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Volume 3

**Appendix 8-3 Spoil and Peat
Management Plan (SPMP)**

BUILT ON KNOWLEDGE

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1. INTRODUCTION

The proposed wind farm is located on the Offaly and Tipperary county border approximately 3.6km northeast of Shinrone and approximately 5km south of Birr.

The land use/activities on the proposed wind farm itself is predominantly agricultural lands with cutover peat and forestry plantation to the north of the proposed wind farm. Forestry is comprised of coniferous plantations with some broadleaf areas. There is an extensive network of existing internal access roads across the proposed wind farm to facilitate the ongoing forestry operations as well as local access to farmlands. The proposed wind farm site is characterised by flat areas to the east and moderately steep topography to the east at T6.

Peat and peaty soils were encountered to the east of the proposed wind farm at T2 to T4 and T8 to T9. 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. No active peat was recorded in the footprint of the proposed project.

The peaty soil and peat on the proposed wind farm is predominantly drained due to historical turf cutting, farming activity and afforestation. It is proposed to manage peat within the proposed wind farm boundaries in accordance with the principles of the circular economy. Government policy is moving towards achieving a circular economy, where resources are re-used or recycled as much as possible, and the generation of waste is minimised. There are no indications of peat instability on the proposed wind farm as detailed in Appendix 8-2 PSRA.

The proposed grid connection route (GCR) is approximately 12.23 km in length and from the proposed wind farm 110kV Substation, to the existing Dallow 110 kV Substation north of Birr town. The proposed GCR primarily runs along local roads, with short offroad sections through agricultural grasslands near the respective substations. The proposed turbine delivery route (TDR) runs from Foynes Port, along the national road network until it gets close to the proposed wind farm site, when it turns onto the local road network at the Sharavogue Cross Roads.

1.1 OBJECTIVE

The role of the Spoil and 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 proposed project and a contingency plan should peat instability/failure occur at the proposed wind farm. The SPMP acts as a live document arising from information presented during the consenting process, possible 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 the proposed wind farm. 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 Environmental Impact Assessment Report (EIAR) and within the Construction and Environmental Management Plan (CEMP), Appendix 2-3 of the EIAR.



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 SPMP identifies appropriate and industry proven methods for the reuse of excess peat to restore the effects of construction activities, without significant environmental implications.

1.1.1 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 (2015).

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 the proposed wind farm 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.

The best management option to minimise potential surplus peat is to prevent its production. Therefore, the design of the proposed project has aimed to minimise peat excavation. Discussion of design considerations to avoid deeper areas of peat is included in Appendix 8-2: Peat Stability Risk Assessment and Chapter 3: Consideration of Alternatives of this EIAR.

SEPA has provided a hierarchy of management approaches in which the effectiveness of the approach to peat management is optimised at development sites as summarised below (SEPA 2010, SEPA 2012):



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 the proposed wind farm in habitat restoration of hardstanding or landscaping;
3. Recycling/recovery/treatment: modify peat produced on the proposed wind farm 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.

1.2 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 cm¹*'

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, 2010²*);

- 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

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/>



strength. Water flow in the catotelm is slow unless peat structures such as sink holes or peat pipes are present.

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

1. Reuse of material is proposed for landscaping and restoration of borrow pits;
2. Recycling/recovery is not appropriate on this site; and
3. Temporary storage and reuse are proposed on shallow gradients (<3 degrees and outside of borrow pits).

1.2.1 Peat Conditions

The peat was assessed based on a review of GSI mapping, site walkovers by ecologists and hydrologists – See Chapter 6 Biodiversity and Chapter 8 Land, Soils and Geology and intrusive site investigation were undertaken to determine of peat depth probing and coring across the proposed wind farm site and access track routes.

Peat on the proposed wind farm site is characterised by modified or drained peatland. The land cover to the east for the proposed wind farm site comprises of coniferous forestry and rough grassing in the surrounding area. The peat where present is relatively dry and overlies glacial subsoils i.e. silty sandy till and sand/gravel.

Based on a review of the peat probe data, the areas where excavation are generally <0.5m with areas of deeper peat near T4, T8 and T9. Results from the SI confirm the peat on the proposed wind farm site was cut away and the remaining peat has a relatively low moisture content and high shear vane values. The peat is fibrous and relatively easy to manage. No evidence of instability were noted on the proposed wind farm site.

Where peat is deep and shallow gradient occur, floating roads are frequently used to reduce excavation volume. Based on the proposed wind farm site information, floating and founded roads will be utilised.

