GEOTECHNICAL AND PEAT STABILITY ASSESSMENT REPORT

DERRINLOUGH WIND FARM, CO. OFFALY

JANUARY 2020

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Abstract: Fehily Timoney and Company (FT) were engaged by McCarthy Keville O'Sullivan to undertake a geotechnical assessment of the proposed Derrinlough wind farm site with respect to peat stability. As part of the geotechnical assessment of the proposed development, FT completed walkover surveys at the site and a ground investigation comprising 68 no. trial pits with associated laboratory testing. 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-TECHNICAL SUMMARY

Fehily Timoney and Company (FT) formerly Applied Ground Engineering Consultants Ltd (AGEC) was engaged by McCarthy Keville O'Sullivan on behalf of Bord na Móna Powergen Ltd to undertake a geotechnical and peat stability assessment of the proposed Derrinlough wind farm 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.

The findings of the peat assessment, which involved analysis of 579 no. locations, 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 proposed wind farm comprises 21 no. wind turbines and associated infrastructure.

The site is relatively flat-lying with drainage channels running typically southeast to northwest. The site is split into two areas, Drinagh to the east of the N62 national road and Clongawny to the west. The land uses and types within the proposed development site are a mixture of bare cutover and cutaway peat, re-vegetation of bare peat, commercial forestry, telecommunications (a 30m Mast) and wind measurement (a single 100m anemometry mast on Clongawny Bog). There are also a number of Bord na Móna rail lines that pass through the bogs facilitating the transportation of milled peat to Derrinlough Briquette Factory which is located in the most western part of Drinagh bog.

Bord na Móna has considerable experience in the handling of peat in these circumstances, both during peat production operations and during wind farm construction projects. This experience has shown that the most environmentally sensitive and stable way of handling and moving of peat is its placement across the site and at locations as close as possible to the excavation areas.

Peat thicknesses recorded during the FT walkover, ground investigation and from the ground penetrating radar surveys carried out by Bord na Móna within the proposed infrastructure footprint on site ranged from 0 to 4.7m with an average of 1.1m. It should be noted that the peat thickness within the proposed infrastructure footprint is generally less than 2m with localised deeper deposits of up to 4.7m. The deeper peat areas were generally avoided when optimising the wind farm layout for site.

Slope inclinations at the main infrastructure locations range from 0 to 4 degrees. The flat topography/nature of the terrain on site highlights the low risk of peat failure.

Ground conditions comprised mainly of peat overlying typically lacustrine soil or till.

A walkover including intrusive peat depth probing, a ground investigation including trial pits, 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).

The purpose of the stability analysis is 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.

From the stability analysis for both the undrained and drained conditions, which analysed the turbine locations and other proposed infrastructure locations, the calculated values were above the minimum acceptable FoS of 1.3 at 576 no. of the 579 no. locations. 3 no. locations were calculated with FoS's of between 1.08 and 1.29. The 3 no. marginally low FoS's are located alongside proposed access roads between turbines T12 and T13 and one location along the proposed access road close to turbine T4. The proposed works at these locations entails the construction of a floated section of access road i.e. no excavation works are proposed at these locations. Peat instability at these locations is not envisaged to be an issue.

As presented above for both the undrained and drained conditions, 100% of calculated FoS's are above 1.0 and 99.5% of calculated FoS's are above 1.3 which highlights the low risk of peat failure on site.

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 4-2.

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. 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 Derrinlough site have low potential of peat failure.

In summary, the Derrinlough wind farm site has an acceptable margin of safety and is considered to be at **low** risk of peat failure.

2 INTRODUCTION

2.1 Background and Experience

Fehily Timoney and Company (FT) formerly Applied Ground Engineering Consultants Ltd (AGEC) was engaged in March 2018 by McCarthy Keville O'Sullivan on behalf of Bord na Móna to undertake a geotechnical and peat stability assessment of the proposed Derrinlough wind farm site.

FT have been involved in over 100 wind farm developments in both Ireland and the UK at various stages of development i.e. preliminary feasibility, planning, design, construction and operational stage and have established themselves as one of the leading engineering consultancies in peat stability assessment, geohazard mapping in peat land areas, investigation of peat failures and site assessment of peat.

The relevant geotechnical project team along with their relevant experience are outlined below.

- Gerry Kane (BEng, PGradDip, CEng, MIEI) is a Chartered Civil/Geotechnical Engineer with over 10 years geotechnical consultancy experience in Ireland and the UK. Gerry has completed numerous geotechnical & geological impact assessments for wind farm developments in Ireland. In addition, he has significant experience in the geotechnical/civil design of wind energy projects at construction stage.
- Ian Higgins (BSc, MSc, FGS, MIEI) is a Geotechnical Engineer with over 20 years geotechnical consultancy experience in Ireland and the UK. Ian has completed numerous geotechnical & geological impact assessments for wind farm developments in Ireland. In addition, he has significant experience in the geotechnical/civil design of wind energy projects at construction stage.
- Paul Jennings (PhD, BEng, DipArb, CEng, MIEI) is a Chartered Geotechnical Engineer with over 30 years geotechnical consultancy experience in Ireland, the UK and Hong Kong. Paul has completed numerous geotechnical & geological impact assessments for wind farm developments in Ireland. In addition, he has attended and represented developers and consultants at numerous oral hearings for wind energy developments.

2.2 Description of Works

The Derrinlough wind farm site comprises cut-away blanket peat area of approximately 24km^2. The site is located in the west of Co. Offaly. The nearest village to the site is Cloghan which is at about a distance of 2.5km. The surrounding landscape is predominately flat with land-use comprising forestry, agricultural land and cutaway peatland.

The proposed development comprises the following:

(1) 21 No. wind turbines with an overall blade tip height of up to 185 metres and all associated hard-standing areas.

(2) 2 No. permanent Anemometry Masts up to a height of 120 metres.

(3) Provision of new and upgraded internal site access roads, passing bays, amenity pathways, amenity carpark and associated drainage.

(4) 2 No. permanent underpasses in the townland of Derrinlough. One underpass will be located beneath the N62 and one will be located beneath an existing Bord na Móna rail line.

(5) 1 No. 110 kV electrical substation, which will be constructed in the townland of Cortullagh or Grove. The electrical substation will have 2 No. control buildings, associated electrical plant and equipment and a wastewater holding tank.

(6) 5 No. temporary construction compounds, in the townlands of Clongawny More, Derrinlough, Derrinlough/Crancreagh, Drinagh and Cortullagh or Grove.

