Appendix 8-2 – Spoil and Peat Management Plan

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Cloghercor Wind Farm Ltd.

Cloghercor Wind Farm - EIAR

Spoil and Peat Management Plan

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1.0 INTRODUCTION

The proposed project (See Figure 1-1 of the Environmental Impact Assessment report (EIAR)) is located north of Glenties, Co. Donegal. The land use/activities on the proposed wind farm site itself are a mixture of rough grassland and coniferous forestry, while the surrounding landscape is a mixture of forestry, agricultural land and peatland. The landscape is moderately steep to undulating.

This Spoil and Peat Management Plan is focused on the proposed wind farm site and the activities required to construct the wind farm and supporting infrastructure.

Peat is defined as the partially decomposed remains of plants and soil organisms which have accumulated at the surface of the soil profile. Active peatlands are traditionally described using a simple 2-layer model; the acrotelm including active peat vegetation and catotelm. Peat is present throughout the proposed wind farm site. The remnant peat on site is drained afforested land on gentle to moderate slopes. It is proposed to manage peat within the site boundaries, avoiding the removal of spoil and peat offsite. Based on a review of the available information and site observations, there are no indications of peat slides/ instability on the proposed wind farm site.

The overall proposed project includes for the following:

- Erection of 19 no. wind turbines with an overall blade tip height range from 18 5m to 200 m, a rotor diameter range from 149 m to 164 m, a hub height range from 112 m to 125 m, and all associated foundations and hard-standing areas in respect of each turbine;
- Construction of new site entrance with access onto the L6483 local road for the construction phase (operational phase maintenance traffic only), and utilisation of a permitted forest entrance (Pl. Ref. 1951040) to the L6483 as a second construction phase site access point. A third site entrance on the L6483 will form the operational phase public entrance to the wind farm;
- Improvements and temporary modifications to 5 no. locations adjacent to the public road to facilitate delivery of abnormal loads and turbine delivery on the R262 and N56 in the townlands of Tullycumber, Drumard, Darney, Cashelreagh Glebe and Aghayeevoge;
- Construction of an area of temporary hard standing to function as a blade transfer area to facilitate turbine delivery on the R262 in the townland of Drumnacross;
- Widening of sections of the L6363 and L6483 within the road corridor (up to 4.5 m running width) to facilitate delivery of abnormal loads/turbines in the townlands of Cloghercor, Shallogan More, Derryloaghan and Straboy;
- Construction of 2 no. temporary construction compounds with associated temporary site offices, parking areas and security fencing;
- Installation of 1 no. permanent meteorological mast with a height of 100 m;
- 4 no. borrow pits;
- Construction of new internal site access roads and upgrade of existing site roads, to include passing bays and all associated drainage;
- Construction of drainage and sediment control systems;
- Construction of 1 no. permanent 110kV electrical substation including:
    - 1 no. EirGrid control building containing worker welfare facilities and equipment store;

    - 1 no. Independent Power Producer (IPP) control building containing HV switch room, site offices, kitchen facilities, storeroom and toilet amenities.
    - All electrical plant and infrastructure and grid ancillary services equipment;
    - Parking;
    - Lighting;
    - Security Fencing;
    - Wastewater holding tank;
    - Rainwater harvesting equipment;
    - All associated infrastructure and services including site works and signage;
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed wind farm substation;
- All works associated with the connection of the proposed wind farm to the national electricity grid, which will be via a loop-in 110 kV underground cable connection (approximately 4.1km cable length within trenches on approximately 3.36 km of internal access roads) to the existing 110 kV overhead line in the townland of Cloghercor, Co. Donegal, with two new 16m and 21m high steel lattice end masts at each interface;
- Removal of 13 no. existing wooden polesets and 1 no. steel lattice angle mast between the two new interface end masts;
- 2 no. watercourse (stream) crossings on the grid connection route;
- All related site works and ancillary development including berms, landscaping, and soil excavation;
- Forestry felling to facilitate construction and operation of the proposed project and any onsite forestry replanting;
- Development of a permanent public car park with seating/picnic tables at the end of the construction phase of the development at the location where the proposed grid connection intersects the L6483;
- Permanent recreational facilities including marked walking trails along the site access roads and paths, and associated recreation and amenity signage; and
- Approximately 252 ha of biodiversity enhancement lands located over 3km from the proposed wind turbines.

1.1 OBJECTIVE

The role of the Spoil/Peat Management Plan (SPMP) is to demonstrate that the management of peat excavated during construction of the proposed project has been considered and will be treated appropriately during the construction process.

This SPMP also includes a monitoring programme which will be implemented during the construction phase of the wind farm and a contingency plan should peat instability/failure occur at the site. The SPMP acts as a live document arising from information presented during the consenting process, planning conditions and the content of which will be updated as work is carried out on site.

The SPMP contains some drainage guidelines for construction works and for management of peat on site. It should be noted that the control of water quality and drainage measures for site is outlined in detail in Chapter 9 (Hydrology and Hydrogeology) of the EIAR and within the Construction and Environmental Management Plan (CEMP).

