Appendix H – 9.2 – Outline Peat Management Plan

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1 Introduction

The proposed development of Low Drumclog wind farm lies approximately 2 km to the north of Drumclog and 7.5 km southwest of Strathaven and will require the excavation of peat as identified by the peat depth survey. An outline peat management plan (outline PMP) has been developed to demonstrate that peat can be reinstated on site in an appropriate manner to reduce the impact on the peat resource.

The outline PMP addresses the management of peat during the construction period for the wind turbines and associated infrastructure and the restoration of the site once construction has been completed.

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 peat management plan.

The design of the Low Drumclog wind farm has been undertaken as an iterative process and has been designed to avoid higher value peat habitats and various other environmental constraints including peat slide risk. Deep peat (>1m deep) has therefore been unavoidable but has been minimised as far as possible. A peat survey report has been produced (Appendix H – 9.1) to document the full extent of the peat investigations. The findings of the Peat Slide Risk Assessment are presented in Appendix H – 9.3 of the EIA Report and are summarised in Chapter 9: Geology, Hydrology and Hydrogeology. Details of the iterative design process are presented in Chapter 2 of the EIA Report.

2 Objectives

The outline PMP has been developed to demonstrate that peat has been appropriately considered and will be protected during the design phase of the wind farm and will be carefully managed and preserved throughout the construction and operation periods once the development has been approved.

The outline PMP:

- outlines the overall approach to minimise disruption to peatland that has been taken to date;
- proposes mitigation measures that will minimise any impacts on peat;
- proposes long-term habitat restoration and management plans for areas where peat has been identified;
- demonstrates a commitment that all further opportunities to minimise peat disturbance and extraction will be taken; and
- seeks to identify that any 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.

3 Legislation, Policy and Guidance for Peat Management

3.1 Legislation Policy and Guidance

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:

- Scotland's National Peatland Plan Working for our future. Scottish Natural Heritage (2015).
- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland.
- SEPA Regulatory Position Statement – Developments on Peat. (2010).
- Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste Scottish Renewables, (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.
- Towards an assessment of the state of UK Peatlands, JNCC (2011).
- Carbon Landscapes and Drainage, (2012) 'The Carbon and Water Guidelines' www.clad.ac.uk.

3.2 Role of the Peat Management Plan

The outline 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 follows:

Stage 1: Pre Consent Assessment

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:

- calculation of estimated volumes of excavated peat and potential reuse volume requirements based upon the design of the Proposed Development;

- determine the overall peat balance, and identify whether the generation of excess material can be avoided, and, if not, where reductions in the volumes of excavated materials may be achieved;
- refine layout to avoid areas of deeper peat and therefore reduce carbon impacts associated with construction activities and identify how overarching principles of peat avoidance have been taken into account in the design; and,
- if possible, identify limitations and make recommendations for further site investigation (post-consent) to inform detailed design and any adjustment to the development footprint within permissible limits, such that opportunities for further reductions in excavated peat volumes can be implemented where possible.

Stage 2: Post Consent / Pre-Construction

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

Actual peat volumes excavated during construction will be recorded against the overall predicted volumes provided in Tables 2 to 5 of this outline PMP. The design of the proposed infrastructure 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 Contractor and made available to regulators as required.

Stage 4: Monitoring

Monitoring of restored areas will take place once construction is complete. A site visit would take place annually by an ecologist over a five-year period.

4 Peat Conditions

4.1 Definitions of Peat

Peat is classified as organic material over 0.5m in depth; organic material less than 0.5m depth is not defined as peat. This is in accordance the following guidance:

- 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*;
- The James Hutton Institute defines shallow peat as having 'a prescribed depth of organic matter of 50 – 100 cm'; and
- The 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).

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 H5 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 H8 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. Material should not be stockpiled greater than 1m in height as it can lead to slippage.
- 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.