(7) All associated underground electrical and communications cabling connecting the turbines to the proposed electrical substation.

(8) 2 No. temporary security cabins at the main construction site entrances in the townland of Derrinlough.

(9) All works associated with the connection of the proposed wind farm to the national electricity grid, which will be to the existing Dallow/Portlaoise/Shannonbridge 110 kV line.

(10) Removal of existing meteorological mast.

(11) Upgrade of existing access and temporary improvements and modifications to existing public road infrastructure to facilitate delivery of abnormal loads including locations on the N52 and N62; construction access for delivery of construction materials at locations on the N62 and R357; operational access onto L7009 in the townland of Cortullagh or Grove and amenity access off R357 and L7005.

(12) All associated site works and ancillary development including signage.

(13) A 10-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

The peat depth data recorded by FT during the site walkovers from the 22nd to the 23rd August 2019 and the 10th to the 11th September, by Hydro Environmental Services (HES) in 2019 has been used in the assessment of peat stability for the proposed wind farm site.

Ground investigation in the form of trial pits were carried out by FT/AGEC and Bord na Móna during the following dates:

- 29th and 30th January 2019
- 12th to 16th August 2019
- 7th and 8th October 2019
- 6th November 2019

In addition, a ground penetrating radar (GPR) survey of the site was carried out by Bord na Móna in 2008 and 2015. This peat depth data has also been used in the peat stability assessment.

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

(1) Desk study

(2) Site reconnaissance including shear strength and peat depth measurements

(3) Peat stability assessment of the peat slopes on site using a deterministic and qualitative approach

(4) Peat contour depth plan – is compiled based on the peat depth probes carried out across the site by FT (2019), HES (2019) and GPR survey data from Bord na Móna (2008 and 2015)

(5) Factor of safety plan – is compiled for the short term critical condition (undrained) for 579 no. FoS points analysed along the proposed infrastructure envelope on site

(6) 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

(7) 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

(8) Review of ground investigation carried out at the site by FT

(9) Preliminary assessment of foundation type for turbines

(10) Commentary of founding details for other infrastructure elements such as access roads, crane hardstands, substation compound platform, construction compound platform 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 a site reconnaissance and subsequent feedback from the peat stability and risk assessment results.

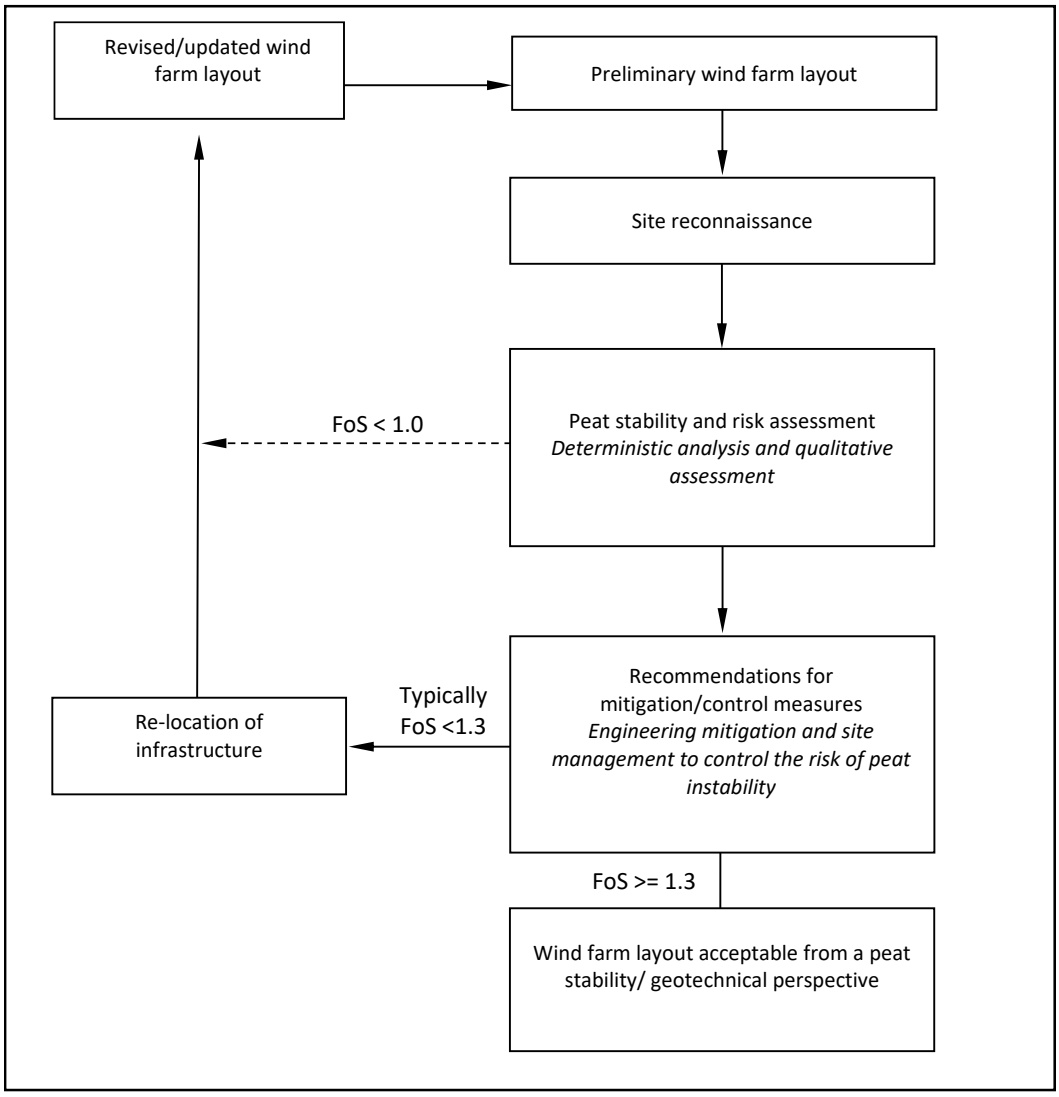

Figure 2-1: Flow Diagram Showing General Methodology for Peat Stability Assessment

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 proposed wind farm development and the surrounding environment. Peat failure excludes localised movement of peat that would occur (say) 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:

(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 discussed in section 2.5).

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 8).

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.

