Appendix 10.4: Peat Management Plan

Mullaghclogher Wind Farm

Renewable Energy Systems Ltd

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SLR Project No.: 428.011231.00001

9 April 2024

Revision: 02

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
0	31 October 2023	R. Watson	A. Huntridge	A. Huntridge
1	12 December 2023	R. Watson	A. Huntridge	A. Huntridge
2	9 April 2024	R. Watson	A. Huntridge	A. Huntridge

Basis of Report

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1.0 Introduction

1.1 General

SLR Consulting Ltd (SLR) was commissioned by Renewable Energy Systems Ltd (RES) to undertake a Stage 1 Outline Peat Management Plan (PMP) for the proposed Mullaghclogher Wind Farm ('the Proposed Development').

The Proposed Development would comprise up to 11 wind turbines, with associated infrastructure including access tracks, crane hardstandings, turning heads, substation, battery storage compound, peat storage areas and temporary enabling works construction compound.

Full details of the Proposed Development are provided in Chapter 2: Proposed Development of the EIA Report. The location and layout of the red line boundary which define "the Site" are detailed in Figure 1.

This report presents the findings of data obtained from peat depth probing surveys conducted by SLR Consulting in September 2022 and June 2023.

The work has been undertaken by a team of Geotechnical Engineers and Geologists, with over 16 years' experience in undertaking peat assessments and specialising in the assessment of soils, geology and water for renewable power projects throughout the UK and Ireland.

1.2 Site Description

The Proposed Development is an area of approximately 615 Hectares (Ha), located approximately 4km North East of Plumbridge, Northern Ireland, centred on National Grid Reference (NGR) of NV 659 582. The Proposed Development Location is detailed on Figure 1.

The Proposed Development is mostly located on the slopes of Mullaghcarbatagh and Mullaghclogher hills slopes which trend northwards. The highest elevation is on the slopes of Mullaghclogher Hill at 572mAOD with the lowest point approximately 3km to the northwest sitting at 180mAOD.

The Proposed Development is accessed from the north via the B48 and Carrickayne Road. It is located on predominantly upland moorland with some plots of cultivated farmland to the north. The surrounding land-use is largely agricultural farmland and uncultivated moorland. A number of farmsteads are located in the vicinity, but no occupied residential properties are located within the Proposed Development.

1.3 Objectives

The PMP outlines the overall approach of minimising disruption to peatland, and it aims to ensure that all further opportunities to minimise peat disturbance and extraction would be taken during detailed design and construction of the development.

The PMP has been developed to demonstrate that peat has been afforded significant consideration during the construction phase of the Proposed Development, should consent be granted. It aims to propose mitigation measures that would minimise any impacts and the long-term habitat restoration and management plans.

The PMP seeks to identify that appropriate proposals to re-use the surplus peat can be accommodated within the Proposed Development and associated Habitat Management Plan (HMP) proposals, without significant environmental or health and safety implications, to minimise risk in terms of carbon release and human health.

The purpose of this report is to ensure that there has been a systematic consideration of peat management and a quantitative assessment throughout the development process.

1.4 Role of the Peat Management Plan

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

1.4.1 Stage 1: Environmental Impact Assessment (EIA)

The Outline Peat Management Plan submitted as part of the EIA. From this initial report the Peat Management Plan will be developed further into a Stage 2 Pre-Construction PMP.

1.4.2 Stage 2: Post Consent / Pre-Construction

As part of the EIA it will have been demonstrated that, based on the investigation and data collected, it is likely that the excavated materials for the Proposed Development can be managed in an appropriate manner. The peat mass balance calculations may be further developed prior to the relevant works commencing, following detailed ground investigation or further survey works required to inform detailed design, or that may be required under planning consent conditions.

1.4.3 Stage 3: Construction Stage

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

1.5 Legislation and Guidance

The PMP has been compiled in accordance with the following legislation and best practice guidance:

- Northern Ireland Peatlands and Uplands Biodiversity Delivery Group (https://www.daera-ni.gov.uk/articles/peatlands) 2019.
- Advising on peatland, carbon-rich soils and priority peatland habitats in development management. NatureScot. June 2023.
- SEPA Regulatory Position Statement - Developments on Peat (Scottish Environment Protection Agency, 2010);
- Good Practice during Windfarm Construction, 4th Edition (Scottish Renewables, Scottish Natural Heritage (now NatureScot), Scottish Environment Protection Agency, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland Science and AEECoW, 2019);
- Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste (Scottish Renewables and SEPA, 2012);
- Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Scottish Government, January 2017);

- Floating Roads on Peat - Report into Good Practice in Design, Construction and Use of Floating Roads on Peat with reference to Wind Farm Developments in Scotland (Forestry Commission Scotland & Scottish Natural Heritage, 2010);
- The Waste Management Licensing (Northern Ireland) Regulations 2003; and
- Developments on Peat and Off-Site Uses of Waste Peat (SEPA, 2017).
- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland

1.5.1 Mitigation Hierarchy

SEPA[1,2] has published guidance regarding the mitigation hierarchy for developments on peat which is summarised below:

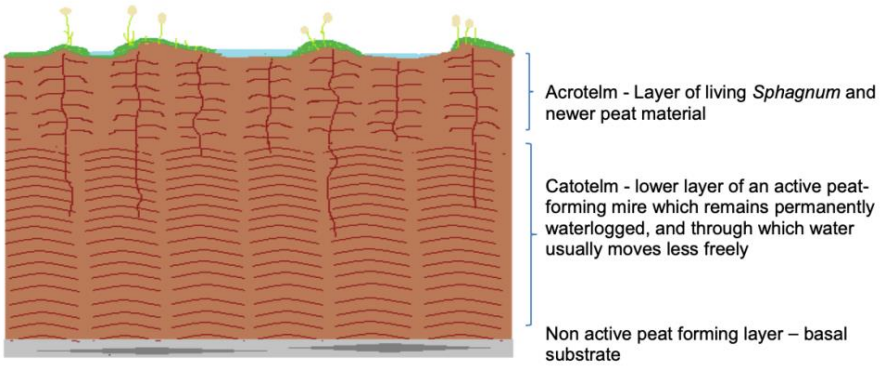
- Prevention – avoiding generating excess peat during construction (e.g., by avoiding peat areas or by using construction methods that do not require excavation such as floating tracks);
- Re-use – use of peat produced on-site in restoration or landscaping, provided that its use is fully justified and suitable;
- Recycling / Recovery / Treatment – modify peat produced on-site for use as fuel, or as a compost / soil conditioner, or dewater peat to improve its mechanical properties in support to re-use; and
- Storage – applying the SEPA guidance, storage of peat up to a depth of 2m is not classified as a waste and, however clarification should be sought from the waste regulator prior to re-use and care must be taken to ensure that it does not cause environmental pollution.