4.2 Peat Conditions on Site

Investigations

The site was assessed for peat vegetation through desktop review of maps and plans and a number of site walkovers by ecologists and peat surveyors. An intrusive site investigation was also undertaken to determine of peat depth through depth of penetration probing on a variable grid both across the infrastructure footprint and the surrounding area. Selected coring was also completed.

Peat Surveying

The spatial occurrence and depth distribution of peat across the site has been examined extensively based on Guidance on Developments on Peatland (2017): Site Surveys SNH, SEPA, Scottish Government and The James Hutton Institute.

Two rounds of depth of penetration (peat) probing were completed across the site in November 2020 and May/June 2021on a 10m grid at potential turbine and crane hardstanding locations and buffer zones, at 50m intervals with 10m, 30m and 50m offset probes either side along access tracks and on a 20m grid in potential borrow pit areas. This resulted in a total of 2,321 depth probes and 18 cores to verify the probe depth.

The data collected is presented in Appendix H – 9.1: Peat Survey Report and should be referred to for detail on peat characteristics.

The depth of penetration at each probe location is presented on Figure 1 of the Peat Survey Report, Appendix H – 9.1. Based on the data collected an interpreted peat depth map was produced to demonstrate the variation in peat across the site and at the infrastructure locations, as observed within Figure 2 of the Peat Survey Report Appendix H – 9.1. A comparison of the peat depth within the site infrastructure footprint is presented in Table 1.

Table 1: Peat Depth Distribution across New Infrastructure Footprint

Depth Range (m)	Area of New Infrastructure Footprint (m^2)	Area of New Infrastructure (%)
0 to 0.5 (no peat)	33,776	58.4
>0.5 – 1.0	1,565	2.7
>1.0 – 1.5	1,444	2.5
>1.5 – 2.0	591	1.0
>2.0 – 3.0	5,914	10.2
>3.0 – 4.0	7,239	12.5
>4.0 – 5.0	1,271	2.2
>5.0 – 6.0	1,110	1.9
>6.0 – 7.0	1,782	3.1
>7.0+	3,165	5.5
Total	**57,857**	**100**

Note: These values are different from the actual excavation footprint as any excavated track surface will be 6m wide however the actual excavated width would be approximately 12m to allow for drainage and batter slopes. In addition, these figures take into account floating roads and floating crane hardstandings.

The area of infrastructure for the proposed development totals 57,857m^2 with 51.6% located on peat. Deep peat (>1.0m depth) is present across 38.9% of the infrastructure footprint and there is no peat (0 – 0.5m depth) present across 58.4% of the infrastructure footprint. The peat is deep and continuous however it does not cover the whole of the site and therefore some infrastructure has been located away from the peat (Figure 2 of the Peat Survey Report Appendix H – 9.1).

Inspection of the subsurface formation was undertaken through 18 cores, two of these were located in mineral soils. The 16 cores that identified peat all had a distinctive acrotelm layer in all the cores that averaged 0.19m in thickness and ranged between 0.10m and 0.25m. The

catotelm thickness within the cores ranged from 0.55m to >4.8m in depth. The cores verified the probing was representative of peat depth. Descriptions were also noted with respect to its characteristics, including fibre content, decomposition and moisture content.

The Von Post test was also carried out at core locations. Von Post scores for the acrotelm ranged between H2 and H3. A score of H2 is defined by Ekono (1981) as '*Almost entirely undecomposed peat which, when squeezed, releases clear or yellowish water. Plant remains still easily identifiable. No amorphous material present.*' A score of H3 is defined as *'Very slightly decomposed peat which, when squeezed, releases clear or yellowish water. Plant remains still easily identifiable. No amorphous material present.'*

H scores of 5 or more begin to have amorphous material, with significant amorphous material occurring at scores of H9 and above. For the catotelm, Von Post scores ranged between H6 and H8, 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, there is evidence of a significant amount of amorphous and plastic catotelm indicated by Von Post scores of H7 and above, which are less favourable in terms of stability.