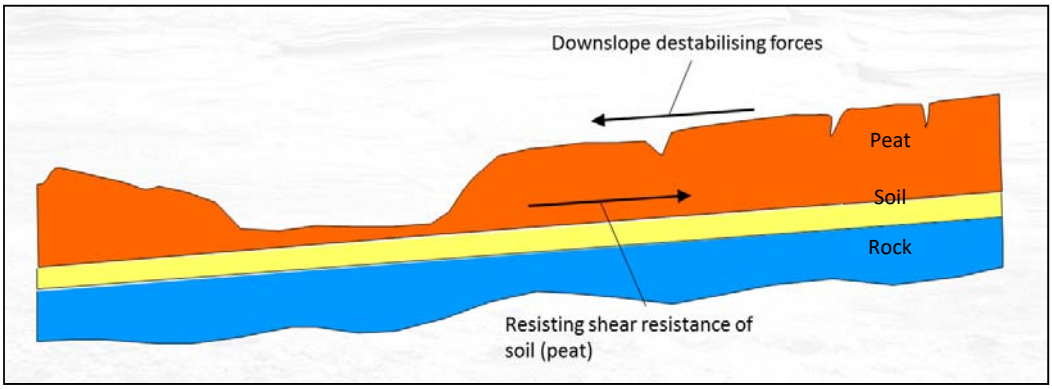

Figure 2-2: Peat Slope Showing Balance of Forces to Maintain Stability

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 factor of safety is 1.3.

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 Slopes

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 in particular, the change in groundwater level as a result of rainfall on the existing stability of the natural/existing 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 between 0 and 100% of the peat depth is conducted, where 0% equates to the peat being 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 8 of this report.

3 DESK STUDY AND SITE RECONNAISSANCE

3.1 Desk Study

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

- Geological plans
- Ordnance survey plans
- Literature review of peat failures
- Review of ground investigation data

The Geological Survey of Ireland (GSI, 2003) geological plans for the site were used to verify the bedrock conditions.

The ordnance surveys 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 included a review of both published literature and GSI online dataset viewer (GSI, 2019) on peat failures/landslides in the vicinity of the site.

3.2 Site Reconnaissance

As part of the assessment of potential peat failure at the proposed site, FT carried out a site reconnaissance. This comprised walkover inspections of the site with recording of salient geomorphological features with respect to the wind farm development and to provide peat thickness and preliminary assessment of peat strength.

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 survey covered the proposed locations for the turbine bases and associated infrastructure.

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

4 FINDINGS OF SITE RECONNAISSANCE

4.1 Previous Failures

The investigation works carried out at the study area have been used in conjunction with a desk study review to assess the susceptibility of the study area to peat failure.

There are no recorded peat failures within the Derrinlough wind farm site (GSI, 2019).

The nearest recorded peat failure is located 3km northeast of the study area. The failure occurred at Pollagh in 1954. The failure mechanism and type is not specified.

Another failure occurred some 5km south of the study area in an area called Lisheen in 1920. The failure occurred within peat and it is reported that an old road was swallowed in the bog.

Based on the Geological Survey of Ireland's dataset viewer (GSI, 2019) no other peat or non-peat failures occurred within an 8km radius of the site. A number of failures/landslides are noted within the Slieve Bloom Mountains to the southeast of the site where the upland terrain is significantly different to the relatively flat terrain present on site.

Based on a broad assessment of landslide susceptibility the site was classified by the GSI (2019) as 'low' to 'moderately low' susceptibility, which is expected given the relatively flat 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 Derrinlough site have low potential of peat failure.

4.2 Ground Conditions along Grid Connection

A connection between the Derrinlough wind farm and the national electricity grid will be necessary to export electricity.

It is proposed that the Derrinlough wind farm will connect to the national grid via the substation proposed as part of the wind farm development located in Cortullagh or Grove townland in the northeast of the site. See Figure 4-1 for the general layout of the proposed substation and its associated grid connection.

The proposed grid connection construction methodology, including proposals for water crossings (where required) on the underground cabling routes is described in Chapter 4 of the EIAR.

Should the proposed substation be connected to the National Grid via underground cabling, it is proposed to excavate the trenches for the underground cable at a uniform level in peat or other overburden material. The trenches will be 600mm wide and 1200mm deep.

The cable trench route is envisaged to encounter peat, lacustrine soil and locally till derived from limestone rock.

No peat stability or geotechnical issues are envisaged as a result of the proposed grid connection works.

4.3 Findings of Site Reconnaissance

The site reconnaissance comprised walkover inspection of the site from 22nd August to 23rd August and the 10th and 11th September. Weather conditions for the inspection varied from dry to heavy showers.

Ground investigation in the form of trial pits were carried out by FT/AGEC and Bord na Móna during the following dates:

- 29th and 30th January 2019

- 12th to 16th August 2019
- 7th and 8th October 2019
- 6th November 2019

The walkovers and ground investigations were carried out by geotechnical engineers experienced in peat failure assessment. The findings from the site reconnaissance have been used to optimise the layout of the infrastructure on site.

The main findings of the site reconnaissance are as follows:

(1) The site which is typically flat consists predominantly of bare locally re-vegetated cut-away peat and shallow peat. The site has been extensively harvested by Bord na Móna using mechanical cutting. Some localised vegetated areas are present across the site (Appendix A – Photos 1 to 4).

(2) Peat depths recorded during the FT walkovers, HES site data, ground investigation (trial pits) and from the ground penetrating radar surveys carried out Bord na Móna within the proposed infrastructure footprint on site ranged from 0 to 4.7m with an average of 1.1m. It should be noted that the peat thickness within the proposed infrastructure footprint is generally less than 2m with localised deeper deposits of up to 4.7m. The deeper peat areas were generally avoided when optimising the wind farm layout for site.

(3) The peat depths recorded at the turbine locations varied from 0 to 2.3m with an average depth of 1.3m.

(4) The site is relatively flat with drainage channels running typically southeast to northwest. The site is split into two areas, Drinagh to the east of the N62 national road and Clongawny to the west.

(5) There are a number of existing Bord na Móna rail lines that pass through the bog that are used to transport milled peat (Photo 5).

(6) The access roads for the wind farm comprise, predominantly, the construction of new proposed access roads. The construction of new proposed access roads will be carried out using predominantly a floated construction technique.

(7) With respect to the new proposed access roads, peat depths are typically less than 2m with localised depths of up to 4.7m recorded.

(8) Slope angles at the turbine locations range from 1 to 4 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 site.

(9) 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.

(10) Localised areas of ponding water were recorded. This is not unexpected given the ground conditions and the flat terrain present on site (Photo 2).