1.5.2 Definition of Peat

Peat is defined as a material consisting of the partially decomposed remains of plant material and organic matter preserved over a period in a waterlogged environment resulting in anaerobic conditions, and is of depths >0.5m.

Peat can be classed as two principal types, the acrotelm layer, and the catotelm layer as shown on **Plate 1-1**.

Plate 1-1: Drawing of two layered Structure of Active Bog Peatlands above Non-Active Peat



1 Scottish Environment Protection Agency. 2010. Regulatory Position Statement – Developments on Peat.

2 Scottish Renewables, Scottish Environment Protection Agency. 2012. Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste.

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. 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.

2.0 Site Work

2.1 Peat Depth Survey

Peat depth surveys have been undertaken across two phases by SLR. The surveys carried out followed best practice guidance for developments on peatland[Error! Bookmark not defined.,3,4,].

Phase 1 peat probing resulted in probing on a 100 m grid to allow for initial assessment of the Proposed Development 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 infrastructure.

Peat is generally defined as an organic soil in excess of 0.5 m, if the soil is less than 0.5 m, then it is considered peaty soil[4].

Where surveys were undertaken by SLR, the thickness of the peat was assessed using a graduated peat probe, approximately 6 mm diameter and capable of probing depths of up to 10 m. This was pushed vertically into the peat to refusal and the depth recorded, together with a unique location number and the co-ordinates from a handheld Global Positioning System instrument (GPS). The accuracy of the GPS was quoted as ±2 m, which was considered sufficiently accurate for this survey. All data was uploaded into a GIS database for incorporation into various drawings and analysis assessments.

2.2 Peat Depth Results

The results from all probing phases are detailed in the following sections and displayed on Figures 3 and 4. A total of 2,232 peat probes were undertaken across all survey phases, with the results summarised in Table A.

Table A: Peat Probing Results

Peat Thickness (m)	No. of Probes	Percentage (of total probes undertaken on-site)
0 (no peat)	361	16.2
0.01 – 0.49 (peaty soil)	327	14.7
0.50 – 0.99	627	28.1
1.00 – 1.49	473	21.2
1.50 – 1.99	269	12.1
2.00 – 2.49	115	5.2
2.50 – 2.99	39	1.7
3.00 – 3.49	17	0.8
3.50 – 3.99	2	0.1
> 4.0	2	0.1

3 Scottish Renewables & SEPA (2012) 'Developments on Peatland Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste'.

4 Scottish Natural Heritage (SNH), SEPA, Scottish Government & James Hutton Institute. (2014)' Peat Survey Guidance; Developments on Peatland: Site Surveys'.

2.3 Peat Condition

Peat is described using BS5930[5] and the von Post classification[6]. Peat samples were collected by SLR in June 2023, using a peat auger and used to inform interpretations of the peat condition and underlying substrate.

Based on interpretations from probing and peat core samples, the peat within the Proposed Development is predominantly fibrous and pseudo-fibrous.

Based on field descriptions at augering points, most of the peat would be classified as between H2 and H4 in the von Post**Error! Bookmark not defined.** classification, showing insignificant to moderate decomposition.

The peat augering logs and photographs are provided within Annex B.

5 BS 5930:2015+A1:2020, Code of practice for ground investigations

6 Von Post, L. and Grunland, E., (1926), 'Sodra Sveriges torvillganger 1' Sverges Geol. Unders. Avh., C335, 1-127.

3.0 Potential Impacts on Peat During Construction

The initial construction phase for the Proposed Development will include soil and peat stripping and excavation activities associated with constructing the foundations for turbine bases, crane pads, access tracks, control compound and substation and temporary construction compounds.

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 gullying, 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.

A range of methods and control measures are described below which are designed to prevent these impacts from occurring.

4.0 Peat Management Proposals

The Proposed Development design required to take account of a number of environmental and technical constraints. The design sought to avoid areas of known or potential thick peat where possible, taking into account other environmental and technical factors such as ecology, ornithology, archaeology, hydrology, topography and existing infrastructure. The Proposed Development has largely avoided areas where peat is >1m and efforts have been made by iterative design to minimise the footprint of site infrastructure on peat>0.5m as far as practicable. Due to site constraints, there is limited scope for conventional peat re-use along/adjacent to proposed infrastructure. Therefore, a number of peat storage areas have been identified to ensure a positive peat re-use balance is achieved. Where peat and peaty soils are to be excavated, re-used or reinstated, the following good practice applies.

4.1 Excavation

Excavated peat should be excavated as turves, including the acrotelm (surface vegetation) and a layer of adjoining catotelm (more humified peat) typically up to 500mm thick in total, or 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; and
- consider timing of excavation activities to avoid very wet weather and avoid 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 will maintain connectivity between the surface vegetation and the partially decomposed upper layers of the catotelm.

4.2 Storage

The following good practice applies to the storage of peaty soils/peat:

- stripped materials should be carefully separated to keep peat and other soils apart;
- to minimised handling and haulage distances, excavated material should be stored local to the site of excavation or end point of restoration;
- peat turves should be stored in wet conditions or irrigated in order to prevent desiccation (once dried, peat will not rewet);
- stockpiling of peat should be in large volumes to minimise exposure to wind and sun (and desiccation), but with due consideration for slope stability, but should not exceed 1 m in height to maintain stability of stockpile;
- stockpiles should be isolated from watercourses or drains with appropriate bunding to minimise pollution risks;
- excavated peat and topsoil stored separately, should be stored to a maximum of 1 m 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 monitoring during periods of very wet weather, or during snowmelt, to identify early signs of peat instability.

4.2.1 Peat Storage Areas

Peat storage areas have been proposed to achieve a peat excavation/re-use balance within the Proposed Development area. The following good practice applies in relation to the use of proposed peat storage areas:

- Detailed ground investigation should be undertaken at each area to characterise the underlying ground conditions and assist in design of the storage areas and any mitigation measures. Design of peat storage areas should be undertaken by a suitably qualified Geotechnical Engineer;
- Monitor areas to ensure stability of placed and existing peat and to avoid any slippages or failures;
- Ensure any bunds constraining peat are fit for purpose i.e. constructed of suitable material and of adequate dimensions;
- Ensure adequate drainage of storage areas, avoid placing peat on flooded area/ ponded water;
- Avoid placement of excavated peat on steep slopes, or adding to already emplaced peat. Ensure placed peat is kept sufficiently distant from top of slopes to avoid slippage;
- Monitor areas of placed peat on regular basis to identify early any change in conditions.

