accurate peat volumes, peat probing and / or other ground investigation techniques will be employed as necessary prior to and during the works in order to inform micrositing requirements.

1.76 Final implementation of peat reuse and classification will be subject to geotechnical on site tests e.g. shear vane testing, to determine peat stability and type and use potential.

Peat Reuse Volumes

1.77 From **Table 10.2.4** above, the volume of peat that will be removed by excavation of the infrastructure is ~5,900 m^3 of acrotelm, and ~59,400 m^3 of catotelm. This volume of peat will be reused around the site in the following areas (**Variation Figure 10.2.1**):

- In appropriate locations around the infrastructure perimeter on the slopes associated with the excavations. These slopes will be constructed at 2 in 1 gradient along the edges of the track, crane hardstandings and the substation where the infrastructure is located in a peat area. This will be in a 0.3 m thickness and should essentially be the reinstatement of excavated peat turfs and tie in with the adjacent peat as presented on **Variation Figure 10.2.1**.
- For reinstatement of the southern construction compound that occupies an area of 4,931 m^2. After construction the stone will be removed and the peat reinstated in this area to a similar depth as is currently present, 0.53 m. Side slopes will also be backfilled along with drains.
- A total of five borrow pits will be required for stone generation which total an area of 49,401m^2. Each borrow pit will be reinstated with peat to a depth of 1 m (BPs 1, 4 and 5) or 1.2m (BPs 2 and 3) to produce engineered wetland areas. Reprofiling of the borrow pits may also require the use of stone that has previously been quarried from them and recovered from the construction compound and any other restored areas after the construction period.

Table 10.2.5: Estimated Reuse Volumes

Reuse Type	Reuse Summary	Acrotelm volume (m^3)	Catotelm volume (m^3)	Total Volume (m^3)
On the 2in1 side slopes of all excavations (tracks, turbines, crane hardstandings, substation and met masts) where peat is present (see **Variation Figure 10.2.1**)	0.3 m depth of peat using average 0.06 m depth of acrotelm peat and 0.24 m catotelm	459	6,801	7,260
Southern Contractors Compound (4931 m^2)	Cover whole area with 0.53 m depth as per current average depth of peat in this location, using 0.06 m average acrotelm and 0.44 m catotelm Plus backfill side slopes and ditches associated with excavation	162	2,535	2,697
Borrow Pit 1	Cover whole area with 1 m depth of peat on average using 0.06 m acrotelm, 0.94 m catotelm and engineered to increase the water table for wetland re-creation.	98	1,536	1,634
Borrow Pit 2	Cover whole area with 1.2 m depth of peat on average using 0.06 m acrotelm, 1.14 m catotelm and engineered to increase the water table for wetland re-creation.	1,631	25,559	27,191

Reuse Type	Reuse Summary	Acrotelm volume (m^3)	Catotelm volume (m^3)	Total Volume (m^3)
Borrow Pit 3	Cover whole area with 1.2 m depth of peat on average using 0.06 m acrotelm, 1.14 m catotelm and engineered to increase the water table for wetland re-creation.	1,367	21,416	22,783
Borrow Pit 4	Cover whole area with 1 m depth of peat on average using 0.06 m acrotelm, 0.94 m catotelm and engineered to increase the water table for wetland re-creation.	71	1,107	1,178
Borrow Pit 5	Cover whole area with 1 m depth of peat on average using 0.06 m acrotelm, 0.94 m catotelm and engineered to increase the water table for wetland re-creation.	297	4,647	4,944
	Total	**4,084**	**63,602**	**67,687**

1.78 It is assumed that the cable trenches will have no impact on peat as the removed volume will be replaced and clay will be used at regular intervals to prevent preferential pathways developing in the sand/cable layer at the base of the trench.

1.79 The re-use of the excavated peat has taken a conservative approach in that a realistic value for acrotelm reinstatement has been used and there is further potential to use more catotelm peat within the borrow pits if required as part of the restoration and re-profiling process. Catotelm peat can be reused in the borrow pit areas with appropriate engineering and profiling to waterlog the area to re-create small areas of new mire and peatland habitat.

1.80 A 1 m depth of peat reinstatement in borrow pits 1, 4 and 5 and a 1.2 m depth in borrow pits 2 and 3 has been used for the calculations.