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

(12) The findings of the site reconnaissance are as follows:

(a) The site which is typically flat consists predominantly of bare locally re-vegetated cut-away peat and intact shallow peat.

(b) The peat depth within the proposed infrastructure footprint is typically less than 2m with localised deeper deposits of up to 4.7m.

(c) The flat topography/nature of the terrain on site highlights the low risk of peat failure.

(d) A construction buffer zone plan has been produced for the site (Figure 4-2). This Figure shows areas which have an elevated or higher construction risk due to the terrain and features encountered during the site reconnaissance i.e. presence of relatively deep peat.

(e) 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 assessment; the findings of which are shown on the construction buffer zone plan and factor of safety plan for site (Figures 4-2 and 8-1).

Based on the findings from the site reconnaissance, the proposed development footprint for the site would be considered to have a low risk of peat instability.

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Temporary Construction Compound 5
Proposed Substation
Proposed Amenity Links
T21
New Proposed Access Track
T18
Temporary Construction Compound 4
Proposed Turbine
T20
T17
Temporary Construction Compound 2
Temporary Construction Compound 3
T19
T12
T8
T1
T7
T6
T2
T16
T10
Proposed Underpass
Existing Excavated Access Track
T13
T15
T9
T14
Proposed Met Mast 2
T11
Temporary Construction Compound 1
T3
T4
T5
Proposed Met Mast 1

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 < 4
- ≥ 4 < 4.5

Scale 1:28000

0m 140m 280m 420m 560m 700m 840m 980m 1120m 1260m 1400m
Scale 1:28000

Scale (@ A3)
1:28000

Date - 12.02.20

FIGURE 4-1 : PEAT DEPTH CONTOUR PLAN

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Temporary Construction Compound 5
Proposed Substation
Proposed Amenity Links
T21
New Proposed Access Track
T18
Temporary Construction Compound 4
Proposed Turbine
T20
Temporary Construction Compound 2
T17
Temporary Construction Compound 3
T19
T8
T1
T12
T7
T6
T16
T2
T10
Proposed Underpass
Existing Excavated Access Track
T13
T15
T9
Proposed Met Mast 2
T14
T11
Temporary Construction Compound 1
T3
T4
T5
Proposed Met Mast 1

Construction Buffer Zone Legend:

Areas which have an elevated or higher construction risk (areas with deep weak and occasionally quaking peat). Areas where additional control/mitigation measures are required.

Scale 1:28000

0m 140m 280m 420m 560m 700m 840m 980m 1120m 1260m 1400m
Scale 1:28000

Scale (@ A3) 1:28000

Date - 12.02.20

FIGURE 4-2 : CONSTRUCTION BUFFER ZONE

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Checked - IH
Rev - C

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Thursday 13 February 2020

5 GROUND INVESTIGATION

Ground investigations were carried out at the Derrinlough site by FT/AGEC and Bord na Móna. Ground investigation in the form of trial pits were carried out during the following dates:

- 29th and 30th January 2019
- 12th to 16th August 2019
- 7th and 8th October 2019
- 6th November 2019

The ground investigations by FT/AGEC comprised 68 no. trial pits with some laboratory testing. The trial pits were carried out at the main infrastructure locations on site and to investigate the potential to develop borrow pits across the site.

The laboratory testing carried out included the following:

- Classification testing for overburden material
- Minimum and maximum density values for over-burden material

The trial pits logs, photographs and associated laboratory testing for each of the respective ground investigations carried out in January 2019 and August/October/November 2019 are included within Appendix E and F of this report.

The purpose of the ground investigations was to assess the ground conditions at the main infrastructure locations and across the site. A ground investigation location plan is included as Figure 5-1 in this report.

5.1 Summary of Ground Conditions

The ground conditions at the site can be typically categorised into the following deposits:

Peat – Typically described as spongy and firm black and brown fibrous to amorphous peat. The hand vanes carried out in the peat indicate undrained shear strengths in the range 20 to 120kPa, with an average value of about 65kPa. The relatively high strengths are as a result of the extensive drainage works which has taken place on site for the harvesting of the peat. Peat thicknesses from the trial pits ranged from 0 to in excess of 4.3m.

Lacustrine Soil – Grey very soft, soft and locally firm sandy silty clay/clayey Silt (Marl) was encountered. The marl is considered to be a lacustrine deposit. Lacustrine soil is typically underlying all peat deposits on site and varies in thickness from less than 1m to several metres.

Till – Typically described as firm brown and grey till - comprises sand, gravel and boulders within a silty clay matrix. The thickness of the layer is variable and was locally encountered on site.

Groundwater recordings in the trial pits varied from none to seepages and inflows between 1.2 and 3.9m bgl.

5.2 Summary of Laboratory Tests

Based on the results of the particle size distribution (PSD) tests, the descriptions on the final trial pit logs have been updated.

Atterberg limit tests carried out on the lacustrine soil classify the material as Clay of low plasticity.

The minimum and maximum densities determined for the Silt/Clay (till) sample ranged from 1.55Mg/m^3 to 2.14Mg/m^3.

5.3 Summary of Geotechnical Parameters

Table 5-1 contains characteristic geotechnical parameters for the main material types likely to be encountered on the Derrinlough wind farm site. Where direct measurement of parameters has not been carried out, established correlations with measured properties have been used to derive values. Characteristic values are defined as a cautious estimate of the value affecting the occurrence of limit state based on clause 2.4.5.2 from Eurocode 7.

Table 5-1: Summary of Geotechnical Parameters

Material Type/Strata	Unit Weight	Geotechnical Parameters		
		Undrained Parameters	Drained Parameters	
	γ (kN/m³)	c_u (kPa)	φ' (°)	c' (kPa)
Peat	11	6 (3)	25	4
Lacustrine Soil	18	20	26	0
Till	19	75	30	0

Notes

Note (1) The above parameters are indicative only and have been derived based on experience and from a review of the ground investigation carried out at the site.

Note (2) Where direct measurement of parameters has not been carried out, established correlations with measured properties have been used to derive values.

Note (3) A lower bound undrained shear strength, cu for the peat of 6kPa was selected. The lowest recorded value on the Derrinlough wind farm site was 20kPa hence a value of 6kPa is a conservative value.