4.3 Temporary Storage

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 or by seeding (although this is unlikely to be significant for peat materials stored less than 2 months).

For crane pads and compounds (with longer term storage requirements), the following good practice applies:

- peat generated from crane pad locations should be transported directly to its allocated restoration location, to minimise the volume being stockpiled with the possibility of drying out;
- stores of catotelm peat 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.

4.4 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.

4.5 Handling

Following refinement of the wind farm peat model, a detailed storage and handling plan should be prepared as a detailed PMP forming part of the detailed CEMP, including:

- best estimate excavation volume at each infrastructure location (including peat volumes split into area/volume of 'acrotelm' or 'turf', and volume of catotelm) which would be achieved by undertaking additional probing in line with current guidance;
- volume to be stored locally and volume to be transferred directly on excavation to restoration areas elsewhere (e.g. peat storage 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, informed by detailed ground investigation with the micro-siting areas for each element of infrastructure.

4.6 Restoration

During restoration, the following best practice should be followed:

- carefully evaluate potential restoration sites, such as peat storage areas for their suitability, and agree that these sites are appropriate with the ECoW, landowners and relevant consultees;
- undertake restoration and revegetation or reseeding work as soon as possible;
- where required, consider exclusion of livestock from areas of the Proposed Development 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.

4.7 Access Tracks

There is much guidance[7,8] available to support access track design in peatlands. Guidance is generally focused on floating tracks and excavated tracks and is summarised below. Based on the avoidance of significant areas of thick peat with tracks all typically present on peat <1.0m and only limited sections of track on localised areas of peat >1.0m then the use of excavated tracks is proposed. Floating tracks may be considered on sections of access track where peat depths are >1m, where detailed ground investigation confirms suitability.

Excavated tracks require complete excavation of soil/peat to a competent substrate. Excavated tracks will generally be undertaken where peat depths are less than 1m. This

7 Scottish Renewables, Scottish Natural Heritage, Scottish Environmental Protection Agency, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland, AEECoW (2019)., Good Practice During Wind Farm Construction. 4th Edition.

8 Scottish Natural Heritage, Forestry Commission (August 2010)., Floating Roads on Peat

peat/soil would require storage ahead of re-use elsewhere within Proposed Development. Good practice guidance relates mainly 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 as per the requirements of the Construction and Environmental Management Plan (CEMP).

Although excavation is normally undertaken in peat of minor thickness (< 1.0m), 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 Factor of Safety (FoS) and an acceptable 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.

4.8 Monitoring and Inspection

There would be frequent, routine and regular inspections of peat in all stockpiles and temporary storage areas as part of the PMP 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 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, 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 PMP had been correctly implemented and to inform any corrective actions should they be required; and
- the physical condition of peats would be retained as carefully as possible both at the peat storage and the peat restoration stages. This is particularly important for vegetation establishment.

5.0 Estimation of Peat Volumes

Table B provides an estimate of peat and peaty soil volumes to be excavated and re-used during the construction of the Proposed Development. The peat and peaty soil excavation and re-use volumes are detailed for each infrastructure element in Annex A. The excavated materials data from Annex A indicates that the areas of infrastructure within the Proposed Development are typically located in areas of peat with limited infrastructure present in areas of peat <1.0m.

The table also demonstrates the following:

- the avoidance of areas of thick peat where possible;
- the excavation of materials is minimised where possible;
- and any excavation and re-use is undertaken in line with updated industry good practices and guidance; and
- limitations and consideration for future work.

Table B: Excavated Materials Management Plan

Method	Volume of Excavated Material (m^3)	Opportunity for Avoidance or Minimisation of Excavated Material	Volume of Re-use Material (m^3)	Re-use Requirements	Hierarchy Adherence	Limitations and Considerations
New Excavated Access Tracks approximately 11.45km long.	49,272m^3	The access track route has been subject to a number of design iterations to avoid thicker peat and steep slopes.	37,756m^3	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 Excavated peaty soil would be temporarily stored along access tracks limited to 0.5m height.	Avoidance was first level of screening to avoid areas of thicker peat. Routing has been planned on thinner peat or peaty 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 extent of peat and peaty soils. Detailed assessment may identify lengths of floating access tracks, which would further reduce requirement for excavation.
Turbine Foundations 11 No. turbines with average excavation of 25m diameter.	4,857m^3	Turbine locations have been subject to a number of design iterations to avoid thicker peat and steep slopes.	880m^3	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 0.5m height.	Avoided areas of thick peat for turbine bases where possible to minimise removal of excessive materials.	Requires detailed ground investigation to fully characterise peat and peaty soils.
Permanent Hardstanding	19,058m^3	Hardstanding locations have been influenced	1,892m^3	At crane hardstandings topsoil would be stripped	Avoided areas of thick peat for turbine crane	Requires detailed ground investigation to fully

Method	Volume of Excavated Material (m^3)	Opportunity for Avoidance or Minimisation of Excavated Material	Volume of Re-use Material (m^3)	Re-use Requirements	Hierarchy Adherence	Limitations and Considerations
11 No. with an average excavation area of 1925m^2.		by the turbine design iterations to avoid thicker peat and steep slopes.		keeping top 200 mm of turf intact. This would be stored adjacent to the base working area and would be limited to 0.5m height.	pads to minimise removal of excessive materials. Orientation of crane hardstandings to be designed following detailed ground investigation, to avoid constraints and further minimise requirement for peat excavation.	characterise peat and peaty soils.
Temporary Hardstanding 11 No. with an average excavation area of 530m^2.	4,664m^3	Hardstanding locations have been influenced by the turbine design iterations to avoid thicker peat and steep slopes.	5,830m^3	At temporary crane hardstandings materials would be re-used on site to reinstate working areas and for appropriate landscaping.	Avoided areas of thick peat for turbine crane pads 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 and peaty soils.
Substation Compound with an approximate area of 4590m^2	4,131m^3	Minimal scope for movement due to site constraints. Location has been moved to avoid areas of thicker peat.	390m^3	Materials would be re-used on site to reinstate working areas and for appropriate landscaping.	Avoided siting substation on thick peat areas where possible.	Requires detailed ground investigation to fully characterise ground conditions.