The SPMP outlines the overall design approach that has been applied to the proposed project to minimise peatland disruption and aims to ensure that all opportunities to minimise peat disturbance and extraction during construction will be taken. The SMP identifies appropriate and industry proven methods for the reuse of excess peat to restore the effects of construction activities, without significant environmental or health and safety implications, to reduce the release of carbon and minimise risk in terms of human health.

1.2 GUIDANCE

The legislation and guidance regarding the management of peat includes:

- Scottish Environment Protection Agency (SEPA), Regulatory Position Statement – Developments on Peat (2010);
- Scottish Government, Guidance on Developments on Peatland – Site Surveys (2014);
- Floating Roads on Peat, Scottish Natural Heritage (2011); and
- Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste, Scottish Renewables and SEPA (2014).

The following guidance specifically relates to wind farm construction and peatland:

- Investigating the impacts of wind farm development on peatlands in England: Part 1 Final Report (2011);
- Best Practice Guidance to Planning Policy Statement 'Renewable Energy' (2009);
- Wind Farm Developments on Peat Land fact sheet. Scottish Government (2011); and
- Good practice during wind farm construction, A joint publication by Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency, Forestry Commission Scotland. (2019).

Many of the publications listed above have been developed by the Scottish Government. The Scottish documents are considered to be best practice in Ireland and are therefore appropriate for use within this SPMP.

The guidance identifies three main stages in the development process and describes what data should be gathered and assessed at each to inform a site specific SPMP:

- Stage 1: Environmental Impact Assessment (EIA);

- Stage 2: Post-consent / pre-construction; and

- Stage 3: Construction.

This SPMP has been prepared in accordance with the principles in the guidance for Stage 1 and proposes that prevention and re-use are the most appropriate means of managing peat excavated during construction at this site. This report details the methodologies required to assess all potential surplus materials and presents the expected volume of excavated materials and required reuse volumes for reinstatement and restoration purposes.

1.3 PEAT DESCRIPTION

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

- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland states that *'Peat soil is an organic soil which contains more than 60 per cent of organic matter and exceeds 50 centimetres in thickness'*; and
- The James Hutton Institute define shallow peat as having *'a prescribed depth of organic matter of 50 – 100 cm*[1]*'*

Also, The Forestry Commission use 45 cm as the critical depth for peat to occur (*Understanding the greenhouse gas (GHG) implications of forestry on peat soils in Scotland*, 2010[2]);

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

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

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

The best management option to minimise potential surplus peat is to prevent its production. Therefore, the design of the project has aimed to minimise peat excavation where possible. Discussion of design considerations to avoid deeper areas of peat is included in Appendix 2-9: Peat Stability Risk Assessment and Chapter 3: Consideration of Alternatives of this EIAR.

[1] https://www.hutton.ac.uk/learning/exploringscotland/soils/organicsoils

[2] https://www.forestresearch.gov.uk/publications/understanding-the-greenhouse-gas-ghg-implications-of-forestry-on-peat-soils-in-scotland/

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 (SEPA 20102 , SEPA 20123):

1. 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);
2. re-use: use peat produced on site in habitat restoration of hardstanding or landscaping;
3. 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 of re-use; and
4. storage: temporarily store peat on-site (for example, during short periods in the construction phase) and then re-use.

In relation to the SEPA guidance the following has been applied to the design and construction of the proposed project:

1. Floating tracks are proposed along access tracks with suitable gradients;
2. Reuse of material is proposed for landscaping and restoration of borrow pits;
3. Recycling/recovery is not appropriate on this site; and
4. Temporary storage and reuse are proposed throughout (outside of borrow pits).

1.3.1 PEAT CONDITIONS ON SITE

The site was assessed for peat vegetation through desktop review of maps and plans, site walkovers by ecologists and hydrologists in 2021 and 2022; and through intrusive site investigation in terms of peat depth probing and coring across the proposed wind farm site and access track routes.

The proposed wind farm site area concerned covers approximately 1,945 ha. It ranges in altitude between just over 10 and 365 mOD. The site is characterised by drained, afforested peatland with minor streams, ponds and lakes in topographical depressions.

The land cover for the site comprises of coniferous forestry. The site in afforested since the 1990s. The peatland areas are drained blanket peat mostly with some marginally areas left unplanted. Forestry is absent to the elevated areas to the south of the site (above 220m). Elevated areas are affected by peat hagging and is partly degraded by overgrazing, with the water quality being characterised by a high amount of organic material as a consequence of hags and erosion.

The peat overlies gravelly till and granite bedrock. Turfing cutting for domestic fuel occurs to the west of the proposed wind farm site.

1.3.2 PEAT SURVEY METHODOLOGY

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

- Habitat mapping detailed within the Chapter 6 - Biodiversity);
- Depth penetration probing (see Appendix 8-1) at 964 locations including:
- at turbines and crane hardstanding, construction compounds and the substation;
- at borrow pit areas;
- at construction compounds and the substation, and
- along the access tracks.
- Collection of peat samples for laboratory analysis incl moisture content;
- Development of a peat depth map to indicate the maximum depth ofprobe penetration at all investigated points across the site;
- Calculation of the maximum potential peat volumes that will be removed due to excavation for infrastructure based on the depth penetration probing results; and,
- Examination of areas where peat is re-used to allow calculation volumes.

