

MYNYDD FFORCH DWM WIND FARM

Soil and Peat Management Plan

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1.0 Introduction

SLR Consulting Ltd (SLR) was commissioned by Naturalis Energy to undertake a Soil and Peat Management Plan (SPMP) for Mynydd Fforch Dwm (MFD) Wind Farm (the 'site'). The site layout is detailed in Figure 01 and Figure 02.

The applicant is currently seeking planning permission for an onshore wind farm comprising six wind turbines with associated infrastructure. It is this proposed development that has been analysed on-site and assessed within this report.

The site is located approximately 6km east of Neath and is centred at National Grid Reference (NGR) SS 821 977. The application boundary occupies an area of approximately 290ha, although only a proportion of this would be occupied by new infrastructure associated with the proposed development.

The proposed development would include the following key components:

- Six wind turbines;
- Associated turbine foundations and hardstanding areas;
- On-site tracks with associated water crossings and turning heads;
- Two on-site substation options;
- Two temporary site construction compounds;
- One area for potential solar development;
- A network of on-site buried electrical cables; and
- Associated ancillary works.

1.1 Scope of Assessment

A programme of soils and peat probing has been completed at the site. This report uses this information and provides indicative volumes for peat extraction and outlines recommendations for the handling, re-use and storage of peat during construction and operation at the site. Areas of the site where soils are less than 0.3m thick are considered to be too thin to be classified as peat and are therefore classified as soils.

Figure 03 shows the areas of the site where soils/peat in excess of 0.3m have been identified. Areas within the site that have been proven to have soil depths of 0.3m or less are not considered as peat within the scope of this SPMP.

The purpose of this report is to ensure that there has been systematic consideration of soil and peat management and to provide an initial quantitative assessment to guide the development process. Specifically, the report is intended to:

- Describe how, through site investigation and iterative design, the proposed development has been structured and designed to minimise, so far as reasonably practicable, the quantity of peat which will be extracted;
- Demonstrate that volumes of peat anticipated to be excavated by the proposed development have been considered; and
- Explain how excavated soil and peat will be managed.

1.2 Legislation, Guidance and Good Practice

1.2.1 Policy and Legislation

Legislation relevant to the management of peat includes the following:

- Future Wales: The National Plan 2040 (2021), Welsh Government;
- Planning Policy Wales (PPW), Edition 11 (2021), Welsh Government;
- Natural Resources Policy (2017), Welsh Government;
- The UK Climate Change Act 2008 (c27);
- The Waste (England and Wales) Regulations 2011; and
- Environmental Protection Act 1990 (as amended).

Legislation in place in Scotland has also been referenced for consideration of best practice:

- Landfill (Scotland) Regulations 2003 (as amended);
- The Waste Management Licensing (Scotland) Regulations 2011; and
- Scottish Planning Policy (2014).

1.2.2 Guidance and Good Practice

The Welsh Government's ambition is that by 2030, renewable sources generate the equivalent of 70% of Wales' energy consumption. New planning applications should consider the carbon cost of constructing a wind farm development with the carbon savings attributable to the wind farm in the long term. When constructing a wind farm on peatlands, it is required that good management practice and guidance would be followed to avoid significant losses of carbon.

Legislation relating to peat environments in Wales is detailed above however, there is no specific guidance relating to the construction of wind farms on areas of peat. A combination of Welsh and Scottish best practice guidance has therefore been used to inform the site layout and SPMP. The SPMP has been undertaken in accordance with this guidance, which is sourced from Scottish Government and the Scottish Environment Protection Agency (SEPA), with relevant reference to Welsh Government policy and guidance throughout.

There are a number of guidance documents appropriate to the activities planned on site which have been used to guide this assessment, including as follows:

- Scottish Government, Scottish Natural Heritage (SNH), SEPA (2017) Peatland Survey. Guidance on Developments on Peatland, on-line version only;
- Scottish Renewables (SR), SEPA (2012), Guidance on the assessment of peat volumes, re-use of excavated peat and the minimisation of waste;
- SEPA (May 2017), SEPA Regulatory Position Statement – Developments on Peat and Off-Site Uses of Waste Peat, SEPA Guidance, WST-G-052, Version 1;
- SR, SNH, SEPA, Forestry Commission Scotland (FCS), Historic Environment Scotland (HES), Marine Scotland Science (2019), Good practice during wind farm construction, 4th Edition;
- SNH, FCS (2010), Floating roads on peat;
- SNH (2015), Constructed Tracks in the Scottish Uplands;
- SEPA (2011), Restoration techniques using peat spoil from construction works;
- Countryside Council for Wales (CCW) (2010), Guidance Note: Assessing the Impact of Windfarm Development on Peatlands in Wales; and
- NRW, Peatlands learning resource accessed on NRW's website via:
<https://naturalresources.wales/guidance-and-advice/business-sectors/education-learning-and-skills/looking-for-learning-resources/learning-resources-search-by-topic/peatland-bogs/?lang=en>.

2.0 Methodology

The SPMP considers the excavation of soil and peat across the site as a result of construction of the proposed development. Evolution of the layout for the site has taken into consideration the results of peat depth probing detailed in Section 3.2 and aspects of the layout have been altered to avoid deeper areas of peat on site. The SPMP considers the potential for minimising excavation and disturbance in order to reduce any unnecessary surplus of soils and peat.

2.1 Design Principles

SEPA has provided a hierarchy of management approaches through which the effectiveness of the approach to peat management is optimised at development sites, as summarised below. The SEPA guidance can be considered applicable in peatland contexts outside Scotland.

The objectives have been achieved by completion of the following:

- **Prevention:** The best management option for waste peat is to prevent or limit its production. This can be done through design, positioning infrastructure in shallower peat or through consideration of alternative construction methods or engineering solutions e.g., floated roads or piling solutions;
- **Reuse** (onsite or offsite for peatland restoration): Using excavated peat in construction or reinstatement (where suitable) e.g., restoration of temporary hardstanding areas, verge reinstatement, screening bunds, peatland restoration etc;
- **Recycling/Recovery/Treatment:** Where peat cannot be reused onsite or offsite for restoration, it may be used for agricultural benefit or treated/blended with other materials to form a soil substitute or used in other relevant works. This use would require a waste management license or registration as an exempt activity and compliance with the legal requirements;
- **Storage:** Temporary storage of peat onsite (for example, during short periods in the construction phase) and then reuse. Should the peat become unsuitable for reuse during storage, it would be classed as a waste material;
- **Disposal** (Waste): Only after all other options have been explored and discounted would this option be considered.

Three main stages within the development process are defined within the guidance and describe what data should be gathered and assessed to inform the site specific SPMP:

- Stage 1: Environmental Impact Assessment (EIA);
- Stage 2: Post-consent/pre-construction; and
- Stage 3: Construction.

In line with the guidance detailed above, this report has been prepared in accordance with the requirements for a Stage 1 SPMP. A detailed SPMP would be prepared post-consent, in advance of construction and would be informed by detailed ground investigation.

This report presents site-specific data and proposals to address the requirements of SEPA's guidance and proposes that **prevention** and **re-use** are the most appropriate means of managing soils and peat excavated during construction at this site. Some temporary **storage** will be considered for any peat not re-used in restoration of temporary construction areas, prior to use for habitat restoration.

This report details the methodologies required to assess all potential surplus materials and presents preliminary estimates of the expected volume of excavated materials and required re-use volumes for reinstatement and restoration purposes.

The initial estimate of peat to be excavated is considered to be conservative. Unless indicated otherwise, all areas of the site where infrastructure is situated on soils and peat with a probe depth of greater than 0.3m is considered to be peat within this report. In reality these areas will likely be a combination of mineral soils and peat. Further refinement of initial calculations within this report will be carried out following post-consent ground investigations.

In particular, this report considers the construction of access tracks, site compounds, turbine foundations and all other associated infrastructure which would result in the excavation of peat and sub-soils potentially resulting in surplus materials.

Many of the issues associated with peat on a wind farm site can be accommodated by modifying the development layout to avoid potentially difficult or sensitive areas. Such areas would include:

- Areas of deep peat, requiring potentially large volumes of excavation;
- Areas of very wet peat (such as flushes, pool and hummock complexes and gullied peatland);
- Areas of moderate to steep slopes (where site infrastructure might increase the chance of peat instability); and
- Areas of sensitive habitat.

Design evolution for the site has taken all of the above points into consideration and the layout of infrastructure has been revised accordingly.

This report estimates the extent of materials generated during the construction phase and identifies potential areas where soils and peat can be re-used as part of the following process:

- The avoidance of creating surplus materials;
- Re-use of materials on site; and
- Re-use of materials off-site for habitat restoration.

The aim of the Stage 1 SPMP is to ensure that there has been systematic consideration of soil and peat management and that a quantitative assessment takes place throughout the development process.

- How, through site investigation and iterative design, the Proposed Development has been structured and designed to minimise, so far as reasonably practicable, the quantity of peat which will be extracted;
- That volumes of soils and peat anticipated to be excavated by the proposed development have been considered; and
- How excavated soil and peat will be managed.

3.0 Baseline Conditions

3.1 Definitions of Peat

Peat is defined as an organic soil consisting of the partially decomposed remains of plant material and organic matter preserved over a period of time in a waterlogged environment. In peatland areas, when surface vegetation dies, it does not decay completely as the remains become waterlogged due to regular rainfall. The effect of waterlogging is to exclude air, creating anaerobic conditions which limit the degree of decomposition. Consequently, instead of decaying to carbon dioxide and water, the partially decomposed material is incorporated into the underlying material and the peat is formed in-situ over time.

