APPENDIX 8-1

FEHILY TIMONEY – GEOTECHNICAL & PEAT STABILITY ASSESSMENT REPORT FOR SLIEVEACURRY RENEWABLE ENERGY DEVELOPMENT, CO. CLARE

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

GEOTECHNICAL & PEAT STABILITY REPORT

SLIEVEACURRY RENEWABLE ENERGY DEVELOPMENT

Prepared for: **MKO Ltd**

MKO

Date: October 2021

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GEOTECHNICAL & PEAT STABILITY ASSESSMENT REPORT

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Client: MKO Ltd

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Abstract: Fehily Timoney and Company (FT) were engaged by MKO to undertake a geotechnical assessment of the proposed Slieveacurry Renewable Energy Development site with respect to peat stability. As part of the geotechnical assessment of the proposed development, FT completed walkover surveys at the site. The findings of the geotechnical and peat stability assessment showed that the site has an acceptable margin of safety and is suitable for the proposed wind farm development.

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1. NON-TECHNCIAL SUMMARY

Fehily Timoney and Company (FT) was engaged by McCarthy Keville O'Sullivan on behalf of Slieveacurry Ltd. to undertake a geotechnical and peat stability assessment of the proposed Slieveacurry Renewable Energy Development site. In accordance with planning guidelines compiled by the Department of the Environment, Heritage and Local Government (DoEHLG), where peat is present on a proposed wind farm development, a peat stability assessment is required.

A walkover including intrusive peat depth probing, desk study, stability analysis and risk assessment was carried out to assess the susceptibility of the site to peat failure following the principles in Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (PLHRAG, 2017). A ground investigation comprising trial pits was also undertaken across the site.

The findings, which involved analysis of 140 locations, show that the site has an acceptable margin of safety and is suitable for the proposed wind farm development. Based on the findings, recommendations and control measures for construction work in peat lands are suggested to ensure that all works adhere to an acceptable standard of safety.

The proposed wind farm comprises 8 no. wind turbines and associated infrastructure. The site comprises gently undulating to hilly terrain and is typically covered in blanket peat that has either been planted with conifer plantations, used as grazing land or harvested for turf production. Up to 2km of existing tracks are present on the site and have been in operation for a number of years.

Slope inclinations at the main infrastructure locations range from 1 to 10 degrees. The flat topography/nature of the terrain on site reflects the low risk of peat failure. Ground conditions comprised mainly of peaty topsoil or peat overlying clay or silt overlying bedrock.

Peat depth recorded during the site walkovers from over 700 probes ranged from 0 to 4.5m with an average peat depth of 0.6m. 82% of the probes recorded peat depths of less than 1.0m with 95% of peat depth probes recorded peat depths of less than 2.0m. A number of localised readings recorded peat depths from 2.0 to 2.7m. The deeper peat areas were generally avoided when optimising the wind farm layout of the site.

The purpose of the stability analysis was to determine the stability i.e. Factor of Safety (FoS), of the peat slopes. The FoS provides a direct measure of the degree of stability of a peat slope. A FoS of less than 1.0 indicates that a slope is unstable; a FoS of greater than 1.0 indicates a stable slope. An acceptable FoS for slopes is generally taken as a minimum of 1.3. The stability analysis for this project, which analysed the turbine locations and associated infrastructure across the site, resulted in FoS above the minimum acceptable value of 1.3 and hence the site has a satisfactory margin of safety.

The risk assessment uses the results of the stability analysis in combination with qualitative factors, which cannot be reasonably included in a stability calculation but nevertheless may affect the occurrence of peat instability, to assess the risk of peat failure at the site. The results of the risk assessment are given in Appendix B. A construction buffer zone plan based on qualitative factors identified during the site walkover is included as Figure 4.3.

In summary, the Slieveacurry Renewable Energy Development site has an acceptable margin of safety and is considered to be at **low** risk of peat failure.

2. INTRODUCTION

2.1 Fehily Timoney and Company

Fehily Timoney and Company (FT) is an Irish engineering, environmental science and planning consultancy with offices in Cork, Dublin and Carlow. The practice was established in 1990 and currently has about 70 members of staff, including engineers, scientists, planners and technical support staff. FT deliver projects in Ireland and internationally in our core competency areas of Waste Management, Environment and Energy, Civils Infrastructure, Planning and GIS and Data Management.

2.2 Project Description

FT was engaged by McCarthy Keville O'Sullivan (MKO) on behalf of Slieveacurry Ltd. to undertake a geotechnical & peat stability assessment of the proposed Slieveacurry Renewable Energy Development site.

The proposed Slieveacurry Renewable Energy Development is located approximately 5km east of Miltown Malbay, Co. Clare.

The Slieveacurry Renewable Energy Development site comprises blanket peat area of approximately 8km^2. The site is located in the west of Co. Clare. The surrounding landscape comprises low hills with land-use comprising forestry, agricultural land and cutaway peatland.

The development comprises the following:

(1) 8 no. wind turbines with an overall ground to blade tip height in the range of 175m maximum to 173m minimum, a blade length in the range 75 metres maximum to 62.5 metres minimum, hub height in the range 108.5 metres maximum to 100 metres minimum

(2) A permanent Meteorological Mast with a maximum height of 30 metres

(3) Underground cabling (33kV) connecting the proposed turbines via a Ring Main Unit (RMU) to the 110kV substation in the townland of Knockalassa

(4) vPermanent extension to the 110kV substation at Knockalassa comprising extension to the existing substation compound, provision of a new control building with welfare facilities and all associated electrical plant and equipment for an additional 110kV bay and security fencing

(5) Upgrade of access junctions

(6) Upgrade of existing tracks/ roads and provision of new site access roads and hardstand areas

(7) 2 no. borrow pits

(8) 2 no. temporary construction compounds

(9) Site drainage

(10) Forestry felling

(11) Permanent signage

(12) Operational stage site signage; and

(13) All associated site development ancillary works and apparatus

2.3 Peat Stability Assessment Methodology

FT undertook the assessment following the principles in Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (PLHRAG, 2017). The Peat Landslide Hazard and Risk Assessment Guide (PLHRAG) is used in this report as it provides best practice methods to identify, mitigate and manage peat slide hazards and associated risks in respect of consent applications for electricity generation projects.

The best practice guide was produced following peat failures in the Shetland Islands, Scotland in September 2003 but more pertinently following the peat failure in October 2003, during the construction of a wind farm at Derrybrien, County Galway, Ireland.

The peat stability assessment has been undertaken taking into account peat failures that have occurred on peatland sites. (such as Garvagh Glebe, Co. Leitrim, Shass Mountain, Co. Leitrim and Meenbog, Co. Donegal). The Meenbog failure occurred on a section of floating road. This construction technique is not proposed on the Slieveacurry site. It is important that the existing site drainage is maintained during construction to avoid a similar failure to that on Shass Mountain, and this is referenced in the Risk Assessments for the turbines/access roads.

A constraints study was initially undertaken by the Environmental, Hydrogeological and Ecological members of the design team to determine the developable area on the site, prior to the site reconnaissance by engineering geologists/geotechnical engineers from FT. The extent and depth of ground investigation and peat stability analysis by FT have been undertaken in accordance with guidance within Eurocode 7 and PLHRAG, 2017 to investigate peat slopes that have the potential to impact on the proposed development, as applicable. Sufficient peat depth data has been recorded during the site walkovers to enable the characterisation of the peat depth across the site, with additional detail at infrastructure locations. The peat stability assessment is undertaken within the proposed development to identify peat slope at risk from the proposed development, and to identify peat slopes that may pose a risk to the proposed development.

The geotechnical and peat stability assessment at the site included the following activities:

(1) Desk study, involving the review of publicly available soils and geology maps, records of historical peat failures, aerial photography

(2) Site reconnaissance including shear strength and peat depth measurements undertaken following initial constraints study (by design team) to determine the proposed construction envelope within the site

(3) Ground investigation comprising trial pits at turbine and borrow pit locations

(4) Peat stability assessment of the peat slopes on site within the proposed construction envelope using a deterministic and qualitative approach

(5) Peat contour depth plan – compiled based on the peat depth probes carried out across the site by FT (2020), AGEC (2012), HES (2012) and MKO (2021)

(6) Factor of safety plan – compiled for the short-term critical condition (undrained) for over 120 no. FoS points analysed along the proposed infrastructure envelope on site

(7) Construction buffer zone plan – identifies areas with an elevated or higher construction risk where mitigation/control measures will need to be implemented during construction to minimise the potential risks and ensure they are kept within an acceptable range

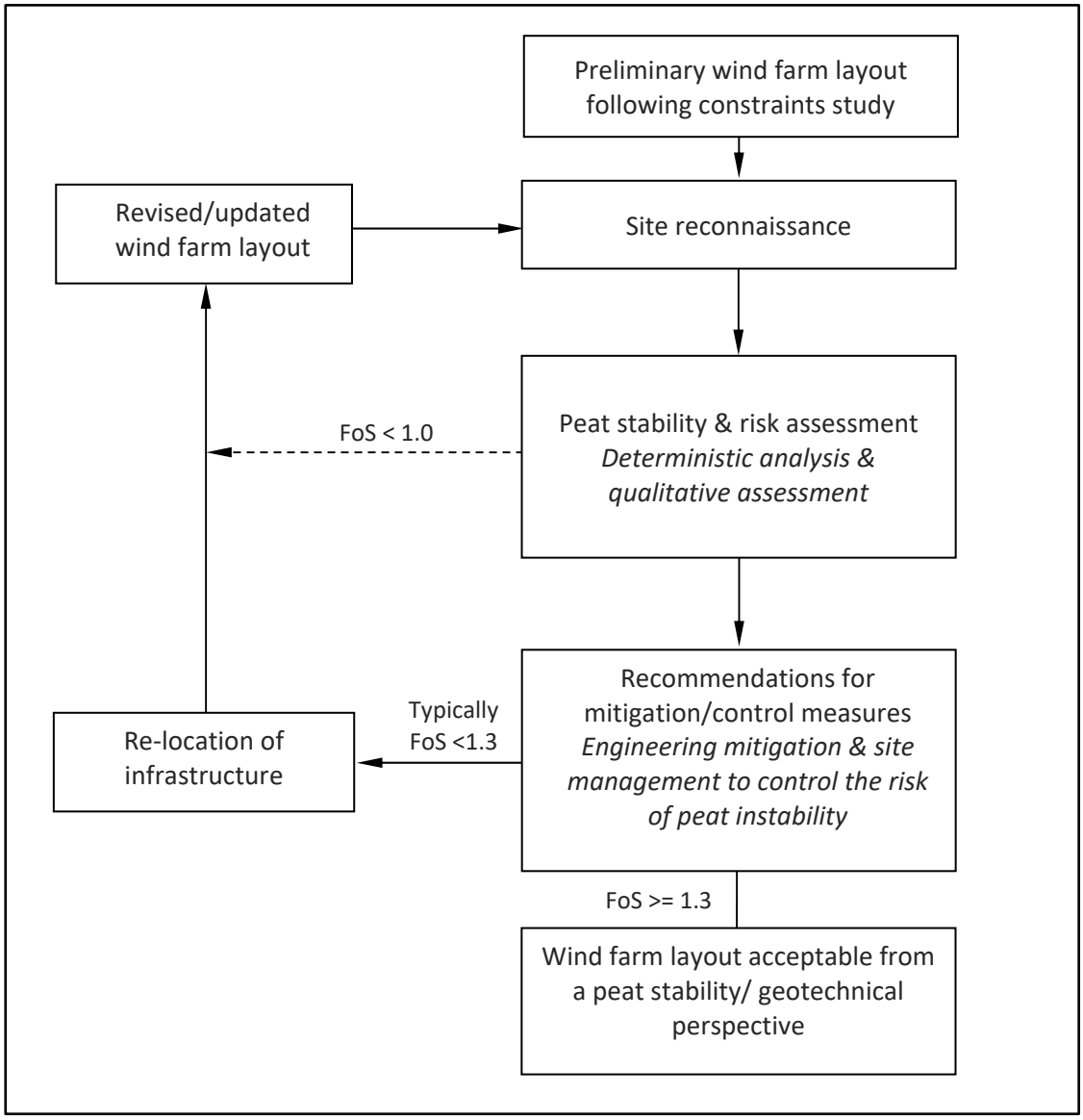
(8) A risk register was compiled to assess the potential design/construction risks at the infrastructure locations and determine adequate mitigation/control measures for each location to minimise the potential risks and ensure they are kept within an acceptable range, where necessary

(9) Preliminary assessment of foundation type for turbines

(10) Commentary of founding details for other infrastructure elements such as access roads, crane hardstands, substation & construction compound platforms and met mast foundation

A flow diagram showing the general methodology for peat stability assessment is shown in Figure 2.1. The methodology illustrates the optimisation of the wind farm layout based on the findings from the site reconnaissance and stability analysis and subsequent feedback.

Figure 2.1: Methodology for Peat Stability Assessment



As for all construction projects, a detailed engineering construction design must be carried out by the appointed construction stage designer prior to any construction work commencing on site. This must take account of the consented project details and any conditions imposed by that consent. This must include a detailed peat stability assessment to account for any changes in the environment which may have occurred in the time

leading up to the commencement of construction and a peat and spoil management plan to allow for the most appropriate geotechnical and environmental led solutions to be developed for the management of peat and spoil.

2.4 Peat Failure Definition

Peat failure in this report refers to a significant mass movement of a body of peat that would have an adverse impact on the proposed wind farm development and the surrounding environment. Peat failure excludes localised movement of peat that would occur below an access road, creep movement or erosion type events.

The potential for peat failure at this site is examined with respect to wind farm construction and associated activity.

2.5 Main Approaches to Assessing Peat Stability

The main approaches for assessing peat stability for wind farm developments include the following:

(1) Geomorphological

(2) Qualitative (judgement)

(3) Index/Probabilistic (probability)

(4) Deterministic (factor of safety)

Approaches (1) to (3) listed above are considered subjective and do not provide a definitive indication of stability; in addition, a high level of judgement/experience is required which makes it difficult to relate the findings to real conditions. FT apply a more objective approach, the deterministic approach (as discussed in Section 2.6).

As part of FT's deterministic approach, a qualitative risk assessment is also carried out taking into account qualitative factors, which cannot necessarily be quantified, such as the presence of mechanically cut peat, quaking peat, bog pools, sub peat water flow, slope characteristics and numerous other factors. The qualitative factors used in the risk assessment are compiled based on FT's experience of assessments and construction in peat land sites and peat failures throughout Ireland and the UK. This approach follows the guidelines for geotechnical risk management as given in Clayton (2001), as referenced in the best practice for Peat Landslide Hazard and Risk Assessment Guide (PLHRAG, 2017), and takes into account the approach of MacCulloch (2005).

The risk assessment uses the results of the deterministic approach in combination with qualitative factors, which cannot be reasonably included in a stability calculation but nevertheless may affect the occurrence of peat instability to assess the risk of instability on a peat land site.

2.6 Peat Stability Assessment – Deterministic Approach

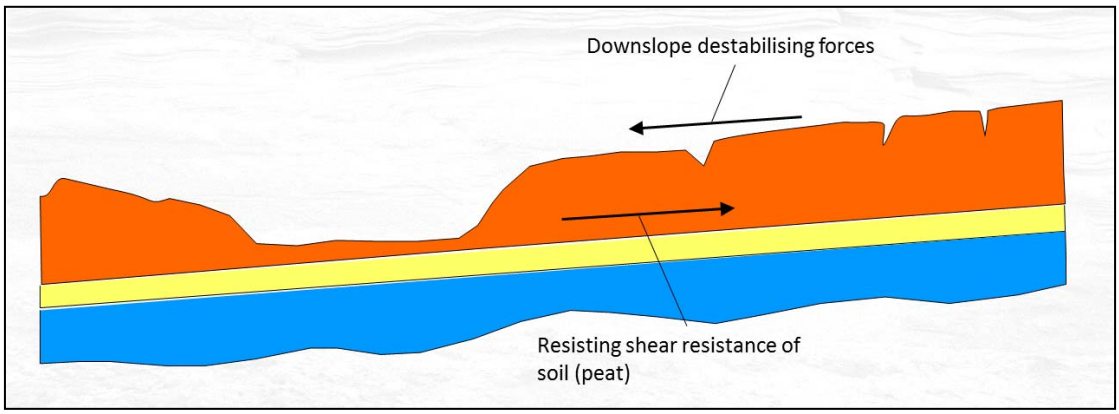
The peat stability assessment is carried out across a wide area of peatland to determine the stability of peat slopes and to identify areas of peatland that are suitable for development; this allows the layout of infrastructure on a particular wind farm site to be optimised. The assessment provides a numerical value (factor of safety) of the stability of individual parcels of peatland. The findings of the assessment discriminate between

areas of stable and unstable peat, and areas of marginal stability where restrictions may apply. This allows for the identification of the most suitable locations for turbines, access roads and infrastructure.