Of the 964 locations probed a total of 234 probes (24%) recorded depths of 0.5m or less, 277 probes (28%) recorded depths of penetration between >0.5m and 1.0m and (81%) recorded depths of penetration <2.0m (See Figures 1 and 2).

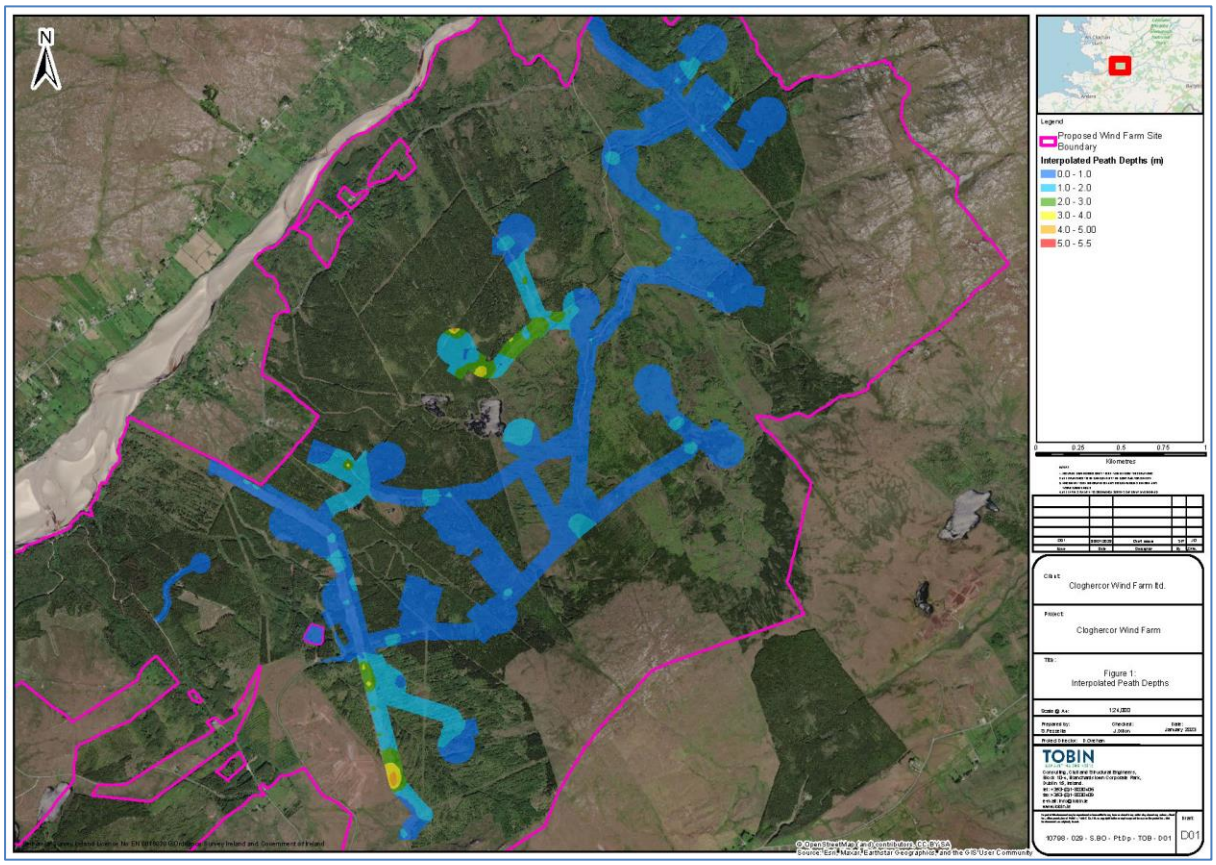

Figure 1 Peat Depths

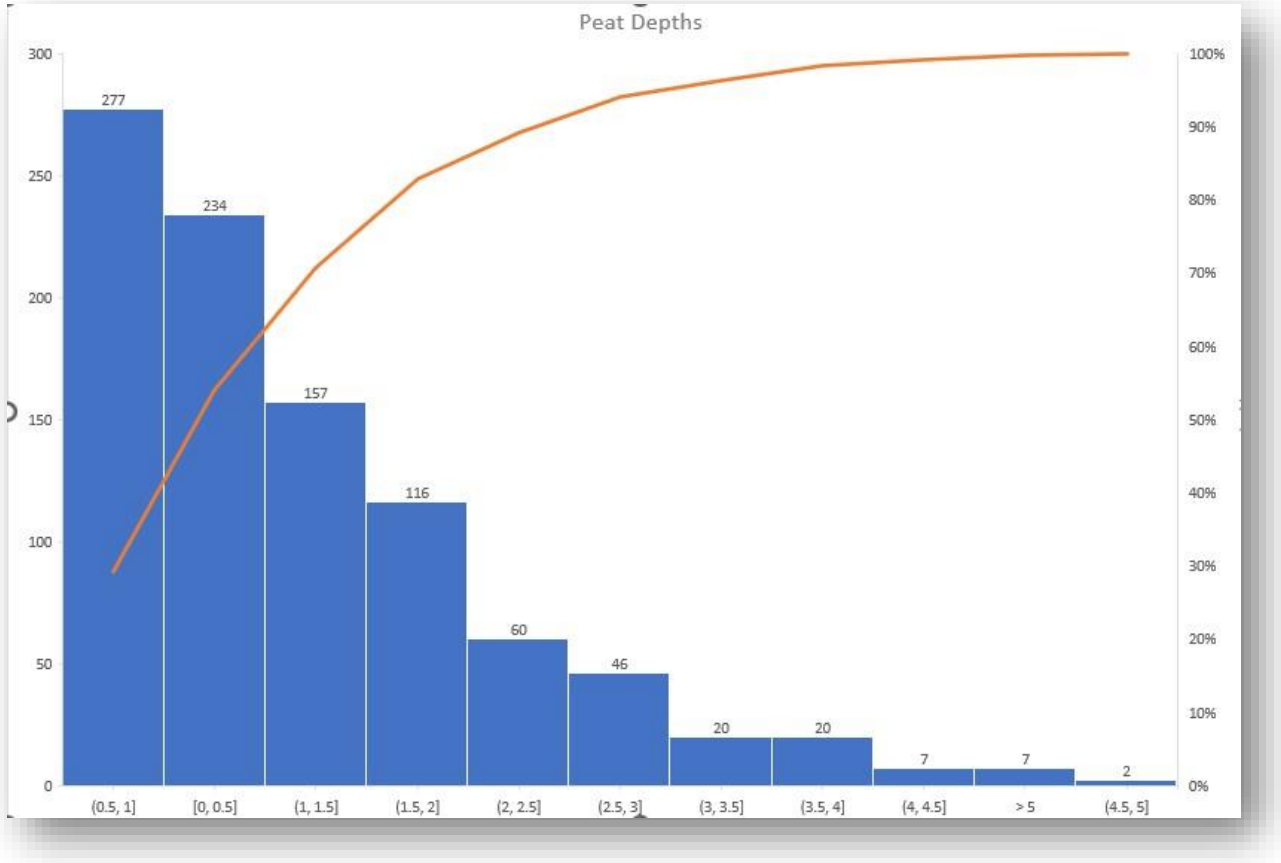

Figure 2 Peat Depths Summary

The depth of penetration at each probe location is presented on Figure 8-4 of the EIAR. Based on the data collected an interpreted peat depth map (Figure 1) was produced to demonstrate the variation in peat across the site and at the various infrastructure locations. A comparison of the peat depth with the site infrastructure footprint. These data indicate that peat (>1.0m depth) is present across >50% of the proposed project infrastructure.

Peat Characteristics

No clear basal layer of amorphous peat (H9/H10) was observed. The peat characterisation studies concluded that the site comprises drained peatland across much of the site. These values have been used in calculations of volumes of peat across the site where the peat contour map indicates that peat is present (e.g., >0.5m probe depth).

Habitat Conditions

Habitat mapping was undertaken by Project Ecologists and is detailed within Chapter 6 Biodiversity and Figures 6-7 of the EIAR.

The majority of the site is occupied by conifer plantation (WD4) habitat. Small patches and narrow strips of open habitats occur along forest roads, rides, stream corridors and in small clearings. These are mainly wet heath (HH3), with some areas of dense bracken (HD1) and lowland blanket bog (PB3). Wet grassland (GS4) occurs along the forest road in the north-eastern part of the site. Areas of wet heath were avoided in the proposed project.

1.3.3 CONSTRUCTION ACTIVITIES COVERED BY SPOIL/PEAT MANAGEMENT PLAN

The overall layout of the proposed project is shown in Figure 1-1 of the EIAR. This figure shows the proposed locations of the wind turbines and associated hardstanding areas, substation, meteorological mast, temporary construction compounds, borrow pits, internal access roads and the main site entrance. Site layout drawings of the proposed project are included as Appendix 1-1 of this EIAR. A 10-year planning permission and 35-year operational life from the date of commissioning of the entire wind farm is being sought. Given the recent advances in turbine technology, and the anticipated lifespan of wind turbines, this is considered to be the optimal operational life for the proposed project. The duration of this operational life allows the proposed turbines to be used to generate clean renewable energy until they have reached the end of their life, rather than being removed prematurely.

2.0 CONSTRUCTION ACTIVITIES

Construction of the turbine bases will require excavation of the surrounding soil from the foundation and crane hardstanding area to founding level with access being provided from adjacent roads at or near the surrounding ground level. The soil will be replaced with granular fill where required.

Each wind turbine will require a reinforced concrete (RC) foundation comprising a base slab bearing onto rock or other competent substrata with a central upstand to support the tower. The foundations for each turbine will be designed by the appointed Civil Designer.