National Resources Wales (NRW) defines peat soils in line with the Soil Survey of England and Wales definition which is confirmed within NRW's National Peatland Action Programme¹. This includes transitioning peaty soils integral to the hydrological functioning of wider peat bodies.

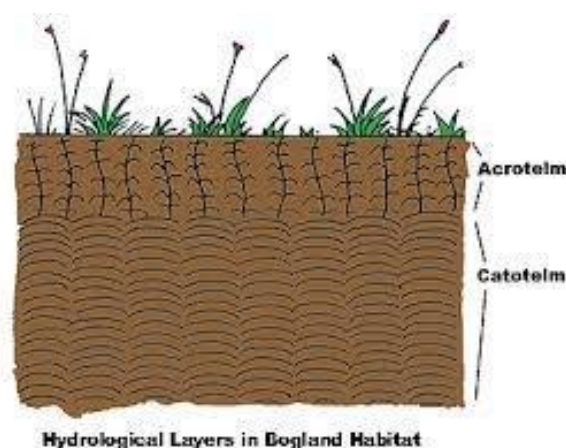
Peat soils are defined as soils with:

- more than 40 cm of organic material within the upper 80cm, excluding fresh litter and living moss; or
- more than 30 cm of organic material resting directly on the bedrock or extremely stony material; and
- no overlying non-humose material mineral horizon that has a colour value of 4 or more and extends below 30cm depth.

Deep peat is generally applied to peats of 0.3m or greater. This differs slightly from SEPA guidance which defines peat to be an organic soil in excess of 0.5m with deep peat classed as peat with depths greater than 1.0m.

Peat can be classed as two principal types, the acrotelm layer, and the catotelm layer as shown on Plate 3-1 and described in the following paragraphs.

Plate 3-1
Hydrological Layers in Bogland Habitat



The acrotelm layer is found in the upper layer of peat where conditions are relatively dry and comprises living vegetation and partially decomposed plant material. Hydraulic conductivity in this layer tends to be higher in relation to distance from the water table.

¹ National Peatland Action Programme 2020-2025, NRW, 2020

The thickness of the acrotelm layer varies depending on topography such as steepness of slope, peat hags, and hummocks. In particular, the acrotelm layer can be affected during periods of drought or as a consequence of drainage. Fibrous in texture, the acrotelm layer has some tensile strength and is generally considered to be stable for storage and re-use.

The catotelm layer is found under the acrotelm layer and comprises decayed plant material and organisms and is denser and with a very low hydraulic conductivity. The catotelm layer sits below the water table resulting in permanent anaerobic conditions. The catotelm layer is amorphous and has very low tensile strength making it less suitable for storage and re-use.

3.2 Peat Conditions

Data from the Peatlands of Wales mapping² indicates that there are no peat deposits on the western Mynydd Blaenafon (MB) area of the site and peat on the eastern Mynydd Fforch Dwm (MFD) area is limited to the eastern extent of the site, coinciding with the proposed location of Turbine T3 and two smaller isolated areas on the west of the MFD plateau, south of Turbine T6.

Chapter 9: Ecology of the Environmental Statement states that habitat surveys identified areas of wet modified bog within the eastern extent of the MFD area of the site and areas of marshy grassland on the MB area plateau and in the east of the MFD area. The surveys consisted of an Extended Phase 1 Habitat Survey undertaken in 2019 (MFD area) and 2021 (MB area), to inform the development proposals.

Peat depth surveys were undertaken in order to inform the design of the infrastructure layout, with development located away from areas with deep peat where achievable. Surveys were conducted in April 2022 and August 2022. Phase 1 peat probing resulted in probing on a 100m grid to allow for initial assessment of the site which was used in preliminary site layout designs. Phase 2 probing saw detailed probing undertaken across the proposed layout, focussing on access tracks, turbine locations and other site infrastructure.

The results of the probing survey are detailed within Figure 03 with a summary of peat depths included within Table 3-1 below.

Table 3-1
Peat Probe Data

Peat Thickness (m)	No. of Probes	Percentage (of total probes undertaken on-site)
0 (no peat)	37	4.5
0 – 0.29	386	46.8
0.30 – 0.49	190	23.1
0.50 – 0.79	158	19.2
0.80 – 0.99	33	4.0
1.00 – 1.49	14	1.7
1.50 – 1.80	6	0.7

In summary the peat depth probing has shown that:

- The peat was found to vary across the site in terms of thickness, surface slopes and apparent characteristics;

² Available at <https://smnr-nrw.hub.arcgis.com/apps/d18ef8c74ecc4dc4a0cbf71ab69355ba0/explore> [Accessed May 2023]

- Peat thickness varies from zero to 1.8m across the site with an average depth of 0.3m;
- The geomorphology of the peat across the site is generally of thinner drier deposits blanketing the plateaus and undulating slopes with small, localised areas of apparently thicker peat with higher moisture content; and
- There are limited peat deposits across the site with over 50% identifying soil less than 0.3m in depth.

The probing surveys and sampling undertaken by SLR identified the following profiles within the peat:

- Soft to firm from surface to base of peat;
- Relatively firmer, vegetative root system at surface to approximately 0.5m, underlain by slightly softer, partially waterlogged peat to base;
- Vegetation still present to base of peat and clearly identifiable; and
- Peat generally not humified at depth.

Where possible, the deeper areas of peat have been avoided. During consultation NPTCBC indicated that the proposed development infrastructure (including internal roads) and construction areas are not to be located within areas where peat is found to be at a depth higher than 0.5 m. Where this is not possible mitigation measures as set out within this SPMP should be adopted. The proposed infrastructure has been designed to avoid areas of peat with depths greater than 0.5m where possible, taking into account other environmental and engineering constraints.

Table 3-2 below shows the peat thickness at each proposed turbine location. Further detail regarding soil and peat depths in relation to proposed infrastructure is included in Appendix 01.

Table 3-2
Ground Conditions at Proposed Turbine Locations

Turbine No.	Peat Thickness (m)	Substrate	Slope (°)
T1	0.43	Granular	4.7
T2	0.20	Rock	2.6
T3	0.45	Rock	3.6
T4	0.26	Granular	5.8
T5	0.20	Rock	5.8
T6	0.19	Granular	6.8

Soil depths recorded during the surveys recorded a maximum of 1.8 m based on probing and shallow soil samples were observed at a number of locations to confirm the presence or absence of peat and the degree of humification. The attributed depths from the probing survey are presented in Figure 03. Areas of deeper peat are typically found on the plateaus with depths generally of up to 1.0 m. In areas of steeper topography the topsoil is present to up to 0.5 m depth.

The distribution of peat depths detailed in Figure 03 shows an area of deeper deposits towards the centre of the plateau within the MB area of the site. The maximum depth recorded during the Phase 1 survey was 1.5 m. Phase 2 surveys along the access track route and around Turbine T1 location identified further, more isolated, areas of deep peat up to 1.0 m in depth. The design of the development was amended in these locations in order to move infrastructure onto shallower areas of peat. Samples of the soil on the MB plateau revealed moderately decomposed peat at shallow depth, with lighter colouration and a Von Post score between H3 and H5. On the survey points indicating a shallower depth, the samples of soil trended towards mineral soils below 0.3 m depth. Vegetative structure of plants were evident throughout the peat with no amorphous peat evident.

Photo 3-1 Sample of shallow peat in centre of plateau within MB area of site



On the MFD area peat is generally restricted to the eastern extent of this part of the site. The maximum depth recorded during the Phase 1 survey was 1.8 m. All aspects of the proposed development apart from the eastern extent of the development (Turbine T3) are generally on areas where depth of probing was <0.45 m. Phase 2 peat probing was carried out to inform the final positioning of Turbine T3 which is now situated such that the turbine location and associated crane pad are on areas where peat depths are <0.5 m.

Samples of the soil at the east of the MFD plateau revealed moderately decomposed peat at shallow depth, with brown colouration and a Von Post score between H3 and H6. Land to the east of the proposed development showed darker soils and some areas of more decomposed peat.

Photo 3-2 Sample of peat at the eastern extent of MFD area of site north of Turbine T3



Photo 3-3 Sample of peat at the eastern extent of MFD area of site east of Turbine T3



3.2.1 Summary

The peat probe surveys have identified a range of soils and peat overlying rock or granular substrate, in thicknesses varying from zero to 1.8m across the site. There are limited peat deposits across the site with over 50% of surveyed points identifying soil less than 0.3m in depth. In general, the geomorphology of the peat across the site is of thinner drier deposits blanketing the undulating slopes with small, localised areas of thicker peat with higher moisture content on the MB plateau and to the east of the MFD area of the site. There was a lack of amorphous peat evident in all samples observed indicating little evidence of an acrotelm/catotelm structure to the peat habitats present on site.

Much of the proposed infrastructure on the MFD area of the site is situated on agricultural land that is likely to comprise mineral soil and vegetation/turf over shallow weathered bedrock, with limited excavation of soils or peat proposed.

Where peat excavation is required, on the MB area of the site and to the east of the MFD area, depths are generally less than 0.5m and likely to comprise acrotelmic peat. It is considered unlikely that there will be amorphous, catotelmic peat excavated as part of the development proposals.

As identified in Figure 03, the areas of deeper peat are located on land with shallow / flat slopes and therefore where peat slide risk is negligible. Additionally, all proposed development is situated in areas where peat depths are less than 1.0 m or on areas of no peat. A peat slide risk assessment is therefore not considered necessary.