No amorphous peat was identified in the coring as no Von Post scores higher than H8 were recorded, however no coring was undertaken below 5m and it is possible that the deeper peat may be amorphous. Fine fibrous content was identified throughout, even in deep peat, and wood was noted in nine of the 18 cores. The peat was also very wet as shown in the high Von Post B scores (mainly B4 and B5).

Habitat Conditions

Habitat mapping was undertaken by Starling Learning.

Bog vegetation is extensive on the deep peat with areas of blanket bog, wet modified bog and dry modified bog. There is some **E1.8 Dry modified bog** around the margins of the main northern peat mass. There, the bog has been the subject of many years of heavy draining and continuous grazing. That has resulted in a more degraded, grassy (graminoid) bog vegetation cover dominated by Hare's-tail Cotton-grass Eriophorum vaginatum defining these grazed bogs as NVC M20.

The best quality bog habitat (**E1.6.1 Blanket bog**) is found in the north eastern part of the site and is of particular note for its species diversity and structure. The bog-mosses can form thick carpets in the frequent bog pools (NVC M2b), some associated with slow-flowing channels and gullies. This vegetation assemblage has affinities to the raised bog community NVC M18, but the frequency of Deer-grass, Purple Moor-grass and Bog Asphodel shows affinities to the western blanket bog community NVC M17, and both codes have been employed at wetter parts, e.g. 'M17-M18'.

In **E1.7 Wet modified bog**, Hare's-tail Cotton-grass can be frequent but Purple Moor-grass Molinia caerulea generally forms the bulk of the vegetation. Where Purple Moor-grass is dominant, the vegetation is referable to NVC M25a. This is a common habitat around margins of the core area of blanket bog, where it occurs on deep peats and with other bog species as associates. The Purple Moor-grass-dominated vegetation is often rather monotonous and tussocky but, rarely, where there is some mineral flushing on shallower peat, associate species

diversity can be higher (NVC M25c – see below Marshy grassland B5 for an example within the study area).

Other mire vegetation is widespread and often forms extensive stands along broad valleys and to the margins of watercourses, and many are fed by drainage (both natural and artificial) from the blanket mires along the summit ridges.

Drainage

There is a network of largely recovered former gullies in the centre of the site which are very soft due to the presence of peat forming vegetation and higher water levels. The intervening areas of peat lie slightly higher and are relatively competent underfoot. The recovered gully network drains outwards, primarily to the south towards Coldwakning Burn, but also east along a single large gully which joins a field drain that passes north of Hallfield. Hummock and hollow macro-topography are present between the recovered gullies in the centre of the site, with a largely planar and featureless surface elsewhere (where artificial drainage dominates).

5 Avoidance and Minimisation of Peat Disturbance

The disturbance of peat 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.

Throughout the construction process, the appointed Contractor 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.

Further measures to minimise peat disturbance will be incorporated in the development and construction process. The following principles 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 to facilitate habitat, ecological and hydrogeological restoration, improvement and enhancement;
- Avoid and/or minimise off site reuse; and
- Avoid waste peat being sent for disposal and/or recovery off site.

All contractors will be made aware of the sensitivity of peat and wetland 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.

Risk Assessment Method Statements (RAMS) will be produced prior to works being undertaken, these will include peat considerations such as minimisation of hydrological and physical disturbance.

6 Excavation and Reuse Volume Estimates and Strategy

The dimensions used in the peat balance calculations are related to the footprint of the proposed excavated wind turbine infrastructure.

The access track will be floated on all areas where peat is present so that no peat will be excavated in this area.

The crane hardstandings will also be floated with piles where the crane outriggers will be placed. These will be driven down into the bedrock and the peat will be displaced sideways so no peat will be excavated.

The borrow pits and construction compound are located in areas of no peat.

6.1 Peat Excavation Areas and Assumptions

The Proposed Development infrastructure dimensions are summarised in Table 2 and are based on the Proposed Development layout GIS shape files provided.