A deterministic assessment requires geotechnical information and site characteristics which are obtained from desk study and site walkover, e.g. properties of peat/soil/rock, slope geometry, depth of peat, underlying strata, groundwater, etc. An adverse combination of the factors listed above could potentially result in instability. Using the information above, a factor of safety is calculated for the stability of individual parcels of peatland on a site (as discussed in Section 7).

The factor of safety is a measure of the stability of a particular slope. For any slope, the degree of stability depends on the balance of forces between the weight of the soil/peat working downslope (destabilising force) and the inherent strength of the peat/soil (shear resistance) to resist the downslope weight, see Figure 2.2.

Figure 2.2: Peat Slope Showing Balance of Forces to Maintain Stability



The factor of safety provides a direct measure of the degree of stability of a slope and is the ratio of the shear resistance over the downslope destabilising force. Provided the available shear resistance is greater than the downslope destabilising force then the factor of safety will be greater than 1.0 and the slope will remain stable. If the factor of safety is less than 1.0 the slope is unstable and liable to fail. The acceptable range for factor of safety is typically from 1.3 to 1.4.

2.7 Applicability of the Factor of Safety (Deterministic) Approach for Peat Slopes

The factor of safety approach is a standard engineering approach in assessing slopes which is applied to many engineering materials, such as peat, soil, rock, etc.

The factor of safety approach is included in the Peat Landslide Hazard and Risk Assessments Best Practice Guide for Proposed Electricity Generation Developments (PLHRAG, 2017); see Section 5.3.1 of the guide. This guide provides best practice methods to identify, mitigate and manage peat slide hazards and associated risks in respect of consent applications for electricity generation projects.

Furthermore, the best practice guide notes that the results from the factor of safety approach 'has provided the most informative results' with respect to analysing peat stability (Section 5.3.1 of the guide).

The factor of safety approach in this report includes undrained (short-term stability) and drained (long-term stability) analyses. The undrained condition is the critical condition for the development. The purpose of the drained analysis is to identify the relative susceptibility of rainfall-induced failures at the site.

Notwithstanding the above, the stability analysis used by FT in this report also includes qualitative factors to determine the potential for peat stability i.e. the analysis used does not solely rely on the factor of safety approach.

The deterministic analysis is considered an acceptable engineering design approach. This concurs with the best practice guide referenced above.

2.8 Assessment of Intense Rainfall and Extreme Dry Events on the Peat Slope

The deterministic approach carried out by FT examines intense rainfall and extreme dry events. The deterministic approach includes an undrained (short-term stability) and drained (long-term stability) analysis to assess the factor of safety for the peat slopes against a peat failure.

The drained loading condition applies in the long-term. This condition examines the effect of the change in groundwater level as a result of rainfall on the existing stability of the natural peat slopes. For the drained analysis the level of the water table above the failure surface is required to calculate the factor of safety for the peat slope.

In order to represent varying water levels within the peat slopes, a sensitivity analysis is carried out which assesses varying water level in the peat slopes i.e. water levels ranging from 0 to 100% of the peat depth is conducted, where 0% equates to the peat been completely dry and 100% equates to the peat being fully saturated.

By carrying out such a sensitivity analysis with varying water level in the peat slopes, the effects of intense rainfall and extreme dry events are considered and analysed. The results of which are presented in Section 7 of this report.

3. DESK STUDY

3.1 Desk Study

The main relevant sources of interest with respect to the site include:

- Geological plans and Geological Survey of Ireland database
- Ordnance survey plans
- Literature review of peat failures

The Geological Survey of Ireland (GSI, 1999) geological plans for the site were used to verify the soil and bedrock conditions.

The Ordnance Survey plans were reviewed to determine if any notable features or areas of particular interest (from a geotechnical point of view) are present on the site.

The desk study also includes a review of both published literature and GSI online dataset viewer (GSI, 2020) on peat failures/landslides in the vicinity of the site.

3.2 Soils, Subsoil & Bedrock

A review of the Geological Survey of Ireland online database and published documents from GSI namely sheet 17 Geology of Shannon Estuary was carried out.

The GSI subsoils maps indicates that the site is underlain by a combination of blanket peat and till derived from Namurian sandstones and shales.

In relation to bedrock, the site location and surrounding area is underlain by the Central Clare Group. The group comprises five cyclotherms (I to V), of mudstone, siltstone, and sandstone. The basal mudstone is 7 to 18m thick and laminated.

There is one mapped fault running across the site, which has a southwest to northeast trend.

A number of rock exposures are present in the study area. Inspected rock exposures by FT were found to contain light brown/orange sandstone bedrock which is consistent with the description of the Central Clare Group rocks described by the Geological Survey of Ireland maps (GSI, 1999).

There is a quarry recorded approximately 300m south of the site boundary.

No karst features were identified on/near the survey area.

No geological heritage sites are noted within the site development. The closest feature is approximately 6.7km west of the proposed site location at Spanish Point. This feature is described as a “coastal section – foreshore exposure”.

3.3 Previous Failures

There are no recorded peat failures within the Slieveacurry Renewable Energy Development site (GSI, 2020). The nearest recorded peat failures are located some 50km from the study area. These failures occurred at Corbehagh in 1935, Slieve Bearnagh in 2003 and Maghera in 2004 and were all described as flow type failures. Based on the Geological Survey of Ireland's dataset viewer (GSI, 2012) the Corbehagh and the Maghera sites are situated within 500m of each other.

There are non-peat failures recorded 16 to 17km north of the study area. The failure at Ballaghline is reported to have occurred in 1900, no description of the failure is given. The more recent failure at Doonnagore is reported to have occurred in 2011, no description of the failure is given.

The landslide susceptibility of the site was classified by the GSI (2020) as low to high susceptibility, which is expected given the undulating terrain present.

The presence, or otherwise, of relict peat failures or clustering of relict failures within an area is an indicator that particular site conditions exist that pre-dispose a site to failure or not as the case may be. Hence based on the historical data reviewed and the terrain and ground conditions present on site it can be concluded that site conditions in the area of the Slieveacurry Renewable Energy Development site have a limited potential of peat failure.

3.4 Ground Conditions along Underground Cable Route

The proposed wind farm will connect to the grid via:

- An underground cable (7.1 km in length) running from the turbines to the existing 110 kV Slievecallan substation, located to the south of the proposed wind farm site. The proposed underground cable will be predominately located on existing or proposed tracks and within the public road corridor.

See Figure 4.1 for the general layout of the underground cable route in the vicinity of the site.

Peat depths range from 0 to 1.9m along the cable route. Peat depths along the section of public road are <1m. An assessment of peat stability was undertaken in the location of deepest peat, recorded between T6 and the public road to the south, where a peat depth of 1.9m was recorded. No peat stability or geotechnical issues are envisaged as a result of the proposed grid connection works.

4. FINDINGS OF SITE RECONNAISSANCE AND GROUND INVESITGATION

4.1 Site Reconnaissance

As part of the assessment of potential peat failure at the proposed site, FT carried out a site reconnaissance in conjunction with the desk study review described in Section 3. This comprised walkover inspections of the site with recording of salient geomorphological features with respect to the wind farm development which included peat depth and preliminary assessment of peat strength. Previous walkovers had been undertaken in 2012 and 2013 by AGEC (now part of FT) and HES. General photographs of the site are included at the end of the main text.

The following salient geomorphological features were considered:

- Active, incipient or relict instability (where present) within the peat deposits
- Presence of shallow valley or drainage line
- Wet areas
- Any change in vegetation
- Peat depth
- Slope inclination and break in slope

The surveys covered the proposed development area on the site, in particular the locations for the turbine bases and associated infrastructure.

The method adopted for carrying out the site reconnaissance relied on experienced practitioners carrying out a visual assessment of the site supplemented with measurement of slope inclinations.

4.2 Findings of Site Reconnaissance

The most recent site reconnaissance undertaken by FT comprised a walkover inspection of the site from the 11th March to the 12th March 2020. Weather conditions for the site visit were mainly dry. Previous site reconnaissance had been undertaken in 2012 and 2013. Additional peat probing was undertaken by MKO during June 2021.

The findings from the site walkover have been used to optimise the layout of the infrastructure on site.

The main findings of the site walkover of the wind farm site are as follows:

(1) The site is typically covered in a layer of peat and has an undulating terrain. Peat depths vary across the site depending on mainly topography. Generally deeper peat was encountered in the flatter areas in the northwestern corner of the site (around the existing access road), with thinner peat on the surrounding slopes. Mature forestry and open peatland are present across the site (see Appendix A).

(2) A total of over 700 no. peat depth probes were carried out within the development envelope on the site (Figure 4-1). Peat depths recorded across the site ranged from 0 to 4.5m with an average depth of 0.6m. Approximately 95 percent of peat depth probes recorded peat depths of less than 2.0m. A number of localised readings were recorded where peat depths were 2.0 to 2.7m. The deeper peat areas were generally avoided when optimising the wind farm site layout.

(3) The peat depths recorded at the turbine locations varied from 0.2 to 2.1m with an average depth of 0.9m.

(4) With respect to the new proposed access roads, peat depths are typically less than 2.0m with localised depths of up to 2.7m recorded.

(5) Peat depths along the proposed grid connection route ranged from 0 to 2m.

(6) The access roads for the wind farm comprise the upgrade of existing access roads and the construction of new proposed access roads. The construction of new proposed access roads will be carried out using an excavate & replace construction technique which involves the removal and replacement of peat or soft ground where encountered.

(7) Slope angles at the turbine locations ranged from 1 to 10 degrees. These slope angle readings were obtained using a combination of readings taken during the site reconnaissance by FT using handheld equipment, such as the Silva Clino Master which has an accuracy of +/- 0.25 degrees and from contour survey plans for the site.

(8) The slope angle quoted typically reflects the slope within the footprint of each infrastructure location. The flat topography/nature of the terrain on site highlights the low risk of peat failure.

(9) Localised areas of ponded water were recorded. This is not unexpected given the ground conditions and the flat terrain present in localised areas across the site.

(10) An inspection of the ground conditions at an existing borrow pit on site was carried out.

(11) No evidence of past failures or any significant signs of peat instability were noted on site.

(12) A summary of the site walkover findings for the wind farm are as follows:

(a) The site is typically covered in a layer of peat with undulating terrain and widespread mature forestry and open peatland coverage. Peat depths recorded across the site ranged from 0 to 4.5m with an average depth of 0.6m.

(b) A construction buffer zone plan has been produced for the site (Figure 4-2). This shows areas on the site where no development is advised and areas with an elevated or higher construction risk. The above identified buffer areas are based on qualitative factors identified during the walkover survey e.g. relatively deep peat, quaking peat, mechanically cut peat, recent peat landslide, etc.

(c) The results of the peat depth probing, shear strength testing of the peat and qualitative factors identified on site have been used in the stability and risk assessments, see Sections 6, 7 and 8 of this report for details.

(d) Based on the findings from the walkover survey, the proposed development is considered to have a low risk of peat failure.

In summary, based on the findings from the site reconnaissance, the proposed development is considered to have a low risk of peat instability.

4.3 Ground Investigation

A ground investigation comprising trial pitting was undertaken on 17 June 2021. A total of seven trial pits were excavated at turbine and borrow pit locations, where accessible. Trial pit logs are included in Appendix E. Peat depth ranged from 0 to 0.6m and was described as a soft brown fibrous Peat. This was underlain by a soft to firm gravelly Clay and Silt, with bedrock recorded in all of the trial pits at depths of between 0.3 and 2.0m bgl.

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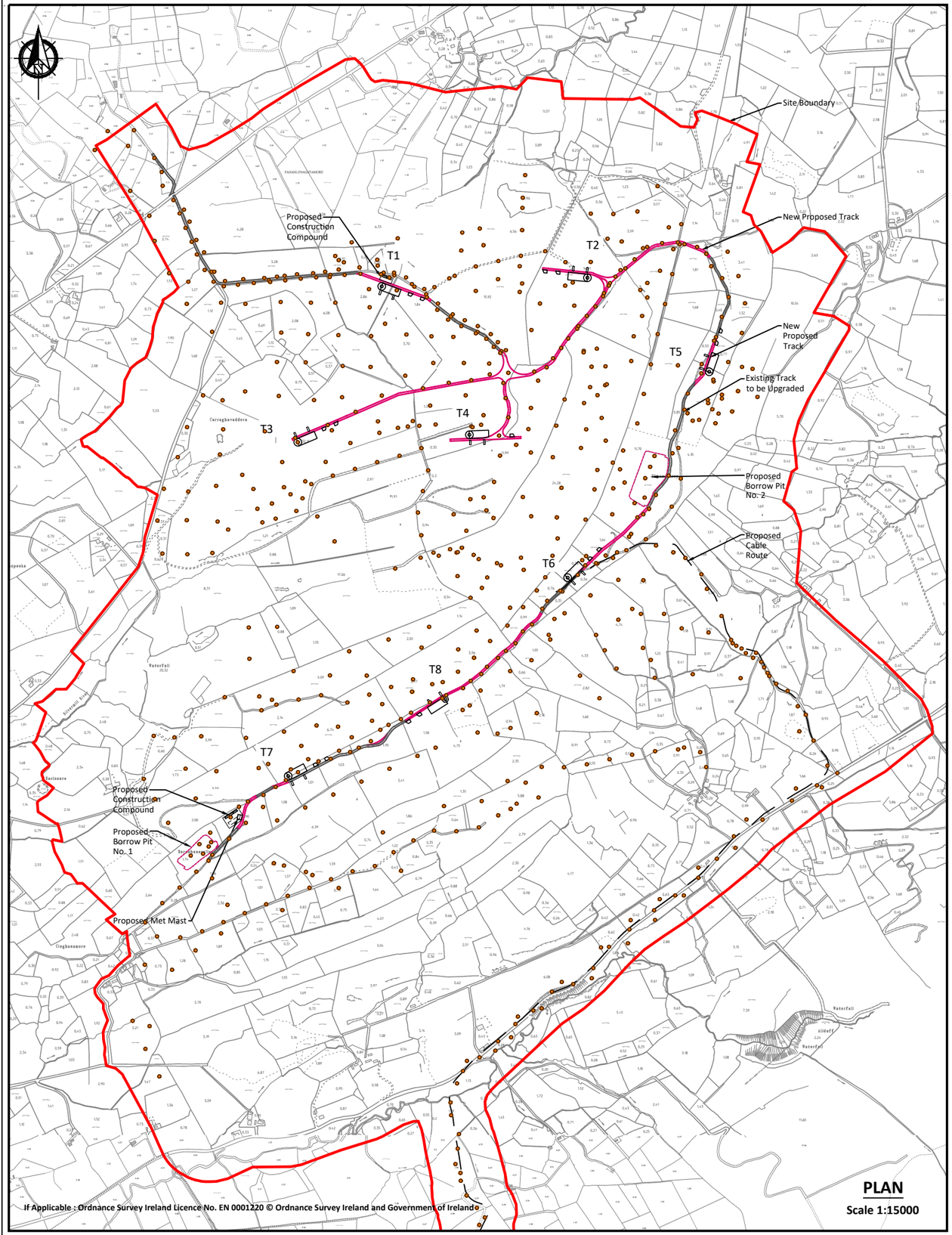