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Temporary Construction Compound 5
Proposed Substation
SS/TP4
SS/TP3
SS/TP1
SS/TP2
Proposed Amenity Links

Ground Investigation Legend:
Trial Pit Locations

T21
TP/T21
New Proposed Access Track
Temporary Construction Compound 4
T18
TP/T18
Proposed Turbine
T20
TP/T20
BP1/TP1
BP1/TP2
TP16a
T17
TP/T17
BP7/TP1
Temporary Construction Compound 2
Temporary Construction Compound 3
T19
TP/T19
TP/CC4
TP/CC3
TP/CC5SS
T12
TP/T12
TP19a
T8
TP/T8
T1
TP/T1
BP9TP1
BP9TP2
TP7
TP8
T7
TP/T7
TP5
TP6
TP3
TP4
T6
TP/T6
TP/CC2
TP/CSH1
TP1
TP/UP1
TP/CSH2
TP14
TP15
TP20a
T16
TP/T16
T2
TP/T2
TP06a
T10
TP/T10
T9
TP/CC1
BP6/TP1
TP05a
TP/T9
Proposed Underpass
Existing Excavated Access Track
T13
TP/T13
T15
TP/T15
BP3/TP2
BP3/TP1
T14
TP/T14
Proposed Met Mast 2
T11
TP/T11
TP08a
Temporary Construction Compound 1
TP09a
T3
TP10a
TP/T3
T4
TP/T4
TP9
TP10
TP12a
T5
TP/T5
TP13a
TP13
Proposed Met Mast 1
TP12
TP11

Scale 1:28000

0m 140m 280m 420m 560m 700m 840m 980m 1120m 1260m 1400m
Scale 1:28000

Scale (@ A3)
1:28000

Date - 12.02.20

FIGURE 5-1 : GROUND INVESTIGATION LOCATION PLAN

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6 SITE GROUND CONDITIONS

6.1 Soils and Subsoils

The bog at the Derrinlough site forms part of the Boora Group of Bogs which have essentially formed in poorly drained topographical depressions within the Midlands. Prior to the growth of the bog the area would have comprised water-logged and shallow lakes, which since the end of the last Ice Age have become silted hence the formation of a blanket peat area.

Based on the site walkover and the exposures present at the site the superficial deposits were typically described as plastic to firm black/brown fibrous and amorphous peat overlying lacustrine soil (marl) overlying till.

A review of the GSI subsoils maps indicate that the site is underlain by predominantly cutover raised peat with lacustrine soil and some localised till derived from limestone rock.

6.2 Bedrock

The underlying bedrock was described by the Geological Survey of Ireland (GSI, 2003) and shown on Sheet 15 (Geology of Galway - Offaly). In the area of the Derrinlough site, Sheet 15 shows 2 no. bedrock formations.

The dominant bedrock formation is Waulsortian Limestone, which is described as pale-grey, sparry, fossiliferous (bryozoan) poly-mud micritic limestones, often massive knoll forms, with crinoidal or pale cherty shaly interbeds, frequently dolomitised.

A localised bedrock formation located in the northeast of the site is the Ballysteen formation which is described as dark-grey bioclastic, wackestone, packstone and grainstone, shale-parted limestones increasingly muddy upwards.

There are two mapped faults located on the site, typically with a northwest to southeast trend. These mapped faults are shown in Figure 8-7 of Chapter 8 in the EIAR.

Two geological heritage features are noted within the proposed development. The features are noted as Mushroom Rocks, described as an isolated upstanding rock in a woodland track and a grass field.

7 PEAT DEPTHS, STRENGTH AND SLOPE AT PROPOSED INFRASTRUCTURE LOCATIONS

As part of the site walkover, peat depth, in-situ peat strength and slope angles were recorded at various locations across the site.

7.1 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 typically up to 5 probes were carried out around the turbine location, where accessible, and an average peat depth was calculated. The peat depth probe information was supplemented by the ground penetrating radar survey carried out by Bord na Móna and was also used to estimate the peat depth on site.

7.2 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. Peat strength testing was carried out at various locations across the site to give representative coverage of the full site.

7.3 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 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. It should be noted that slope angles derived from contour survey plans would be 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 and would generally be deemed more accurate and representative of local topography.

7.4 Summary of Findings

Based on the peat depth information for site, the peat varied in depth from 0 to 4.7m with an average of 1.1m. All peat depth probes carried out on site, ground investigation findings and the 2008 and 2015 GPR surveys carried out by Bord na Móna 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 7-1. The data presented in Table 7-1 is used in the peat stability assessment of the site; see Section 8 of this report.

Table 7-1: Peat Depth and Slope Angle at Proposed Infrastructure Locations

Turbine	Easting (ITM)	Northing (ITM)	Peat Depth Range (m) (1)	Average Peat Depth (m)	Slope Angle (°) (2)
T1	607027	715375	0.2 - 0.5	0.35	1
T2	607171	714768	0.8 – 1.4	1.1	1.5
T3	606666	713348	0.8 – 1.4	1.3	1
T4	605958	713100	1.1 – 1.8	1.5	2
T5	606961	712824	1.7 – 2.3	2.0	1
T6	606452	714870	1.0 – 1.6	1.3	1.9
T7	605724	714916	2.0 – 2.3	2.2	1
T8	605919	715618	0.7 - 1.8	1.4	1
T9	605954	714337	1.2 – 1.7	1.4	1
T10	605094	714562	1.0 – 1.5	1.3	2
T11	605273	714023	0.8 – 1.8	1.1	3.1
T12	609661	715257	0.3 – 0.8	0.6	1
T13	609600	714503	0.2 – 0.8	0.45	2
T14	609982	714058	1.2 – 1.5	1.35	2
T15	610807	714384	0.5 – 0.7	0.6	2
T16	610313	714732	0.5 – 0.6	0.55	1
T17	610068	715972	0.15 – 0.8	0.5	3
T18	609958	716616	0.3 – 0.8	0.6	4.1
T19	609360	715724	0.2 – 1.2	0.9	1
T20	609307	716406	0.8 – 1.1	0.9	1
T21	609761	717087	1.2 – 1.6	1.4	2.9
Substation	610966	718547	0.3 – 1.1	0.9	1
Temporary Construction Compound 1	606260	714498	2.2 – 3.3	2.5	1
Temporary Construction Compound 2	607630	715110	0.3 – 1.3	0.6	1
Temporary Construction Compound 3	609113	715577	0.4 – 2.1	1.4	1
Temporary Construction Compound 4	610305	715713	0.4 – 1.5	1.0	3
Temporary Construction Compound 5	610858	718421	0.8 – 1.1	1.0	1
Met Mast 1	606638	712525	2.7 – 3.5	3.1	1

Turbine	Easting (ITM)	Northing (ITM)	Peat Depth Range (m) (1)	Average Peat Depth (m)	Slope Angle (°) (2)
Met Mast 2	609210	714421	0.3 – 1.1	0.8	1

Note (1) Based on peat depth probe results from the site walkovers, ground investigation and from a ground penetrating radar (GPR) survey of site carried out by Bord na Móna in 2008 and 2015.