Table 2 – Infrastructure Dimension Final Layout

Infrastructure	Dimensions	Area (m^2)
Turbine 1	Circular – diameter 34.3m	924
Turbine 2	Circular – diameter 34.3m	924
Turbine 3	Circular – diameter 34.3m	924
Crane hardstanding 1	Approximately rectangular 50m x 60m	2,749
Crane hardstanding 2	Approximately rectangular 50m x 60m	2,749
Crane hardstanding 3	Approximately rectangular 50m x 60m	2,749
Borrow Pit 1	Irregular shape	11,796
Borrow Pit 2	Irregular shape	4,415
New Track Excavated	6m width	11,628
New Track Floated	6m width	13,074
Total		**57,857**

It is assumed that drainage will be kept to a minimum to reduce any additional impact on peat however where required it is assumed that these would be 0.5m side slopes of V shaped drains.

6.2 Excavated Volumes

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 detailed probing across the site;
- Dimensions of the proposed areas for excavation of the turbine bases based on the layout shape files provided and slope angles of the surrounding excavation;
- The access track will be floated so no peat will be excavated in this area;
- Crane hardstandings will be floated and piled so no peat will be excavated;
- The borrow pit is located in an area with no peat;
- An estimated acrotelm depth of 0.19 m across the footprint of the turbine 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 (0.19 m) across the footprint of the turbine base where peat is present, and based on the peat core data;
- No occurrence of amorphous peat; and,
- An assumption that the probe depth is representative of the actual depth of the peat (validated by the cores).

The contoured surface of the peat created has been used to determine the average depth of peat under the excavation footprint for the turbine and associated infrastructure and therefore the total volume of peat to be excavated as well as the volume of acrotelmic and catotelmic peat.

The following table presents the peat excavation volumes associated with the three turbine bases. These are based on the cross sections for excavation and foundation installations as shown in Figure 1. The excavation volumes are calculated in Table 3 for each section of the turbine foundation excavation as an inner cylindrical central section and then outer rings with either flat or sloping bases.

Table 3 – Peat Excavation Volumes

Turbine	Inner Radius (m)	Outer Radius (m)	Peat Depth (m)	Sloped or flat	Area (m2)	Volume Excavated (m3)	Acrotelm (m3)	Catotelm (m3)
Turbine 1	0	13	6.02 (depth from peat model)	Flat	528.2	3,181.2	100.4	3,080.8
Turbine 1	13	17	3 to 7 (assumed to be all within peat)	Sloped	375.1	1,875.5	71.3	1,804.2
Turbine 1	17	24	3 (peat deeper than excavation)	Flat	897.1	2,691.3	170.4	2,520.9
Turbine 1	24	34	0 to 3 (peat deeper than excavation)	Sloped	1,817	2,725.5	345.2	2,380.3
Turbine 1						**10,474 m³**	**687.3**	**9,786.2**
Turbine 2	0	20	2.35 (depth from peat model)	Flat	1,250.3	2,940.9	237.6	2,703.3
Turbine 2	20	30	2.3 (depth from peat model)	Sloped	1,565	1,800	297.4	1,502.7
Turbine 2						**4,741 m³**	**534.9**	**4,206.1**
Turbine 3	0	13	3.4 (depth from peat model)	Flat	528.2	1,796.4	100.4	1,696.0
Turbine 3	13	14	3.4 (depth from peat model)	Sloped	84.4	295.4	16.0	279.4

Turbine	Inner Radius (m)	Outer Radius (m)	Peat Depth (m)	Sloped or flat	Area (m2)	Volume Excavated (m3)	Acrotelm (m3)	Catotelm (m3)
Turbine 3	14	21	3 (peat deeper than excavation)	Flat	765.8	2,297.4	145.5	2,151.9
Turbine 3	21	31	0 to 3 (peat deeper than excavation)	Sloped	1,628.3	2,442.5	309.4	2,133.1
Turbine 3						**6,832 m³**	**571.3**	**6,260.7**
All turbines						**22,046 m³**	1,793.5	20,252.5
All excavated peat plus 10% bulking						**24,250 m³**	1,972.8	22,277.8