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PLAN
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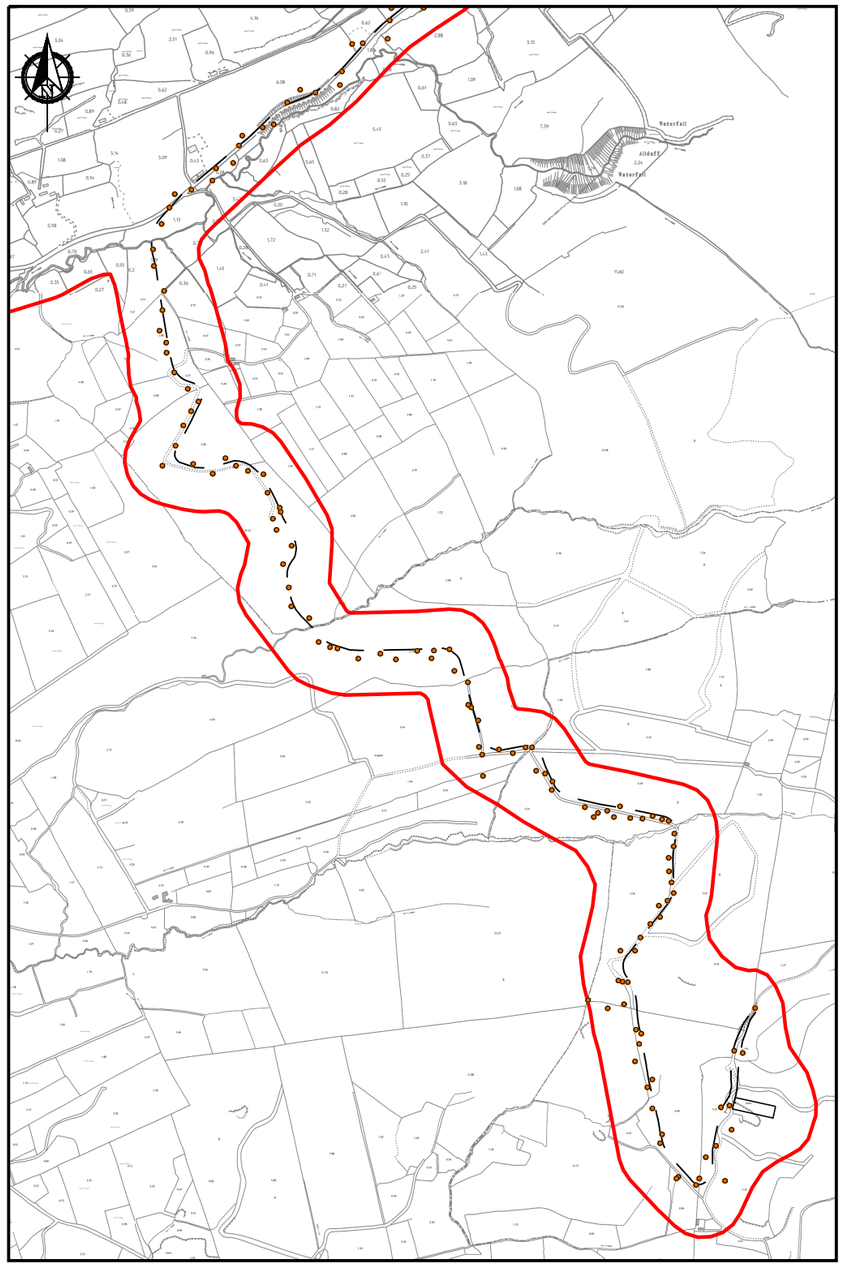

PLAN CONTD. TO THE SOUTHEAST OF MAIN SITE ALONG CABLE ROUTE
Scale 1:15000

0m 75m 150m 225m 300m 375m 450m 525m 600m 675m 750m
Scale 1:15000

Scale (@ A3)
1:15000

Date - 10.11.21

FIGURE 4.1 : PEAT DEPTH PROBE LOCATIONS

Drawn - POR
Checked - IH
Rev - C

Thursday 11 November 2021

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Peat Depth Legend:

- ≥ 0 < 0.5
- ≥ 0.5 < 1
- ≥ 1 < 1.5
- ≥ 1.5 < 2
- ≥ 2 < 2.5
- ≥ 2.5 < 3
- ≥ 3 < 3.5
- > 3.5

Site Boundary
New Proposed Track
Proposed Construction Compound
T1
T2
T3
T4
T5
T6
T7
T8
New Proposed Track
Existing Track to be Upgraded
Proposed Borrow Pit No. 2
Proposed Cable Route
Proposed Construction Compound
Proposed Borrow Pit No. 1
Proposed Met Mast

PLAN
Scale 1:15000

PLAN CONTD. TO THE SOUTHEAST OF MAIN SITE ALONG CABLE ROUTE
Scale 1:15000

0m 75m 150m 225m 300m 375m 450m 525m 600m 675m 750m
Scale 1:15000

Scale (@ A3) 1:15000

Date - 10.11.21

FIGURE 4-2 : PEAT DEPTH CONTOUR PLAN

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Checked - IH
Rev - I

Wednesday 10 November 2021

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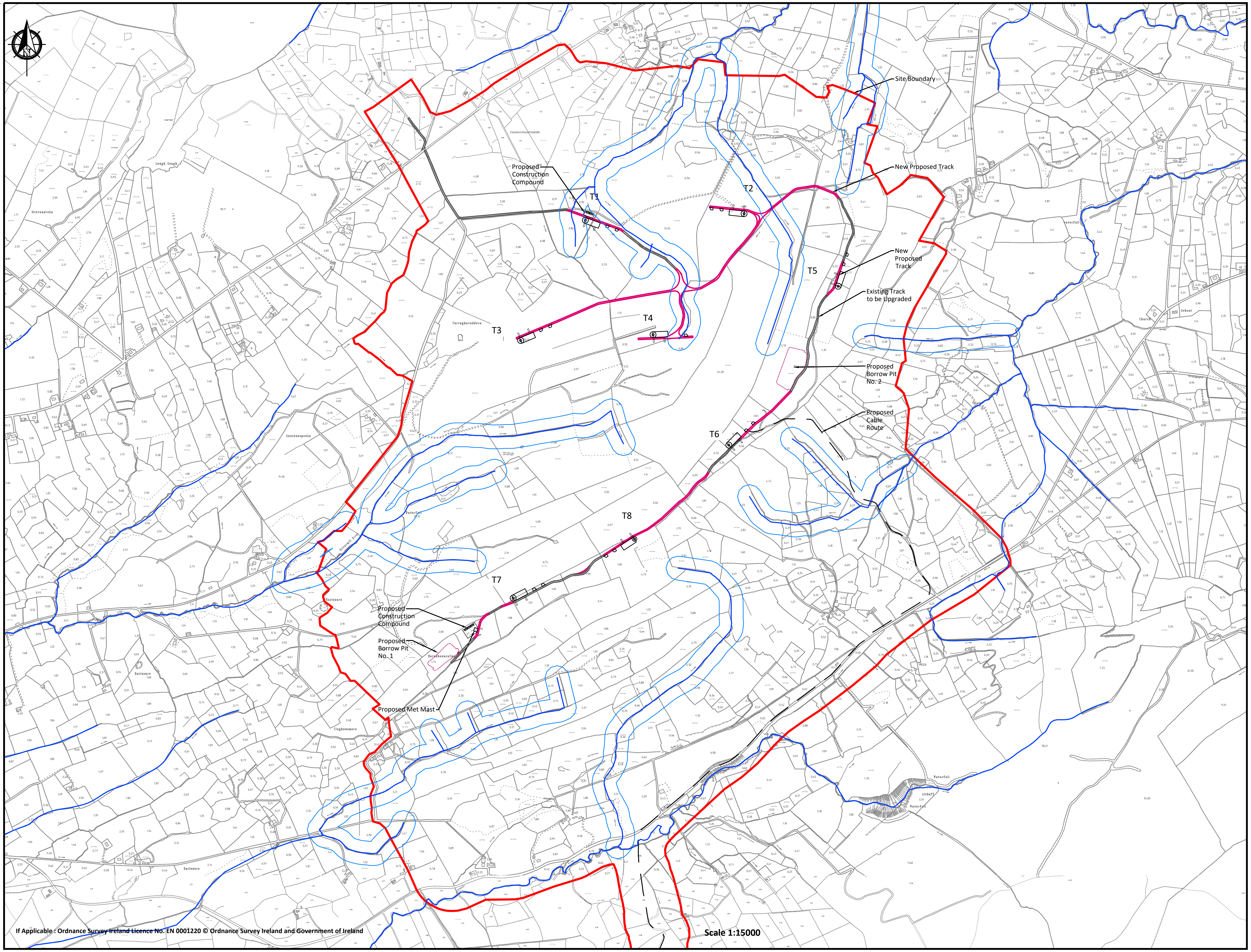

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Date - 22.10.21

FIGURE 4-3 : CONSTUCTION BUFFER ZONE PLAN

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Rev - F

Friday 22 October 2021

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5. SITE GROUND CONDITIONS

5.1 Soils & Subsoils

The site consists of upland blanket peat.

A review of the GSI subsoils maps in Section 3 indicates that the site is underlain by a combination of blanket peat and till derived from Namurian sandstones and shales.

Based on the site walkover the superficial deposits for the site were typically described as peaty topsoil or spongy brown/black fibrous and amorphous Peat overlying typically firm and stiff light brown/grey slightly sandy Clay (in the shallow peat areas) and soft and firm grey Silt/Marl (in the deeper peat areas) overlying weathered Sandstone bedrock. Where peat was present on site, peat depths ranged from 0 to 4.5m with an average depth of 0.6m.

5.2 Bedrock

A review of the GSI bedrock maps in Section 3 indicates that the site location and surrounding area is underlain by the Central Clare Group. The group comprises five cyclotherms (I to V), of mudstone, siltstone, and sandstone. The basal mudstone is 7-18m thick and laminated.

There is one mapped fault running across the site, it has a southwest to northeast trend.

No karst features were identified on/near the survey area.

Bedrock, comprising a weak thinly bedded Shale and a strong muddy Limestone was recorded within trial pits excavated across the site. Bedrock was recorded at between 0.3 and 2.0m bgl.

6. PEAT DEPTHS, STRENGTH & SLOPE AT PROPOSED INFRASTRUCTURE LOCATIONS

As part of the site walkovers undertaken by FT, AGEC and HES, peat depth, in-situ peat strength and slope angles were recorded at various locations across the site.

6.1 Peat Depth

Peat depth probes were carried out at/near to proposed turbine locations and access roads and other main infrastructure elements. At turbine locations 5 probes were carried out around the turbine location and an average peat depth was calculated.

6.2 Peat Strength

The strength testing was carried out in-situ using a Geonor H-60 Hand-Field Vane Tester. From FT's experience hand vanes give indicative results for in-situ strength of peat and would be considered best practice for the field assessment of peat strength. Shear strengths have been recorded at 0.5m vertical intervals to a maximum depth of 2.5m.

Vane testing in peat is recognised as being an index tool (Boylan, Jennings & Long, 2008) and remains the most practical means of assessing peat strength during a site walkover.

6.3 Slope Angle

The slope angles at each of the main infrastructure locations were obtained using a combination of readings taken during the site reconnaissance by FT using handheld equipment, such as the Silva Clino Master and from contour survey plans for site.

The slope angle quoted typically reflects the slope within the footprint of each infrastructure location. It should be noted that slope angles derived from contour survey plans are considered approximate, as such surveys are dependent on the density of survey data and do not always reflect local variations in ground topography. Slope angles recorded during the site reconnaissance by FT using handheld equipment would generally be deemed more accurate and representative of local topography.

6.4 Summary of Findings

Based on the peat depths recorded across the site by FT, AGEC and HES, the peat varied in depth from 0 to 4.5m with an average depth of 0.6m. All peat depth probes carried out on site have been utilised to produce a peat depth contour plan for the site (Figure 4.1).

A summary of the peat depths at the proposed infrastructure locations is given in Table 6.1. The data presented in Table 6.1 is used in the peat stability assessment of the site.

Table 6.1: Peat Depth & Slope Angle at Proposed Infrastructure Locations

Turbine	Easting	Northing	Peat Depth Range (m) (1)	Average Peat Depth (m)	Slope Angle (°) (2)
T1	111820	180747	1.7-2.1	1.8	1
T2	112486	180775	0.4-0.9	0.6	8
T3	111548	180243	0.2-0.6	0.4	2
T4	112104	180269	0.7-1.7	1.0	4
T5	112881	180470	0.5-1.0	0.7	4
T6	112421	179804	0.5-1.5	0.8	8
T7	111517	179163	0.4-0.7	0.5	2
T8	112026	179412	0.4-0.8	0.6	16
Southern Borrow Pit	111214	178900	0.1-0.3	0.15	>10
Northern Borrow Pit	112730	180092	0.1-0.5	0.15	5-10
Construction Compound (South)	111330	179019	0.1	0.1	10
Construction Compound (North)	111835	180773	1.8	1.8	1
Met Mast	111311	179007	0.1	0.1	10
Underground Cable Route	Varies		0-1.9	0.25	Varies
Entrance road to T1	Varies		1.5-3.5	2.5	Varies
T1 to Main Junction	Varies		0.5-1.5	1.1	Varies
Main Junction to T2	Varies		0-0.8	0.2	Varies
Spur road to T3	Varies		0.5-1.0	0.3	Varies
Spur road to T4	Varies		0.3-1.2	0.8	Varies
T2 to T5	Varies		0-0.6	0.2	Varies
T5 to T6	Varies		0-0.4	0.1	Varies
T6 to T8	Varies		0-0.3	0.1	Varies
T7 to T8	Varies		0-0.3	0.1	Varies
Substation extension	113528	176061	No peat recorded at this location		

Note (1) Based on probe results from the site walkovers. The range of peat depths for the infrastructure locations are typically based on a 10m grid carried out around the infrastructure element, where accessible.

Note (2) The slope angles at each of the main infrastructure locations were obtained using a combination of readings taken during the site reconnaissance by FT using handheld equipment, such as the Silva Clino Master (which has an accuracy of +/- 0.25 degrees) and from contour survey plans for site. The slope angle quoted typically reflects the slope within the footprint of each infrastructure location.

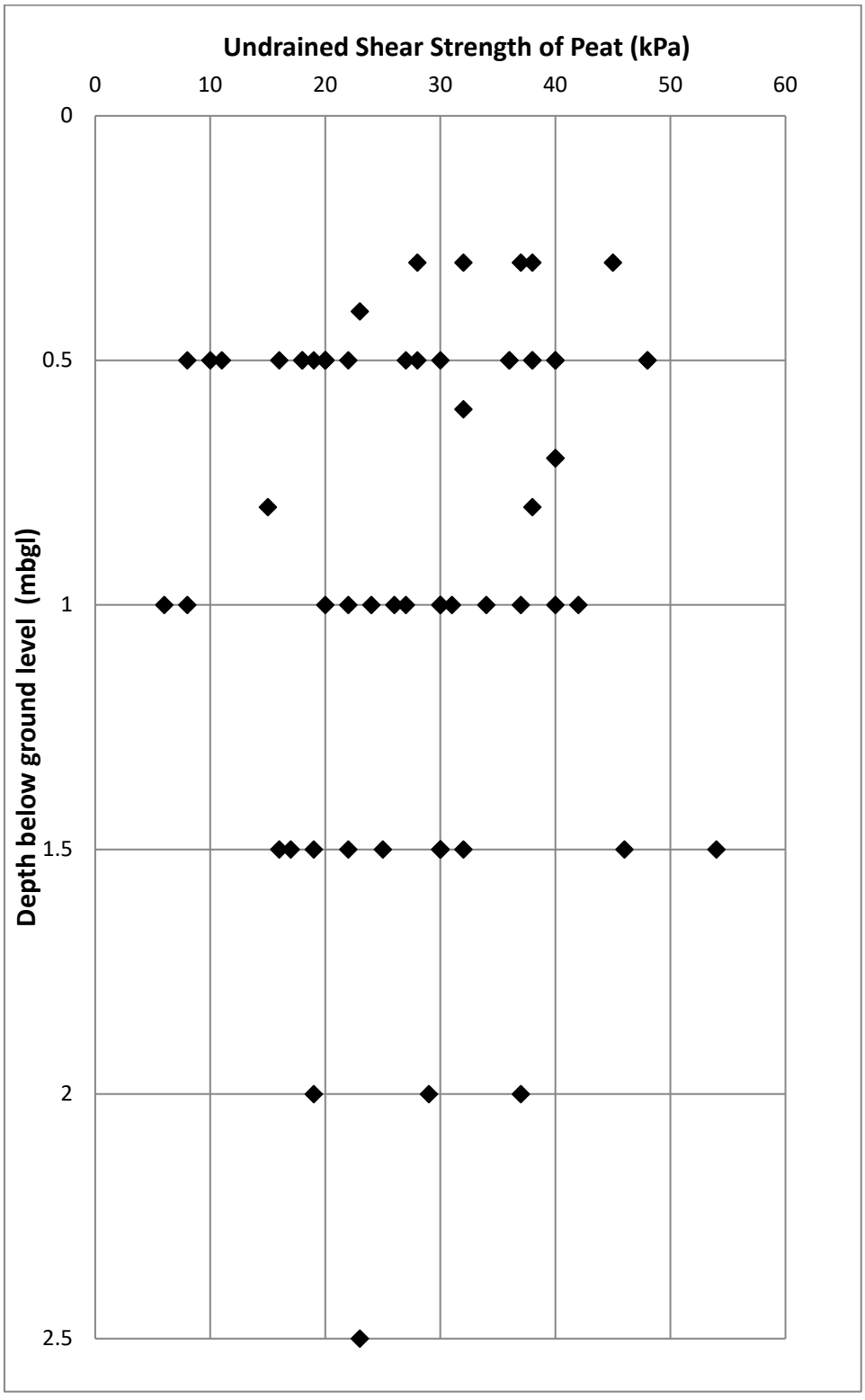
Note (3) The data presented in the Table above is used in the peat stability assessment of the site.