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; see Section 8 of this report.

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 are presented in Figure 7-1.

The hand vane results indicate undrained shear strengths in the range 20 to 120kPa, with an average value of about 65kPa. The strengths recorded would be typical of well drained peat as is present on the Derrinlough 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 essentially back-analysis, though some testing was carried out, was estimated at 2.5kPa. The recorded undrained strength 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 Derrinlough site.

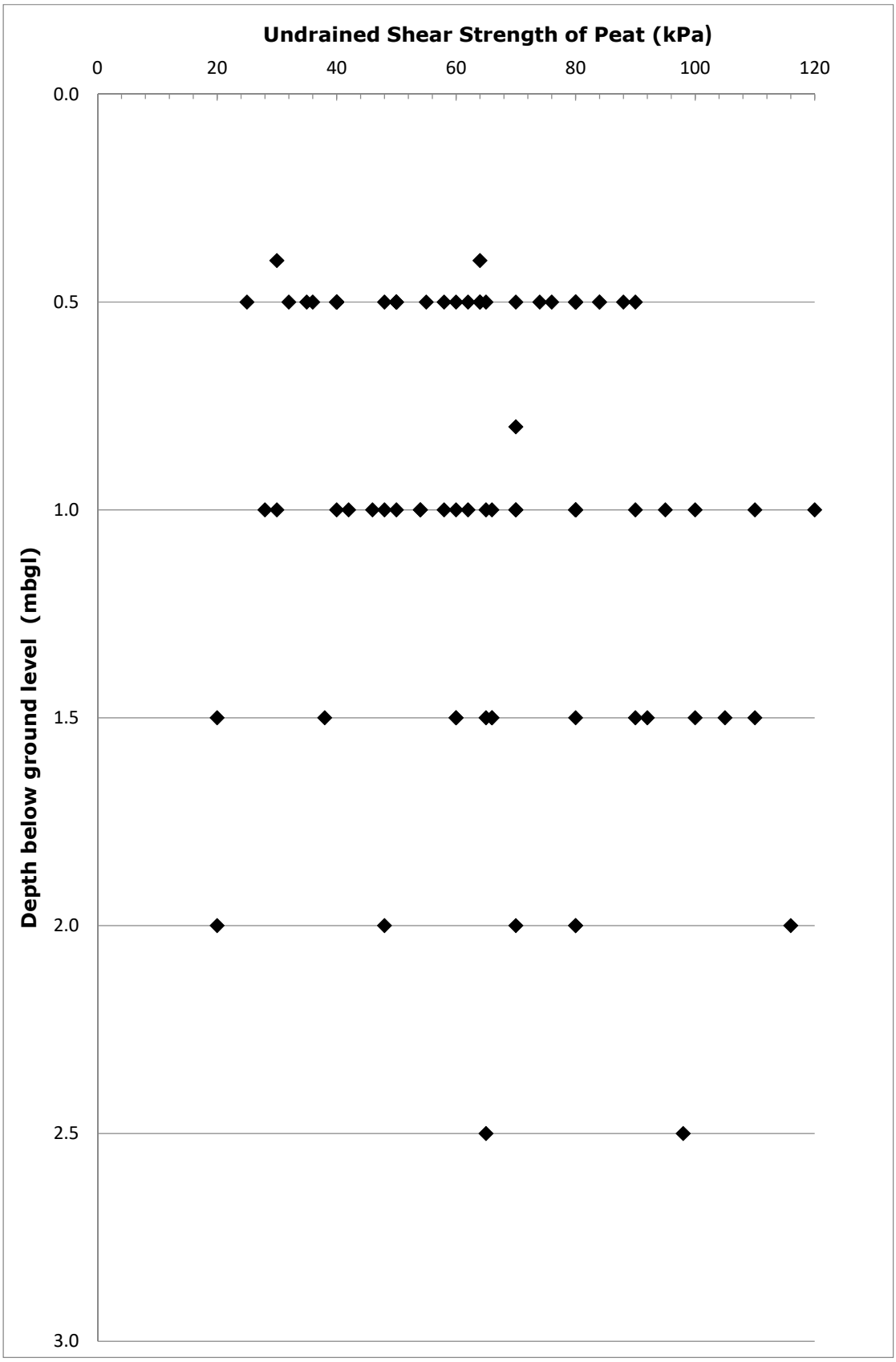

Figure 7-1: Undrained Shear Strength (C_u) Profile for Peat with Depth

8 PEAT STABILITY ASSESSMENT

The peat stability assessment analyses the stability of the existing peat slopes for individual parcels across the site including at the turbine locations and along the proposed access roads. The assessment also analyses the stability of the existing peat slopes with a surcharge loading of 10kPa, equivalent to placing 1m of stockpiled peat on the surface of the peat slope.

8.1 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 in particular, the change in groundwater level as a result of rainfall on the existing stability of the existing peat slopes.

Undrained shear strength values (c_u) for peat are used for the total stress analysis. Based on the findings of the Derrybrien failure, undrained loading during construction was found to be the critical failure mechanism.

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 8-1 shows a summary of the published information on peat together with drained strength values.

Table 8-1: List of Effective Cohesion and Friction Angle Values

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 and Grognet (2014)	-	37.4	From large DSS apparatus
O'Kelly and Zhang (2013)	0	28.9 to 30.3	Tests carried out on reconstituted, undisturbed and blended peat samples

From Table 8-1 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 degrees

8.2 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, along the proposed access roads and at various locations across the site.

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 8-2.

Table 8-2: 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 6kPa was selected for the assessment. The lowest recorded value on the Derrinlough wind farm site was 20kPa. It should be noted that a c_u of 6kPa 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 extensive drainage and extraction works which have been carried out on site.

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
cu = 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
γw = Unit weight of water
hw = 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 been 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, ground investigation or from the GPR surveys carried out by Bord na Móna.

(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 would be considered approximate, as such surveys are dependent on the density of survey data and do not always reflect local variations in ground topography. In general the slope angles derived from the contour survey plans appear to have over-estimated the steepness of the slopes on site.