In addition, an assumed volume of excavated peat is anticipated from the formation of drains alongside infrastructure. Assuming the 0.5m deep V ditch this would amount to a total volume of excavated peat of 0.125m^3 per metre length of drain. It is anticipated that drains would only be installed where completely necessary and an estimated length of drains of 4,000m is considered which would result in a total excavated volume of 500m^3 or 550m^3 with bulking resulting in 423.3m^3 of acrotelm and 117.7m^3 of catotelm.

Total volume of Excavated Peat

The total volume of peat required to be excavated for the project is about 22,550m^3 however it is assumed that this will bulk out by 10% to a volume of 24,800m^3.

The total volume is comprised of:

Acrotelm = 2,405m^3 including bulking.

Catotelm = 22,395m^3 including bulking.

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.

6.3 Peat Reuse Volumes

A significant volume of peat will be placed back into the turbine excavations once the engineering fill, turbine foundation and rockfill berm have been installed.

Excess peat will be placed in the borrow pit located south of the three proposed turbines, adjacent to the access track at 1m depth.

The total reuse volume for the site is presented in Table 4.

Table 4 – Peat Reuse Volumes

Turbine	Inner Radius (m)	Outer Radius (m)	Depth of void (m)	Sloped or flat	Area (m2)	Volume Reinstated (m3)	Acrotelm (m3)	Catotelm (m3)
Turbine 1	11	17	3	Flat	527.8	1,583.4	100.3	1483.1
Turbine 1	17	20.5	0 to 3	Sloped	412.3	618.5	78.3	540.2
Turbine 1	20.5	24	0 to 3	Sloped	489.3	734	93.0	641.0
Turbine 1	24	34	0 to 3	Sloped	1,822.1	2,733	346.2	2387.0
Turbine 1						**5,669 m³**		
Turbine 2	11	13	3	Flat	150.8	452.4	28.7	423.7
Turbine 2	13	16.5	0 to 3	Sloped	324.4	486.6	61.6	424.9
Turbine 2	16.5	20	0 to 3	Sloped	401.3	602.0	76.3	525.8
Turbine 2	20	30	0 to 3	Sloped	1,570.8	2,356.2	298.5	2057.7
Turbine 2						**3,897 m³**		
Turbine 3	11	14	3	Flat	235.6	706.9	44.8	662.1
Turbine 3	14	17.5	0 to 3	Sloped	346.4	519.5	65.8	453.7
Turbine 3	17.5	21	0 to 3	Sloped	423.3	635.0	80.4	554.6
Turbine 3	21	31	0 to 3	Sloped	1,633.6	2,450.4	310.4	2140.1

Turbine	Inner Radius (m)	Outer Radius (m)	Depth of void (m)	Sloped or flat	Area (m2)	Volume Reinstated (m3)	Acrotelm (m3)	Catotelm (m3)
Turbine 3						**4,312 m³**		
All turbines						**13,878 m³**	**1,584**	**12,294**
Borrow Pit 1			1	Flat	11,726	11,726 m³	2,228	9,498
Borrow Pit 2			1	Flat	4,415	4,415 m³	839	3,576
Total Volume Reinstated						**30,019 m³**	**4,651**	**25,368**

Investigations have identified that the proposed borrow pit has the potential to be restored through the placement of peat which would extend the peat habitat. The location presented is the preferred location as it is easily accessible and therefore there is limited risk of additional damage to the habitat due to machinery tracking. The borrow pit is located immediately adjacent to peat habitat and therefore the placement of peat subsequent to excavation of rock allows the peat habitat to expand in this area.