Net Peat Balance

1.81 The volume of peat predicted to be excavated does not exceed the intended reuse volume so no disposal of excess peat off site is expected for the proposed development. The excavated peat volumes and volumes of peat to be re-used are summarised in **Table 10.2.6** below (values rounded up or down as appropriate).

Table 10.2.6: Net Peat Balance

Peat Balance	Acrotelm volume (m^3)	Catotelm / Amorphous volume (m^3)	Total Volume (m^3)
Excavated Peat	5,900	59,400	65,300
Potential Peat Reuse	4,100	63,600	67,700
Total Balance	+1,800	-4,200	-2,400

1.82 Over the life time of the proposed development it is expected that there will be a potential for more peat to be reused on the site than the volume excavated. This is as a result of 7.13 ha of mainly forested poor quality peatland habitat being directly lost to tracks, turbines and other infrastructure generating a total amount of excavated peat of about 65,300 m^3 and there is a capacity for the reuse of about 67,700 m^3 of peat onsite. The numbers indicate that more acrotelm peat will be excavated than currently shown to be reused, however the acrotelm is the most valuable and easily used peat as it has greater stability, vegetation cover and can be used to tie in peat habitats. In addition this calculation is very sensitive to the acrotelm thickness of 0.06 m and in practice the upper section of the peat will be removed in 0.3 m thick sections for reuse to maintain integrity so the total excavated volume and reuse volume comparison is more important.

1.83 The reuse of excavated peat calculations makes the assumption that three of the five borrow pits in the forestry areas will be re-profiled with up to 1.0 m depth of peat and two of the five borrow pits with up to 1.2 m of peat. In this form the peat will be managed in a carbon sequestration friendly manner through appropriate drainage and re-profiling along with the re-contouring of the borrow pits to re-create mire habitats and retain carbon.

Handling Excavated Materials

Excavation

1.84 The following methodologies for excavation of peat are recommended:

- Areas of peat within the footprint of any excavation will have the top layer of vegetation stripped off as turf prior to construction by an experienced specialist contractor. When excavating areas of peat, excavated turfs should be as intact as possible. Often it is easiest to achieve this by removing large turfs up to 500 mm in order to keep the peat intact.
- These turfs should be stored adjacent to the construction area such that they remain moist and viable (see temporary storage below). Excavated turfs should be as intact as possible so as to minimise carbon losses.
- Peat will then be removed, stored separately and kept damp (Carbon and Water Guidelines 2012). The moisture content of stored/stockpiled peat will be monitored and if it falls below 25% of that in surrounding, intact peat then it will be watered.
- Excavated soils and turfs will be handled so as to avoid cross contamination between distinct horizons and allow reuse potential to be maximised.
- Prior to any excavations, the Main 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 this Method Statement. The Contractor will consider potential impacts on

downstream hydrological receptors and also the potential for instability issues with the excavated material.

- Care will be taken when stripping and removing topsoil and peat turfs and appropriate storage methods used on site, i.e. excavated material will be stored in separate horizons and vegetation rich top layers will be stored vegetation side up.
- 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 turf, acrotelm and catotelm/amorphous), peaty soils and mineral soils (subsoil and topsoil).

Temporary Storage

1.85 Following excavation, peat will be required to be temporarily stored before reuse, although peat restoration will commence in locations as soon as feasible e.g. in borrow pits as they are completed. Excavated peat should be stored in stockpiles to minimise carbon losses while being stored.

1.86 Where possible excavated turfs will be stored adjacent to the construction area such that they remain moist and viable.

1.87 Areas of temporary storage required for peat will be identified in the Main Contractors Method Statement taking into account constraints and mitigation requirements identified in the consolidated supplementary environmental information. This will describe any intended drainage, pollution prevention and material stability mitigation measures that may be required. The following general guidelines will apply:

- The appropriate temporary storage areas for excavated peat will be as close to the excavation as practicable.
- The design and location of stockpiles, including incorporated drainage elements, will be agreed with the ECoW and Geotechnical Consultant / Geotechnical Clerk of Works prior to excavation works commencing.
- Temporary peat storage areas should be located so that erosion and run off is limited, leachate from the material is controlled, and stability of the existing peatland in the vicinity is not affected.
- Excavated material is to be stockpiled at least 50 m away from watercourses. This will prevent the runoff of any wetting required on stored peat and discharge into adjacent watercourses.
- Any edges of cut peat that may remain exposed, or areas of peat excavation on steep slopes, will be covered with geotextile or similar approved. This will allow re-turfing and re-vegetation and reduce erosion risks.
- Suitable storage areas are more appropriately sited in areas with lower ecological value and low slopes. Cleared areas of forestry are preferred to areas of higher ecological value or areas close to watercourses.
- Temporary peat storage should be in locations where the water table can be kept artificially high.
- An up-gradient cut off ditch should be installed around the edge of the storage bund in order to collect up-gradient surface water runoff and divert water runoff from eroding the toe of the bund.
- It is desirable to keep haul distances of excavated peat as short as possible and as close to intended re-use destinations to minimise plant movements in relation to any earthworks activity, including peat management, in order to minimise the potential impact on the peat

structure. It is important that temporary storage is safe and keeps the material suitable for its planned reuse.

- The handling and storage of peat will look to avoid that excavated peat does not lose either its structure or moisture content. Peat turfs require careful storage and wetting to be maintained and to prevent drying out and subsequent oxidisation such that they remain fit for re-use.
- Stockpiling of peat should be in large volumes, taking due regard to potential loading effects. Piles should be bladed off at the side to minimise the available drying surface area.
- Higher piles are more likely to become dewatered, while smaller piles expose a greater area to evaporation. Reducing mound size may also increase likelihood of erosional losses as particulate organic carbon (POC). Overall volumes of stockpiling should be minimised and height and surface areas kept to a minimum.
- Stockpiles should be battered so as to limit instability and erosion and should be bunded using impermeable material. The bunds should extend to a level above the toe of the stockpiled material to provide restraint to surface runoff.
- When planning the temporary storage areas any additional disturbance areas should be minimised.
- Transport of peat to temporary storage areas, restoration areas or designated spoil areas will be by low ground pressure vehicles to avoid excessive compaction of the peat.

Reuse of Peat in Infrastructure and Borrow Pit Restoration

Bare Peat

1.88 There are a number of important methodologies regarding the exposure of bare peat including:

- The amount of time any bare peat will be exposed will be minimised to preserve its integrity.
- The phasing of work should be carried out to minimise the total amount of exposed ground at any one time. By stripping turf and replacing as soon as possible after peat has been re-distributed there will be minimal areas of bare peat.
- Any peat areas on steep ground, or that remains partially bare, will be covered using geotextile or a similar method to stop erosion.
- Any areas of bare peat, where vegetation is not re-growing, will be seeded with a seed mixture obtained from the existing habitat.

1.89 This approach has been shown to be effective on other peat sites and the turfs re-grow quickly both establishing vegetation and consolidating the peat. The re-vegetated areas will be monitored. Any areas of bare peat, where vegetation is not re-growing, will be seeded with a seed mixture obtained from the existing habitats on site. Stock exclusion in these areas will continue until vegetation is properly established.

Infrastructure Re-use

1.90 Peat reuse around and within infrastructure areas is an important aspect of the development as it allows an opportunity to maintain the integrity of the excavated peat, enhance habitats and create new habitats. This will be undertaken through:

- The Contractor will be required to provide appropriate plant for undertaking all reinstatement works such that no unnecessary disturbance of the ground surface occurs. In order to minimise disturbance and damage to the ground surface, any mobile plant required for reinstatement and landscaping works will be positioned on constructed access tracks,

hardstanding areas or existing disturbed areas wherever possible. The use of a long reach excavator for excavations and reinstatement works is preferable as it enables sufficient room to allow initial side casting and subsequent pulling back of turfs over reinstated peat or soil.