Method	Volume of Excavated Material (m^3)	Opportunity for Avoidance or Minimisation of Excavated Material	Volume of Re-use Material (m^3)	Re-use Requirements	Hierarchy Adherence	Limitations and Considerations
Construction Compound/Battery Storage with an approximate area of 4000m^2	3,600m^3	Minimal scope for movement due to site constraints. Location has been moved to avoid areas of thicker peat.	356m^3	Materials would be re-used on site to reinstate working areas and for appropriate landscaping.	Avoided siting Construction Compound/Battery Storage on thick peat areas where possible.	Requires detailed ground investigation to fully characterise ground conditions.
Temporary Enabling Works Compound with an approximate area of 900m^2	1,350m^3	Minimal scope for movement due to site constraints. Location has been moved to avoid areas of thicker peat.	1,350m^3	Materials would be re-used on site to reinstate working areas and for appropriate landscaping.	Avoided siting Enabling Compound on thick peat areas where possible.	Requires detailed ground investigation to fully characterise ground conditions.
Peat Storage Areas There are 9 No. peat storage area options	N/A	There is limited peaty soils overlying the proposed peat storage areas.	55,357m^3	Limited peaty topsoil can be stockpiled and used for restoration. Peat/peaty soils from elsewhere on-site could be stored within these areas once suitable assessment and design has been undertaken.	Site selection avoided areas of peat slide risk.	Current calculations are based on conservative re-use and based on the use of all locations. Detailed ground investigation is required to assess the ground conditions at each site.
Total Excavated	92,795m^3		Total Re-use	102,272m^3		

6.0 Peat Classification

This section of the stage 1 PMP includes the method for dealing with peat which could potentially be classified as waste (only if the above volumes estimate significant quantities of catotelm peat, which cannot be re-used).

Table C outlines where those materials that are likely to be generated on-site, fall within the Waste Management Licensing (Northern Ireland) Regulations 2003.

Based on the results presented in this document, it has been concluded that all of the materials to be excavated on-site would fall within the non-waste classification as most of 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 peat which would be suitable to be re-used on-site. Typically, the peat was found to be fibrous and fairly dry within the top metre before becoming slightly more pseudo-fibrous with depth.

The majority of the excavated peat is therefore entirely re-useable as it is predominantly fibrous and easily re-used on-site. Areas of thick peat have been avoided by design, where possible.

Table C: 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	25	Yes	Yes	Not classified as waste	Yes	Will 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, crane hardstandings and peat storage areas.
Turf (Surface layer of vegetation and fibrous matt)	35	Yes	Yes	Not classified as waste	Yes	
Acrotelm peat	35	Yes	Yes	Not classified as waste	Yes	Will 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, crane hardstandings and peat storage areas.
Catotelm Peat (amorphous material unable to stand unsupported when stockpiled >1m)	5 Very limited as it has been avoided by design.	Potentially	Potentially*	Potentially if not required as justifiable restoration of habitat management works	Limited	If peat does not require treatment prior to re-use it can be used on-site providing adequate justification and method statements are provided and approved by NIEA. If it is unsuitable for use without treatment then it may 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 may be justification for use in the base of peat storage 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.

7.0 Conclusion

This Stage 1 PMP presents a pre-construction assessment of the expected peat extraction and reuse volumes associated with the works phase of the construction of the Proposed Development. The PMP also provides the guiding principles which would be applied during the construction of the Proposed Development. Peat depth surveys have shown that there are localised peat deposits across the Proposed Development.

Through a process of continued design refinement (focused on minimising peat excavation volumes) and adoption of best practice working method, the development is expected to achieve an overall peat balance. Thus, all excavated material will be required for reuse as part of the works and no surplus peat is anticipated.

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 layout of the Proposed Development and the results of several phases of peat probing. Such parameters can still vary over small scale areas and therefore topographic changes in the bedrock profile could impact the total accuracy of the volume calculations.

The various calculations presented here would be updated and expanded upon as part of detailed design works, taking account of pre-construction site investigations and micro-siting, to confirm actual quantities of arising peat. The Applicant would achieve an actual balance between arising peat and reinstatement by prioritising the areas for reinstatement, following advice from the project ECoW and Geotechnical Engineer. It is anticipated that a detailed, construction phase PMP would be developed, and maintenance and updating of this plan in conjunction with a Geotechnical Risk Register. The implementation of the detailed PMP would ensure a robust commitment to excavating, storing and reinstating peat in a manner that follows best practice and ensures the protection of peat throughout the construction and post-construction phases.

Figures

Mullaghclogher Wind Farm

Renewable Energy Systems Ltd

SLR Project No.: 428.011231.00001

649000 650000 651000 652000 653000

898000 897000 896000

N

LEGEND

- Site Boundary
- Proposed Turbine Location
- New Site Track
- Permanent Hardstanding
- Temporary Hardstanding
- Substation Compound
- Temporary Construction Compound
- Battery Storage Compound
- Temporary Enabling Works Compound
- Peat Storage Area
- Water Crossing Location

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11

Inver Burn
Burndennett River
Carrickayne Road
Tornoyse Road
Aghabrack Road
Legnaragh Road
B48
Longford Road
Butterlope Road
Mullaghcarbatagh 517 m
Mullaghclogher 572 m
Sperrins AONB

0 0.5 1
Kilometres

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PMP

SITE LAYOUT

FIGURE 1

Scale 1:15,000 @ A3

Date OCTOBER 2023

428.011231.00001.0026.0 Figure 1 Site Layout

649000 650000 651000 652000 653000

898000 897000 896000

N

LEGEND

- Site Boundary
- Proposed Turbine Location
- New Site Track
- Permanent Hardstanding
- Temporary Hardstanding
- Substation Compound
- Temporary Construction Compound
- Battery Storage Compound
- Temporary Enabling Works Compound
- Peat Storage Area
- Water Crossing Location
- Peat Core Location
- Phase I Peat Probing Location
- Phase II Peat Probing Location

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11

PC01 PC02 PC03 PC04 PC05

0 0.5 1

Kilometers

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PEAT DEPTH

FIGURE 2

Scale 1:15,000 @ A3

Date DECEMBER 2023

428.011231.00001.0027.1 Figure 2 Peat Depth

649000 650000 651000 652000 653000

898000 897000 896000

N

B48 Lismaragh Road Aghabrack Road Aghabrack Road Tonrioge Road Carrickayne Road Carrickayne Road Carrickayne Road Carrickayne Road Burrindennett River Inver Burn Butterhope Road