4.0 Potential Impacts on Peat from Construction Activities

The design process for development of the wind farm has minimised the potential for impact on peat and requirement for excavation of peat – while taking account of other constraints. This has been informed by desk study, walkover observations and targeted peat depth survey work.

The following activities are likely to generate excavation of peat during the construction process:

- Wind turbine foundations;
- Crane hardstandings;
- Substation and construction compounds;
- Access tracks; and
- Cable trenching.

There are no borrow pits proposed as part of this development.

4.1 Wind Turbines

Wind turbine foundations in peatlands would normally require full and permanent excavation of peat to competent strata, with temporary excavation of peat from a wider diameter to enable safe access to the base of the excavation.

The resulting peat generated could be considered as a permanent loss, unless satisfactory re-use could be achieved within the development site. Some of this peat would normally be used to partially reinstate track shoulders, around crane hardstandings and turbine bases, dependent on the suitability of excavated turf and acrotelm peat layer.

4.2 Crane Hardstanding

In order to assemble the wind turbine and enable servicing during operation, crane pads are constructed adjacent to each wind turbine. These must be sufficient to take the weight of both the crane and turbine components, and therefore excavation to underlying competent strata is required.

Crane pads must remain in place for the life of the Proposed development to enable routine inspection and maintenance. Peat generated from these excavations would be considered a permanent loss, unless satisfactory re-use could be achieved within the development site, dependent on the suitability of excavated turf and acrotelm peat layer.

4.3 Substation and Construction Compound

Temporary compounds are provided during the construction phase to enable storage of construction materials, turbine components and fuel, concrete batching plant, siting of welfare facilities and site offices.

Should peat be excavated during the construction of the proposed substation, this peat would be considered a permanent loss if it cannot be reused onsite.

Due to their temporary nature, peat excavated for compounds would normally be stored locally and reinstated, and therefore re-use is required.

4.4 Access Tracks

Access tracks are required to enable passage of construction and servicing traffic around the site. Over peatlands, the choice of access track design normally reflects the peat depths along the route, with shallow peat/organic soils <1 m deep excavated to competent strata (cut and fill tracks), and deeper peats overlain by

floating tracks (with no excavation). No floating tracks are anticipated as part of these development proposals as all access track is on peat with depths less than 1.0m, and in most cases, substantially less than this.

Access tracks are permanent infrastructure, peat excavated for cut and fill would be considered a permanent loss, unless the peat can be re-used elsewhere on site.

If following more detailed investigations any sections of floating track are deemed necessary, no excavations would be undertaken, and therefore there is no associated peat excavation.

In excavated tracks, the surface vegetation (i.e. habitat) would be lost unless stored and reinstated elsewhere, however the intention would be to re-use excavated turves on verges and track shoulders and hardstandings for landscaping and restoration purposes. Where areas of peat are identified, this would only be re-used for reinstatement where the excavated acrotelm is already dry and where adjoining habitats to the area being restored is of the same dry habitat.

Access tracks have the potential to disrupt natural hydrological drainage pathways, appropriate drainage would be designed to mitigate this.

4.5 Cable Trenching

Electrical cabling is typically buried or ducted adjacent to the proposed access track network where practicable (cable trenching). The grid connection cable would similarly be buried or ducted within trenches along the final selected route. Where excavation is required for trenching, peat generated from these works is normally replaced at its point of origin, and therefore is not considered a volume loss and re-use is a certainty.

5.0 Proposed Mitigation During Construction

There are four main types of impact on peat which can occur during construction. These are:

- Loss of structural integrity and peat strength, due to stripping off or damaging the surface vegetation turf, excavation, handling and transporting peat (particularly wet, subsurface peat);
- Erosion and gully, caused by exposure and desiccation of bare peat surfaces primarily caused by water erosion, due to surface runoff after rainfall;
- Contamination, caused by leaks, spillages or inappropriate laydown of materials; and
- Peat slide, caused by laying wet peat on top of wet peat, laying other heavy materials (including excavated mineral soil or other construction materials) on top of wet peat or by inappropriate stockpiling, such as attempting to create stockpiles of peat that are too high, without bunding, engineering or geotechnical support.

5.1 Development Specific Mitigation

There are a number of ways in which detailed design and construction activities can be specified to prevent or minimise these impacts from occurring. The following sections outline briefly the likely mitigation required to minimise impact, based on the re-use of peat specific to key elements of the proposed development.

5.1.1 Wind Turbine Foundations

Wind turbine foundations represent permanent excavation and the primary mitigation measure is to locate the wind turbines to avoid the areas of deepest peat, thereby reducing excavated volumes. Appendix 01 details peat depths in relation to proposed infrastructure. The average peat depth at turbine locations is 0.29m, ranging from 0.19 to 0.45m. Peat is present at the location of Turbine T1 and Turbine T3 only and the positioning of these aspects of the development has been guided by the results of the peat probing surveys.

5.1.2 Crane Hardstandings and Temporary Compounds

In relation to crane hardstanding, guidance is to avoid their full reinstatement post-construction, given the likelihood of re-use for maintenance activities associated with the wind turbines.

In relation to temporary compounds, the following good practice guidance applies:

- Peat stripped from compound and hard standing areas would not be stored higher than 1m and could require to be seeded in the short term to prevent drying out, if stored for longer residence times;
- Stripped turves are used for final restoration, however where turves are insufficient or vegetation regeneration requires reseed, temporary fencing may be considered around compound areas undergoing restoration in order to prevent grazing; and
- The choice of seed mix for reseed should be appropriate to the ecological and hydrological conditions of the restored compound location and surrounding habitats and should be advised by the Ecological Clerk of works.

Peat is present at the location of the crane hardstanding for Turbine T1 and Turbine T3 only and the positioning of these aspects of the development has been guided by the results of the peat probing surveys. Peat probing results at Appendix 01 show shallow depths and no peat at the temporary construction compounds.

5.1.3 Access Tracks

In comparison to infrastructure specific to wind turbines, there is considerably more guidance, as set out in Section 1.2, available to support access track design in peatlands. Guidance is generally focused on excavated and floating track designs and is summarised below.

For all types of track the following should be followed:

- Prior to construction works, the setting out the centreline of the proposed access track to identify any ground instability concerns or particularly wet zones;
- Identifying 'stop' rules, i.e. weather dependent criteria for cessation of access track construction based on local meteorological data; and
- Maximising the interval between material deliveries over newly constructed access tracks that are still observed to be within the primary consolidation phase.

The calculations at Appendix 01 are based on an average depth of probing along the new excavated tracks. The average depth of probing is less than 0.3m, indicating that there is no peat along the track alignment. It is noted however that two short sections of track cross peat with a depth slightly greater than 0.3m:

- The track to Turbine T1 has been realigned to avoid an area of deeper peat associated with a small mire feature (M25b). The realigned section of track crosses peat with a depth of up to 0.5m for a short section; and
- The track to Turbine T2 passes to the south of the area of deeper peat towards the centre of MB plateau. This section of track has been realigned as far as possible to avoid the deeper peat, however is also constrained by the new Glastir grant plantation within the MB plateau. A short section of the track crosses peat up to 0.7m in depth.

These depths are at the lower limit of what is typically feasible for floating construction and the track lengths that overlap with peat are sufficiently short that the transition track sections from excavated to floating track and back again would result in little benefit from floating in these two sections.

The evolution of the site design is discussed in more detail within the ES at Chapter 4.0: Scheme Description, Alternatives and Design Evolution.

Excavated Access Tracks

Excavated tracks require complete excavation of soil/peat to a competent substrate. Excavated tracks would generally be undertaken where peat depths are typically less than 1.0m. This peat/soil would require storage ahead of re-use elsewhere on site in line with storage guidance detailed in Section 5.2.2, which would ensure the integrity of the peat is retained and there is no peat loss.

Good practice guidance relating to drainage in association with excavated tracks:

- Trackside ditches should capture surface water (within the acrotelm) before it reaches the road;
- Interceptor drains should be shallow and flat bottomed (and preferably entirely within the acrotelm to limit drawdown of the water table);
- Any stripped peat turves should be placed back in the invert and sides of the ditch to assist regeneration and prevent erosion to the peat and wash out that could occur; and
- Culverts and cross drains should be installed under excavated tracks to maintain subsurface drainage pathways (such as natural soil pipes or flushes). Discharge from constructed drainage should allow for as much diffuse dispersion of clean (silt free) water as possible while minimising disturbance to existing peatland as far as possible. Silt mitigation measures will be incorporated into all constructed drainage.

Although excavation is normally undertaken in peat of minor thickness, there is a possibility of minor slippage from the cut face of the peat mass. Accordingly:

- Free faces should be inspected for evidence of instability (cracking, bulging, excessive discharge of water or sudden cessation in discharge); and
- Where significant depths of peat are to be stored adjacent to an excavation, stability analysis should be conducted to determine an acceptable factor of safety (FoS) adopted for loaded areas.

Regular routine monitoring should be scheduled post-construction to ensure that hydrological pathways and track integrity have been suitably maintained.