In addition to probing, in-situ shear vane testing was carried out as part of the ground investigation. Strength testing was carried out at selected locations across the site to provide representative coverage of indicative peat strengths. The results of the vane testing with depth are presented in Figure 6.1.

The hand vane results indicate undrained shear strengths in the range 6 to 90kPa, with an average value of about 30kPa. The strengths recorded is typical of well drained peat as is present on the Slieveacurry Renewable Energy Development site.

Peat strength at sites of known peat failures (assuming undrained loading failure) are generally very low, for example the undrained shear strength at the Derrybrien failure (AGEC, 2004) as derived from back-analysis, was estimated at 2.5kPa. The recorded undrained strength at the site is significantly greater than the lower bound values for Derrybrien indicating that there is no close correlation to the peat conditions at the Derrybrien site and that there is significantly less likelihood of failure on the Slieveacurry Renewable energy Development site.

Figure 6.1: Undrained Shear Strength (c_u) Profile for Peat with Depth



7. PEAT STABILITY ASSESSMENTS

The peat stability assessment includes an assessment of the stability of the natural peat slopes for individual parcels across the site including at the turbine locations and associated infrastructure. The assessment also analyses the stability of the natural peat slopes with a surcharge loading of 10kPa, equivalent to placing 1m of stockpiled peat on the surface of the peat slope.

7.1 Methodology for Peat Stability Assessment

Stability of a peat slope is dependent on several factors working in combination. The main factors that influence peat stability are slope angle, shear strength of peat, depth of peat, pore water pressure and loading conditions.

An adverse combination of factors could potentially result in peat sliding. An adverse condition of one of the above-mentioned factors alone is unlikely to result in peat failure. The infinite slope model (Skempton and DeLory, 1957) is used to combine these factors to determine a factor of safety for peat sliding. This model is based on a translational slide, which is a reasonable representation of the dominant mode of movement for peat failures.

To assess the factor of safety for a peat slide, an undrained (short-term stability) and drained (long-term stability) analysis has been undertaken to determine the stability of the peat slopes on site.

1. The undrained loading condition applies in the short-term during construction and until construction induced pore water pressures dissipate.

2. The drained loading condition applies in the long-term. The condition examines the effect of the change in groundwater level as a result of rainfall on the existing stability of the natural peat slopes.

Undrained shear strength values (c_u) for peat are used for the total stress analysis. Based on the findings of the 2003 Derrybrien failure and other failures in peat, undrained loading during construction was found to be the critical failure mechanism. More recent failures at Garvagh Glebe and Meenbog has followed a similar pattern.

A drained analysis requires effective cohesion (c') and effective friction angle (ø') values for the calculations. These values can be difficult to obtain because of disturbance experienced when sampling peat and the difficulties in interpreting test results due to the excessive strain induced within the peat. To determine suitable drained strength values a review of published information on peat was carried out. Table 7.1 shows a summary of the published information on peat together with drained strength values.

From Table 7.1 the values for c' ranged from 1.1 to 8.74kPa and ø' ranged from 21.6 to 43°. The average c' and ø' values are 4.5kPa and 30° respectively. Based on the above, it was considered to adopt a conservative approach and to use design values below the averages. For design the following general drained strength values have been used for the site:

c' = 4kPa
$ø'$ = 25°

Table 7.1: List of Effective Cohesion and Friction Angle Values for Peat

Reference	Cohesion, c' (kPa)	Friction Angle, ø' (degs)	Testing Apparatus/ Comments
Hanrahan et al (1967)	5 to 7	36 to 43	From triaxial apparatus
Rowe and Mylleville (1996)	2.5	28	From simple shear apparatus
Landva (1980)	2 to 4	27.1 to 32.5	Mainly ring shear apparatus for normal stress greater than 13kPa
	5 to 6	-	At zero normal stress
Carling (1986)	6.5	0	-
Farrell and Hebib (1998)	0	38	From ring shear and shear box apparatus. Results are not considered representative.
	0.61	31	From direct simple shear (DSS) apparatus. Result considered too low therefore DSS not considered appropriate
Rowe, Maclean and Soderman (1984)	1.1	26	From simple shear apparatus
	3	27	From DSS apparatus
McGreever and Farrell (1988)	6	38	From triaxial apparatus using soil with 20% organic content
	6	31	From shear box apparatus using soil with 20% organic content
Hungr and Evans (1985)	3.3	-	Back-analysed from failure
Dykes and Kirk (2006)	3.2	30.4	Test within acrotelm
Dykes and Kirk (2006)	4	28.8	Test within catotelm
Warburton et al (2003)	5	23.9	Test in basal peat
Warburton et al (2003)	8.74	21.6	Test using fibrous peat
Hendry et al (2012)	0	31	Remoulded test specimen
Komatsu et al (2011)	8	34	Remoulded test specimen
Zwanenburg et al (2012)	2.3	32.3	From DSS apparatus
Den Haan & Grognet (2014)	-	37.4	From large DSS apparatus
O'Kelly & Zhang (2013)	0	28.9 to 30.3	Tests carried out on reconstituted, undisturbed and blended peat samples

7.2 Analysis to Determine Factor of Safety (Deterministic Approach)

The purpose of the analysis was to determine the Factor of Safety (FoS) of the peat slopes using infinite slope analysis. The analysis was carried out at the turbine locations and associated infrastructure.

The FoS provides a direct measure of the degree of stability of the slope. A FoS of less than unity indicates that a slope is unstable, a FoS of greater than unity indicates a stable slope.

The acceptable safe range for FoS typically ranges from 1.3 to 1.4. The previous code of practice for earthworks BS 6031:1981 (BSI, 1981), provided advice on design of earthworks slopes. It stated that for a first-time failure with a good standard of site investigation the design FoS should be greater than 1.3.

As a general guide the FoS limits for peat slopes in this report are summarised in Table 7.2.

Table 7.2: Factor of Safety Limits for Slopes

Factor of Safety (FoS)	Degree of Stability
Less than 1.0	Unstable (red)
Between 1.0 and 1.3	Marginally stable (yellow)
1.3 or greater	Acceptable (green)

Eurocode 7 (EC7) (IS EN 1997-1:2005) now serves as the reference document and the basis for design geotechnical engineering works. The design philosophy used in EC7 applies partial factors to soil parameters, actions and resistances. Unlike the traditional approach, EC7 does not provide a direct measure of stability, since global Factors of Safety are not used.

As such, and in order to provide a direct measure of the level of safety on a site, EC7 partial factors have not been used in this stability assessment. The results are given in terms of FoS.

A lower bound undrained shear strength, c_u for the peat of 8kPa was selected for the assessment based on the c_u values recorded at the site. It should be noted that a cu of 8kPa for the peat is considered a conservative value for the analysis and is not representative of all peat present across the site. In reality the peat generally has a higher undrained strength.

The formula used to determine the factor of safety for the undrained condition in the peat (Bromhead, 1986) is as follows:

$$F = \frac{c_u}{\gamma z \sin\alpha \cos\alpha}$$

Where:

F = Factor of Safety
c_u = Undrained strength
γ = Bulk unit weight of material

z = Depth to failure plane assumed as depth of peat

α = Slope angle

The formula used to determine the factor of safety for the drained condition in the peat (Bromhead, 1986) is as follows:

$$F = \frac{c' + (\gamma z - \gamma_w h_w)\cos^2 \alpha \tan \phi'}{\gamma z \sin \alpha \cos \alpha}$$

Where:

F = Factor of Safety

c' = Effective cohesion

γ = Bulk unit weight of material

z = Depth to failure plane assumed as depth of peat

γ_w = Unit weight of water

h_w = Height of water table above failure plane

α = Slope angle

ϕ' = Effective friction angle

For the drained analysis the level of the water table above the failure surface is required to calculate the factor of safety for the slope. Since the water level in blanket peat can be variable and can be recharged by rainfall, it is not feasible to establish its precise location throughout the site. Therefore, a sensitivity analysis using water level ranging between 0% and 100% of the peat depth was conducted, where 0% equates to the peat being completely dry and 100% equates to the peat been fully saturated.

The following general assumptions were used in the analysis of peat slopes at each location:

(1) Peat depths are based on the maximum peat depth recorded at each location from the walkover surveys.

(2) The slope angles used in the peat stability assessment were obtained using a combination of readings taken during the site reconnaissance by FT using handheld equipment and from contour survey plans for site. It should be noted that slope angles derived from contour survey plans are considered approximate, as such surveys are dependent on the density of survey data and do not always reflect local variations in ground topography.

(3) Slope angle at base of sliding assumed to be parallel to ground surface.

(4) A lower bound undrained shear strength, c_u for the peat of 8kPa was selected for the assessment. The lowest recorded value on the Slieveacurry Renewable Energy Development site during the 2020 walkover was 18kPa. It should be noted that a c_u of 8kPa for the peat is considered a conservative value for the analysis and is not representative of all peat present across the site. In reality, the peat has a significantly higher undrained strength as a result of the drainage & extraction works which have been carried out on site.

For the stability analysis two load conditions were examined, namely

Condition (1): no surcharge loading

Condition (2): surcharge of 10 kPa, equivalent to 1m of stockpiled peat/a 1m column of water or a 0.5m high berm around a settlement pond assumed as a worst case.

7.3 Results of Analysis

7.3.1 Undrained Analysis for the Peat

The results of the undrained analysis for the natural peat slopes are presented in Appendix C and the results of the undrained analysis for the most critical load case (load condition 2) are shown on Figure 7.1. The undrained analysis for load condition 2 is considered the most critical load case as most peat failures occur in the short term upon loading of the peat surface. The results from the main infrastructure locations are summarised in Table 7.3. For the access roads, the values quoted below are the worst cases reviewed along each section of access road. Settlement ponds at turbine locations were selected as they represent the range of slopes and peat depths present where settlement ponds will be constructed across the site and are therefore considered representative of the conditions found on site.

The calculated FoS for load condition 1 is in excess of 1.30 for each of the locations (140 no. locations) analysed with a range of FoS of 4.47 to in excess of 10, indicating a low risk of peat instability.

The calculated FoS for load condition 2 is in excess of 1.30 for each of the locations (140 no. locations) analysed with a range of FoS of 1.92 to in excess of 10, indicating a low risk of peat instability.

Table 7.3: Factor of Safety Results (Undrained Condition)

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T1	111820	180748	**24.92**	**16.14**
T2	112486	180776	**9.07**	**3.54**
T3	111548	180243	**57.34**	**16.38**
T4	112104	180269	**11.5**	**5.75**
T5	112881	180471	**15.54**	**6.61**
T6	112422	179805	**11.61**	**3.87**
T7	111517	179163	**42.48**	**4.25**
T8	112026	179412	**5.03**	**1.89**
Construction Compound (South)	111330	179019	**46.78**	**4.25**
Construction Compound (North)	111835	180773	**25.47**	**16.37**
Met Mast	111311	179007	**46.78**	**4.25**
Southern Borrow Pit	111214	178900	**15.10**	**2.52**
Northern Borrow Pit	112730	180092	**13.23**	**4.41**
Underground Cable Route	113044	179572	**4.85**	**3.18**

Table 7.4: Factor of Safety Results for Peat Slopes along Access Roads (Undrained Condition)

Location	Factor of Safety for Load Condition	
	Condition (1)	Condition (2)
Entrance road to T1	**9.17**	**6.55**
T1 to Main Junction	**8.38**	**4.39**
Main Junction to T2	**34.68**	**5.78**
Spur road to T3	**22.05**	**5.09**
Spur road to T4	**8.27**	**3.67**
Road from T2 to T5	**76.53**	**12.76**
Road from T5 to T6	**127.66**	**11.61**
Road from T6 to T8	**54.92**	**4.99**
Road from T7 to T8	**458.46**	**41.68**

Table 7.5: Factor of Safety Results for Settlement Ponds (Undrained Condition)

Location	Settlement Pond Number	Factor of Safety for Load Condition	
		Condition (1)	Condition (2)
T1	SP-B4	**24.92**	**16.14**
T2	SP-E4	**9.07**	**3.54**
T3	SP-C4	**57.34**	**16.38**
T4	SP-D2	**11.50**	**5.75**
T5	SP-G1	**15.54**	**6.61**
T6	SP-J2	**11.61**	**3.87**
T7	SP-K4	**10.75**	**3.77**
T8	SP-K2	**5.03**	**1.89**
Met Mast	SP-L4B	**23.91**	**2.17**

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Factor of Safety Legend:

- 0 < 1.0
- ≥ 1.0 < 1.3
- ≥ 1.3

Increasing Stability

No Peat Recorded At This Location

Site Boundary

New Proposed Track

Proposed Construction Compound

T1

T2

T3

T4

T5

T6

T7

T8

New Proposed Track

Existing Track to be Upgraded

Proposed Borrow Pit No. 2

Proposed Cable Route

Proposed Construction Compound

Proposed Borrow Pit No..1

Proposed Met Mast

Scale 1:15000

0m 75m 150m 225m 300m 375m 450m 525m 600m 675m 750m

Scale 1:15000

Scale (@ A3) 1:15000

Date - 10.11.21

FIGURE 7-1 : FACTOR OF SAFETY PLAN - SHORT TERM CRITICAL CONDITION (UNDRAINED)

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7.3.2 Drained Analysis for the Peat

The results of the drained analysis for the peat are presented in Appendix C. The results from the main infrastructure locations are summarised in Table 7.6. As stated previously, the drained loading condition examines the effect of rainfall and water on the existing stability of the natural peat slopes.

The calculated FoS for load condition 1 is in excess of 1.30 for each of the locations (140 no. locations) analysed with a range of FoS of 2.23 to in excess of 10, indicating a low risk of peat instability.

The calculated FoS for load condition 2 is in excess of 1.30 for each of the locations (140 no. locations) analysed with a range of FoS of 1.92 to in excess of 10, indicating a low risk of peat instability.

Table 7.6: Factor of Safety Results (Drained Conditions)

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T1	111820	180748	12.46	17.48
T2	112486	180776	4.53	3.79
T3	111548	180243	28.67	17.73
T4	112136	180338	5.75	6.21
T5	112881	180471	7.77	7.14
T6	112422	179805	3.46	3.38
T7	111517	179163	21.24	16.12
T8	112026	179412	2.43	1.94
Construction Compound (South)	111330	179019	23.39	4.59
Construction Compound (North)	111835	180773	12.73	17.73
Met Mast	111311	179007	23.39	4.59
Southern Borrow Pit	111214	178900	11.70	4.15
Northern Borrow Pit	112730	180092	6.61	4.74
Underground Cable Route	113044	179572	2.42	3.51

Table 7.7: Factor of Safety Results for Peat Slopes along Access Roads (Drained Condition)

Location	Factor of Safety for Load Condition	
	Condition (1)	Condition (2)
Entrance road to T1	4.59	7.09
T1 to Main Junction	4.19	4.73
Main Junction to T2	17.34	6.21
Spur road to T3	11.02	5.47
Spur road to T4	4.13	3.95
Road from T2 to T5	38.27	13.79
Road from T5 to T6	63.83	12.54
Road from T6 to T8	27.46	5.34
Road from	229.23	45.13

Table 7.8: Factor of Safety Results for Settlement Ponds (Drained Condition)

Location	Settlement Pond Number	Factor of Safety for Load Condition	
		Condition (1)	Condition (2)
T1	SP-B4	12.46	17.48
T2	SP-E4	4.53	3.79
T3	SP-C4	28.67	17.73
T4	SP-D2	5.75	6.21
T5	SP-G1	7.77	7.14
T6	SP-J2	5.80	4.15
T7	SP-K4	5.37	4.04
T8	SP-K2	2.52	1.96
Met Mast	SP-L4B	11.96	2.19

8. PEAT STABILITY RISK ASSESSMENT

A peat stability risk assessment was carried out for the main infrastructure elements at the wind farm. This approach takes into account guidelines for geotechnical/peat stability risk assessments as given in PLHRAG (2017) and MacCulloch (2005).