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11

PC01 PC02 PC03 PC04 PC05

Mullaghclogher 572 m

Mullaghcarbarragh 517 m

0 0.5 1

Kilometres

LEGEND

- Site Boundary
- Proposed Turbine Location
- New Site Track
- Permanent Hardstanding
- Temporary Hardstanding
- Substation Compound
- Temporary Construction Compound
- Battery Storage Compound
- Temporary Enabling Works Compound
- Peat Storage Area
- Water Crossing Location
- Peat Core Location
- Phase I Peat Probing Location
- Phase II Peat Probing Location

Peat Depth (m)

- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

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PEAT DEPTH > 0.5M

FIGURE 3

Scale 1:15,000 @ A3

Date DECEMBER 2023

428.011231.00001.0028.1 Figure 3 Peat Depth Over 0.5 m

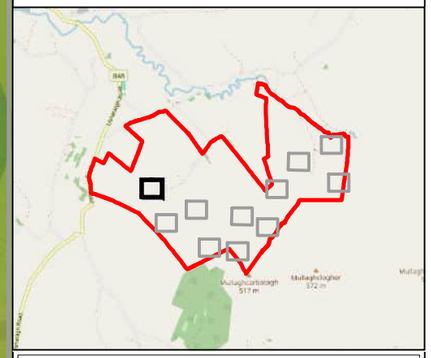
650100
650200
650300
896300
896200
T1
N
0
25
50
Metres

LEGEND

- Site Boundary
- Proposed Turbine Location
- New Site Track
- Permanent Hardstanding
- Temporary Hardstanding
- Peat Storage Area
- Water Crossing Location
- Phase I Peat Probing Location
- Phase II Peat Probing Location

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5



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DETAILED PEAT DEPTH AT T1

FIGURE 4.1

Scale 1:1,000 @ A3

Date DECEMBER 2023

428.011231.00001.0030.1 Fgure 4 Peat Depth at Turbines

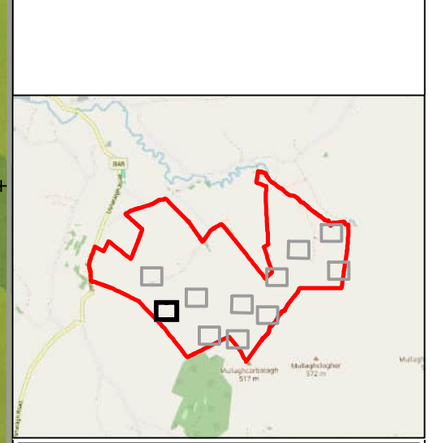
650300
650400
650500
895700
895600
N
T2
0
25
50
Metres

LEGEND

- Site Boundary
- Proposed Turbine Location
- New Site Track
- Permanent Hardstanding
- Temporary Hardstanding
- Peat Storage Area
- Water Crossing Location
- Phase I Peat Probing Location
- Phase II Peat Probing Location

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5



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DETAILED PEAT DEPTH AT T2

FIGURE 4.2

Scale 1:1,000 @ A3

Date DECEMBER 2023

428.011231.00001.0030.1 Fgure 4 Peat Depth at Turbines

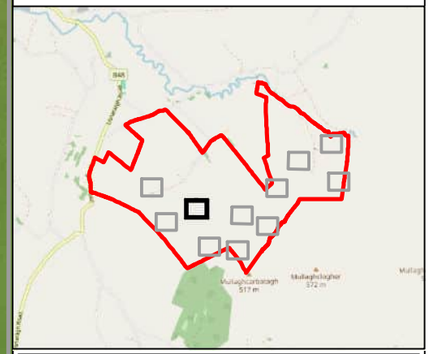
650800
650900
651000
895900
895800
N
T3
PC03
0
25
50
Metres

LEGEND

- Site Boundary
- Proposed Turbine Location
- New Site Track
- Permanent Hardstanding
- Temporary Hardstanding
- Water Crossing Location
- Peat Core Location
- Phase I Peat Probing Location
- Phase II Peat Probing Location

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2



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DETAILED PEAT DEPTH AT T3

FIGURE 4.3

Scale 1:1,000 @ A3

Date DECEMBER 2023

428.011231.00001.0030.1 Fgure 4 Peat Depth at Turbines

651000
651100
651200
895300
895200
428.011231.00001.0030.1 Fgure 4 Peat Depth at Turbines

T4

N

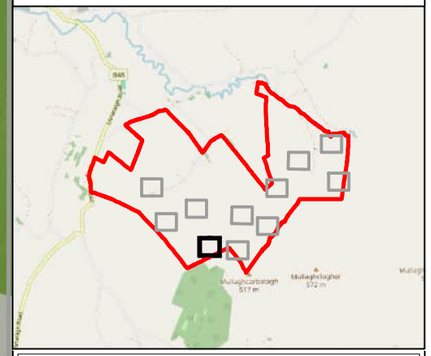
0
25
50
Metres

LEGEND

Site Boundary
Proposed Turbine Location
New Site Track
Permanent Hardstanding
Temporary Hardstanding
Phase I Peat Probing Location
Phase II Peat Probing Location

Peat Depth (m)

0
0 - 0.5
0.5 - 1
1 - 1.5
1.5 - 2



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DETAILED PEAT DEPTH AT T4

FIGURE 4.4

Scale 1:1,000 @ A3

Date DECEMBER 2023

651500 651600 651700 651800

895800

895700

T5

N

0 25 50

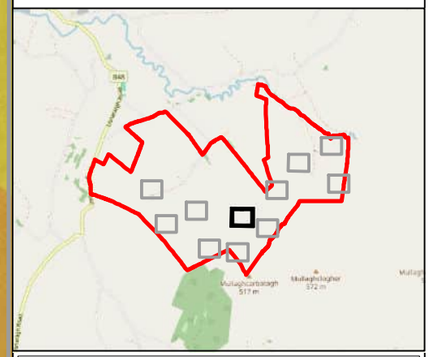
Metres

LEGEND

- Site Boundary
- Proposed Turbine Location
- New Site Track
- Permanent Hardstanding
- Temporary Hardstanding
- Peat Storage Area
- Water Crossing Location
- Phase I Peat Probing Location
- Phase II Peat Probing Location