Net Peat Balance

The volume of peat that will be excavated for the project assuming a 10% bulking factor is ~2,405 m^3 of acrotelm, and ~22,395m^3 of catotelm. This volume of peat will be reused around the site, as presented on Figure 9.8 Peat Reuse of the hydrology, hydrogeology and geology chapter, and totals ~30,000m^3 which is based on backfilling the wider areas around the turbine bases and reinstating a 1m depth of peat in both borrow pits of a combined area of over 16,000m^2. The peat placed within the borrow pits will extend the existing adjacent peat habitats.

The volume of peat predicted to be excavated does not exceed the potential reuse volume so no disposal of excess peat off site is expected. The excavated peat volumes and volumes of peat to be re-used are summarised in Table 5 below (values rounded up or down as appropriate).

Table 5: Net Peat Balance

	Acrotelm volume (m^3)	Catotelm / Amorphous volume (m^3)	Total Volume (m^3)
Excavated Peat (includes 10% bulking)	**2,405**	**22,395**	**24,800**
Peat Reuse	**4,651**	**25,368**	**30,019**
Total Balance	**2,246**	**2,973**	**5,219**

The peat balance demonstrates that all peat can be reused in either the turbine reinstatement or the borrow pit reinstatement. There is a lack of acrotelm to cover all of the areas of peat restoration, however it is recognised practice that if hydrological conditions are managed appropriately to maintain a saturated environment, then a patchwork of acrotelm will allow the development of full acrotelm across the restored areas.

7 Handling Excavated Materials

The following methodologies for excavation and temporary storage of peat are proposed but are subject to confirmation once detailed design and construction plans are in place:

- 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 peat earthworks contractor. When excavating areas of peat, excavated turfs will 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.
- Excavated soils and turfs will be handled in order to avoid cross contamination between distinct horizons, for example separating out of peat from soils and peat turfs from acrotelmic and catotelmic peat and to ensure reuse potential is maximised.
- Prior to any excavations, the Contractor will produce additional detail for the PMP as part of the Construction 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 associated with the excavated material in accordance with the Peat Landslide Hazard Risk Assessment.
- Care will be taken when stripping and removing topsoil and peat turfs and appropriate storage methods will be 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 of peat (which may be sub-divided into turf, acrotelm and catotelm/amorphous), peaty soils and mineral soils (subsoil and topsoil).
- 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.

Any areas of temporary storage required for peat will be identified in the Contractors RAMS taking into account constraints and mitigation requirements identified in the environmental information. This will describe any intended drainage, pollution prevention and material stability mitigation measures that may be required. The areas will:

- be located as close to the excavation as practicable to minimise movement;
- avoid all areas of deep peat (peat >1.0m);
- be located ideally on flat areas 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;
- 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;
- located away from any sensitive habitats; and
- in locations where the water table can be kept artificially high.

The temporary stockpiles should be managed as follows:

- 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.
- 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.
- Stockpiles should be bladed off at the side to minimise the available drying surface area.
- Peat will then be removed, stored separately and kept damp. The Contractor will be required to monitor moisture content of stored/stockpiled peat and if it falls below 25% of that in surrounding, intact peat then it will be watered.
- The design and location of stockpiles, including incorporated drainage elements, will be agreed with the ECoW and Clients Engineer prior to excavation works commencing.

8 Reuse of Peat

8.1 Peat Re-use associated with works

Peat reuse on site 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 achieved by the following:

- 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 roads, hardstanding areas or existing disturbed areas wherever practicable. 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.
- 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.
- Any reinstatement and re-profiling proposals will consider, and mitigate against, identified significant risks to environmental receptors. In particular, areas of replaced peat, water management will be considered in the Contractor's RAMS 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.
- Peat turfs should be replaced on all disturbed areas, including constructed roadside drainage channel embankments where possible.

- Any landscaping should be limited to the areas of ground already disturbed.

8.2 Maintaining Saturation

There are a number of critical aspects to any peat restoration programme, however managing and maintaining groundwater levels to keep the peat saturated is essential in order for the peat to not degrade and to allow the peat to develop. If surface water can be managed so that pools can develop in the restored peat, then the conditions for the growth of sphagnum bog mosses will also develop. This is particularly feasible on this site due to the low gradients in the proposed areas of peat restoration that offer good conditions to enable surface water to be easily managed and pooled.