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

(4) A lower bound undrained shear strength, cu for the peat of 6kPa was selected for the assessment. The lowest recorded value on the Derrinlough wind farm site was 20kPa. It should be noted that a cu of 6kPa 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 extensive drainage and 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 1 m of stockpiled peat assumed as a worst case.

8.3 Results of Analysis

8.3.1 Undrained Analysis for the Peat

The results of the undrained analysis for the existing 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 8-1. 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 8-3.

The calculated FoS for load condition (1) is in excess of 1.30 for each of the locations (579 no. locations) analysed with a range of FoS of 1.62 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 (579 no. locations) except at 2 no. locations where FoS's of 1.21 and 1.26 were calculated. It should be noted that the locations where the marginally low FoS's were calculated, the slope angles were based on contour survey plans for site which give approximate values. Based on site data recorded during the walkover, it is likely that the slope angles derived from the contour survey plans overestimated the slope angle at these locations. The 2 no. marginally low FoS's are located alongside the proposed access road between turbines T12 and T13. The proposed works at these locations entails the construction of a floated section of access road i.e. no excavation works are proposed at these locations. Peat instability at these locations is not envisaged to be an issue.

The calculated FoS for load condition (2) for the remaining 577 no. locations were in excess of 1.30, indicating a low risk of peat instability.

Table 8-3: Factor of Safety Results (undrained condition)

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T1	607027	715375	68.77	22.92
T2	607171	714768	16.38	9.55
T3	606666	713348	24.56	14.33
T4	605958	713100	9.56	6.14
T5	606961	712824	14.95	10.42
T6	606452	714870	11.32	6.96
T7	605724	714916	14.95	10.42
T8	605919	715618	19.10	12.28
T9	605954	714337	20.23	12.73
T10	605094	714562	11.47	6.88
T11	605273	714023	6.17	3.97
T12	609661	715257	42.98	19.10
T13	609600	714503	21.50	9.56
T14	609982	714058	11.47	6.88
T15	610807	714384	24.58	10.12
T16	610313	714732	57.31	21.49
T17	610068	715972	14.35	6.38
T18	609958	716616	10.52	4.67
T19	609360	715724	28.65	15.63

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T20	609307	716406	31.26	16.37
T21	609761	717087	7.42	4.57
Substation	610966	718547	31.26	16.37
Temporary Construction Compound 1	606260	714498	10.42	8.00
Temporary Construction Compound 2	607630	715110	26.45	14.95
Temporary Construction Compound 3	609113	715577	16.37	11.09
Temporary Construction Compound 4	610305	715713	7.65	4.59
Temporary Construction Compound 5	610858	718421	31.26	16.37
Met Mast 1	606638	712525	9.82	7.64
Met Mast 2	609210	714421	31.26	16.37

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Temporary Construction Compound 5

Proposed Substation

Cable Corridor

Proposed Amenity Links

T21

New Proposed Access Track

T18

Temporary Construction Compound 4

Proposed Turbine

T20

T17

T19

T12

Temporary Construction Compound 2

Temporary Construction Compound 3

T8

T1

T7

T6

T2

T10

T9

T16

T13

T15

T14

Proposed Underpass

Existing Excavated Access Track

Proposed Met Mast 2

Temporary Construction Compound 1

T11

T3

T4

T5

Proposed Met Mast 1

Factor of Safety Legend:

0 < 1.0	
≥ 1.0 < 1.3	
≥ 1.3	
No Peat Recorded At This Location	

Increasing Stability

Scale 1:28000

0m 140m 280m 420m 560m 700m 840m 980m 1120m 1260m 1400m

Scale 1:28000

Scale (@ A3) 1:28000

Date - 12.02.20

FIGURE 8-1 : FACTOR OF SAFETY - SHORT TERM CRITICAL CONDITION (UNDRAINED)

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8.3.2 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 8-4. As stated previously, the drained loading condition examines the effect of in particular, rainfall on the stability of the existing peat slopes.

The calculated FoS for load condition (1) is in excess of 1.30 for each of the locations (579 no. locations) analysed with a range of FoS of 1.30 to in excess of 10 except for 3 no. locations where FoS's of between 1.08 and 1.29 were calculated. It should be noted that the locations where the marginally low FoS's were calculated, the slope angles were based on contour survey plans for site which give approximate values. Based on site data recorded during the walkover, it is likely that the slope angles derived from the contour survey plans overestimated the slope angle at these locations. The 3 no. marginally low FoS's are located alongside the proposed access road between turbines T12 and T13 and one location along the proposed access road at turbine T4. The proposed works at these locations entails the construction of a floated section of access road i.e. no excavation works are proposed at these locations. Peat instability at these locations is not envisaged to be an issue.

The calculated FoS for load condition (2) for the remaining 576 no. locations were in excess of 1.30, 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 (579 no. locations) analysed with a range of FoS of 1.71 to in excess of 10, indicating a low risk of peat instability.

Table 8-4: Factor of Safety Results (drained condition)

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T1	607027	715375	45.85	33.09
T2	607171	714768	10.92	13.79
T3	606666	713348	16.37	20.68
T4	605958	713100	6.37	8.86
T5	606961	712824	9.97	15.04
T6	606452	714870	7.54	10.05
T7	605724	714916	9.97	15.04
T8	605919	715618	12.73	17.73
T9	605954	714337	13.48	18.38
T10	605094	714562	7.65	9.93
T11	605273	714023	4.12	5.72
T12	609661	715257	28.65	27.58
T13	609600	714503	14.34	13.79
T14	609982	714058	7.65	9.93
T15	610807	714384	16.38	14.60
T16	610313	714732	38.20	31.02
T17	610068	715972	9.57	9.20
T18	609958	716616	7.01	6.73

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T19	609360	715724	19.10	22.56
T20	609307	716406	20.84	23.64
T21	609761	717087	4.95	6.59
Substation	610966	718547	20.84	23.64
Temporary Construction Compound 1	606260	714498	6.95	11.54
Temporary Construction Compound 2	607630	715110	17.63	21.58
Temporary Construction Compound 3	609113	715577	10.92	16.01
Temporary Construction Compound 4	610305	715713	5.10	6.62
Temporary Construction Compound 5	610858	718421	20.84	23.64
Met Mast 1	606638	712525	6.55	11.03
Met Mast 2	609210	714421	20.84	23.64

9 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 PLHRA (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 9-1. 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 9-1: 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.