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5



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DETAILED PEAT DEPTH AT T5

FIGURE 4.5

Scale 1:1,000 @ A3

Date DECEMBER 2023

428.011231.00001.0030.1 Fgure 4 Peat Depth at Turbines

651500 651600 651700

895200

895100

T6

N

0 25 50

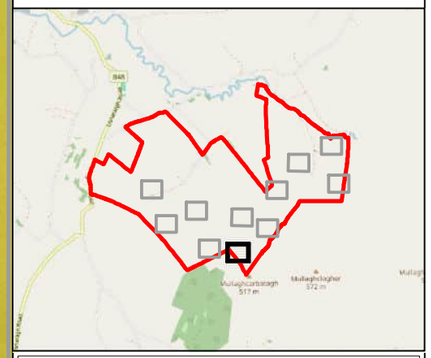
Metres

LEGEND

- Site Boundary
- Proposed Turbine Location
- New Site Track
- Permanent Hardstanding
- Temporary Hardstanding
- Peat Storage Area
- Phase I Peat Probing Location
- Phase II Peat Probing Location

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5



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DETAILED PEAT DEPTH AT T6

FIGURE 4.6

Scale 1:1,000 @ A3

Date DECEMBER 2023

428.011231.00001.0030.1 Fgure 4 Peat Depth at Turbines

651900 652000 652100 652200

895600

895500

N

T7

0 25 50

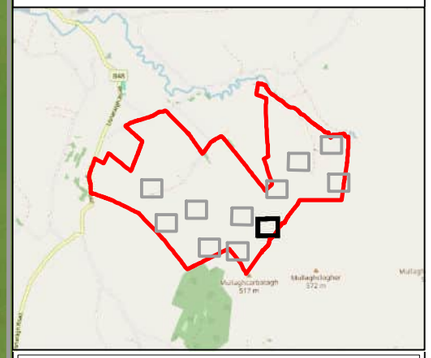
Metres

LEGEND

- Site Boundary
- Proposed Turbine Location
- New Site Track
- Permanent Hardstanding
- Temporary Hardstanding
- Water Crossing Location
- Phase I Peat Probing Location
- Phase II Peat Probing Location

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5



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DETAILED PEAT DEPTH AT T7

FIGURE 4.7

Scale 1:1,000 @ A3

Date DECEMBER 2023

428.011231.00001.0030.1 Fgure 4 Peat Depth at Turbines

652100 652200 652300

896300 896200 96100

N

T8

0 25 50

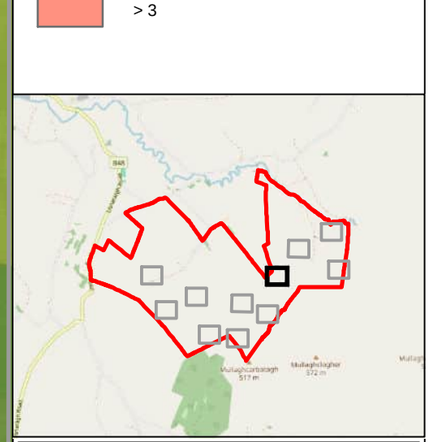
Metres

LEGEND

- Site Boundary
- Proposed Turbine Location
- New Site Track
- Permanent Hardstanding
- Temporary Hardstanding
- Peat Storage Area
- Phase I Peat Probing Location
- Phase II Peat Probing Location

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3



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DETAILED PEAT DEPTH AT T8

FIGURE 4.8

Scale 1:1,000 @ A3

Date DECEMBER 2023

428.011231.00001.0030.1 Fgure 4 Peat Depth at Turbines

652500 652600 652700

896700

896600

N

PC04

T9

0 25 50

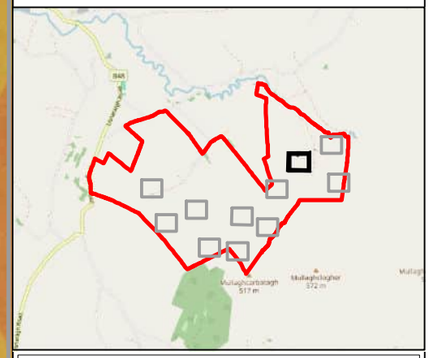
Metres

LEGEND

- Site Boundary
- Proposed Turbine Location
- New Site Track
- Permanent Hardstanding
- Temporary Hardstanding
- Peat Core Location
- Phase I Peat Probing Location
- Phase II Peat Probing Location

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3



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DETAILED PEAT DEPTH AT T9

FIGURE 4.9

Scale 1:1,000 @ A3

Date DECEMBER 2023

428.011231.00001.0030.1 Fgure 4 Peat Depth at Turbines

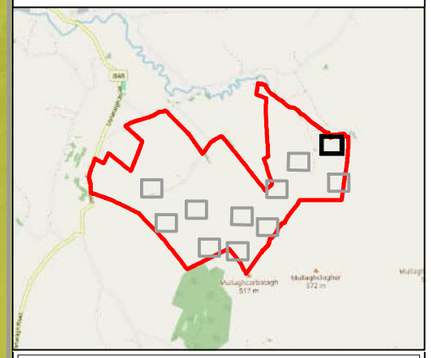
653000
653100
653200
897000
896900
T10
N
0
25
50
Metres

LEGEND

- Site Boundary
- Proposed Turbine Location
- New Site Track
- Permanent Hardstanding
- Temporary Hardstanding
- Phase I Peat Probing Location
- Phase II Peat Probing Location

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5



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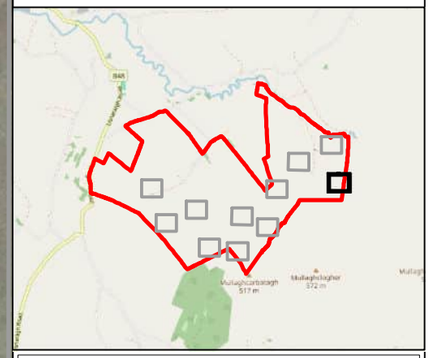
DETAILED PEAT DEPTH AT T10

FIGURE 4.10

Scale 1:1,000 @ A3

Date DECEMBER 2023

428.011231.00001.0030.1 Fgure 4 Peat Depth at Turbines

653100
653200
653300
896400
896300
N
T11
PC05
0
25
50
Metres
LEGEND
Site Boundary
Proposed Turbine Location
New Site Track
Permanent Hardstanding
Temporary Hardstanding
Peat Core Location
Phase I Peat Probing Location
Phase II Peat Probing Location
Peat Depth (m)
0 - 0.5
0.5 - 1
1 - 1.5
1.5 - 2