Use of Soil and Peat as Trackside Shoulders

Excavated soil will generally be reused on site to reinstatement and landscaping of constructed access tracks. Some limited re-use of peat for trackside reinstatement can be considered using good practice for reinstatement at the margins of an access track under the following conditions:

- Peat is only re-used at the edges of tracks if:
 - there is valid need and it provides an environmental benefit, e.g. reduces or buffers runoff, encourages habitat restoration, stabilises verges, minimises visual impact;
 - re-used peat consists of turves and drier acrotelm peat only, which is anticipated on this site;
 - widths of reinstated verges are kept to a minimum, defined on a case by case basis and be fully justified;
- Care should be taken when forming verges and landscaping with soil and peat so as not to over-deposit arisings to the detriment of the works. Therefore, low verges are used on the sides of the track to permit any surface water to drain naturally, and diffusely, where it arises;
- Reinstatement is only applied in stretches of low longitudinal track gradient (e.g. $<5^\circ$) to ensure stability, with batters used to form stable slopes;
- Rapid revegetation of the soil and peat surface through the use of stored turves or re-seeding is encouraged to stabilise the reinstated area and minimise erosion;
- Buffer zones are maintained around surface water bodies where no peat restoration is carried out; and
- Verges may also be suitable locations for burying cables to avoid excavating cable trenches in undisturbed peat material. If this is planned, then the verges should be constructed wider to accommodate the cabling.

Careful assessment and selection of peat by the ECoW to be used for reinstatement, in line with the guidelines set out above, will ensure that peat integrity is retained and there will be no loss of peat through this process.

Floating Access Tracks

The use of floating access track is not anticipated as part of these proposals. If following further, more detailed site investigations, a requirement for floating track is deemed necessary, the following guidance should be followed.

Over deeper peat (typically $>1.0\text{m}$), floating tracks are used to remove the requirement for peat excavation and limit disruption of hydrological pathways. The success of construction requires careful planning to take account of the unique characteristics of peat soils. Specific guidance is available on design, the duration and timing of construction, the sequence of construction and the re-use of peat on the shoulders of the floating access track. Floated tracks will be utilised where possible when peat depths of greater than 1.0m are identified along with shallow topography in the area (generally below 5%) and the section is long enough to make floating track appropriate.

Design of Floating Access Tracks

The following issues should be considered during detailed design of floating access tracks:

- Adopting conservative values for peat geotechnical properties during detailed design (post-consent);
- Applying a maximum depth rule whereby an individual layer of geogrid and aggregate should not normally exceed 450mm without another layer of geogrid being added;
- On gently sloping ground and where the access track runs transverse to the prevailing slope, accommodating natural hydrological pathways such as flushes and peat pipes through installation of a permanent conduit within or underneath the track and allowing for as much diffuse discharge (while minimising disturbance to existing peatland) on the downslope as possible;
- Ensuring transitions between floating tracks and excavated tracks (or other forms of track not subject to long term settlement) are staged in order to minimise likelihood of track failure at the boundary between construction types;
- Scheduling access track construction to accommodate for, and reduce peat settlement characteristics; and
- Re-use of existing roads (with upgrading if required), where possible.

Duration and Timing of Construction of Floating Access Tracks

The critical factor in successful construction of floating access tracks is the timescale of construction, and the following good practice guidance is provided:

- The settlement characteristics of peat; should be accommodated by appropriate scheduling of access track construction, as follows:

Sequence of Construction

The sequence of construction is normally stipulated in guidance provided by the supplier of the geotextile or geogrid layer, and suppliers are often involved in the detailed access track design. Good practice in relation to the sequence of access track construction is as follows:

- Retaining rather than stripping the vegetation layer (i.e. the acrotelm, providing tensile strength), and laying the first geotextile/geogrid directly on the peat surface;
- Adding the first rock layer;
- Adding the second geotextile/geogrid, and add overlying graded rock fill as a running surface;
- Heavy plant and Heavy Goods Vehicles (HGV) using the access tracks during the construction period should be trafficked slowly in the centre of the track to minimise dynamic loading from cornering, breaking and accelerating;
- Ensuring wheel loads should remain at least 0.5m from the edge of the geogrid, markers should be laid out, monitored and maintained on the access track surface to clearly emphasise these boundaries; and
- Ongoing 'toolbox' talks and subsequent feedback to construction and maintenance workers and drivers to emphasise the importance of the implementing the above measures.

Re-use of Peat as Trackside Shoulders

There is potential for re-use of excavated peat (from other areas of the site) in landscaping of floating access tracks. Wedge-shaped reinstatement at the margins of a floating access track (which is elevated above the peat surface) is termed shoulders, and good practice guidance is as follows:

- Peat is only re-used at the edges of tracks if:

- there is valid need and it provides an environmental benefit, e.g. reduces or buffers runoff, encourages habitat restoration, stabilises verges, minimises visual impact;
 - re-used peat consists of turves and drier acrotelm peat only, which is anticipated on this site;
 - widths of reinstated verges are kept to a minimum, defined on a case by case basis and be fully justified;
- Re-using peat excavated from elsewhere on site as shoulders adjacent to the floating track;
 - Peat shoulders should taper from just below the track sides (thereby preventing over high shoulders from causing ponding on the track surface) to join the surrounding peat surface, keeping as natural a profile as possible to tie in with existing slope profiles;
 - Limiting the width of peat shoulders to avoid unnecessary smothering of intact vegetation adjacent to the floating track;
 - Peat must not be laid too thinly (minimum 0.5m) to avoid drying out;
 - Peat must not be compressed during reinstatement to prevent cracking; and
 - Where possible these should be capped with turves or seeded as quickly as possible to prevent run off erosion and should not be left bare for excessive periods.

5.1.4 Cable Trenches

Cable trenches either require soil/peat excavation specifically for this purpose, or they could be constructed within landscaping of shoulders adjacent to floating tracks. Guidance is as follows:

- Utilise trackside shoulders for cable lays where possible to minimise peat excavations specifically for this purpose, in this case, peat shoulders should be 1.0m to 1.5m thick;
- Where cable trenching is constructed adjacent to a floating road, ensure the trench is backfilled to prevent void filling by material migration;
- Minimise time between excavation of the cable trench and peat reinstatement, preferably avoiding excavation until the electrical contractor has cables on-site ready for installation; and
- Avoid incorporating substrate materials in the excavation, to minimise contamination of the peat to be reinstated. Replace excavated materials sequentially.

5.2 General Mitigation Measures

Where peat is to be re-used or reinstated with the intention that its supported habitat continues to be viable, the following general good practice for excavation, transport and storage of peat, outlined below, applies.

5.2.1 Excavation

The acrotelm (including the vegetated turves) layers of peat should be recognised during peat excavation and reuse activities and stored separate to any catotelm peat encountered during excavations. For excavation works the following good practice applies:

- Peat should be excavated as turves, including the acrotelm (surface vegetation). Any adjoining catotelm (more humified peat) encountered will be stored as blocks of catotelm;
- The acrotelm should not be separated from its underlying peat;
- The turves should be as large as possible to minimise desiccation during storage, though the practicalities of handling should be considered;
- Contamination of excavated peat with substrate materials to be avoided at all times through separate storage and transport; and
- Consider timing of excavation activities to avoid very wet weather and multiple handling to minimise the likelihood of excavated peat losing structural integrity.

If possible, extract intact full depth acrotelm layers from the top surface of the peat deposit. This technique would maintain connectivity between the surface vegetation and the partially decomposed upper layers of any catotelm present at lower levels.

5.2.2 Storage

Peat storage will only be required where reinstatement is not immediately possible, and stored peat should be reinstated at the end of the construction phase. Some temporary storage of peat for habitat restoration purposes may be required for slightly longer dependant on the proposed habitat restoration works.

To ensure that the storage locations are suitable in terms of environment, construction practicality and safety, the precise location of temporary peat stockpiles should be determined at a site level following consideration and assessment of suitable areas by the ECoW, geotechnical engineer and contractor using the guiding principles below:

- To minimise handling and haulage distances, excavated material should be stored local to the site of excavation or end point of re-use or restoration;
- Peat turves should be stored in wet conditions or irrigated in order to prevent desiccation (once dried, peat will not re-wet);
- Stockpiling of peat should be in large volumes to minimise exposure to wind and sun (and desiccation), but with due consideration for slope stability (should not exceed 1m in height to maintain stability of stockpile);
- Stockpiles should be isolated from watercourses or surface drains with appropriate bunding to minimise pollution risks;
- Excavated peat and topsoil stored separately, should be stored to a maximum of 1m thickness;
- Stores of non-turf (catotelm) peat should be bladed off to reduce the surface area and desiccation of the stored peat; and
- Peat storage areas should be monitored during periods of very wet weather, or during snowmelt, to identify early signs of peat instability.

5.2.3 Temporary Storage around Infrastructure

Any peaty soils/peat to be removed during construction would require a temporary storage area near to the construction works/area of re-use. Where peat cannot be transferred immediately to an appropriate restoration area, short term storage will be required. In this case, the following good practice applies:

- Peat should be stored around the turbine perimeter at sufficient distance from the cut face to prevent overburden induced failure;
- Local gullies, diffuse drainage lines (or very wet ground) and locally steep slopes should be avoided for peat storage; and
- Drying of stored peat should be avoided by irrigation and/or by seeding (although this is unlikely to be an issue for peat materials stored less than two months).
- Any peat generated from crane pad locations should be transported directly to its allocated re-use or restoration location, to minimise the volume being stockpiled with the possibility of drying out;
- Stores of catotelmic peat (if encountered) should be bladed off to reduce their surface area and minimise desiccation;
- Where transport cannot be undertaken immediately, stored peat should be irrigated to limit drying and stored on a geotextile mat to promote stability; and
- Monitoring of large areas of peat storage during wet weather or snowmelt should be undertaken to identify any early signs of peat instability.