1.2.2 Peat Instability

Peat instability in this report is defined as a mass movement of a body of peat that would have a significant adverse impact on the surrounding environment. Peat instability excludes localised movement of peat that would occur (say), creep movement or localised erosion type events.

As is detailed in the Peat Stability Risk Assessment (PSRA) in Appendix 8-2 of the main EIAR and summarised in Chapter 8 (Land, Soils and Geology) of the EIAR, the risk of instability is low at the proposed project due to the limited peat encountered. Adherence to the PSRA and SPMP should reasonably minimise the potential for all such peat movements. However, it is noted that due to the soft ground nature of the peat terrain it is not possible to completely avoid localised peat movement. There are no known peat instability issues on the proposed wind farm site. The GSI web resource indicates the nearest related slope stability events on elevated sites to the north and west of the proposed wind farm but does not show any record of such events within 1km of the proposed project.



1.2.3 Construction Activities Covered by Spoil and Peat Management Plan

The proposed project is characterised by the following civil engineering works to provide the necessary infrastructure to complete the proposed project as described in Chapter 2, Description of the Proposed Project. The proposed wind farm site is located approximately 3.6 km northeast of Shinrone, and approximately 5 km south of Birr. The proposed wind farm site (Figure 1-2 of this EIAR) has an area of 355 ha and comprises an elongated land parcel approximately 4 km long in the north/south direction and is approximately 1.2 km wide in an east/west direction at the widest point.

The land use/activities on the proposed wind farm site are primarily commercial forestry and cutover peat, with some areas of open peatland that is grazed. The remaining shallow peat is in dry condition and utilised for agricultural purposes. No peat was found to the west of the proposed wind farm site (T5, T6, T7, T10, T11).



2. CONSTRUCTION ACTIVITIES

Peat management of the construction activities are covered individually in this report. The proposed wind farm site is characterised by flat to moderately steep topography between 45 and 65 m above ordnance datum (AOD). The proposed wind farm site is covered with thick glacial deposits with drumlins identified resulting in local variations in topography.

For the construction phase of the proposed wind farm, the activities that are considered include

- Excavations in peat for:
 - turbine foundations;
 - hardstanding foundations;
 - substation foundation;
 - met masts;
 - construction compound;
 - underground cables;

Construction techniques will consist of:

- new permanent excavated access tracks in peat; and
- new permanent/temporary floating access tracks over peat.

Following excavation, peat arisings will be reused on site in designated areas –

- Peat Deposition Area 1 – east of the BESS;
- Borrow Pit 2 – northwest of T6, and;
- Borrow Pit 3 – southwest of T6.

Borrow pit 1 will not be utilised as a peat deposition area and will be used instead for flood compensation.

2.1 EXCAVATIONS OF PEAT FOR INFRASTRUCTURE FOUNDATIONS

The material encountered in the trial pits excavated at each proposed turbine location was soft to stiff generally firm with depth - see Figure 8-7, Chapter 8 (Land, Soils and Geology) of the EIAR. Deeper excavations to more competent material will be required to construct the proposed turbine foundations.

During proposed turbine construction at T2 to T4 and T8 to T9, peaty soils and 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 25m in diameter with detailed foundation design being dictated by the local ground conditions and the requirements of the turbine supplier.

Volume calculations provide an approximate estimation of fill that will be required for all the proposed turbine foundations. Due to the nature of the development, i.e., deposition of soil and peat, there is the potential for impacting the shallow soil and geology environment. Excavation



of peat and subsoil will be required for construction of works for the installation of access roads. This will result in a permanent removal and relocation of cutover peat and subsoil.

The calculated volume of peat or peaty soils is 59,000 m³. In order to utilise and reuse the peat soils, the construction works will be sequenced as follows:

- Construction works to commence to the south of the proposed wind farm i.e. Site entrance to T9, and central borrow pits (Borrow Pit 2 and 3) and central compounds;
- Material from borrow pits and quarries utilised to construction of the central roads;
- Stripping of peaty soils for T8/T9;
- Placement of peaty soils/peat and placing material in the borrow pit 2 and 3; and
- Reinstatement of borrow pits in a phased basis.

Peat or peaty soil will all be relocated within the proposed wind farm site. Due to the proposed phasing of the works, the southern section of the proposed wind farm site and upgrades to the southern roads will be constructed first. The borrow pits will be available to accept material at the later stages of the construction works.

The proposed excavations will be battered at a 1:2 to 1:3 gradient. Once excavated, the proposed turbine foundation is installed, occupying a foundation footprint, approximately 25m in diameter. Piled foundation will be utilised where peat is deeper at T4, T8 and T9. This will reduce the excavated peat requirement with detailed design stage following additional ground investigation.