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PMP
DETAILED PEAT DEPTH AT T11
FIGURE 4.11
Scale 1:1,000 @ A3
Date DECEMBER 2023
428.011231.00001.0030.1 Fgure 4 Peat Depth at Turbines

Annex A Excavated Materials Calculations

Mullaghclogher Wind Farm

Renewable Energy Systems Ltd

SLR Project No.: 428.011231.00001

Infrastructure	Length (m)	Width (m)	Area (m^2)	Average Peat Depth (m)	Number	Total Volume Excavated (m^3)	Length (m)	Width (m)	Area (m^2)	Average Depth (m)	Number	Total Re-use Volume (m^3)
Site Track (Excavated)	9439	6	56634	0.87	1	49272	9439	2	18878	1.00	2	37756
Passing Place	70	4.5	315	0.39	1	123						
T1 Junction			1276	0.65	1	829						
T1 Junction			194	0.20	1	39						
T4/T6 Junction			1202	0.00	1	0						
T7 Junction			106	1.83	1	193						
T7 Turning Head			375	1.34	1	503						
T8 Junction			734	2.24	1	1648						
T9 Junction			4307	0.42	1	1829						
T10 Junction			635	0.67	1	427						
T11 Turning Head			375	0.73	1	274						
Site Entrance			74	0.00	1	0						
Turbine Bases - formation only	-	-	491	0.90	11	4857	80	2	160	0.50	11	880
Permanent Hardstandings	35	55	1925	0.90	11	19058	172	2	344	0.50	11	1892
Temporary Hardstandings	-	-	530	0.80	11	4664	-	-	530	0.80	11	4664
Substation Compound	-	-	4590	0.90	1	4131	195	2	390	0.50	1	195
Construction Compound/Battery Storage	-	-	4000	0.90	1	3600	178	2	356	0.50	1	178
Temporary Enabling Works Compound	30	30	900	1.50	1	1350	-	-	900	1.50	1	1350
Peat Storage Area 1									10115	0.50	1	5058
Peat Storage Area 2									42984	0.50	1	21492
Peat Storage Area 3									3759	0.50	1	1880
Peat Storage Area 4									6433	0.50	1	3217
Peat Storage Area 5									2743	0.50	1	1372
Peat Storage Area 6									6145	0.50	1	3073
Peat Storage Area 7									4977	0.50	1	2489
Peat Storage Area 8									26087	0.50	1	13044
Peat Storage Area 9									7470	0.50	1	3735

Total Excavated Volume (m^3)	92795
Total Re-use Volume (m^3)	102272
Net Balance (m^3)	-9477

Annex B Peat Coring Data

Mullaghclogher Wind Farm

Renewable Energy Systems Ltd

SLR Project No.: 428.011231.00001

Peat Core Log

Hole No.
PC01
Sheet 1 of 1

Project: Mullaghclogher Wind Farm	Client: RES Ltd		Dates: 27-06-2023
Project No: 428.011231.00001	Logger: CR	Approved By:	Coordinates: E: 64784.00 N: 559030.00
Location:	Hole Type: PC	Level:	Vertical Scale: 1:11

Water	Depth (m)	Sample Type	Depth	Recovery (%)	Depth (m) / Discontinuity Detail	Level (mAOD)	Legend	Stratum Description
	0.00 - 0.50	C	0.00 - 0.50	Recovery = 100%	0.50			Brown fibrous PEAT, with abundant plant remains. (H2, B2).
	0.50 - 1.00	C	0.50 - 1.00	Recovery = 100%	1.50			Brown fibrous PEAT, charcoal band at 1.3m. (H3, B2).
	1.00 - 1.50	C	1.00 - 1.50	Recovery = 100%				Peat Core Complete at 1.50m

Remarks:

Peat core recovered using peat sampler.

Peat Core Log

Hole No.
PC02
Sheet 1 of 1

Project: Mullaghclogher Wind Farm	Client: RES Ltd		Dates: 27-06-2023
Project No: 428.011231.00001	Logger: CR	Approved By:	Coordinates: E: 64729.00 N: 558992.00
Location:	Hole Type: PC	Level:	Vertical Scale: 1:11

Water	Depth (m)	Sample Type	Depth	Recovery (%)	Depth (m) / Discontinuity Detail	Level (mAOD)	Legend	Stratum Description
	0.00 - 0.50	C	0.00 - 0.50	Recovery = 100%	0.75			Brown fibrous PEAT. (H2, B2).
	0.50 - 1.00	C	0.50 - 1.00	Recovery = 100%	1.25			Reddish brown fibrous PEAT. (H3, B2).
	1.00 - 1.50	C	1.00 - 1.50	Recovery = 100%	1.50			Dark brown fibrous PEAT. (H4, B2).
								Peat Core Complete at 1.50m

Remarks:

Peat core recovered using peat sampler.

Peat Core Log

Hole No. **PC03**

Sheet 1 of 1

Project: Mullaghclogher Wind Farm	Client: RES Ltd		Dates: 27-06-2023
Project No: 428.011231.00001	Logger: CR	Approved By:	Coordinates: E: 65486.00 N: 558321.00
Location:	Hole Type: PC	Level:	Vertical Scale: 1:11

Water	Depth (m)	Sample Type	Depth	Recovery (%)	Depth (m) / Discontinuity Detail	Level (mAOD)	Legend	Stratum Description
	0.00 - 0.50	C	0.00 - 0.50	Recovery = 100%	0.50			Brown fibrous PEAT, with abundant plant remains. (H2, B2).
	0.50 - 1.00				0.75			Dark brown fibrous PEAT, with frequent plant remains. (H3, B2).
	1	C	0.50 - 1.00	Recovery = 100%	1.00			Reddish brown fibrous PEAT. (H3, B2).
								Peat Core Complete at 1.00m

Remarks:

Peat core recovered using peat sampler.