5.2.4 Transport

The following good practice applies to transport:

- Movement of turves should be kept to a minimum once excavated, and therefore it is preferable to transport peat planned for translocation and reinstatement to its destination at the time of excavation; and;
- If HGVs/dump trucks that are used for transporting non-peat material are also to be used for peat materials, measures should be taken to minimise cross-contamination of peat soils with other materials.

5.2.5 Handling

A detailed storage and handling plan would be provided as part of the detailed SPMP and should be prepared, including:

- Refined estimates for excavation volumes at each infrastructure location (including peat volumes split into area/volume of 'acrotelm' or 'turf', and volume of catotelm, if further ground investigations indicate any is present).
- Volume to be stored locally and volume to be transferred directly on excavation to restoration areas elsewhere (e.g. habitat restoration areas) in order to minimise handling;
- Location and size of storage area relative to turbine foundation, crane hardstanding and natural peat morphology / drainage features; and
- Irrigation requirements and methods to minimise desiccation of excavated peat during short term storage.

These parameters are best determined post-consent in light of detailed ground investigation with the micro-siting areas for each element of infrastructure.

5.3 Restoration

Any peat not re-used for reinstatement or landscaping purposes will be considered for relocation and use in habitat enhancement. The Habitat Management Plan (HMP) (ES Appendix 9.4) highlights the potential for enhancement within the M25a habitat in the west of the site on the MB plateau area and within the Tyle'r Waun Waun Site of Interest for Nature Conservation (SINC) on the MFD area of the site, if considered appropriate. This would include work to enhance peatland habitat within these management areas.

During restoration, the following best practice should be followed:

- Carefully evaluate potential restoration sites for their suitability, and agree that these sites are appropriate with the ECoW, landowners and relevant consultees and that the sites align with the aims of the HMP;
- Undertake restoration and revegetation or reseedling work as soon as possible;
- Where required, consider exclusion of livestock from areas of the site undergoing restoration, to minimise impacts on revegetation; and
- As far as reasonably practicable, restoration should be carried out concurrently with construction rather than at its conclusion.

6.0 Site Based Peat Excavation and Management Assessment

This Stage 1 SPMP has been undertaken as part of the Environmental Impact Assessment Report for the proposed development to ensure that there is an understanding of the extent of peat on site, the total amount of soil and peat that might be excavated, a demonstration that the current design avoids areas of deep peat where possible and that the reuse of the excavated materials is certain and minimised where possible, and in line with updated industry good practices and guidance.

The proposed development comprises six wind turbines and associated crane hardstandings, access for construction traffic, on-site access tracks of cut construction (including upgrade to existing tracks), temporary construction compounds and permanent substation compound with operations building, potential solar development and underground cabling.

6.1 Estimated Soil and Peat Excavation and Re-use Volumes

Multiple phases of peat probing and assessment has been undertaken by SLR. The results have been used to produce a peat isopach map (Figure 03). A total of 824 probe locations were undertaken in areas of identified peaty soil/peat to determine the thickness thereof. Based on this mapping, the total predicted volume of excavated materials has been calculated, with estimates of reuse. These are summarised on Table 6-1, with more detail in Appendix 01.

The total soil and peat volumes are based on a series of assumptions for the development and peat depth data averaged across discrete areas of the development. Such parameters can still vary over small scale and therefore topographic changes in the bedrock profile, historical ground disturbance etc. may impact the total accuracy of the volume calculations.

Although there is anticipated to be very limited catotelmic peat excavated as part of the development, all material would be assessed by the ECoW on excavation and the live SPMP document would be revised where necessary should volumes of acrotelmic peat vary or areas of catotelmic peat be identified. The ECoW/Geotechnical engineer would also assess the suitability of material for reuse on excavation and update the SPMP accordingly if required.

The overall conclusion regarding peat stability is that there is negligible and low risk of peat instability across the site with no medium or high-risk areas identified.

6.1.1 Re-use of Soils and Peat

Excavated soils and peat from the construction process will be re-used in the following ways:

- Reinstatement of temporary infrastructure;
- Appropriate landscaping of new infrastructure e.g. track sides, hardstanding edges, etc; and
- Re-use for local habitat restoration.

Consultation with NPTCBC Lost Peatland Project team has identified potential re-use options for any surplus peat generated by the proposed development, however where appropriate, the priority will be to re-use acrotelmic peat and turves for reinstatement. The Lost Peatland team are working to restore upland landscape areas locally and have been involved in restoration work on the adjacent Pen y Cymoedd Wind Farm site.

Aim 1 of the HMP (ES Appendix 9.4) highlights the potential for habitat enhancement on the site:

- Surplus peat generated on the MFD area of the site could potentially be re-used in new or planned restoration works on peatland habitat within the Tyle'r Waun Waun SINC.
- Surplus peat generated on the MB area of the site could be used for enhancement of the M25a habitat present across the plateau area.

Table 6-1
Excavation Materials Management Plan

Method	Volume of Excavated Material (m ³)		How much of this can be re-used on site (%)	Opportunity for Avoidance or Minimisation of Excavated Material	Re-use Requirements	Hierarchy Adherence	Limitations and Considerations
	soil	peat					
Excavated Access Track Total Length of the new cut access tracks on site would be 5,480m. The excavated tracks would be located on an average peat depth of 0.22m.	6,028m ³	-	100%	The access track route has been subject to a number of design iterations to avoid deeper peat and steep slopes. Where possible track width would be minimised.	Verge restoration and visual screening, particularly along access track. Sections of the route may require cut and fill and these slopes would require restoration to minimise visual impact. 6,720m³ soil 1,500m³ peat excavated soil would be used along access tracks. Peat can be considered for verge restoration where peat is found to be appropriate and will tie in with adjacent habitat – 1000m assumed	Avoidance was first level of screening to avoid areas of deeper peat. Routing has been planned on thinner peat or soils where possible. The layout design has been guided by constraints which highlight ecological, hydrogeological and geomorphological - all of which identify the peat areas to avoid.	Requires detailed ground investigation to fully characterise peat. Detailed assessment may identify further lengths of floating access tracks, which would further reduce requirement for excavation.

Method	Volume of Excavated Material (m ³)		How much of this can be re-used on site (%)	Opportunity for Avoidance or Minimisation of Excavated Material	Re-use Requirements	Hierarchy Adherence	Limitations and Considerations
	soil	peat					
Existing / Upgraded Access Track It is anticipated that 3,548m of existing tracks on-site would be upgraded.	355m ³	-	100%	Existing tracks have been utilised where possible to minimise the disturbance of the soil and peat.	Verge restoration along upgraded access tracks. Only viable on sections where reinstatement to adjacent habitat is viable (500m assumed) 750m ³ soil	Avoidance was first level of screening to avoid areas of thicker peat. Routing has been planned to utilise existing tracks.	Requires detailed ground investigation to fully characterise peat and conditions of existing track.
Turbine Bases – formation only 6 No. turbines With average excavation of 25m diameter x 0.3m (average thickness of peat at turbines).	417m ³	432m ³	100%	Turbine locations have been subject to a number of design iterations to avoid deeper peat and steep slopes. Average thickness of peat at turbine bases sites is ~0.29m.	At turbine foundations topsoil would be stripped keeping top 200mm of turf intact. This would be stored adjacent to the base working area and would be limited to 1m height. 632m ³ soil 316m ³ peat	Avoided areas of thick peat for turbine bases where possible to minimise removal of excessive materials.	Requires detailed ground investigation to fully characterise peat.
Crane Hardstandings 6 No. crane hardstandings. With average excavation of 35m x 40m x 0.37m with additional areas for cranes and blades.	1,135m ³	1,686m ³	23%	Crane hardstanding locations have been influenced by the turbine design iterations to avoid deeper peat and steep slopes. Average thickness of peat at crane hardstanding sites is ~0.34m.	At crane hardstandings topsoil would be stripped keeping top 200 mm of turf intact. This would be stored adjacent to the base working area and would be limited to 1m height. 440m ³ soil 220m ³ peat could be re-used to dress the edges of the hardstanding area.	Avoided areas of thick peat for turbine bases to minimise removal of excessive materials. Orientation of crane hardstandings to be designed following detailed ground investigation, to avoid constraints and minimise requirement for peat excavation.	Requires detailed ground investigation to fully characterise peat.

Method	Volume of Excavated Material (m ³)		How much of this can be re-used on site (%)	Opportunity for Avoidance or Minimisation of Excavated Material	Re-use Requirements	Hierarchy Adherence	Limitations and Considerations
	soil	peat					
Blade Laydown and ancillaries	805m ³	687m ³	100%	Temporary laydown areas have been influenced by the turbine design iterations to avoid deeper peat and steep slopes.	Temporary laydown areas 805m ³ soil 687m ³ peat re-used on site to reinstate working areas and for appropriate landscaping.	Avoided areas of thick peat for turbine bases to minimise removal of excessive materials. Orientation of laydown areas to be designed following detailed ground investigation, to avoid constraints and minimise requirement for peat excavation.	Requires detailed ground investigation to fully characterise peat.
Turning Heads It is anticipated that 7No. turning heads are required adjacent to hardstanding areas.	330m ³	280m ³	50%	Tracks have been subject to several design iterations, to avoid deep peat where possible.	Verge restoration at turning heads 204m ³ soil 102m ³ peat	Avoidance was first level of screening to avoid areas of thicker peat.	Requires detailed ground investigation to fully characterise peat.
Switchback Area	50m ³	-	100%	Tracks have been subject to several design iterations, to avoid deep peat where possible.	Verge restoration at switchback area c.300m ³ soil	Avoidance was first level of screening to avoid areas of thicker peat.	Requires detailed ground investigation to fully characterise peat.
HGV Turning Area	30m ³	-	83%	Tracks have been subject to several design iterations, to avoid deep peat where possible.	Verge restoration at HGV turning area. . Only viable on sections where adjacent habitat is peatland (50m assumed) ~ c.25m ³ soil	Avoidance was first level of screening to avoid areas of thicker peat.	Requires detailed ground investigation to fully characterise peat.