The construction of a new site entrance for the proposed project is located along the L6483 road between Doocharry and the L6363. This entrance will be the main construction phase entrance to the site. It will facilitate material deliveries to the site (stone, steel and concrete) and staff access, as well as large oversize components such as turbine blades, tower sections and substation components. For further information see Chapter 16 (Traffic & Transportation) and the Traffic Management Plan (Appendix 2-7).

Peat management of the above construction activities are covered individually in this report.

2.1 EXCAVATIONS IN PEAT FOR TURBINE BASES, HARDSTANDINGS, SUBSTATION & INFRASTRUCTURE FOUNDATIONS

2.1.1 TURBINES AND HARDSTANDING

During turbine construction, peat will be excavated to the substrate to make room for the concrete turbine foundation, and for a small working area surrounding the foundation footprint. Typically, turbine bases are between approximately 20-26m in diameter with detailed foundation design being dictated by the local ground conditions and the requirements of the turbine supplier.

Peat will be removed from the turbine footprint. Volume calculations provide an approximate estimation of fill that will be required for all the turbine foundations. Surrounding the foundation, peat, which will either be flush with the existing ground surface or will form a raised mound between 300 and 500mm above the existing ground level, depending on the depth of the foundation at each specific turbine location. A summary of the ground conditions encountered during the ground investigation carried out as part of this report are given in Table 8-4, Chapter 8 of the EIAR.

Similarly, hardstanding for cranes and other infrastructure foundations on site are to be founded on material gravel deposits or bedrock which will also require excavation through peat. A crane hardstanding is required adjacent to each turbine for the purpose of turbine installation and maintenance. Each crane pad requires the full excavation of peat (where present) to substrate and replacement with rock is required to provide a suitably stable surface for turbine component handling. Once excavated, peat will be re-used to batter the edges of platforms grading the bases into the local topography or used to reinstate the borrow pits.

Full excavation of peat (where present) to substrate and replacement with rock is required to provide a suitably stable surface for turbine placement. Once excavated, peat will be re-used to batter the edges grading the bases into the local topography or placed in the Peat Repository.

2.2 EXCAVATIONS FOR THE UNDERGROUND CABLE

The proposed wind farm will connect to the grid via an underground cable along onsite access tracks and the public road corridor. Final detailed design of the grid connection will be subject to receiving a grid connection offer and EirGrid/ESBN post planning system studies.

See Figure 2-1 of the EIAR for the location of the proposed substation and the associated grid connection within the proposed windfarm. It is proposed to excavate the trenches for the underground cable at a uniform level in peat or overburden material. The trenches will typically be 825mm wide and 1315 mm deep.

The cable will be placed in an access road. The access track will be designed to carry vehicles conforming to maximum legal weights and dimensions applicable to public roads. Stone will be brought in to build up the area to the same level of the track. The excess material from the track will be used elsewhere on reinstatement works.

2.3 CONSTRUCTION OF NEW TRACKS THROUGH PEAT

2.3.1 TRACK CONSTRUCTION TYPES

To provide access within the site and to connect the wind turbines and associated infrastructure new tracks will need to be constructed. The identification of the access track layout is an iterative procedure. While the majority of tracks onsite will be constructed on mineral soil, there are some locations where floating roads will be required.

The track construction design considers the following key factors:

- Requirement to minimise disruption to peat hydrology;
- Minimise excavation arisings;
- Serviceability requirements for construction and wind turbine delivery and maintenance vehicles; and
- Buildability considerations.

Whilst the above key factors are used to determine the track design the actual construction technique employed for a particular length of track will be determined on the prevailing ground conditions encountered along that length of track. The proposed project has avoided intact peat areas at the edge of the peatlands.

Access tracks will be constructed to enable the construction works to take place and to provide access to turbine locations and infrastructure of the wind farm. The tracks will be constructed using unbound crushed aggregates and incorporate drainage to maintain the performance of the pavement during wet weather. The majority of the tracks are likely to be constructed as founded tracks. Founded tracks are excavated down to and constructed up from a competent geological stratum.

Ground investigations in the form of peat probing and trial pitting has been carried out along the proposed access routes to inform the depth of excavation and upfill required for the access tracks.

Table 1 General Construction Access Tracks

Construction Method	Typical Site Conditions		
	Description	Typical Peat Depth (m)	Additional criteria
Construction of new excavated tracks through peat	Moderate slopes with shallow peat	Typically, less than 1.0m, locally up to 2m	
Construction of new floating tracks over peat	Flat to shallow slopes with deeper peat	>1m	Less than 5 degrees

2.4 BORROW PITS

It is proposed to open borrow pits for the construction of the proposed wind farm. Limited in-situ peat will be encountered at the borrow pits. This material will be reused for restoration on completion of the construction phase.

Peat will be reused within borrow pits for the purpose of their restoration provided the method of reuse is consistent with the environmental reinstatement objectives of the site and presents no residual risks from pollution of the environment or harm to human health (SEPA, 2012). Key issues for borrow pit restoration are:

- Prevention of desiccation and carbon losses from peat used in the restoration; and

- Fencing where required to exclude grazing stock and encourage vegetation establishment.