The risk assessment uses the results of the stability analysis (deterministic approach) in combination with qualitative factors, which cannot be reasonably included in a stability calculation but nevertheless may affect the occurrence of peat instability, to assess the risk for each infrastructure element.

For each of the main infrastructure elements, a risk rating (product of probability and impact) is calculated and rated as shown in Table 8.1. Where a subsection is rated 'Medium' or 'High', control measures are required to reduce the risk to at least a 'Low' risk rating. Where a subsection is rated 'Low' or 'Negligible', only routine control measures are required.

Table 8.1: Risk Rating Legend

17 to 25	High: avoid works in area or significant control measures required
11 to 16	Medium: notable control measures required
5 to 10	Low: only routine control measures required
1 to 4	Negligible: none or only routine control measures required

A full methodology for the peat stability risk assessment is given in Appendix D.

8.1 Summary of Risk Assessment Results

The results of the peat stability risk assessment for potential peat failure at the main infrastructure elements is presented as a Geotechnical Risk Register in Appendix B and summarised in Table 8.2.

The risk rating for each infrastructure element at the Slieveacurry Renewable Energy Development is designated low following some mitigation/control measures being implemented. Sections of access roads to the nearest infrastructure element will be subject to the same mitigation/control measures that apply to the nearest infrastructure element.

Details of the required mitigation/control measures can be found in the Geotechnical Risk Register for each infrastructure element and section of access road (Appendix B) and are summarised below:

- Detailed ground investigation to verify peat, mineral soil and bedrock condition and properties.
- Use of experienced geotechnical staff for site investigation.
- Maintain hydrology of area as far as possible to prevent the build-up of water pressures in the peat, leading to the peat becoming "buoyant".
- Use of experienced contractors and trained operators to carry out the work.

Table 8.2: Summary of Peat Stability Risk Registers (Infrastructure)

Infrastructure	Pre-Control Measure Implementation Risk Rating	Pre-Control Measure Implementation Risk Rating Category	Notable Control Measures Required	Post-Control Measure Implementation Risk Rating	Post-Control Measure Implementation Risk Rating Category
Turbine T1	Medium	11 to 16	No	Low	5 to 10
Turbine T2	Low	5 to 10	No	Low	5 to 10
Turbine T3	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T4	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T5	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T6	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T7	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T8	Negligible	1 to 4	No	Negligible	1 to 4
Construction Compound (South)	Negligible	1 to 4	No	Negligible	1 to 4
Construction Compound (North)	Negligible	1 to 4	No	Negligible	1 to 4
Met Mast	Negligible	1 to 4	No	Negligible	1 to 4
Southern Borrow Pit	Negligible	1 to 4	No	Negligible	1 to 4
Northern Borrow Pit	Negligible	1 to 4	No	Negligible	1 to 4
Underground Cable Route	Low	5 to 10	No	Low	5 to 10

Table 8.3: Summary of Peat Stability Risk Register (Access Roads)

Infrastructure	Pre-Control Measure Implementation Risk Rating	Pre-Control Measure Implementation Risk Rating Category	Notable Control Measures Required	Post-Control Measure Implementation Risk Rating	Post-Control Measure Implementation Risk Rating Category
Entrance road to T1	Medium	11 to 16	No	Low	5 to 10
T1 to Main Junction	Low	5 to 10	No	Low	5 to 10
Main Junction to T2	Low	5 to 10	No	Negligible	1 to 4
Spur road to T3	Low	5 to 10	No	Negligible	1 to 4
Spur road to T4	Low	5 to 10	No	Negligible	1 to 4

Infrastructure	Pre-Control Measure Implementation Risk Rating	Pre-Control Measure Implementation Risk Rating Category	Notable Control Measures Required	Post-Control Measure Implementation Risk Rating	Post-Control Measure Implementation Risk Rating Category
Road from T2 to T5	Low	5 to 10	No	Negligible	1 to 4
Road from T5 to T6	Low	5 to 10	No	Negligible	1 to 4
Road from T6 to T8	Negligible	1 to 4	No	Negligible	1 to 4
Road from T7 to T8	Negligible	1 to 4	No	Negligible	1 to 4

9. SUMMARY AND RECOMMENDATIONS

9.1 Summary

The following summary is given.

FT was engaged by MKO on behalf of Slieveacurry Ltd to undertake a geotechnical and peat stability assessment of the proposed wind farm site.

The findings of the peat assessment showed that the site has an acceptable margin of safety and is suitable for the proposed wind farm development. The findings include recommendations and control measures for construction work in peat lands to ensure that all works adhere to an acceptable standard of safety.

The site which comprises undulating to hilly terrain consists predominantly of blanket peat and poor quality agricultural land.

Peat thicknesses recorded during the site walkovers from over 700 probes ranged from 0 to 4.5m with an average depth of 0.6m. 82% of the probes recorded peat depths of less than 1.0m. 95% of peat depth probes recorded peat depths of less than 2.0m. A number of localised readings were recorded where peat depths from 2.0 to 2.7m. The deeper peat areas were avoided when optimising the wind farm layout for site. Peat thickness along the proposed grid connection ranged from 0 to 1.9m.

Slope inclinations at the main infrastructure locations range from 1 to 10 degrees.

An analysis of peat sliding was carried out at the main infrastructure locations across site for both the undrained and drained conditions. The purpose of the analysis was to determine the Factor of Safety (FoS) of the peat slopes.

For the undrained condition, the calculated FoS for load conditions 1 and 2 for the locations analysed, showed that all locations have an acceptable FoS of greater than 1.3, indicating a low risk of peat failure. The undrained analysis is considered the most critical condition for the peat slopes.

A drained analysis was also carried out, which examined the effect of in particular, rainfall on the existing stability of the natural peat slopes on site. For the drained condition, the calculated FoS for load conditions (1) & (2) for the locations analysed, showed that all locations have an acceptable FoS of greater than 1.3.

The peat stability risk assessment at each infrastructure location provides a number of mitigation/control measures to reduce the potential risk of peat failure. See Appendix B for details of the required mitigation/control measures for each infrastructure element.

In summary, the findings of the peat assessment showed that the proposed Slieveacurry Renewable Energy Development site has an acceptable margin of safety, is suitable for the proposed development and is considered to be at **low** risk of peat failure. The findings include recommendations and control measures for construction work in peat lands to ensure that all works adhere to an acceptable standard of safety.

9.2 Recommendations

The following recommendations are given.

Notwithstanding that the site has an acceptable margin of safety a number of mitigation/control measures are given to ensure that all works adhere to an acceptable standard of safety for work in peatlands. Mitigation/control measures identified for each of the infrastructure elements in the risk assessment will be taken into account and implemented throughout design and construction works (Appendix B).

The proposed construction method for all the new proposed access roads at the wind farm is excavate and replace type construction.

Recommendations and guidelines given in FT's report 'Peat & Spoil Management Plan - Slieveacurry Renewable Energy Development, County Clare' (FT 2020) will be taken into consideration during the design and construction stage of the wind farm development.

To minimise the risk of construction activity causing potential peat instability the Construction Method Statements (CMSs) for the project will take into account, but not be limited, to the recommendations above. This will ensure that best practice guidance regarding the management of peat stability will be inherent in the construction phase.

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APPENDIX A

Photos from Site Walkover

Photo 1: Existing founded access track

Photo 2: Open peatland near T6

Photo 3: Existing entrance road from north-east of site

Photo 4: View west towards T7

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APPENDIX B

Peat Stability Risk Registers

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Turbine T1

Grid Reference (Eastings, Northings):	111820	180748
Distance to Watercourse (m)	< 50	
Min & Max Measured Peat Depth (m):	1.7-2.1	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 16.14 (u), 12.46 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	3	4	12	Medium	No		2	4	8	Low
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		2	4	8	Low
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	2	4	8	Low	No		2	4	8	Low
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Other	0	4	0	Not Applicable	No		0	4	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T1**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Turbine T2

Grid Reference (Eastings, Northings):	112486	180776
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	0.4-0.9	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 3.54 (u), 3.79 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	0	3	0	Not Applicable	No		0	3	0	Not Applicable
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Other	0	3	0	Not Applicable	No		0	3	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T2**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Turbine T3

Grid Reference (Eastings, Northings):	111548	180243
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.2-0.6	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 16.38 (u), 17.73 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T3**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Turbine T4

Grid Reference (Eastings, Northings):	112104	180269
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.7-1.7	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 5.75 (u), 5.75 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T4**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Turbine T5

Grid Reference (Eastings, Northings):	112881	180471
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.5-1.0	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 6.61 (u), 7.14 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T5**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Turbine T6

Grid Reference (Eastings, Northings):	112422	179805
Distance to Watercourse (m)	100 - 150	
Min & Max Measured Peat Depth (m):	0.6-1.5	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 3.87 (u), 4.15 (d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		2	2	4	Negligible
4	Evidence of previous failures/slips	0	2	0	Not Applicable	No		0	2	0	Not Applicable
5	Type of vegetation	2	2	4	Negligible	No		2	2	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	2	4	Negligible	No		2	2	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Other	0	2	0	Not Applicable	No		0	2	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T6**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Turbine T7

Grid Reference (Eastings, Northings):	111453	179202
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.4-0.7	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 14.89 (u), 16.12(d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T7**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Turbine T8

Grid Reference (Eastings, Northings):	112131	179304
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.2-1.0	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 1.89 (u), 1.94 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T8**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Const. Comp. (S)

Grid Reference (Eastings, Northings):	111330	179019
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.1	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 4.25 (u), 4.53 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	1	1	1	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	1	1	1	Negligible	No		1	1	1	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Met. Mast

Grid Reference (Eastings, Northings):	111331	179007
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.1	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 4.25 (u), 4.53 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	1	1	1	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	1	1	1	Negligible	No		1	1	1	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Met. Mast**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note
(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Const. Comp. (N)

Grid Reference (Eastings, Northings):	111835	180773
Distance to Watercourse (m)	< 50	
Min & Max Measured Peat Depth (m):	1.8	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 16.37 (u), 12.73 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		1	4	4	Negligible
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	1	4	4	Negligible	No		1	4	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Other	0	4	0	Not Applicable	No		0	4	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound (North)**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note
(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Southern Borrow Pit

Grid Reference (Eastings, Northings):	111214	178900
Distance to Watercourse (m)	100 - 150	
Min & Max Measured Peat Depth (m):	0.2	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.52 (u), 4.15 (d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		1	2	2	Negligible
4	Evidence of previous failures/slips	0	2	0	Not Applicable	No		0	2	0	Not Applicable
5	Type of vegetation	2	2	4	Negligible	No		2	2	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	1	2	2	Negligible	No		1	2	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Other	0	2	0	Not Applicable	No		0	2	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Southern Borrow Pit**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine bedrock condition and properties.

Note
(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Northern Borrow Pit

Grid Reference (Eastings, Northings):	112730	180092
Distance to Watercourse (m)	100 - 150	
Min & Max Measured Peat Depth (m):	0.5	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 4.41 (u), 4.74 (d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		1	2	2	Negligible
4	Evidence of previous failures/slips	0	2	0	Not Applicable	No		0	2	0	Not Applicable
5	Type of vegetation	2	2	4	Negligible	No		2	2	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	1	2	2	Negligible	No		1	2	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Other	0	2	0	Not Applicable	No		0	2	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for No**thern Borrow Pit**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine bedrock condition and properties.

Note
(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Cable Route

Grid Reference (Eastings, Northings):	Varies	Varies
Distance to Watercourse (m)	< 50	
Min & Max Measured Peat Depth (m):	0-1.9	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 4.41 (u), 4.74 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		1	4	4	Negligible
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	1	4	4	Negligible	No		1	4	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Other	0	4	0	Not Applicable	No		0	4	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Cable Route**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Main Entrance Road to T1

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**1.7-2.5**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 6.55 (u), 4.59 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	3	4	12	Medium	No		2	4	8	Low
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		2	4	8	Low
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	3	4	12	Medium	No		2	4	8	Low
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Other	0	4	0	Not Applicable	No		0	4	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Main Entrance Road to T1**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainge measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix D in PSA.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	T1 to Main Junction

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**0.4-0.9**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 4.39 (u), 4.19 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		1	4	4	Negligible
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	2	4	8	Low	No		1	4	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		1	4	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Other	0	4	0	Not Applicable	No		0	4	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T1 to Main Junction**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix D in PSA.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Main Junction to T2

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**50 - 100**
Min & Max Measured Peat Depth (m):	**0.2-0.6**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 5.78 (u), 6.21 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		1	3	3	Negligible
4	Evidence of previous failures/slips	0	3	0	Not Applicable	No		0	3	0	Not Applicable
5	Type of vegetation	2	3	6	Low	No		1	3	3	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		1	3	3	Negligible
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Other	0	3	0	Not Applicable	No		0	3	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Main Junction to T2**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix D in PSA.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Spur to T3

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**50 - 100**
Min & Max Measured Peat Depth (m):	**0.5-1.8**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 5.29 (u), 5.47 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		1	3	3	Negligible
4	Evidence of previous failures/slips	0	3	0	Not Applicable	No		0	3	0	Not Applicable
5	Type of vegetation	2	3	6	Low	No		1	3	3	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		1	3	3	Negligible
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Other	0	3	0	Not Applicable	No		0	3	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Spur to T3**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix D in PSA.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Spur to T4

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**1.0-2.1**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 3.67 (u), 3.95 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		1	4	4	Negligible
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	2	4	8	Low	No		1	4	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		1	4	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Other	0	4	0	Not Applicable	No		0	4	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Spur to T4**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix D in PSA.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	**Road from T2 to T5**

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**0.2-0.6**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 12.76 (u), 13.795 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		1	4	4	Negligible
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	2	4	8	Low	No		1	4	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		1	4	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Other	0	4	0	Not Applicable	No		0	4	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T2 to T5**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix D in PSA.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Road from T5 to T6

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**100 - 150**
Min & Max Measured Peat Depth (m):	**0.4-1.0**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 11.61 (u), 12.54(d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		1	2	2	Negligible
4	Evidence of previous failures/slips	0	2	0	Not Applicable	No		0	2	0	Not Applicable
5	Type of vegetation	2	2	4	Negligible	No		1	2	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	2	4	Negligible	No		1	2	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Other	0	2	0	Not Applicable	No		0	2	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T5 to T6**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note
(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix D in PSA.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	**Road from T6 to T8**

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**100 - 150**
Min & Max Measured Peat Depth (m):	**0.2-0.7**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 4.99 (u), 5.44 (d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		1	2	2	Negligible
4	Evidence of previous failures/slips	0	2	0	Not Applicable	No		0	2	0	Not Applicable
5	Type of vegetation	2	2	4	Negligible	No		1	2	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	2	4	Negligible	No		1	2	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Other	0	2	0	Not Applicable	No		0	2	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T6 to T8**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix D in PSA.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Slieveacurry Renewable Energy Devlopment - Peat Stability Risk Register (Rev 0)

Location:	Road from T8 to T7

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**100 - 150**
Min & Max Measured Peat Depth (m):	**0.2-0.7**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 20.85 (u), 22.57 (d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		1	2	2	Negligible
4	Evidence of previous failures/slips	0	2	0	Not Applicable	No		0	2	0	Not Applicable
5	Type of vegetation	2	2	4	Negligible	No		1	2	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	2	4	Negligible	No		1	2	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Other	0	2	0	Not Applicable	No		0	2	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for T8 to T7
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

(1) FOS abbreviations are: u: FOS for undrained analysis, d: FOS for drained analysis.
(2) Probability assessed as per Table A and B of Appendix D in PSA.
(3) Impact based on distance of infrastructure element to nearest watercourse.