Method	Volume of Excavated Material (m ³)		How much of this can be re-used on site (%)	Opportunity for Avoidance or Minimisation of Excavated Material	Re-use Requirements	Hierarchy Adherence	Limitations and Considerations
	soil	peat					
Solar Panel Area	No excavation required.		-	The proposed solar panel area location would largely be located on peaty/glacial soils adjacent to the proposed access tracks.	No reinstatement required	Avoided siting solar array on deeper peat areas where possible.	Requires detailed ground investigation to fully characterise ground conditions.
Substation East	360m ³	-	22%	The proposed substation location would largely be located on peaty/glacial soils adjacent to the proposed access tracks.	Materials would be re-used on site to reinstate edge of working areas and for appropriate landscaping. 80m ³ soil	Avoided siting substation on thick peat areas where possible.	Requires detailed ground investigation to fully characterise ground conditions.
Substation West	660m ³	-	12%	The proposed substation location would largely be located on peaty/glacial soils adjacent to the proposed access tracks.	Materials would be re-used on site to reinstate working areas and for appropriate landscaping. 82m ³ soil	Avoided siting substation on thick peat areas where possible.	Requires detailed ground investigation to fully characterise ground conditions.
Temporary Compound East	1,296m ³	-	100%	The proposed construction compound would largely be located on peaty/glacial soils adjacent to the proposed access tracks.	Materials would be re-used on site to reinstate working areas and for appropriate landscaping. 1,296m ³ soil	Avoided siting Temporary Construction Compound on thick peat areas where possible.	Requires detailed ground investigation to fully characterise ground conditions.

Method	Volume of Excavated Material (m³)		How much of this can be re-used on site (%)	Opportunity for Avoidance or Minimisation of Excavated Material	Re-use Requirements		Hierarchy Adherence	Limitations and Considerations
	soil	peat						
Temporary Compound West	1,044m³	-	100%	The proposed construction compound would largely be located on peaty/glacial soils adjacent to the proposed access tracks.	Materials would be re-used on site to reinstate working areas and for appropriate landscaping. 1,044m³ soil		Avoided siting Temporary Construction Compound on thick peat areas where possible.	Requires detailed ground investigation to fully characterise ground conditions.
Total Excavated	Soil 12,511m³	Peat 3,086m³		Total Re-use	Soil 12,377m³	Peat 2,826m³		
	15,597m³				15,203m³			

Based on the values indicated, there is a minor surplus of soil and peat anticipated to be generated on site – See Appendix 01.

Should further ground investigation information become available, the figures would need to be re-calculated, the figures in the table are indicative only.

7.0 Peat Excavation Considerations

This section of the stage 1 SPMP includes the method for dealing with catotelmic peat which could potentially be classified as waste. This is currently not anticipated as significant quantities of catotelmic peat, which cannot be re-used are not expected on site.

Table 7-1 below outlines those materials that are likely to be generated on site.

Based on the results presented in Table 7-1, it has been concluded that all of the materials to be excavated on-site would fall within the non-waste classification as the topsoil and peaty soils would be re-used on site. Based on a detailed probing exercise and visual inspection of the peat, it is predominantly fibrous – pseudofibrous peat which would be suitable to be re-used on site if good practice guidance is followed. Typically the peat was found to be fibrous and fairly dry within the top metre before becoming more amorphous with depth. No excavation of deeper amorphous peat is required on site.

The excavated peat is therefore considered to be entirely re-useable as it is predominantly fibrous and stable provided good practice guidance is followed for excavation, handling and storage. This peat can be easily re-used on-site and there will be no loss of peat. Areas of deep peat have been avoided by design.

Table 7-1
Excavated Materials – Assessment of Suitability

Excavated Material	Indicative Volume on Site by % of total excavated soils	Is there a suitable use for material	Is the Material required for use on Site	Material Classified as Waste	Re-use Potential	Re-use on Site
Mineral Soil	80	Yes	Yes	Not classified as waste	Yes	Would be re-used in reinstatement of floated access track verges, cut and fill verges, road verges, side slopes and check drains. Peripheral embankments of turbine bases and crane hardstandings.
Turf (Surface layer of vegetation and fibrous matt)	20	Yes	Yes	Not classified as waste	Yes	
Acrotelmic peat		Yes	Yes	Not classified as waste	Yes	
Catotelmic Peat (amorphous material unable to stand unsupported when stockpiled >1 m)	Not anticipated as it has been avoided by design.	Potentially	No [*]	Potentially if not required as justifiable restoration of habitat management works	Limited	If peat does not require treatment prior to re-use it could be used on-site providing adequate justification and method statements are provided. If the peat is unsuitable for use without treatment then it could be regarded as a waste. However, every attempt to avoid this type of peat has been incorporated into the design.

* Such uses for this type of material are limited, however there could be justification for use in restoration areas to maintain waterlogged conditions and prevent desiccation of restored area and in some habitat management works such as gully or ditch blocking where saturated peat is required to mimic mire type habitats and encourage establishment of sphagnum.

8.0 Monitoring and Inspection

There would be frequent, routine, and regular inspections of peat in all temporary stockpiles and storage areas as part of the SPMP audit process. Inspections would assess in situ peat physical conditions, integrity of containment and temporary drainage conditions, and they would seek to confirm that stockpile design and management was adequate to prevent erosion and peat slide. These inspections would take place weekly (at a minimum) during stockpile creation and storage.

Should any problems be observed during regular visual inspections of peat stockpiles, this would invoke implementation of an appropriate corrective action which would be recorded and monitored for effectiveness. Types of corrective actions would include, but would not necessarily be limited to:

- modification of temporary drainage;
- additional or modified bunding;
- incorporating of sediment fencing if required; and
- light re-grading to correct any areas of surface erosion, etc.

Regular, frequent inspections of peat conditions during construction and restoration phases of work would be carried out by the Geotechnical Engineer and ECoW as follows:

- Peat surface, peat profile and peat consistency conditions would be carried out as part of ground investigations prior to the start of construction. This information would provide detailed information on the baseline conditions for each part of the infrastructure footprint.
- Restored peat conditions would be inspected immediately after restoration to ensure that the methods detailed in the SPMP had been correctly implemented and to inform any corrective actions should they be required.
- The physical condition of peat would be retained as carefully as possible both at the peat storage and the peat restoration stages. This is particularly important for vegetation establishment.
- Within 3 months of completion of works in any area, the ECoW inspects the reinstatement efforts to determine satisfactory placement of sub-soil, topsoil and turves.
- The ECoW (or other qualified person) undertakes a final inspection of all reinstated areas at the end of the first growing season following completion of reinstatement.
- The ECoW should complete a daily diary of onsite activities which would be compiled within a monthly ECoW report which will include information relating to peat reinstatement, these reports will be available at the request of the Planning Authority.

Further habitat monitoring of existing habitat and potential habitat restoration areas is included within the HMP at Appendix 9.4 of the ES.

9.0 Conclusion

The outline SPMP follows the guiding principles and has been created in adherence with best practice guidance.

The SPMP addresses the following peat related issues:

- The depth and condition of peat deposits at site;
- The volumes of peat that are predicted to be excavated and its suitability for reuse;
- The capacity to reuse the peat onsite;
- Peat handling and temporary storage; and
- Restoration and monitoring of peatland habitat.

The figures detailed within this report are to be considered indicative at this stage. The total peat volumes are based on a series of assumptions for the proposed development's layout and peat depth data averaged across discrete areas of the site. Such parameters can still vary over small scale and therefore topographic changes in the bedrock profile could impact the total accuracy of the volume calculations.

The accuracy of these predictions would be improved and updated with the results of further detailed peat probing data, to be carried out during refinement in accordance with guidance, as part of detailed ground investigation to be undertaken post-consent.

The figures shown in the tables suggest that the majority of soil and peat excavated on-site would be re-used. Any surplus following reinstatement would be temporarily stored for re-use in future habitat restoration.