Borrow Pits and deposition areas

There are three main areas utilised for peat reuse on the proposed wind farm. Peat Deposition Area 1 is located to the north of the proposed wind farm with Borrow Pit 2 and 3 are located in the centre of the proposed wind farm site i.e. near T6. With a shallow excavation in the area, material up to 5m bgl are accessible with excavators. A summary of potential volumes is included in **Error! Reference source not found.**

Table 2-1: PDA and Borrow Pits -Summary of the Spoil Areas

Area	Potential Volume (m ³)	Ecological/Other Constraints	Proposed end use
PDA 1	16,200 m ³ - 16,200 m ² x 1.0m	No significant ecology constraints, no archaeological features encountered	Habitat creation
Borrow Pit 2	37,000 m ³ - 9,340 m ² x 4m	No significant ecology constraints, no archaeological features encountered	Restoration of borrow pits
Borrow Pit 3	75,000 m ³ - 18,720 m ² x 4m	No significant ecology constraints, no archaeological features encountered	Restoration of borrow pits



Similarly, hardstanding for cranes and other infrastructure foundations on the proposed wind farm site are to be founded on material underlying peat deposits which will also require excavation through peat. A crane hardstanding is required adjacent to each proposed turbine for the purpose of turbine installation and maintenance. Each crane pad has an area of 25m x 40m and will require 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.

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.

2.2 EXCAVATIONS FOR THE UNDERGROUND CABLE

The proposed wind farm site 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 for the location of the proposed substation and the associated grid connection within the proposed wind farm site. 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 1350mm deep with variations on this design to adapt to bridge crossings, culvert crossings, service crossings and watercourse crossings, etc.

2.2.1 Cable Trench Construction Methodology

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

With respect to placement of arisings from excavation, the guidelines below are to be followed.

- All proposed excavations within peat are to be adequately supported or peat slopes are to be battered to a safe slope inclination. This slope inclination will be reviewed during construction, as appropriate;
- Proposed excavations shall always be kept reasonably free from water; and
- Backfill requirements for the cable trench will be decided as part of the detailed design/construction.

All excavated material will be stored near the excavations and reused for reinstatement works. Any soil required for reinstatement that will be temporarily stockpiled on the proposed wind farm site will be placed at least 15m back from the nearest watercourse on level ground and will be ringed at the base by silt fencing and be regularly monitored by a designated competent person for signs of solids escape. In which case an additional line of silt fencing will be added in line with the relevant environmental control measures.



2.3 CONSTRUCTION OF NEW TRACKS

To provide access within the proposed wind farm and to connect the proposed 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 on the proposed wind farm site will be constructed on mineral soil, there are some locations where construction on peat and peaty soils will be required.

The track construction preliminary design has considered the following key factors:

- Requirement to minimise disruption to peat/soil 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 proposed 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. Proposed access tracks will be constructed to enable the construction works to take place and to provide access to turbine locations and infrastructure of the proposed wind farm site. The proposed 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 with adequate cross drainage to prevent water accumulation on the upgradient side. 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. The access tracks will be constructed as founded or floating roads. Founded roads are excavated down to and constructed up from a competent geological stratum, whereas floated roads are built directly on top of the peat and soft soils. The use of floating roads limited the area of excavation.





Photo1 Floating road on peat

Ground investigation in the form of trial pitting and peat probing have been carried out along the proposed access routes to inform the depth of excavation and upfill required for the access tracks. It is calculated as 59,000 m³ of peat material, to be excavated and reused on site for borrow pit reinstatement and habitat creation.

2.3.1 Track Construction Types

To provide access within the proposed wind farm 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 construction on peat will be required.

The majority of site construction will utilise the permanent access track network for access and egress, and this access will be constructed in advance of other ground works in a sequential manner.

It is intended that the access tracks will be constructed using site won material as subbase and unbound crushed aggregates and incorporate drainage to maintain the performance of the pavement during wet weather. The access tracks shall be constructed to average heights of 0.3m above existing ground level.