FEHILY TIMONEY

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APPENDIX C

Calculated FOS for Peat Slopes on Site

Calculated FoS of Natural Peat Slopes for Slieveacurry Renewable Energy Development - Undrained Analysis

Turbine No./Waypoint	Easting	Northing	Slope	Undrained shear strength	Bulk unit weight of Peat	Peat Depth	Surcharge Equivalent Placed Fill Depth (m)	Factor of Safety for Load Condition	
			β (deg)	c_u (kPa)	γ (kN/m^3)	(m)	Condition (2)	Condition (1)	Condition (2)
T1	111820	180748	1	8	10	1.84	2.8	**24.92**	**16.14**
T2	112486	180776	8	8	10	0.64	1.6	**9.07**	**3.54**
T3	111548	180243	2	8	10	0.40	1.4	**57.34**	**16.38**
T4	112122	180305	4	8	10	1.00	2.0	**11.50**	**5.75**
T5	112881	180471	4	8	10	0.74	1.7	**15.54**	**6.61**
T6	112422	179805	8	8	10	0.50	1.5	**11.61**	**3.87**
T7	111517	179163	2	8	10	0.54	1.5	**42.48**	**14.89**
T8	112026	179412	16	8	10	0.60	1.6	**5.03**	**1.89**
Construction Compound (south)	111330	179019	10	8	10	0.10	1.1	**46.78**	**4.25**
Construction Compound (north)	111835	180773	1	8	10	1.80	2.8	**25.47**	**16.37**
Met Mast	111331	179007	10	8	10	0.10	1.1	**46.78**	**4.25**
Southern Borrow Pit	111214	178900	16	8	10	0.20	1.2	**15.10**	**2.52**
Northern Borrow Pit	112730	180092	7	8	10	0.50	1.5	**13.23**	**4.41**
Cable Route	113044	179572	5	8	10	1.90	2.9	**4.85**	**3.18**
OL_29	111308	178691	4	8	10	0.2	1.2	**54.13**	**9.02**
OL_32	111093	178645	7	8	10	0.1	1.1	**67.08**	**6.10**
OL_33	111054	178691	17	8	10	0.1	1.1	**29.10**	**2.65**
OL_34	111110	178753	21	8	10	0.2	1.2	**12.02**	**2.00**
OL_35	111166	178803	21	8	10	0.1	1.1	**23.87**	**2.17**
OL_36	111220	178855	18	8	10	0.1	1.1	**26.80**	**2.44**
OL_37	111272	178909	20	8	10	0.1	1.1	**25.19**	**2.29**
OL_38	111326	178961	15	8	10	0.1	1.1	**32.07**	**2.92**
OL_39	111380	179013	10	8	10	0.1	1.1	**44.77**	**4.07**
OL_40	111436	179064	15	8	10	0.1	1.1	**31.47**	**2.86**
OL_41	111477	179129	5	8	10	0.1	1.1	**99.41**	**9.04**
OL_42	111549	179176	0	8	10	0.2	1.2	**833.35**	**138.89**
OL_43	111616	179212	0	8	10	0.1	1.1	**1428.62**	**129.87**
OL_44	111682	179246	4	8	10	0.2	1.2	**57.26**	**9.54**
OL_46	111816	179314	6	8	10	0.3	1.3	**25.89**	**5.98**
OL_47	111883	179348	12	8	10	0.1	1.1	**39.18**	**3.56**
OL_49	112017	179415	12	8	10	0.4	1.4	**9.76**	**2.79**
OL_50	112084	179449	**No peat recorded at this location**						
OL_51	112143	179494	8	8	10	0.1	1.1	**54.92**	**4.99**
OL_52	112197	179546	12	8	10	0.1	1.1	**39.74**	**3.61**
OL_53	112254	179594	9	8	10	0.2	1.2	**26.48**	**4.41**
OL_54	112307	179655	**No peat recorded at this location**						
OL_56	112405	179761	11	8	10	0.2	1.2	**21.46**	**3.58**
OL_57	112455	179815	9	8	10	0.5	1.5	**10.38**	**3.46**
OL_58	112519	179852	11	8	10	0.1	1.1	**43.97**	**4.00**
OL_59	112582	179888	11	8	10	0.2	1.2	**21.26**	**3.54**
OL_64	112762	180209	11	8	10	0.2	1.2	**21.32**	**3.55**
OL_65	112770	180283	**No peat recorded at this location**						
OL_66	112810	180338	6	8	10	0.5	1.5	**16.00**	**5.33**
OL_67	112877	180370	4	8	10	0.3	1.3	**34.62**	**7.99**
OL_78	112350	179807	5	8	10	0.4	1.4	**25.38**	**7.25**
OL_79	112280	179832	6	8	10	0.2	1.2	**37.81**	**6.30**
OL_80	112207	179846	8	8	10	0.2	1.2	**28.41**	**4.74**
OL_81	112134	179866	8	8	10	0.2	1.2	**29.96**	**4.99**
OL_82	112063	179887	4	8	10	0.3	1.3	**35.11**	**8.10**
OL_83	111988	179887	2	8	10	1.0	2.0	**19.54**	**9.77**
OL_97	111593	180109	2	8	10	1.6	2.6	**17.74**	**10.92**
OL_110	112439	180761	7	8	10	0.2	1.2	**34.68**	**5.78**
OL_116	112057	180783	4	8	10	0.2	1.2	**52.66**	**8.78**
OL_117	111991	180746	4	8	10	0.2	1.2	**57.26**	**9.54**
OL_118	111926	180748	4	8	10	0.1	1.1	**110.32**	**10.03**
OL_119	111861	180785	**No peat recorded at this location**						
OL_120	111827	180793	2	8	10	0.3	1.3	**71.59**	**16.52**
G15	112785	180885	4	8	10	0.1	1.1	**128.70**	**11.70**
G3	112648	180305	**No peat recorded at this location**						
PP23	112891	180351	3.9	8	10	0.6	1.6	**19.65**	**7.37**
PP25	112895	180441	3.3	8	10	0.3	1.3	**46.40**	**10.71**
PP26	112876	180381	4.2	8	10	0.4	1.4	**27.38**	**7.82**
PP27	112848	180317	3.6	8	10	0.1	1.1	**127.66**	**11.61**
PP37	111564	180063	0.2	8	10	0.5	1.5	**458.37**	**152.79**
PP56	112005	179877	2.1	8	10	0.9	1.9	**24.27**	**11.50**
PP57	112080	179903	4	8	10	0.2	1.2	**57.48**	**9.58**
PP79	111422	179190	4.2	8	10	0.7	1.7	**15.65**	**6.44**
PP87	111573	180118	1.6	8	10	1	2.0	**28.66**	**14.33**
PP88	111639	180181	0.3	8	10	1.2	2.2	**127.33**	**69.45**
PP89	111719	180242	2.5	8	10	1	2.0	**18.36**	**9.18**
PP90	111813	180275	0.8	8	10	2	3.0	**28.65**	**19.10**
PP91	111921	180313	3.2	8	10	1	2.0	**14.35**	**7.18**
PP93	111659	180283	4.5	8	10	0.1	1.1	**102.28**	**9.30**
PP94	111540	180258	4.3	8	10	0.5	1.5	**21.40**	**7.13**
~~T7~~ T5 (P)	112080	179903	4	8	10	0.8	1.8	**14.37**	**6.39**
~~T9~~ T2 (P)	111905	180295	3.4	8	10	2.7	3.7	**5.00**	**3.65**
3	111455	180768	2	8	10	2.5	3.5	**9.17**	**6.55**
5	111654	180786	2	8	10	1.1	2.1	**20.85**	**10.92**
8	111869	180736	2	8	10	0.9	1.9	**25.49**	**12.07**
9	111967	180714	5	8	10	1	2.0	**9.21**	**4.61**
10	112045	180651	**No peat recorded at this location**						
11	112130	180601	5	8	10	1.1	2.1	**8.38**	**4.39**
12	112208	180539	6	8	10	0.3	1.3	**25.65**	**5.92**
15	112305	180608	3	8	10	0.9	1.9	**17.01**	**8.06**
16	112333	180693	2	8	10	1.4	2.4	**16.38**	**9.56**
17	112415	180751	3	8	10	0.8	1.8	**19.13**	**8.50**
20	112680	180876	5	8	10	1	2.0	**9.21**	**4.61**
21	112779	180891	**No peat recorded at this location**						
22	112871	180856	3	8	10	0.2	1.2	**76.53**	**12.76**
25	112903	180585	4	8	10	0.4	1.4	**28.74**	**8.21**
26	112856	180497	4	8	10	0.5	1.5	**22.99**	**7.66**
28	112827	180314	3	8	10	0.6	1.6	**25.51**	**9.57**
29	112781	180226	**No peat recorded at this location**						
30	112789	180127	22	8	10	0.2	1.2	**11.52**	**1.92**
31	112759	180036	18	8	10	0.2	1.2	**13.61**	**2.27**
33	112676	179931	9	8	10	0.3	1.3	**17.26**	**3.98**

Calculated FoS of Natural Peat Slopes for Slieveacurry Renewable Energy Development - Undrained Analysis

Turbine No./Waypoint	Easting	Northing	Slope	Undrained shear strength	Bulk unit weight of Peat	Peat Depth	Surcharge Equivalent Placed Fill Depth (m)	Factor of Safety for Load Condition	
			β (deg)	c_u (kPa)	γ (kN/m^3)	(m)	Condition (2)	Condition (1)	Condition (2)
35	112256	180236	7	8	10	0.8	1.8	**8.27**	**3.67**
37	112150	180066	3	8	10	0.3	1.3	**51.02**	**11.77**
39	112042	179898	4	8	10	0.3	1.3	**38.32**	**8.84**
40	111947	179871	2	8	10	2.2	3.2	**10.43**	**7.17**
43	111668	179924	2	8	10	1.5	2.5	**15.29**	**9.17**
44	111612	180005	3	8	10	2.6	3.6	**5.89**	**4.25**
45	112327	180444	4	8	10	0.6	1.6	**19.16**	**7.19**
46	112304	180356	6	8	10	1	2.0	**7.70**	**3.85**
50	111995	180302	3	8	10	1.7	2.7	**9.00**	**5.67**
51	112052	180585	5	8	10	0.9	1.9	**10.24**	**4.85**
53	111897	180460	6	8	10	1.4	2.4	**5.50**	**3.21**
54	111821	180396	8	8	10	0.6	1.6	**9.67**	**3.63**
55	111736	180343	7	8	10	0.3	1.3	**22.05**	**5.09**
56	111646	180301	5	8	10	0.8	1.8	**11.52**	**5.12**
61	111101	178192	4	8	10	0.2	1.2	**57.48**	**9.58**
62	111055	178281	4	8	10	0.2	1.2	**57.48**	**9.58**
63	111014	178372	**No peat recorded at this location**						
65	111054	178554	**No peat recorded at this location**						
67	111069	178355	**No peat recorded at this location**						
69	111142	178537	**No peat recorded at this location**						
70	111218	178600	**No peat recorded at this location**						
71	111300	178655	**No peat recorded at this location**						
72	111321	178747	15	8	10	0.2	1.2	**16.00**	**2.67**
73	111271	178833	10	8	10	0.2	1.2	**23.39**	**3.90**
74	111260	178890	10	8	10	0.4	1.4	**11.70**	**3.34**
75	111482	179021	6	8	10	1.3	2.3	**5.92**	**3.35**
76	111573	179062	8	8	10	1.3	2.3	**4.47**	**2.52**
77	111664	179104	7	8	10	0.7	1.7	**9.45**	**3.89**
78	111755	179146	8	8	10	0.8	1.8	**7.26**	**3.22**
79	111845	179188	9	8	10	0.7	1.7	**7.40**	**3.05**
80	111936	179229	5	8	10	1.3	2.3	**7.09**	**4.01**
81	111995	179256	10	8	10	0.8	1.8	**5.85**	**2.60**
1	511081	681113	2	8	10	4.50	5.5	**5.10**	**4.17**
500	512563	680840	5	8	10	1.50	2.5	**6.14**	**3.69**
501	512345	680555	2	8	10	0.40	1.4	**57.34**	**16.38**
25	512872	680624	3	8	10	0.40	1.4	**38.27**	**10.93**
T4-1	512112	680340	4	8	10	0.50	1.5	**22.99**	**7.66**
53	511175	680932	2	8	10	1.00	2.0	**22.94**	**11.47**
43	511478	680807	2	8	10	1.50	2.5	**15.29**	**9.17**
109	512413	680725	3	8	10	0.70	1.7	**21.87**	**9.00**
88	512913	680753	**No peat recorded at this location**						
57	512191	680426	5	8	10	0.50	1.5	**18.43**	**6.14**
63	512080	680484	4	8	10	0.80	1.8	**14.37**	**6.39**
61	511924	680458	4	8	10	0.30	1.3	**38.32**	**8.84**
62	512007	680476	3	8	10	0.30	1.3	**51.02**	**11.77**

Minimum =	**4.47**	**1.89**
Maximum =	**1428.62**	**152.79**
Average =	**51.85**	**10.61**

Notes:

(1) Assuming a bulk unit weight for peat of 10kN/m^3

(2) Assuming a surcharge equivalent to fill depth of 1m of peat i.e. 10kPa.

(3) Slope inclination (β) based on site readings and site contour plans.

(4) A lower bound undrained shear strength, cu for the peat of 8kPa was selected for the assessment. It should be noted that a cu of 8kPa for the peat is considered a conservative value for the analysis and is not representative of all peat present across the site. In reality the peat has a significantly higher undrained strength.

(5) Peat depths based on probes carried out by FT.

(6) For load conditions see report text.

(7) Cable route waypoint is area of deepest peat along cable route

Calculated FoS of Natural Peat Slopes for Slieveacurry Renewable Energy Development - Drained Analysis