3.0 PROPOSED MITIGATION

This methodology includes procedures that are to be included in the construction phase to minimise peat excavations. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations.

The Principal Contractor will produce a detailed Method Statement identifying where and how excavated peat will be used in reinstatement or landscaping works. Specific requirements for the excavation, handling, storage and reinstatement of peat will be outlined in this Method Statement. The Principal Contractor will consider potential impacts on downstream receptors and the potential for instability issues with the excavated material.

Some of the requirements to be contained within this are outlined below. The majority of the site comprises drained peatland and rock. For founded roads, areas of peat within the footprint of excavation will have the top layer of vegetation stripped prior to construction by an experienced specialist contractor. Underlying peat or bare peat will then be removed.

Classification of excavated materials will depend on their identified re-use in reinstatement works. At this site it is anticipated that the material to be excavated will comprise peat and mineral subsoil.

A total of 15km of access tracks are proposed at the site. Of this total, it is proposed 10.2km of track will be constructed using cut and fill methodologies. The remaining 5 km crosses an area of deeper peat and this will be constructed as a floating track.

3.1 CUT AND FILL TRACKS

Some of the cut and fill tracks will be constructed on peat less than 1.0m in depth by excavation of the peat to substrate and replacement with rock. Peat will be used to landscape track verges in these areas. The maximum verge height will be 0.5m above the track surface and the reinstated slope will have a shallow 1:3 gradient. It is expected that shortly after reinstatement, the peat verges will compact naturally and the final verge height will be contiguous with the road surface. The low angle of the reinstated slope reduces rainfall runoff and therefore reduces peat

loss and improves chances of vegetation regeneration along verges. Furthermore, cut and fill access tracks will be constructed to be semi-permeable in order to avoid the tracks becoming a hydraulic barrier to flows within peat.

It is calculated 32,000 m^3 of peat and soil will be excavated from cut and fill access tracks. Material will be re-used in reinstatement and landscaping of both cut and fill tracks. The surplus will be re-used for borrow pit restoration. It should be noted that Table 1 summarises the general track construction techniques only.

3.1.1 UPGRADING AND WIDENING OF EXISTING ROADS AND ACCESS TRACKS

For the construction of the wind farm, it is proposed to upgrade existing internal roads. These roads will be widened by removing organic material and soft subsoil to formation level and constructing a road on a layer of geogrid or geotextile as required by site conditions. This road construction will be similar in build up to the excavated road construction which is outlined in in EIAR Chapter 16 (Traffic). The new width of road and the existing road surface, where required, will be capped with a 150mm layer of hard wearing Class 6F stone or similar. This road type will have a crossfall of 2.5% from one edge to the other. The existing roadside drains on the lower side of the road will be used as part of the drainage system for the site. The existing roadside drains on the higher side of the road will be retained as clean water drains. The sequence for upgrading and widening existing access roads will comprise the following:

3.1.2 EXCAVATED TRACK CONSTRUCTION METHODOLOGY

Given the topography and relatively shallow peat on site, excavated access tracks are deemed an appropriate construction technique for the majority of the site.

This methodology includes procedures that are to be included in the construction phase to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations:

- Interceptor drains will be installed upslope of the access track alignment to divert any surface water away from the construction area;
- Excavation of tracks shall be to the line and level given in the design requirements. Excavation will take place to a competent stratum beneath the peat (as agreed with the site designer);
- Track construction will be carried out in sections of approximately 50m lengths; i.e. no more than 50m of access track will be excavated without re-placement with stone fill unless otherwise agreed with the resident engineer on site;
- All excavated peat shall be placed/spread alongside the excavations or in the peat repository site;
- Side slopes in peat shall be not greater than 1 (v): 2 or 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required. Battering of the side slopes of the excavations will be carried out as the excavation progresses;
- The surface of the finished excavated access track will be finished above current ground level;
- A layer of geogrid/geotextile at the surface of the competent stratum (to be confirmed by the designer);

- At transitions between floating and excavated tracks a length of track of about 10m shall have all peat excavated and replaced with suitable fill. The surface of this fill shall be graded so that the track surface transitions smoothly from floating to excavated track;
- Where slopes of greater than 5 degrees are encountered along with relatively deep peat (i.e., greater than 1.5m) and where it is proposed to construct the access track perpendicular to the slope contours it is best practice to start construction at the bottom of the slope and work towards the top, where possible. This method avoids any unnecessary loading to the adjacent peat and greatly reduces any risk of peat instability. It should be noted that slopes greater than 5 degrees are not envisaged on site; and
- A final surface layer shall be placed over the excavated track, as per design requirements, to provide a track profile and graded to accommodate wind turbine construction and delivery traffic.

Wind farm access tracks require careful monitoring to ensure that there is no significant standing water forming, which would lead to potholes in the surface. If areas of track are causing concern, repairs will be carried out in favourable, preferably dry, conditions, to ensure that there is no saturation of the surface of the track.