Peat Core Log

Hole No. **PC04** Sheet 1 of 1

Project: Mullaghclogher Wind Farm	Client: RES Ltd		Dates: 27-06-2023
Project No: 428.011231.00001	Logger: CR	Approved By:	Coordinates: E: 67215.00 N: 558976.00
Location:	Hole Type: PC	Level:	Vertical Scale: 1:11

Water	Depth (m)	Sample Type	Depth	Recovery (%)	Depth (m) / Discontinuity Detail	Level (mAOD)	Legend	Stratum Description
	0.00 - 0.50	C	0.00 - 0.50	Recovery = 100%	0.50			Brown fibrous PEAT, with frequent plant remains. (H2, B2).
	0.50 - 1.00	C	0.50 - 1.00	Recovery = 100%	1.00			Brown fibrous PEAT. (H3, B2).
	1.00 - 1.25	C	1.00 - 1.25	Recovery = 50%	1.25			Dark brown fibrous PEAT. (H3, B2).
								Peat Core Complete at 1.25m

Remarks:

Peat core recovered using peat sampler.

Peat Core Log

Hole No. **PC05** Sheet 1 of 1

Project: Mullaghclogher Wind Farm	Client: RES Ltd		Dates: 27-06-2023
Project No: 428.011231.00001	Logger: CR	Approved By:	Coordinates: E: 67828.00 N: 558569.00
Location:	Hole Type: PC	Level:	Vertical Scale: 1:11

Water	Depth (m)	Sample Type	Depth	Recovery (%)	Depth (m) / Discontinuity Detail	Level (mAOD)	Legend	Stratum Description
	0.00 - 0.50	C	0.00 - 0.50	Recovery = 100%	0.50			Light brown PEAT, with frequent plant remains. (H3, B2)
	0.50 - 1.00	C	0.50 - 1.00	Recovery = 100%	1.10			Brown PEAT, frequent plant remains. (H3, B2)
	1.00 - 1.10	C	1.00 - 1.10	Recovery = 20%				Peat Core Complete at 1.10m

Remarks:

Peat core recovered using peat sampler.

Peat Auger 1
0 – 0.5m

Peat Auger 1
0.5 – 1.0m

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Project : Mullaghclogher Wind Farm

res

Project No. :- 428.011231.00001

Date :- June 2023

Peat Auger 1
1.0 – 1.5m

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Peat Auger 2
0 – 0.5m

Peat Auger 2
0.5 – 1.0m

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Peat Auger 2
1.0 – 1.5m

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Peat Auger 3
0 – 0.5m

Peat Auger 3
0.5 – 1.0m

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Peat Auger 4
0 – 0.5m

Peat Auger 4
0.5 – 1.0m

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Peat Auger 4
1.0 – 1.25m

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Peat Auger 5
0 – 0.5m

Peat Auger 5
0.5 – 1.0m

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Peat Auger 4
1.0 – 1.1m

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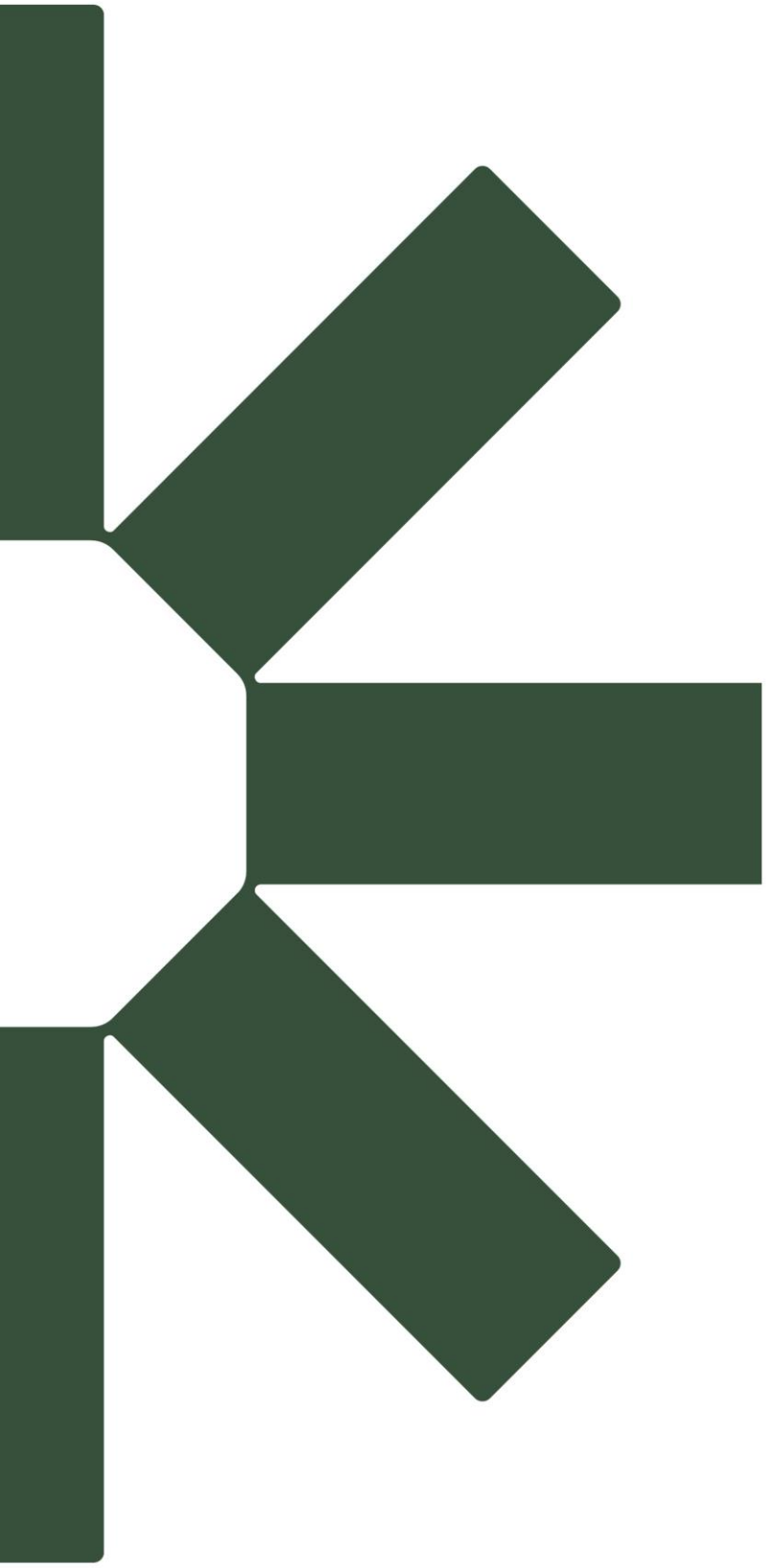
Project No. :- 428.011231.00001

Date :- June 2023



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