Turbine No./Waypoint	Slope	Design c'	Bulk unit weight of Peat	Unit weight of Water	Depth of In situ Peat	Friction Angle	Surcharge Equivalent Placed Fill	Equivalent Total Depth of Peat (m)	Factor of Safety for Load Condition	
	α (deg)	c' (kPa)	γ (kN/m^3)	γ_w (kN/m^3)	(m)	ø' (deg)	Condition (2)	Condition (2)	Condition (1)	Condition (2)
									100% Water	100% Water
T1	1	4	10.0	10.0	1.8	25	1.0	2.8	**12.46**	**17.48**
T2	8	4	10.0	10.0	0.6	25	1.0	1.6	**4.53**	**3.79**
T3	2	4	10.0	10.0	0.4	25	1.0	1.4	**28.67**	**17.73**
T4	4	4	10.0	10.0	1.0	25	1.0	2.0	**5.75**	**6.21**
T5	4	4	10.0	10.0	0.7	25	1.0	1.7	**7.77**	**7.14**
T6	8	4	10.0	10.0	0.5	25	1.0	1.5	**5.80**	**4.15**
T7	2	4	10.0	10.0	0.5	25	1.0	1.5	**21.24**	**16.12**
T8	16	4	10.0	10.0	0.6	25	1.0	1.6	**2.43**	**1.94**
Construction Compound (south)	10	4	10.0	10.0	0.1	25	1.0	1.1	**23.39**	**4.53**
Construction Compound (north)	1	4	10.0	10.0	1.8	25	1.0	2.8	**12.73**	**17.73**
Met Mast	10	4	10.0	10.0	0.1	25	1.0	1.1	**23.39**	**4.53**
Southern Borrow Pit	10	4	10.0	10.0	0.2	25	1.0	1.2	**11.70**	**4.15**
Northern Borrow Pit	7	4	10.0	10.0	0.5	25	1.0	1.5	**6.61**	**4.74**
Cable Route	5	4	10.0	10.0	1.9	26	1.0	2.9	**2.42**	**3.51**
OL_29	4	4	10.0	10.0	0.2	25	1.0	1.2	**27.07**	**9.74**
OL_32	7	4	10.0	10.0	0.1	25	1.0	1.1	**33.54**	**6.55**
OL_33	17	4	10.0	10.0	0.1	25	1.0	1.1	**14.55**	**2.74**
OL_34	21	4	10.0	10.0	0.2	25	1.0	1.2	**6.01**	**2.02**
OL_35	21	4	10.0	10.0	0.1	25	1.0	1.1	**11.94**	**2.19**
OL_36	18	4	10.0	10.0	0.1	25	1.0	1.1	**13.40**	**2.50**
OL_37	20	4	10.0	10.0	0.1	25	1.0	1.1	**12.60**	**2.33**
OL_38	15	4	10.0	10.0	0.1	25	1.0	1.1	**16.03**	**3.04**
OL_39	10	4	10.0	10.0	0.1	25	1.0	1.1	**22.38**	**4.33**
OL_40	15	4	10.0	10.0	0.1	25	1.0	1.1	**15.73**	**2.98**
OL_41	5	4	10.0	10.0	0.1	25	1.0	1.1	**49.71**	**9.75**
OL_42	0	4	10.0	10.0	0.2	25	1.0	1.2	**416.68**	**150.40**
OL_43	0	4	10.0	10.0	0.1	25	1.0	1.1	**714.31**	**140.64**
OL_44	4	4	10.0	10.0	0.2	25	1.0	1.2	**28.63**	**10.31**
OL_46	6	4	10.0	10.0	0.3	25	1.0	1.3	**12.95**	**6.43**
OL_47	12	4	10.0	10.0	0.1	25	1.0	1.1	**19.59**	**3.77**
OL_49	12	4	10.0	10.0	0.4	25	1.0	1.4	**4.88**	**2.95**
OL_50	**No peat recorded at this location**									
OL_51	8	4	10.0	10.0	0.1	25	1.0	1.1	**27.46**	**5.34**
OL_52	12	4	10.0	10.0	0.1	25	1.0	1.1	**19.87**	**3.82**
OL_53	9	4	10.0	10.0	0.2	25	1.0	1.2	**13.24**	**4.72**
OL_54	**No peat recorded at this location**									
OL_56	11	4	10.0	10.0	0.2	25	1.0	1.2	**10.73**	**3.80**
OL_57	9	4	10.0	10.0	0.5	25	1.0	1.5	**5.19**	**3.70**
OL_58	11	4	10.0	10.0	0.1	25	1.0	1.1	**21.99**	**4.25**
OL_59	11	4	10.0	10.0	0.2	25	1.0	1.2	**10.63**	**3.76**
OL_64	11	4	10.0	10.0	0.2	25	1.0	1.2	**10.66**	**3.77**
OL_65	**No peat recorded at this location**									
OL_66	6	4	10.0	10.0	0.5	25	1.0	1.5	**8.00**	**5.75**
OL_67	4	4	10.0	10.0	0.3	25	1.0	1.3	**17.31**	**8.62**
OL_78	5	4	10.0	10.0	0.4	25	1.0	1.4	**12.69**	**7.83**
OL_79	6	4	10.0	10.0	0.2	25	1.0	1.2	**18.91**	**6.78**
OL_80	8	4	10.0	10.0	0.2	25	1.0	1.2	**14.21**	**5.07**
OL_81	8	4	10.0	10.0	0.2	25	1.0	1.2	**14.98**	**5.35**
OL_82	4	4	10.0	10.0	0.3	25	1.0	1.3	**17.55**	**8.75**
OL_83	2	4	10.0	10.0	1.0	25	1.0	2.0	**9.77**	**10.57**
OL_97	2	4	10.0	10.0	1.6	25	1.0	2.6	**8.87**	**11.82**
OL_110	7	4	10.0	10.0	0.2	25	1.0	1.2	**17.34**	**6.21**
OL_116	4	4	10.0	10.0	0.2	25	1.0	1.2	**26.33**	**9.47**
OL_117	4	4	10.0	10.0	0.2	25	1.0	1.2	**28.63**	**10.31**
OL_118	4	4	10.0	10.0	0.1	25	1.0	1.1	**55.16**	**10.83**
OL_119	**No peat recorded at this location**									
OL_120	2	4	10.0	10.0	0.3	25	1.0	1.3	**35.80**	**17.88**
G15	4	4	10.0	10.0	0.1	25	1.0	1.1	**64.35**	**12.64**
G3	**No peat recorded at this location**									
PP23	3.9	4	10.0	10.0	0.6	25	1.0	1.6	**9.82**	**7.96**
PP25	3.3	4	10.0	10.0	0.3	25	1.0	1.3	**23.20**	**11.58**
PP26	4.2	4	10.0	10.0	0.4	25	1.0	1.4	**13.69**	**8.45**
PP27	3.6	4	10.0	10.0	0.1	25	1.0	1.1	**63.83**	**12.54**
PP37	0.2	4	10.0	10.0	0.5	25	1.0	1.5	**229.18**	**165.45**
PP56	2.1	4	10.0	10.0	0.9	25	1.0	1.9	**12.14**	**12.44**
PP57	4	4	10.0	10.0	0.2	25	1.0	1.2	**28.74**	**10.35**
PP79	4.2	4	10.0	10.0	0.7	25	1.0	1.7	**7.82**	**6.96**
PP87	1.6	4	10.0	10.0	1	25	1.0	2.0	**14.33**	**15.51**
PP88	0.3	4	10.0	10.0	1.2	25	1.0	2.2	**63.66**	**75.21**
PP89	2.5	4	10.0	10.0	1	25	1.0	2.0	**9.18**	**9.93**
PP90	0.8	4	10.0	10.0	2	25	1.0	3.0	**14.33**	**20.68**
PP91	3.2	4	10.0	10.0	1	25	1.0	2.0	**7.18**	**7.76**
PP93	4.5	4	10.0	10.0	0.1	25	1.0	1.1	**51.14**	**10.04**
PP94	4.3	4	10.0	10.0	0.5	25	1.0	1.5	**10.70**	**7.70**
~~T7~~ T5 (P)	4	4	10.0	10.0	0.8	25	1.0	1.8	**7.19**	**6.90**
~~T9~~ T2 (P)	3.4	4	10.0	10.0	2.7	25	1.0	3.7	**2.50**	**3.95**
3	2	4	10.0	10.0	2.5	25	1.0	3.5	**4.59**	**7.09**
5	2	4	10.0	10.0	1.1	25	1.0	2.1	**10.43**	**11.82**
8	2	4	10.0	10.0	0.9	25	1.0	1.9	**12.74**	**13.06**
9	5	4	10.0	10.0	1	25	1.0	2.0	**4.61**	**4.97**
10	**No peat recorded at this location**									
11	5	4	10.0	10.0	1.1	25	1.0	2.1	**4.19**	**4.73**
12	6	4	10.0	10.0	0.3	25	1.0	1.3	**12.83**	**6.37**
15	3	4	10.0	10.0	0.9	25	1.0	1.9	**8.50**	**8.71**
16	2	4	10.0	10.0	1.4	25	1.0	2.4	**8.19**	**10.34**
17	3	4	10.0	10.0	0.8	25	1.0	1.8	**9.57**	**9.20**
20	5	4	10.0	10.0	1	25	1.0	2.0	**4.61**	**4.97**
21	**No peat recorded at this location**									
22	3	4	10.0	10.0	0.2	25	1.0	1.2	**38.27**	**13.79**
25	4	4	10.0	10.0	0.4	25	1.0	1.4	**14.37**	**8.87**
26	4	4	10.0	10.0	0.5	25	1.0	1.5	**11.50**	**8.28**

Calculated FoS of Natural Peat Slopes for Slieveacurry Renewable Energy Development - Drained Analysis

Turbine No./Waypoint	Slope	Design c'	Bulk unit weight of Peat	Unit weight of Water	Depth of In situ Peat	Friction Angle	Surcharge Equivalent Placed Fill	Equivalent Total Depth of Peat (m)	Factor of Safety for Load Condition	
	α (deg)	c' (kPa)	γ (kN/m^3)	γ_w (kN/m^3)	(m)	ø' (deg)	Condition (2)	Condition (2)	Condition (1)	Condition (2)
									100% Water	100% Water
28	3	4	10.0	10.0	0.6	25	1.0	1.6	**12.76**	**10.34**
29	No peat recorded at this location									
30	22	4	10.0	10.0	0.2	25	1.0	1.2	**5.76**	**1.92**
31	18	4	10.0	10.0	0.2	25	1.0	1.2	**6.81**	**2.33**
33	9	4	10.0	10.0	0.3	25	1.0	1.3	**8.63**	**4.26**
35	7	4	10.0	10.0	0.8	25	1.0	1.8	**4.13**	**3.95**
37	3	4	10.0	10.0	0.3	25	1.0	1.3	**25.51**	**12.73**
39	4	4	10.0	10.0	0.3	25	1.0	1.3	**19.16**	**9.55**
40	2	4	10.0	10.0	2.2	25	1.0	3.2	**5.21**	**7.76**
43	2	4	10.0	10.0	1.5	25	1.0	2.5	**7.65**	**9.93**
44	3	4	10.0	10.0	2.6	25	1.0	3.6	**2.94**	**4.60**
45	4	4	10.0	10.0	0.6	25	1.0	1.6	**9.58**	**7.76**
46	6	4	10.0	10.0	1	25	1.0	2.0	**3.85**	**4.14**
50	3	4	10.0	10.0	1.7	25	1.0	2.7	**4.50**	**6.13**
51	5	4	10.0	10.0	0.9	25	1.0	1.9	**5.12**	**5.23**
53	6	4	10.0	10.0	1.4	25	1.0	2.4	**2.75**	**3.45**
54	8	4	10.0	10.0	0.6	25	1.0	1.6	**4.84**	**3.89**
55	7	4	10.0	10.0	0.3	25	1.0	1.3	**11.02**	**5.47**
56	5	4	10.0	10.0	0.8	25	1.0	1.8	**5.76**	**5.52**
61	4	4	10.0	10.0	0.2	25	1.0	1.2	**28.74**	**10.35**
62	4	4	10.0	10.0	0.2	25	1.0	1.2	**28.74**	**10.35**
63	No peat recorded at this location									
65	No peat recorded at this location									
67	No peat recorded at this location									
69	No peat recorded at this location									
70	No peat recorded at this location									
71	No peat recorded at this location									
72	15	4	10.0	10.0	0.2	25	1.0	1.2	**8.00**	**2.78**
73	10	4	10.0	10.0	0.2	25	1.0	1.2	**11.70**	**4.15**
74	10	4	10.0	10.0	0.4	25	1.0	1.4	**5.85**	**3.56**
75	6	4	10.0	10.0	1.3	25	1.0	2.3	**2.96**	**3.60**
76	8	4	10.0	10.0	1.3	25	1.0	2.3	**2.23**	**2.70**
77	7	4	10.0	10.0	0.7	25	1.0	1.7	**4.72**	**4.18**
78	8	4	10.0	10.0	0.8	25	1.0	1.8	**3.63**	**3.46**
79	9	4	10.0	10.0	0.7	25	1.0	1.7	**3.70**	**3.25**
80	5	4	10.0	10.0	1.3	25	1.0	2.3	**3.54**	**4.32**
81	10	4	10.0	10.0	0.8	25	1.0	1.8	**2.92**	**2.77**
1	2	4	10.0	10.0	4.50	25	1.0	5.5	**2.55**	**4.51**
500	5.0	4	10.0	10.0	1.50	25	1.0	2.5	**3.07**	**3.97**
501	2.0	4	10.0	10.0	0.40	25	1.0	1.4	**28.67**	**17.73**
25	3.0	4	10.0	10.0	0.40	25	1.0	1.4	**19.13**	**11.82**
T4-1	4.0	4	10.0	10.0	0.50	25	1.0	1.5	**11.50**	**8.28**
53	2.0	4	10.0	10.0	1.00	25	1.0	2.0	**11.47**	**12.41**
43	2.0	4	10.0	10.0	1.50	25	1.0	2.5	**7.65**	**9.93**
109	3.0	4	10.0	10.0	0.70	25	1.0	1.7	**10.93**	**9.74**
88	No peat recorded at this location									
57	5.0	4	10.0	10.0	0.50	25	1.0	1.5	**9.21**	**6.62**
63	4.0	4	10.0	10.0	0.80	25	1.0	1.8	**7.19**	**6.90**
61	4.0	4	10.0	10.0	0.30	25	1.0	1.3	**19.16**	**9.55**
62	3.0	4	10.0	10.0	0.30	25	1.0	1.3	**25.51**	**12.73**

Minimum =	**2.23**	**1.92**
Maximum =	**714.31**	**165.45**
Average =	**25.96**	**11.46**

Notes:

(1) Assuming a bulk unit weight of peat of 10 (kN/m^3)
(2) Assuming a surcharge equivalent to fill depth of 1.0m.
(3) Slope inclination (β) based on site readings and contour survey plans of site.
(4) FoS is based on slope inclination and shear test results obtained from published data.
(5) Peat depths based on probes carried out by FT.
(6) For load conditions see Report text.
(7) Minimum acceptable factor of safety required of 1.3 for first-time failures based on BS: 6031:1981 Code of practice for Earthworks.
(8) Cable route waypoint is area of deepest peat along cable route

Calculated FoS of Natural Peat Slopes for Slieveacurry Renewable Energy Development - Undrained Analysis

Location	Easting	Northing	Slope	Undrained shear strength	Bulk unit weight of Peat	Peat Depth	Surcharge Equivalent Placed Fill Depth (m)	Factor of Safety for Load Condition	
			β (deg)	c_u (kPa)	γ (kN/m^3)	(m)	Condition (2)	Condition (1)	Condition (2)
Entrance road to T1	111455	180768	2	8	10	2.5	3.5	**9.17**	**6.55**
T1 to Main Junction	112130	180601	5	8	10	1.1	2.1	**8.38**	**4.39**
Main Junction to T2	112439	180761	7	8	10	0.2	1.2	**34.68**	**5.78**
Spur to T3	111736	180343	7	8	10	0.3	1.3	**22.05**	**5.09**
Spur to T4	112256	180236	7	8	10	0.8	1.8	**8.27**	**3.67**
Road from T2 to T5	112871	180856	3	8	10	0.2	1.2	**76.53**	**12.76**
Road from T5 to T6	112848	180317	3.6	8	10	0.1	1.1	**127.66**	**11.61**
Road from T6 to T8	112143	179494	8	8	10	0.1	1.1	**54.92**	**4.99**
Road from T7 to T8	111616	179212	2	8	10	0.1	1.1	**229.37**	**20.85**
							Minimum =	**229.37**	**20.85**
							Maximum =	**229.37**	**20.85**
							Average =	**229.37**	**20.85**

Notes:

(1) Assuming a bulk unit weight for peat of 10kN/m^3

(2) Assuming a surcharge equivalent to fill depth of 1m of peat i.e. 10kPa.

(3) Slope inclination (β) based on site readings and site contour plans.

(4) A lower bound undrained shear strength, cu for the peat of 8kPa was selected for the assessment. It should be noted that a cu of 8kPa for the peat is considered a conservative value for the analysis and is not representative of all peat present across the site. In reality the peat has a significantly higher undrained strength.

(5) Peat depths based on probes carried out by FT/MKO.

(6) For load conditions see report text.

Calculated FoS of Natural Peat Slopes for Slieveacurry Renewable Energy Development - Drained Analysis

Location	Slope	Design c'	Bulk unit weight of Peat	Unit weight of Water	Depth of In situ Peat	Friction Angle	Surcharge Equivalent Placed Fill	Equivalent Total Depth of Peat (m)	Factor of Safety for Load Condition	
	α (deg)	c' (kPa)	γ (kN/m^3)	γ_w (kN/m^3)	(m)	ø' (deg)	Condition (2)	Condition (2)	Condition (1)	Condition (2)
									100% Water	100% Water
Entrance road to T1	2	4	10.0	10.0	2.5	25	1.0	3.5	**4.59**	**7.09**
T1 to Main Junction	5	4	10.0	10.0	1.1	25	1.0	2.1	**4.19**	**4.73**
Main Junction to T2	7	4	10.0	10.0	0.2	25	1.0	1.2	**17.34**	**6.21**
Spur to T3	7	4	10.0	10.0	0.3	25	1.0	1.3	**11.02**	**5.47**
Spur to T4	7	4	10.0	10.0	0.8	25	1.0	1.8	**4.13**	**3.95**
Road from T2 to T5	3	4	10.0	10.0	0.2	25	1.0	1.2	**38.27**	**13.79**
Road from T5 to T6	3.6	4	10.0	10.0	0.1	25	1.0	1.1	**63.83**	**12.54**
Road from T6 to T8	8	4	10.0	10.0	0.1	25	1.0	1.1	**27.46**	**5.34**
Road from T7 to T8	2	4	10.0	10.0	0.1	25	1.0	1.1	**114.68**	**22.57**
								Minimum =	**4.13**	**3.95**
								Maximum =	**114.68**	**22.57**
								Average =	**43.23**	**10.61**

Notes:

(1) Assuming a bulk unit weight of peat of 10 (kN/m^3)
(2) Assuming a surcharge equivalent to fill depth of 1.0m.
(3) Slope inclination (β) based on site readings and contour survey plans of site.
(4) FoS is based on slope inclination and shear test results obtained from published data.
(5) Peat depths based on probes carried out by FT/MKO.
(6) For load conditions see Report text.
(7) Minimum acceptable factor of safety required of 1.3 for first-time failures based on BS: 6031:1981 Code of practice for Earthworks.
(8) Cable route waypoint is area of deepest peat along cable route

Calculated FoS of Natural Peat Slopes for Slieveacurry Renewable Energy Development - Undrained Analysis

Location	Settlement Pond Number	Slope	Undrained shear strength	Bulk unit weight of Peat	Peat Depth	Surcharge Equivalent Placed Fill Depth (m)	Factor of Safety for Load Condition	
		β (deg)	c_u (kPa)	γ (kN/m^3)	(m)	Condition (2)	Condition (1)	Condition (2)
T1	SP-B4	1	8	10	1.84	2.8	**24.92**	**16.14**
T2	SP-E4	8	8	10	0.64	1.6	**9.07**	**3.54**
T3	SP-C4	2	8	10	0.40	1.4	**57.34**	**16.38**
T4	SP-D2	4	8	10	1.00	2.0	**11.50**	**5.75**
T5	SP-G1	4	8	10	0.74	1.7	**15.54**	**6.61**
T6	SP-J2	8	8	10	0.50	1.5	**11.61**	**3.87**
T7	SP-K4	8	8	10	0.54	1.5	**10.75**	**3.77**
T8	SP-K2	16	8	10	0.60	1.6	**5.03**	**1.89**
MM	SP-L4B	21	8	10	0.1	1.1	**23.91**	**2.17**
						Minimum =	**5.03**	**1.89**
						Maximum =	**57.34**	**16.38**
						Average =	**18.85**	**6.68**

Notes:

(1) Assuming a bulk unit weight for peat of 10kN/m^3

(2) Assuming a surcharge equivalent to fill depth of 1m of peat i.e. 10kPa.