3.2 FLOATING TRACKS

The floating track design has been adopted in relatively flat areas where peat depths exceed 1m. All tracks will have a surface width of >5m. Floating tracks will be constructed by layering geotextiles, rock fill and aggregate directly over existing vegetation.

Track surfaces will be elevated above slightly existing ground level so peat will be used to reinstate verges by creating peat shoulders. Peat will be graded on both sides of the track adjacent to the track surface forming a gentle (1:3) slope. The maximum batter height will be 0.5m above the running surface level. Floating track verges will be reinstated on both of the track.

It is expected that founded tracks will constitute the majority of the site, however floating tracks will be used over the area where peat is greater than 1m. Floating track sections will be designed by a geogrid manufacturer, or by a consultant assisted by a geogrid manufacturer. The design will have a geotechnical input to fully understand the principles at work in the floating track. Design can be by calculation or, more usually by the application of semi-empirical rules based on experience of EN 1997 (Geotechnical Design).

Transitions between the site floating tracks and excavated tracks (or other forms of track not subject to long term settlement) will be gentle (e.g., 1:10 basal transition slope) in order to minimise likelihood of track failure at the boundary between construction types.

This methodology includes procedures that are to be included in the construction phase to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations. Note: The specialist geogrid provider/designer will provide details of geogrid arrangement.

- Mark out the line of track;
- Install advance drainage ahead of construction;

- Clear the intended floating track area of major protrusions such as rocks, trees, bushes etc down to ground level leaving any residual stumps and roots in place;
- retaining rather than stripping the vegetation layer (i.e., providing tensile strength), and laying the first geotextile/geogrid directly on the peat surface;
- Fill any local hollows and depressions with a suitable local lightweight fill such as tree brash, logs, or a combination of lightweight fill and suitable material. (Brash mats and fascines can also be used to form an initial surface on difficult ground.);
- Floating track construction shall be to the line and level requirements as per design/planning conditions;
- Base geogrid to be laid directly onto the existing peat surface along the line of the track in accordance with geogrid provider's requirements; and
- Construction of track to be in accordance with appropriate design from the designer.
- heavy plant and Heavy Goods Vehicles (HGV) using the access tracks during the construction period will be trafficked slowly in the centre of the track to minimise dynamic loading from cornering, breaking and accelerating;
- Ensure wheel loads will remain at least 0.5m from the edge of the geogrid; and
- Initial 'toolbox' talks and subsequent feedback to construction and maintenance workers and drivers to emphasise the importance of the implementing the above measures.

The typical make-up of new floating access track is between 600mm and 1000mm of selected granular fill with 2 no. layers of geogrid with possibly the inclusion of a geotextile separator. This varies depending on designer requirements.

The finished track width will be approximately 5m (to be confirmed by the designer). Stone delivered to the floating track construction shall be end-tipped onto the constructed floating track. Direct tipping of stone onto the peat shall not be carried out.

To avoid excessive impact loading on the peat due to concentrated end-tipping all stone delivered to the floating track shall be tipped over at least a 10m length of constructed floating track.

Where it is not possible to end-tip over a 10m length of constructed floating track then dumpers delivering stone to the floating track shall carry a reduced stone load (not greater than half full) until such time as end-tipping can be carried out over a 10m length of constructed floating track.

Following end-tipping suitable machinery shall be employed to spread and place the tipped stone over the base geogrid along the line of the track. A final surface layer shall be placed over the floating track, as per design requirements, to provide a track profile and graded to accommodate wind turbine construction and delivery traffic.

3.3 DURATION OF CONSTRUCTION OF FLOATING ACCESS TRACKS

The main factor in successful construction of floating access tracks is the timescale of construction, and the following guidance is provided. The settlement characteristics of peat; should be accommodated by appropriate scheduling of access track construction, as follows:

- 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.
- A key opportunity to re-use peat is to employ it in landscaping of constructed 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:
- 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; and
- Limiting the width of peat shoulders to avoid unnecessary smothering of intact vegetation adjacent to the floating track.

3.4 EXCAVATION AND STORAGE OF ARISINGS

This methodology includes procedures that are to be included in the construction phase to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations.

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

Some of the requirements to be contained within this are outlined below. The majority of the site comprises bare peat with some areas where revegetation is occurring. Areas of peat within the footprint of excavation will have the top layer of vegetation stripped prior to construction by an experienced specialist contractor. Underlying peat or bare peat will then be removed.

The handling, storage and re-use of excavated materials are of importance during the construction phase of the project. The majority of the site is on afforested lands with some areas of partially drained peatlands. It is intended that peat and unsuitable founding soils will be placed adjacent to works locations or used to reinstate the borrow pits.

Any surplus excavated material will be reused, either in profiling/landscaping or constructing berms as close to the excavation areas.

The site has been extensively drained and afforested resulting in well drained and extensively trafficked peat.