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 2-2: General Construction of Access Tracks

Construction Method	Typical Site Conditions		
	Description	Typical Peat Depth (m)	Typical Slope Inclination (degrees)
Construction of new excavated tracks in peat	Flat slopes with shallow peat, site	Typically, less than 0.5m, locally up to 1m	Less than 3 degrees
Construction of new floating tracks over peat	Flat slopes with deeper peat	>1m	Less than 3 degrees

2.4 GENERAL ACCESS TRACK CONSTRUCTION TECHNIQUES

Prior to the construction of any access tracks on the proposed wind farm site a detailed design will need to be carried out. Given the topography and relatively shallow peat on the proposed wind farm site, excavated access tracks are deemed an appropriate construction technique for the majority of the proposed wind farm 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;
- Proposed 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 proposed wind farm 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 the proposed wind farm site;
- All excavated peat shall be placed/spread alongside the excavations;
- 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. 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 may be required at the surface of the competent stratum (to be confirmed by the designer);
- Where slopes of greater than 5 degrees are encountered along with relatively deep peat (i.e. greater than 1m) 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. This method avoids any unnecessary loading to the adjacent peat and greatly reduces risk of peat instability; 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.



access tracks to the proposed wind farm site 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.

2.4.1 Construction of new Floating Roads over Peat

Floating roads are built directly on top of the peat and soft soils. Where peat is deeper than 1m, floating roads will be used. The access tracks shall be constructed to average heights of 0.5m above existing ground level. It is expected that founded tracks will constitute the majority of the proposed wind farm, 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. It can also be designed in-house by a contractor with experience in track construction over peat. 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 proposed wind farm 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.

2.4.1.1 Floating Access Track Construction Methodology

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: Details of geogrid arrangement will be provided by the specialist geogrid provider/designer.

- Mark out the line of track;
- Install advance drainage ahead of construction where necessary;
- 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;
- Leave the local surface vegetation and soils in place if possible;
- 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.

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



Following the detailed design of the floating access tracks it may be deemed necessary to include pressure berms either side of the access track in some of the deeper peat areas. The inclusion of a 2 to 5m wide pressure berm (typically 0.5m in height) either side of the access track will reduce the likelihood of potential bearing failures beneath the access track.

The finished track width will be approximately 5-6m (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. EXCAVATION AND STORAGE OF ARISING

The handling, storage and re-use of excavated materials are of importance during the construction phase of the proposed project. The majority of the proposed wind farm is on forestry lands with some areas under agricultural production. It is intended that peat and unsuitable founding soils will be placed at the borrow pit areas.

Any surplus excavated material will be reused, either in profiling/landscaping or constructing berms as close to the excavation areas. The proposed wind farm site has been extensively drained and afforested resulting in well drained and extensively trafficked peat and soils.

3.1.1 Excavation & Storage of Arisings Methodology

This methodology includes procedures that are to be included in the proposed construction phase to minimise any adverse impact on peat and soil 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 a detailed 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 proposed wind farm 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.

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

3.1.2 Peat Excavation Method

The following methodologies for excavation of peat are recommended:

- Prior to any proposed excavations, a detailed Method Statement identifying where and how excavated peat will be used in reinstatement or landscaping works. Specific requirements for the excavation, handling, storage and reinstatement of peat will be outlined in this Method Statement. The Contractor will consider potential impacts on downstream hydrological receptors and also the potential for instability issues with the excavated material.
- Areas of peat will have the top layer of vegetation stripped off as turf prior to construction by an experienced specialist contractor. When excavating areas of peat, excavated turfs will be as intact as possible.
- Excavated soils and turfs will be handled so as to avoid cross contamination between distinct horizons and ensure reuse potential is maximised.



- Care will be taken when stripping and removing topsoil and peat turfs and appropriate storage methods used on the proposed wind farm site, i.e. excavated material will be stored in separate horizons and vegetation rich top layers will be stored vegetation side up.
- Classification of excavated materials will depend on their identified re-use in reinstatement works. At the proposed wind farm site it is anticipated that the material to be excavated will comprise peat (which may be sub-divided into peaty soils, peat and mineral soils (subsoil and topsoil)).

3.1.3 Temporary Storage

Temporary storage of excavated soils will only occur where peat thickness is minimal or absent. It is proposed that any temporary onsite stockpiles of soil, rock and other excavated material shall be removed and utilised in the site reinstatement programme to infill any excavated areas which will then be mounded and capped with sod prior to the completion of works.

The peat soils will be transported to the borrow pit/deposition area. It is not proposed to store peat near T8/T9. Peat material will be used to reinstate the borrow pit areas.

Mineral soil, subject to a geotechnical risk assessment may be temporarily stored on the proposed wind farm site. For example, a volume (100m³), this would require a temporary storage area near to the construction works of approximately 5m x 20m to a height of 1m. In this case, the following good practice applies:

- Excavated material will not be stored adjacent to turbine bases, on or adjacent to slopes (>5 degrees gradient), or in areas of peat.
- Peat will not be stored around the proposed turbine perimeter;
- Diffuse drainage lines and locally steep slopes should be avoided for peat storage; and
- Stored upper turves (incorporating vegetation) will be organised and identified according to soil type.