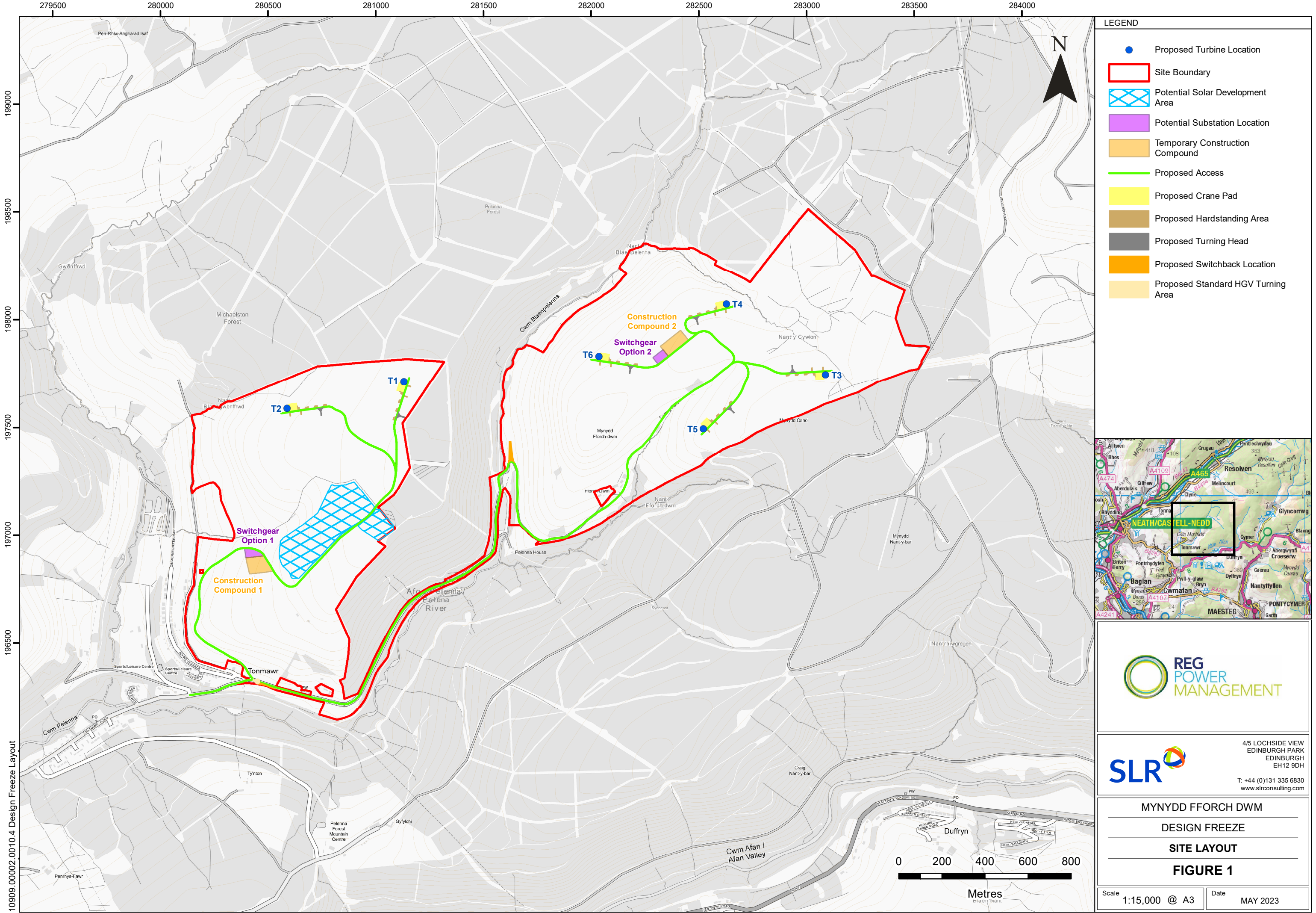
The proposed works are not anticipated to creating any materials which would require to be classified as waste. Post-consent, the Stage 1 SPMP would be updated with information obtained during detailed ground investigations and design stage.

These plans would be developed to update the Outline CEMP, with post-construction restoration plans. This would be reviewed and monitored along with the updated SPMP and CEMP to ensure compliance with method statements and to keep track of volumes.

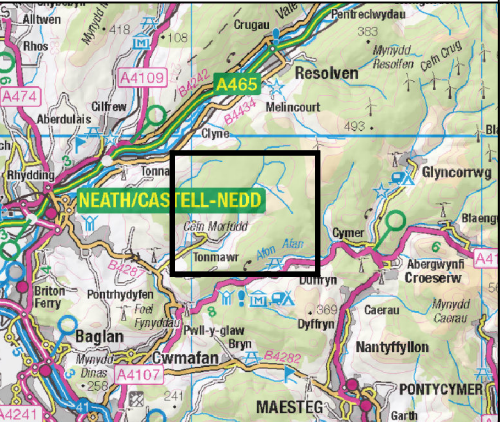
FIGURES & APPENDICES

FIGURE 01

Site Layout



- LEGEND
- Proposed Turbine Location
 - Site Boundary
 - Potential Solar Development Area
 - Potential Substation Location
 - Temporary Construction Compound
 - Proposed Access
 - Proposed Crane Pad
 - Proposed Hardstanding Area
 - Proposed Turning Head
 - Proposed Switchback Location
 - Proposed Standard HGV Turning Area



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DESIGN FREEZE

SITE LAYOUT

FIGURE 1

Scale 1:15,000 @ A3

Date MAY 2023

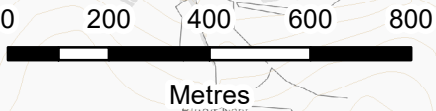
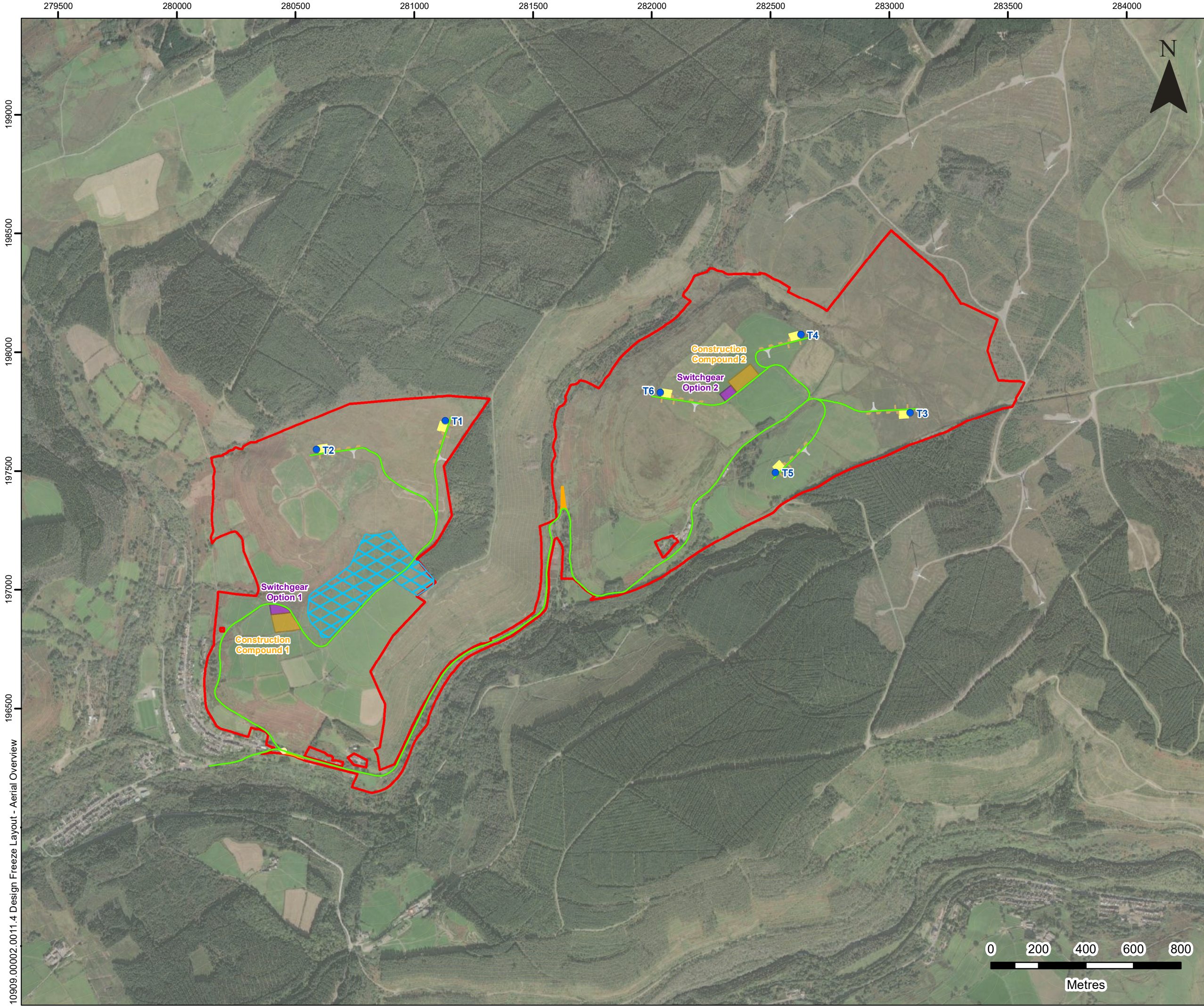


FIGURE 02

Site Layout – Aerial Overview



LEGEND

- Proposed Turbine Location
- Site Boundary
- Potential Solar Development Area
- Potential Substation Location
- Temporary Construction Compound
- Proposed Access Track
- Proposed Crane Pad
- Proposed Hardstanding Area
- Proposed Turning Head
- Proposed Switchback Location
- Proposed Standard HGV Turning Area

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SITE LAYOUT - AERIAL OVERVIEW