9 Conclusions

Based on the peat depth and characteristics across the area of proposed excavated infrastructure, all peat to be excavated is planned either for replacement in the void where it was excavated (turbine excavations) or for reuse for restoration work of the two borrow pits during the construction phase which will provide the opportunity to extend the peat habitat. Although there is less acrotelm available due to the presence of deep peat it is recognised practice to use the acrotelm as a patchwork across the restored area and by managing the surface water and adding seed mix where necessary it is anticipated that peat vegetation will develop in the spaces.

The Contractor 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 Proposed Development will be made available for review by regulators as and when required.

10 References

Scotland's National Peatland Plan Working for our future. Scottish Natural Heritage (2015).

Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland.

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

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

Towards an assessment of the state of UK Peatlands, JNCC (2011).

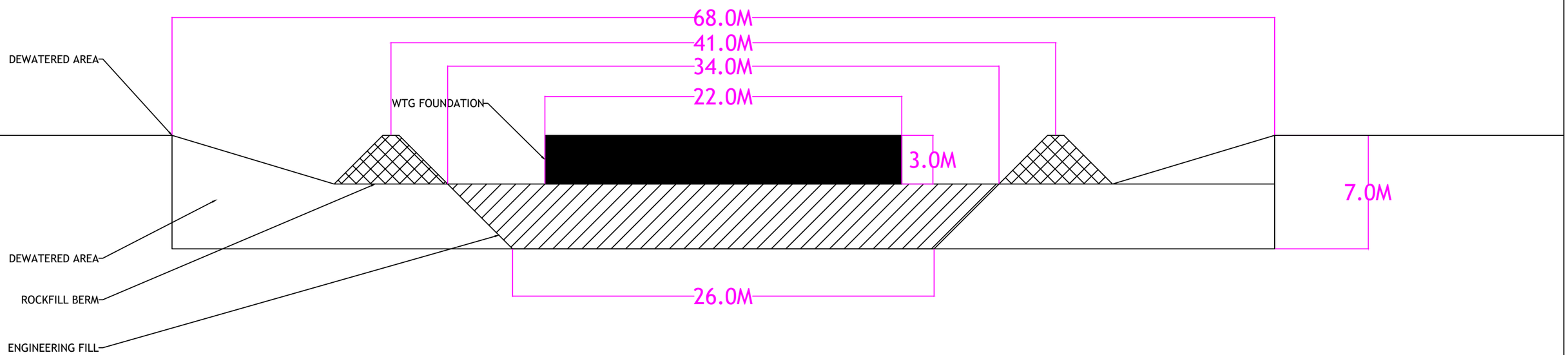
Carbon Landscapes and Drainage, (2012) 'The Carbon and Water Guidelines' www.clad.ac.uk.

The Soil Survey of Scotland (1984)

Understanding the GHG implications of forestry on peat soils in Scotland, The Forestry Commission (2010)