For borrow pits and compounds (with longer term storage requirements), the following applies:

- peat generated from crane pad locations will be transported directly to its allocated restoration location, to minimise the volume being stockpiled with the possibility of drying out;
- stored peat will be stored and placed at the borrow pit below the current land profile to promote stability; and
- monitoring of areas of peat storage during wet weather.
- No permanent stockpiles will be left on the proposed wind farm site after the completion of the construction phase works.

Transport

- Movement of peaty soils will be kept to a minimum once excavated, and therefore it is preferable to transport peat planned for reinstatement to its destination at the time of excavation;
- Carefully evaluate potential restoration sites, such as borrow pits, and agree phasing as appropriate with the ECoW, landowners and relevant consultees; and
- Undertake restoration and revegetation work as soon as possible.
- Spoil will be deposited, in layers of 0.8 m.



After completion of the turbine base reinstatement works all remaining stockpiles are to be removed for permanent disposal at the proposed deposition areas within the proposed wind farm site.

3.1.4 Excavated Rock and Glacial subsoils

Stone and soil material will be excavated during proposed construction. This will be used under and around key infrastructure including the proposed turbines, substation, site roads, hardstands and construction compounds. By sourcing the majority of the required stone volume from the onsite borrow pits as described above, the volume of traffic that will occur on public roads in the area will be significantly reduced. Stone from offsite sources will be used for surface dressing, while stone sourced onsite will be used for the initial capping layer. Further information on the proposed traffic volumes and impacts are discussed in Chapter 14 of this EIAR (Traffic & Transportation).

Hardstands and site roads will be constructed to be above the existing ground level. The lower layer (approx. 300mm) of this will be lower grade stone, with the top 150mm being high quality compacted aggregate. Internal cable trenches which connect each turbine to the proposed on site substation will be approximately 1350mm deep, with the first 600mm being backfilled with sand. The surplus excavated material will be used to complete the backfilling of the borrow pit.

3.2 GENERAL RECOMMENDATIONS FOR GOOD CONSTRUCTION PRACTICE

The recommendations of the PSRA are incorporated into this document and summarised below. The following outlines an overview of the tasks for the proposed 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 the proposed wind farm 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 proposed wind farm site including but not limited to risk register, 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 toolbox 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.

3.2.1 Operation and Maintenance Phase:

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



- Communication of residual stability 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.
- Routine inspection of the proposed wind farm site by contractor to include an assessment of ground stability conditions (e.g. cracking, excessive track settlement, disrupted surface, closed-up drains) and drainage conditions (e.g. blocked drains, absence of water in previously flowing drains, springs, etc).

3.2.2 Decommissioning Phase:

All above proposed ground infrastructure will be disassembled and remaining infrastructure will remain in place, therefore very limited excavations will be required for decommissioning.



4. MONITORING

To monitor possible peat/soil movements, it is proposed to install sighting posts upslope and downslope of the access track at staggered intervals at locations where the peat depth is greater than 1.0m i.e. near turbine 2. Visual inspections and photo logs will be completed pre construction, during construction and post construction. Details of sighting posts are given below.

Where there is excessive movement or continuing peat movement recorded at a monitoring location or identified at any location within the proposed wind farm site but no apparent signs of distress to the peat (e.g. cracking, surface rippling) then the following shall be carried out.

- All activities (if any) shall cease within the affected area;
- Increased monitoring at the location shall be carried out. The area will be monitored, as appropriate, until movements have ceased; and
- Re-commencement of activities shall only start following a cessation of movement and agreement with all parties.

Due to the drained cutaway nature of the proposed wind farm site, the risk of a regional scale landslide is low/negligible as detailed in the PSRA. In the event of a localised peat movement the following measures will be put in place. Where the onset or actual detachment of peat (e.g. cracking, surface rippling) then the following shall be carried out:

- On alert of a peat slide incident, all activities (if any) in the area will cease and all available resources will be diverted to assist in the required mitigation procedures.
- Where considered possible, action will be taken to prevent a peat slide reaching any watercourse. This will take the form of the construction of check barrages on land; and
- All relevant authorities will be notified if a peat slide event occurs on the proposed wind farm site.

For localised peat slides that do not represent a risk to a watercourse and have essentially come to rest, the area will be stabilised initially by rock infill, if required. The failed area and surrounding area will then be assessed by the engineering staff and stabilisation procedures implemented. The area will be monitored, as appropriate, until movements have ceased.