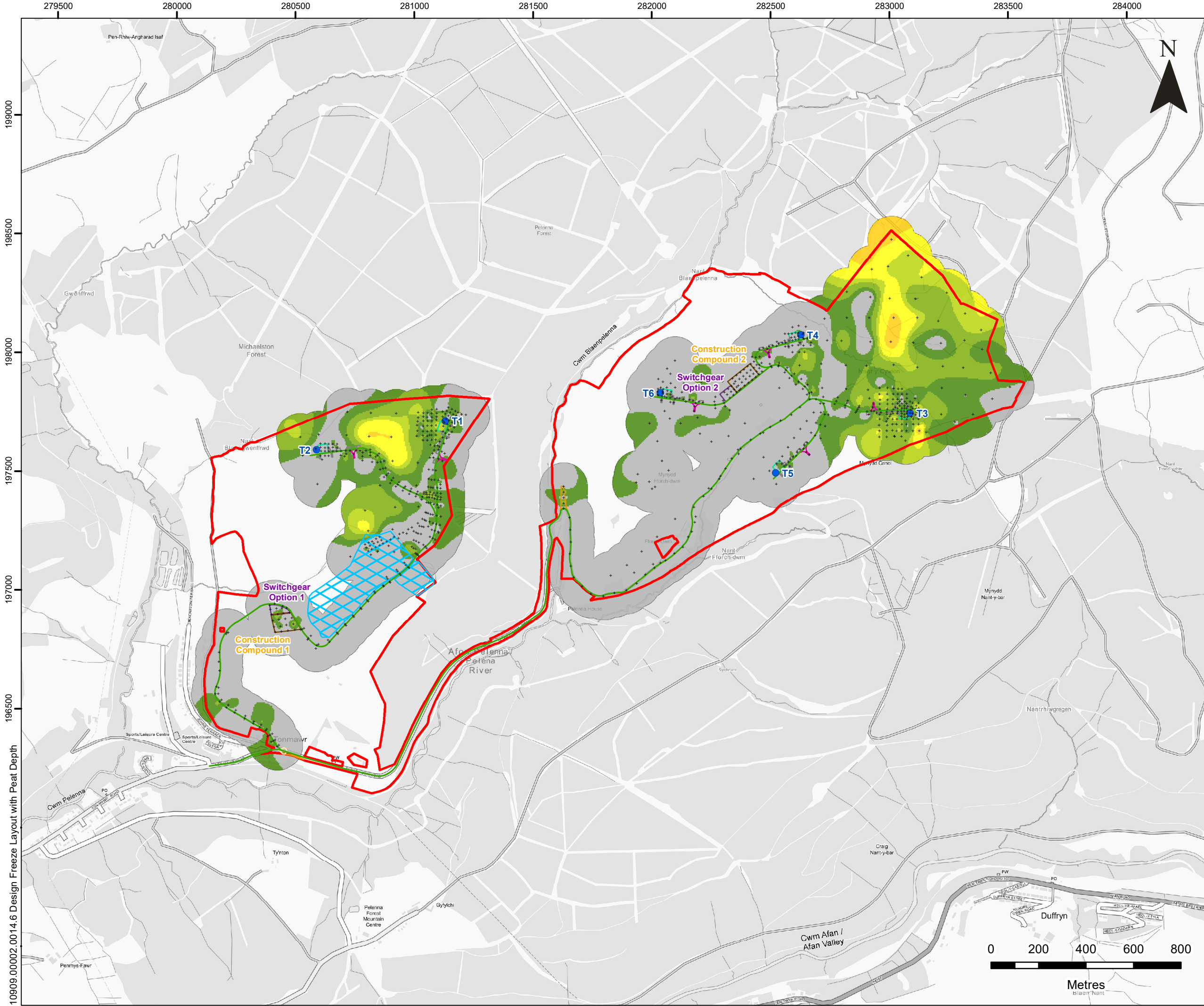
FIGURE 2

Scale 1:15,000 @ A3

Date MAY 2023

FIGURE 03

Peat Depth



LEGEND

•

Proposed Turbine Location

Site Boundary

Potential Solar Development Area

Potential Substation Location

Temporary Construction Compound

Proposed Access Track

Proposed Crane Pad

Proposed Hardstanding Area

Proposed Turning Head

Proposed Switchback Location

Proposed Standard HGV Turning Area

+

Peat Probe

Peat Depth (m)

0 - 0.3 (Organic Soil)

0.3 - 0.5

0.5 - 0.8

0.8 - 1

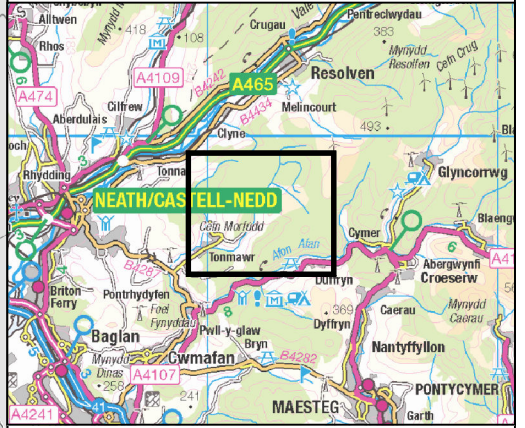
1 - 1.5

1.5 - 2

2 - 2.5

2.5 - 3

> 3



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SITE LAYOUT WITH PEAT DEPTH

FIGURE 3

Scale 1:15,000 @ A3

Date JUNE 2023

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APPENDIX 01

Excavated Materials Calculator

Infrastructure	Length (m)	Width (m)	Area (m2)	Average Depth (m)	Number	Total Volume Excavated Peat (m3)	Total Volume Excavated Soils (m3)	Length (m)	Width (m)	Area (m2)	Average Depth (m)	Number	Total Re-use Volume - peat (m3)	Total Re-use Volume - soil (m3)	Balance of Peat (m3)	Balance of Soils (m3)	Notes
New Excavated Track	5480	5	-	0.22	1		6038	5480	1.5		0.50	2	1500	6720	-1500	-692	Peat considered for verge restoration where appropriate - 1000m assumed
Existing Upgraded Track	3548	2	-	0.05	1		355	500	1.5		0.50	2		750	0	-395	
Turbine Base (Formation Only) T1	-	-	491	0.43	1	211		79	2		1.00	1	158		53	0	
Turbine Base (Formation Only) T2	-	-	491	0.20	1		98	79	2		1.00	1		158	0	-60	
Turbine Base (Formation Only) T3	-	-	491	0.45	1	221		79	2		1.00	1	158		63	0	
Turbine Base (Formation Only) T4	-	-	491	0.26	1		128	79	2		1.00	1		158	0	-30	
Turbine Base (Formation Only) T5	-	-	491	0.20	1		98	79	2		1.00	1		158	0	-60	
Turbine Base (Formation Only) T6	-	-	491	0.19	1		93	79	2		1.00	1		158	0	-65	
Crane Hardstanding T1	-	-	1400	0.78	1	-1085		110	2		0.50	1	110		975	0	
Crane Hardstanding T2	-	-	1400	0.15	1		213	110	2		0.50	1		110	0	103	
Crane Hardstanding T3	-	-	1400	0.43	1	601		110	2		0.50	1	110		491	0	
Crane Hardstanding T4	-	-	1400	0.14	1		197	110	2		0.50	1		110	0	87	
Crane Hardstanding T5	-	-	1400	0.30	1		420	110	2		0.50	1		110	0	310	
Crane Hardstanding T6	-	-	1400	0.22	1		305	110	2		0.50	1		110	0	195	
Blade laydown and ancillaries T1	90	10	-	0.34	1	302		90	10		0.34	1	302		0	0	Temporary laydown area
Blade laydown and ancillaries T2	90	10	-	0.28	1		249	90	10		0.28	1		249	0	0	Temporary laydown area
Blade laydown and ancillaries T3	90	10	-	0.43	1	385		90	10		0.43	1	385		0	0	Temporary laydown area
Blade laydown and ancillaries T4	90	10	-	0.19	1		172	90	10		0.19	1		172	0	0	Temporary laydown area
Blade laydown and ancillaries T5	90	10	-	0.19	1		173	90	10		0.19	1		173	0	0	Temporary laydown area
Blade laydown and ancillaries T6	90	10	-	0.23	1		211	90	10		0.23	1		211	0	0	Temporary laydown area
Turning Heads T1	-	-	340	0.33	1	-112		68	1.5		0.50	1	51		61	0	
Turning Heads T2	-	-	340	0.29	1		99	68	1.5		0.50	1		51	0	48	
Turning Heads T3	-	-	340	0.50	1	-168		68	1.5		0.50	1	51		117	0	
Turning Heads T4	-	-	340	0.41	1		139	68	1.5		0.50	1		51	0	88	Average depth probing >0.3m however agricultural land with no peat.
Turning Heads T5	-	-	340	0.12	1		41	68	1.5		0.50	1		51	0	-10	
Turning Heads T6	-	-	340	0.15	1		51	68	1.5		0.50	1		51	0	0	
Switchback	-	-	201	0.25	1		50	400	1.5		0.50	1		300	0	-250	
HGV Turning Area	-	-	600	0.05	1		30	50	1		0.50	1		25	0	5	
Substation East	-	-	2400	0.15	1		360	160	1		0.50	1		80	0	280	
Substation West	-	-	2640	0.25	1		660	164	1		0.50	1		82	0	578	
Temporary Compound East	-	-	7200	0.18	1		1296			7200	0.18	1		1296	0	0	Temporary compound
Temporary Compound West	-	-	7454	0.14	1		1044			7454	0.14	1		1044	0	0	Temporary compound
						3085	12511						2826	12377	260	134	
						15597							15203		394		

Total Excavated Volume Peat (m3)	3085
Total Excavated Volume Soils (m3)	12511
Total Excavated Volume (m3)	15597
Total Re-use Volume (m3)	15203
Habitat Restoration Volume (m3)	394

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