3.5 EXCAVATED ACCESS TRACKS

Excavated tracks require complete excavation of peat to a competent substrate. Excavated tracks are undertaken where slopes are >5% or where peat depths are less than 1m. This peat

would require storage ahead of re-use elsewhere on site. Good practice guidance relates to drainage in association with excavated tracks:

- Trackside ditches capture surface water before it reaches the road;
- Interceptor drains will be shallow and flat bottomed;
- Culverts and cross drains should be installed under excavated tracks to maintain all drainage pathways.
- Any stripped peat turves should be placed back in the invert and sides of the ditch to assist regeneration; and
- Discharge from constructed drainage should allow for as much diffuse dispersion of clean (silt free) water as possible while minimising disturbance to existing land as far as possible.

Silt mitigation measures will be incorporated into all constructed drainage as per the requirements of the CEMP and the . 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 peat is stored adjacent to an excavation, stability analysis should be conducted to determine Factor of Safety (FoS) and an acceptable FoS adopted for loaded areas.

As with floating tracks, monitoring should be scheduled post-construction to ensure that hydrological pathways and track integrity have been suitably maintained.

Cable Trenches

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

- utilise peat 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, and
- Replace excavated materials sequentially.

3.5.1 TEMPORARY STORAGE

Excavation volumes for construction of turbine foundations and hardstanding range between 3,000m^3 and 14,400m^3 depending on ground conditions at each turbine. Peat and soil will require excavation from the turbine bases. Where peat cannot be transferred immediately to an

appropriate restoration area, short term storage is 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.

Classification of excavated materials will depend on their identified re-use in reinstatement works. At this site it is anticipated that the material to be excavated will comprise peat and mineral subsoil.

3.6 SUMMARY OF EXCAVATED PEAT VOLUMES ON SITE

A summary of the excavated peat volumes calculated for the proposed wind farm site is provided in Table 2.

Table 2 Excavation Volume Summary

Area	Peat Excavated Volume (m^3)	Note
Roads (amenity and access)	32,000	No peat excavation required for floating road
Substation (110kV)	22,500	Peaty topsoil – included as part of worst-case assessment
Turbines	129,500	Variable depth, Assuming 1.2m average and 6,800m2 excavation area
Total	184,000	

3.7 GENERAL RECOMMENDATIONS FOR GOOD CONSTRUCTION PRACTICE

The recommendations of the PSRA are incorporated into this document and summarised below.

Following application of mitigation measures, including consideration to the siting of infrastructure to minimise the risk, the findings of the planning stage PSRA indicate a "low" hazard ranking for instability related to the requirement for excavations on the site, subject to appropriate mitigation measures. Routine and common place mitigation measures will be put in place during the detailed design and construction of the scheme to reduce the likelihood of a failure. Required mitigation measures include stepping or battering back of excavations to a safe angle (as determined through a detailed slope stability assessment by a competent temporary works designer) or construction of a temporary sheet pile wall or rock fill berm to support the peat during construction. Following mitigation, the hazard ranking of the development is considered to be "low" for all areas. Further the site terrain is rolling and undulating and topographically confined, limiting the potential and scale of peat slide and debris runout distances. It is concluded that the site is suitable for the proposed project.

3.7.1 CONSTRUCTION PHASE:

The following outlines an overview of the tasks for the construction phase:

- Client's Geotechnical Engineer to provide a Geotechnical Induction to all contractor supervisory staff.
- Client to appoint a Site Geotechnical Supervisor to carry out supervision of site works as required. The Site Geotechnical Supervisor will be required to inspect that works are carried in accordance with the requirements of the PSRA, identifying new risks and ensuring all method statements for works are in place and certified.
- Retain a Site Geotechnical Folder which contains all the information relevant to the geotechnical aspects of the site including but not limited to GRR, site investigation information, method statements etc.
- Contractor to develop a Method Statement for the works to be carried out in each of the PSRA areas cognisant of the required mitigating measures.
- Client's Geotechnical Engineer/Site Geotechnical Supervisor to approve the method statement.
- Contractor to provide tool box talks and on-site supervision prior to and during the works.
- Daily sign off by supervising staff on completed works.
- Implementation of emergency plan and unforeseen event plan by the contractor.

3.7.2 OPERATION AND MAINTENANCE PHASE:

The following outlines an overview of the tasks for the operation and maintenance phase:

- Communication of residual peat risk to appropriate site operatives.
- Ongoing monitoring of residual risks and maintenance if required. Such items would consist of regular inspection of drains and culverts to prevent blockages and inspections of specific areas such as settlement ponds and floated access roads after a significant rainfall event.

4.0 SUMMARY

A high density of peat probes and associated site investigation has been completed at all site infrastructure to obtain an understanding of peat variability, depth and characteristics at the site.

The total volume of excavated peat associated with the infrastructure footprint, associated excavated slopes and drains has been calculated at about 184,500m^3, predominately drained blanket bog in an afforested site. The potential reuse of excavated peat has been calculated and will be reused on site.

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

Floating roads and other measures are utilised on site to minimise the volume of excavation. The peat management plan. An ECoW will maintain a record of actual peat volumes excavated and the subsequent peat re-use volumes. This record during the construction, operation, decommissioning phases of the proposed wind farm project will be made available for review by regulatory authorities as required.