(3) Slope inclination (β) based on site readings and site contour plans.

(4) A lower bound undrained shear strength, cu for the peat of 8kPa was selected for the assessment. It should be noted that a cu of 8kPa for the peat is considered a conservative value for the analysis and is not representative of all peat present across the site. In reality the peat has a significantly higher undrained strength.

(5) Peat depths based on probes carried out by FT, HES and MKO.

(6) For load conditions see report text.

Calculated FoS of Natural Peat Slopes for Slieveacurry Renewable Energy Development - Drained Analysis

Location	Settlement Pond Number	Slope	Design c'	Bulk unit weight of Peat	Unit weight of Water	100% Water to height of Peat	Depth of In situ Peat	Friction Angle	Surcharge Equivalent Placed Fill Depth (m)	Surcharge Equivalent Placed Fill Depth (m)	Factor of Safety for Load Condition	
		α (deg)	c' (kPa)	γ (kN/m^3)	γ_w (kN/m^3)	(m)	(m)	ø' (deg)	Condition (2)	Condition (2)	Condition (1)	Condition (2)
											100% Water	100% Water
T1	SP-B4	1	4	10.0	10.0	1.8	1.84	25	1.0	2.8	**12.46**	**17.48**
T2	SP-E4	8	4	10.0	10.0	0.6	0.64	25	1.0	1.6	**4.53**	**3.79**
T3	SP-C4	2	4	10.0	10.0	0.4	0.40	25	1.0	1.4	**28.67**	**17.73**
T4	SP-D2	4	4	10.0	10.0	1.0	1.00	25	1.0	2.0	**5.75**	**6.21**
T5	SP-G1	4	4	10.0	10.0	0.7	0.74	25	1.0	1.7	**7.77**	**7.14**
T6	SP-J2	8	4	10.0	10.0	0.5	0.50	25	1.0	1.5	**5.80**	**4.15**
T7	SP-K4	8	4	10.0	10.0	0.5	0.54	25	1.0	1.5	**5.37**	**4.04**
T8	SP-K2	16	4	10.0	10.0	0.6	0.60	25	1.0	1.6	**2.52**	**1.96**
MM	SP-L4B	21	4	10.0	10.0	0.1	0.1	25	1.0	1.1	**11.96**	**2.19**
										Minimum =	**2.52**	**1.96**
										Maximum =	**28.67**	**17.73**
										Average =	**9.43**	**7.19**

Notes:

(1) Assuming a bulk unit weight of peat of 10 (kN/m^3)
(2) Assuming a surcharge equivalent to fill depth of 1.0m.
(3) Slope inclination (β) based on site readings and contour survey plans of site.
(4) FoS is based on slope inclination and shear test results obtained from published data.
(5) Peat depths based on probes carried out by FT, HES and MKO.
(6) For load conditions see Report text.
(7) Minimum acceptable factor of safety required of 1.3 for first-time failures based on BS: 6031:1981 Code of practice for Earthworks.

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APPENDIX D

Methodology for Peat Stability Risk Assessment

Methodology for Peat Stability Risk Assessment

A peat stability risk assessment was carried out for each of the main infrastructure elements at the proposed wind farm development. This approach takes into account guidelines for geotechnical/peat stability risk assessments as given in PLHRAG (2017) and MacCulloch (2005). The degree of risk is determined as a Risk Rating (R), which is the product of probability (P) and impact (I). How these factors are determined and applied in the analysis is described below.

The main approaches for assessing peat stability include the following:

(a) Geomorphological

(b) Qualitative (judgement)

(c) Index/Probabilistic (probability)

(d) Deterministic (factor of safety)

Approaches (a) to (c) listed above would be considered subjective and do not provide a definitive indication of stability; in addition, a high level of judgement/experience is required which makes it difficult to relate the findings to real conditions. FT apply a more objective approach, the deterministic approach. As part of FT's deterministic approach, a qualitative risk assessment is also carried out taking into account qualitative factors, which cannot necessarily be quantified.

Probability

The likelihood of a peat failure occurring was assessed based on the results of both the quantitative results of stability calculations (deterministic approach using factors of safety) and the assessment of the severity of several qualitative factors which cannot be reasonably included in a stability calculation but nevertheless may affect the occurrence of peat instability.

The qualitative factors used in the risk assessment are outlined in Table A and have been compiled based on FT's experience of assessments and construction in peat land sites and peat failures throughout Ireland and the UK.

Table A: Qualitative Factors used to Assess Potential for Peat Failure

Qualitative Factor	Type of Feature/Indicator for each Qualitative Factor [1]	Explanation/Description of Qualitative Factor
Evidence of sub peat water flow	No	Based on site walkover observations. Sub peat water flow generally occurs in the form of natural piping at the base of peat. Where there is a constriction or blockage in natural pipes a build-up of water can occur at the base of the peat causing a reduction in effective stress at the base of the peat resulting in failure; this is particularly critical during periods of intense rainfall.
	Possibly	
	Probably	
	Yes	

Qualitative Factor	Type of Feature/Indicator for each Qualitative Factor [1]	Explanation/Description of Qualitative Factor
Evidence of surface water flow	Dry	Based on site walkover observations. The presence of surface water flow indicates if peat in an area is well drained or saturated and if any additional loading from the ponding of surface water onto the peat is likely.
	Localised/Flowing in drains	
	Ponded in drains	
	Springs/surface water	
Evidence of previous failures/slips	No	Based on site walkover observations. The presence of clustering of relict failures may indicate that particular pre-existing site conditions predispose a site to failure.
	In general area	
	On site	
	Within 500m of location	
Type of vegetation	Grass/Crops	Based on site walkover observations. The type of vegetation present indicates if peat in an area is well drained, saturated, etc. Vegetation that indicates wetter ground may also indicate softer underlying peat deposits.
	Improved Grass/Dry Heather	
	Wet Grassland/Juncus (Rushes)	
	Wetlands Sphagnum (Peat moss)	
General slope characteristics upslope/downslope from infrastructure location	Concave	Based on site walkover observations. Slope morphology in the area of the infrastructure location is an important factor. A number of recorded peat failures have occurred in close proximity to a convex break in slope.
	Planar to concave	
	Planar to convex	
	Convex	
Evidence of very soft/soft clay at base of peat	No	Based on inspection of exposures in general area from site walkover. Several reported peat failures identify the presence of a weak layer at the base of the peat along which shear failure has occurred.
	Yes	
Evidence of mechanically cut peat	No	Based on site walkover observations. Mechanically cut peat typically cut using a ‘sausage’ machine to extract

Qualitative Factor	Type of Feature/Indicator for each Qualitative Factor (1)	Explanation/Description of Qualitative Factor
	Yes	peat for harvesting. Areas which have been cut in this manner have been linked to peat instability. The mechanical cuts can notably reduce the intrinsic strength of the peat and also allow ingress of rainfall/surface water.
Evidence of quaking or buoyant peat	No	Based on site walkover observations. Quaking/buoyant peat is indicative of highly saturated peat, which would generally be considered to have a low strength. Quaking peat is a feature on sites that have been previously linked with peat instability.
	Yes	
Evidence of bog pools	No	Based on site walkover observations. Bog pools are generally an indicator of areas of weak, saturated peat. Commonly where there are open areas of water within peat these can be interconnected, with the result that there may be sub-surface bodies of water. The presence of bog pools have been previously linked with peat instability.
	Yes	
Other	Varies	In addition to the above features/ indicators and based on site recordings the following are some of the features which may be identified: Excessively deep peat, weak peat, overly steep slope angles, etc.

Note (1) The list of features/indicators for each qualitative factor are given in increasing order of probability of leading to peat instability/failure.

It should be noted that the presence of one of the qualitative factors alone from Table A is unlikely to lead to peat instability/failure. Peat instability/failure at a site is generally the combination of a number of these factors occurring at the same time at a particular location. The probability rating assigned to the quantitative and qualitative factors is judged on a 5-point scale from 1 (indicating negligible or no probability of failure) to 5 (indicating a very likely failure), as outlined in Table B.

Table B: Probability Scale

Scale	Factor of Safety	Probability
1	1.30 or greater	Negligible/None
2	1.29 to 1.20	Unlikely
3	1.19 to 1.11	Likely
4	1.01 to 1.10	Probable
5	≤1.0	Very Likely

Scale	Likelihood of Qualitative Factor leading to Peat Failure	Probability of Failure
1	Negligible/None	Least
2	Unlikely	
3	Probable	
4	Likely	
5	Very Likely	Greatest

Impact

The severity of the risk is also assessed qualitatively in terms of impact. The impact of a peat failure on the environment within and beyond the immediate wind farm site is assessed based on the potential travel distance of a peat failure. Where a peat failure enters a watercourse, it can travel a considerable distance downstream. Therefore, the proximity of a potential peat failure to a drainage course is a significant indicator of the likely potential impact.

The risk is determined based on the combination of hazard and impact. A qualitative scale has been derived for the impact of the hazard based on distance of infrastructure element to a watercourse (Table C).

The location of watercourses is based on topographic maps and supplemented by site observations from walkover survey. Note that not all watercourses are shown on maps.

Table C: Impact Scale

Scale	Criteria	Impact
1	Proposed infrastructure element greater than 150m of watercourse	Negligible/None
2	Proposed infrastructure element within 150 to 101m of watercourse	Low
3	Proposed infrastructure element within 100 to 51m of watercourse	Medium

4	Proposed infrastructure element within 50 m of watercourse	High
5	Proposed infrastructure element within 50 m of watercourse, in an environmentally sensitive area	Extremely High

Risk Rating

The degree of risk is determined as the product of probability (P) and impact (I), which gives the Risk Rating (R) as follows:

The Risk Rating is calculated from: R = P x I

Due to the 5-point scales used to assess Probability and Impact, the Risk Rating can range from 1 to 25 as shown in Table D.

Table D: Qualitative Risk Rating

		Probability				
		1	**2**	**3**	**4**	**5**
Impact	**5**	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5

Risk Rating & Control Measures	
17 to 25	High: avoid working in area or significant control measures required
11 to 16	Medium: notable control measures required
5 to 10	Low: only routine control measures required
1 to 4	Negligible: none or only routine control measures required

The risk rating is calculated individually for each contributory factor. Control measures are required to reduce the risk to at least a 'Low' risk rating. The control measures in response to the qualitative risk ratings are included in the peat stability risk registers for each main infrastructure element in Appendix B.

The risk rating is calculated individually for each contributory factor. Control measures are required to reduce the risk to at least a 'Tolerable' risk rating

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APPENDIX E

Trial Pit Logs

Trial Pit Log

Trialpit No **T01**

Sheet 1 of 1

Project Name: Slieveacurry Wind Farm	Project No. P20-051	Co-ords: 111830.00 - 180786.00 Level:	Date 17/06/2021
Location: Co. Clare		Dimensions (m): Depth 2.00	Scale 1:25
Client: MKO			Logged

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.60			Soft brown fibrous Peat
				1.80			Soft to firm grey slightly sandy slightly gravelly Clay
				2.00			Possible bedrock - grey angular gravel and cobbles End of pit at 2.00 m

1 2 3 4 5

Remarks: Sides stable. Moderate groundwater inflow at 1.5m bgl

Stability:

Trial Pit Log

Trialpit No **T02**

Sheet 1 of 1

Project Name: Slieveacurry Wind Farm	Project No. P20-051	Co-ords: 112560.00 - 180753.00 Level:	Date 17/06/2021
Location: Co. Clare		Dimensions (m): Depth 1.40	Scale 1:25
Client: MKO			Logged

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.60			Soft brown fibrous Peat
				1.40			Firm grey slightly sandy Clay
				1.40			Weak grey thinly bedded Shale End of pit at 1.40 m

Remarks: Sides stable. Slow seepage at 1.4m bgl

Stability:

Trial Pit Log

Trialpit No **T03**

Sheet 1 of 1

Project Name: Slieveacurry Wind Farm	Project No. P20-051	Co-ords: 111519.00 - 180260.00 Level:	Date 17/06/2021
Location: Co. Clare		Dimensions (m): Depth 1.00	Scale 1:25
Client: MKO			Logged

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.40			Firm brown fibrous Peat
				1.00			Firm light brown gravelly Silt
				1.00			Weak grey thinly bedded Shale End of pit at 1.00 m

Remarks: Sides stable

Stability:

Trial Pit Log

Trialpit No **T05** Sheet 1 of 1

Project Name: Slieveacurry Wind Farm	Project No. P20-051	Co-ords: 112881.00 - 180472.00 Level:	Date 17/06/2021
Location: Co. Clare		Dimensions (m): Depth 1.00	Scale 1:25
Client: MKO			Logged

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			Soft brown organic Topsoil
				0.80			Firm light brown to grey slightly sandy Clay
				1.00			Weak grey thin bedded Shale, slightly to moderately weathered. End of pit at 1.00 m

1 2 3 4 5

Remarks: Sides stable

Stability:

Trial Pit Log

Trialpit No **T06**

Sheet 1 of 1

Project Name: Slieveacurry Wind Farm	Project No. P20-051	Co-ords: 112420.00 - 179805.00 Level:	Date 17/06/2021
Location: Co. Clare		Dimensions (m): Depth 0.90	Scale 1:25
Client: MKO			Logged

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
							Firm brown fibrous Peat
				0.30			Firm to stiff grey slightly gravelly Clay
				0.90			Weak grey Shale, thinly bedded, ironstained.
				0.90			End of pit at 0.90 m

Remarks: Sides stable.

Stability:

Trial Pit Log

Trialpit No
TP01 at BP
Sheet 1 of 1

Project Name: Slieveacurry Wind Farm	Project No. P20-051	Co-ords: 112668.00 - 180088.00 Level:	Date 17/06/2021
Location: Co. Clare		Dimensions (m): Depth 0.20	Scale 1:25
Client: MKO			Logged

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.10			Brown organic Topsoil
				0.20			Firm grey brown Clay
				0.20			Strong grey muddy Limestone, fresh to slightly weathered. End of pit at 0.20 m

1
2
3
4
5

Remarks: Sides stable

Stability:

Trial Pit Log

Trialpit No
TP02 at BP
Sheet 1 of 1

Project Name: Slieveacurry Wind Farm	Project No. P20-051	Co-ords: 112680.00 - 180127.00 Level:	Date 17/06/2021
Location: Co. Clare		Dimensions (m): Depth 0.50	Scale 1:25
Client: MKO			Logged

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.20			Brown organic Topsoil
				0.50			Firm grey Clay
				0.50			Strong grey muddy Limestone, fresh to slightly weathered. End of pit at 0.50 m

1
2
3
4
5

Remarks: Sides stable.

Stability:

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