- Excavated catotelm or amorphous peat will only be used in restoration works where the topography allows straight forward deposition with no pre-treatment or containment measures and without risk to the environment. Suitable scenarios may be present in those disturbed areas where natural topography profile allows such use. A fibrous layer of acrotelm and turf will be placed above any catotelm or amorphous peat reinstated.
- Reinstatement of vegetation will be focused on natural regeneration utilising peat vegetated turfs. To encourage stabilisation and early establishment of vegetation cover, where available, peat turfs (acrotelmic material) or other topsoil and vegetation turfs in keeping with the surrounding vegetation type will be used to provide a dressing for the final surface.
- Consideration should also be given to the impacts of poor drainage control in any areas where peat is used in reinstatement, for instance track verges, reinstatement of construction compounds, etc.
- Any reinstatement and re-profiling proposals will consider, and mitigate against, identified significant risks to environmental receptors. In particular, in areas of replaced peat, water management will be considered in the Contractor's Construction Method Statements to allow an appropriate hydrological regime to be re-established within areas of disturbance. Particular attention will be paid to maintaining hydrological continuity and preventing the creation of preferential subsurface flow paths (for instance within backfilled cable trenches).
- Peat turfs should be replaced on all disturbed areas, including constructed roadside drainage channel embankments where possible.
- When constructing tracks rapid restoration will be undertaken as track construction progresses.
- Immediately following construction some turfs will be replaced along the road edges to allow quicker re-vegetation and to soften the road edges
- Any landscaping or road batters should be limited to the areas of ground already disturbed.
- Track edges, passing places and the crane hardstanding areas on the opposite sides of the access tracks from the turbine bases that are no longer required would be reinstated post construction through the removal of capping material and the reuse of peat turfs. Where peat turfs are used to reinstate track edges this will be done in a manner to allow works to tie in with the surrounding topography, landscape and ground conditions.
- The design and construction of tracks on peat shall be done in such a way so as to reduce impacts on the existing peat hydrology at the site. The built track should allow for the transmittance of water, so natural drainage can be maintained as far as possible.
- The revegetation of temporary hardstanding areas will depend on the identified reinstatement use and associated vegetation character bounding the areas of restoration, with the aim being to match turfs and topsoil to similar ground conditions. Where appropriate, excess peat turfs, if acrotelm in nature and considered suitable by the ECoW, could be used for screening bunds, landscaping or as part of a HMP in conjunction with reseeding. The seed mix used on site would be agreed with the ECoW and SNH and would use local native species akin to the local ecological baseline.

Borrow Pits

1.91 The five borrow pits that will be developed for the proposed development will be reinstated with a layer of peat at the end of the construction period. This will be undertaken with the following methodology:

- Borrow pit reinstatement using excavated peat will depend on the final restoration profiles of the borrow pit areas and will be subject to the ground conditions close to borrow pits (to be confirmed in the final PMP).
- The borrow pit's design will allow for unconsolidated peat to be used at depths of 1 m or 1.2 m with an acrotelm (turf) top.
- The Contractors method statement will provide information on the intended final restoration profile and method statement for how this is to be achieved, the likely volumes of material required in addition to peat, where the material is to be sourced and hydrology design to create and maintain peat status.
- Borrow pit design will take account of medium and long term restoration objectives relating to habitat and environment. In particular they should be designed such that water levels within the restored habitat can be maintained at or very near ground level.
- Any aggregate removed from decommissioned infrastructure will be put back into borrow pits and covered with an appropriate layer of peat.
- Restored borrow pits should be demarked or fenced off to prevent further disturbance while the ground conditions settled, regrow and stabilise.

Peatland Restoration

1.92 Refer to **Original Appendix 8.5:Outline Habitat Management Plan** for peatland restoration areas. Due to the requirement for certain areas to be felled and then kept open during wind farm operation, these areas are suitable for moorland restoration. Overall, the area available for moorland restoration within turbine buffers comprises 23.6 ha. This figure excludes the direct footprint of the wind farm development. It also excludes any buffers or parts of the buffers which already comprise open moorland; these amount to a total of c.12 ha of habitat (mainly moorland vegetation), which will be retained. Both blanket bog and wet heath restoration will be undertaken.

1.93 The restoration program will include tree felling and water table management (including drain blocking and furrow levelling).

Conclusions

1.94 Based on the peat depth, characteristics and distribution investigations undertaken across the proposed development area and the proposed infrastructure layout, a surplus of peat is not expected to be generated by the proposed development. All estimated excavated peat is planned for reuse for restoration work during the construction, post-construction, and decommissioning phases.

1.95 Further investigation will be undertaken prior to works commencing to confirm peat depth, distribution and characterisation. The additional survey data will be used to inform any micro-siting, if required.

1.96 The Main Contractor, monitored by the ECoW, will maintain a record of actual peat volumes excavated and the subsequent peat reuse to compare the predicted and actual peat volumes. This record during the construction, operation, decommissioning and restoration phases of the wind farm will be made available for review by regulators as and when required.