Figures

T1



cleanearth

Clean Earth Energy
Unit 2, Bess Park Rd
Trenant Industrial Estate
PL27 6HB

Tel 01208 455028

Drawing notes

ESTIMATE OF PEAT EXCAVATED 10,848 M^3
ESTIMATE TO BE RELOCATED 5,530 M^3

Rev	Description	Date

Client

XXXX

Project Name

XXXX

Drawing Details

Scale	Drawn	Checked	Sheet
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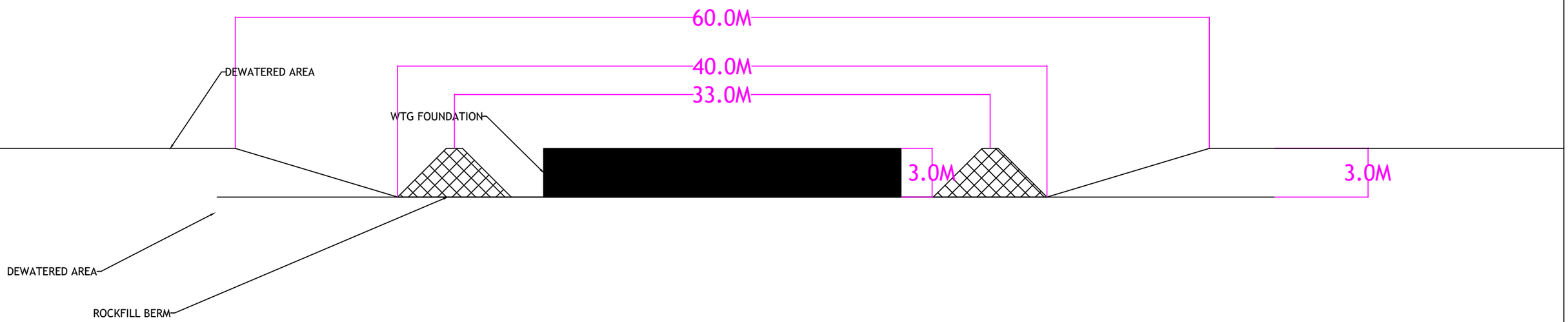
Drawing Number	Rev.
XXXXXX	XXX

T2



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Drawing notes

ESTIMATE OF PEAT EXCAVATED 5,969.03 M^3
ESTIMATE TO BE RELOCATED 2,384.47 M^3

Rev	Description	Date

Client

XXXX

Project Name

XXXX

Drawing Details

Scale	Drawn	Checked	Sheet
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Drawing Number	Rev.
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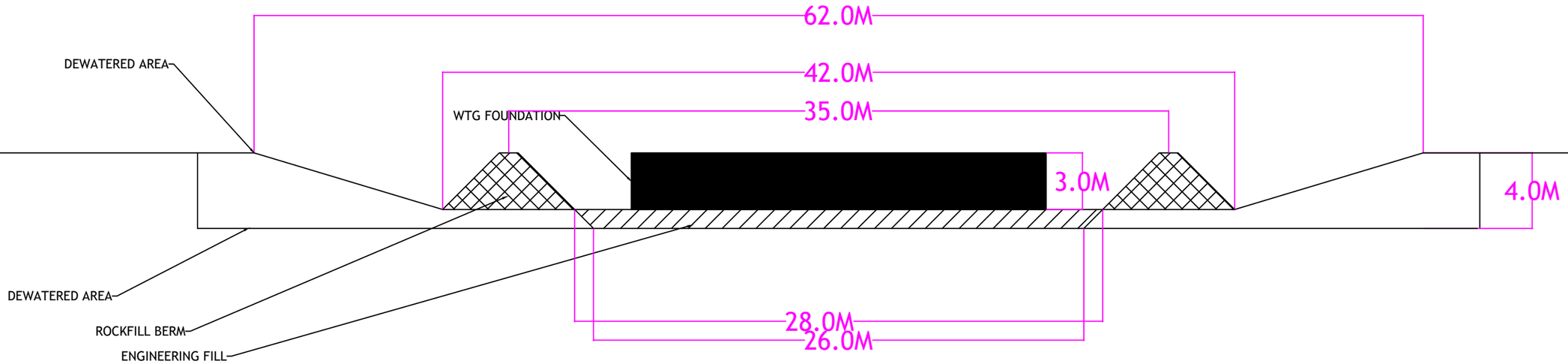
T3



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Drawing notes

ESTIMATE OF PEAT EXCAVATED 7,022.51 M^3
ESTIMATE TO BE RELOCATED 3,026.96 M^3

Rev	Description	Date

Client

XXXX

Project Name

XXXX

Drawing Details

Scale	Drawn	Checked	Sheet
XXXX	XXX	XXX	XXX

Drawing Number	Rev.
XXXXXXXX	XXX