9.1 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 Peat Stability Risk Registers in Appendix B and summarised in Table 9-2.

The risk rating for each infrastructure element at the Derrinlough wind farm is designated negligible following some mitigation/control measures being implemented. Sections of access roads to the nearest infrastructure element should 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 Peat Stability Risk Register for each infrastructure element (Appendix B).

Table 9-2: Summary of Peat Stability Risk Register

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	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T2	Negligible	1 to 4	No	Negligible	1 to 4
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	Yes	Negligible	1 to 4
Turbine T8	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T9	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T10	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T11	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T12	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T13	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T14	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T15	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T16	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T17	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T18	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T19	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T20	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T21	Negligible	1 to 4	No	Negligible	1 to 4
Substation	Negligible	1 to 4	No	Negligible	1 to 4
Temporary Construction Compound 1	Negligible	1 to 4	Yes	Negligible	1 to 4
Temporary Construction Compound 2	Negligible	1 to 4	No	Negligible	1 to 4
Temporary Construction Compound 3	Negligible	1 to 4	Yes	Negligible	1 to 4
Temporary Construction Compound 4	Negligible	1 to 4	No	Negligible	1 to 4
Temporary Construction Compound 5	Negligible	1 to 4	No	Negligible	1 to 4
Met Mast 1	Negligible	1 to 4	Yes	Negligible	1 to 4

Met Mast 2	Negligible	1 to 4	No	Negligible	1 to 4

10 INDICATIVE FOUNDATION TYPE AND FOUNDING DEPTH FOR TURBINES

Based on a review of the ground investigation information for site, a preliminary assessment of the likely foundation type and founding depths for each turbine location was carried out, where possible. A summary of this assessment is provided in Table 10-1.

Table 10-1: Summary of Indicative Turbine Foundation Type and Founding Depths

Turbine No.	Turbine Foundation Type	Relevant GI	Indicative founding depth (m bgl)	Comment
T1	Piled foundation	TP/T1	-	The site investigation works carried out indicate that a piled foundation will be required.
T2	Piled foundation	TP/T2	-	The site investigation works carried out indicate that a piled foundation will be required.
T3	Piled foundation	TP/T3	-	The site investigation works carried out indicate that a piled foundation will be required.
T4	Piled foundation	TP/T4	-	The site investigation works carried out indicate that a piled foundation will be required.
T5	Piled foundation	TP/T5	-	The site investigation works carried out indicate that a piled foundation will be required.
T6	Piled foundation	TP/T6	-	The site investigation works carried out indicate that a piled foundation will be required.
T7	Piled foundation	TP/T7	-	The site investigation works carried out indicate that a piled foundation will be required.
T8	Piled foundation	TP/T8	-	The site investigation works carried out indicate that a piled foundation will be required.
T9	Piled foundation	TP/T9	-	The site investigation works carried out indicate that a piled foundation will be required.
T10	Piled foundation	TP/T10	-	The site investigation works carried out in the area indicate that a piled foundation will be required.
T11	Piled foundation	TP/T11	-	The site investigation works carried out indicate that a piled foundation will be required.
T12	Piled foundation	TP/T12	-	The site investigation works carried out indicate that a piled foundation will be required.
T13	Piled foundation	TP/T13	-	The site investigation works carried out indicate that a piled foundation will be required.

Turbine No.	Turbine Foundation Type	Relevant GI	Indicative founding depth (m bgl)	Comment
T14	Piled foundation	TP/T14	-	The site investigation works carried out indicate that a piled foundation will be required.
T15	Piled foundation	TP/T15	-	The site investigation works carried out indicate that a piled foundation will be required.
T16	Piled foundation	TP/T16	-	The site investigation works carried out indicate that a piled foundation will be required.
T17	Piled foundation	TP/T17	-	The site investigation works carried out indicate that a piled foundation will be required.
T18	Piled foundation	TP/T18	-	The site investigation works carried out indicate that a piled foundation will be required.
T19	Piled foundation	TP/T19	-	The site investigation works carried out indicate that a piled foundation will be required.
T20	Piled foundation	TP/T20	-	The site investigation works carried out indicate that a piled foundation will be required.
T21	Piled foundation	TP/T21	-	The site investigation works carried out indicate that a piled foundation will be required.

It should be noted that further ground investigation will be carried out prior to construction at each turbine location in the form of a borehole with in-situ SPT testing at 1m intervals in the overburden and follow-on rotary core through bedrock to confirm the foundation types and founding stratums assumed in Table 10-1. It is likely that following the completion of further ground investigation prior to construction that a number of the turbine bases will be deemed suitable for gravity type foundations.

For gravity type turbine foundations, where the depth of excavation exceeds the required founding depth for the proposed turbine base, up-fill material consisting of granular fill (6N) shall be used to backfill the excavation to the required founding depth.

For the piled turbine foundations, a typical piling type and configuration could be up to 50 no. 300mm square concrete driven piles. A similar type pile and configuration was used for the turbine foundations on the nearby Mount Lucas wind farm.

11 FOUNDING DETAILS FOR OTHER INFRASTRUCTURE ELEMENTS

11.1 Access Roads

Floating access roads are the predominant road construction type proposed for the site which given the ground conditions and type of terrain present is deemed an appropriate construction approach.

The total length of new proposed access road to be constructed on site is 28.5km (see Figure 1-1 of the Peat and Spoil Management Plan).

The typical make-up of the founded access roads is a minimum stone thickness of 1200mm. The requirement for a layer of geotextile and geogrid and the necessary stone thickness will be determined following confirmatory site investigation works prior to the construction of the proposed development.

See the Peat and Spoil Management Plan for Derrinlough wind farm for further details on the proposed access roads on site.

11.2 Crane Hardstands

The crane hardstands will be constructed using the founded technique (i.e. non-floated technique).

Crane hardstands are generally constructed using compacted Class 1/6F material or granular fill in accordance with turbine manufacturer requirements on a suitable sub-formation to achieve the required bearing resistance. The hardstands will be designed for the most critical loading combinations from the crane.

The hardstands will require to be founded on material underlying the peat deposits. The founding levels for the hardstands will be variable across the site and will be determined following confirmatory site investigation works prior to the construction of the proposed development.

The typical make-up of the hardstands may include up to 1200mm of granular stone fill with possibly a layer of geotextile and/or geogrid.

11.3 Substation Foundations and Platforms

The substation platforms will be constructed using the founded technique (i.e. non-floated technique). The substation foundations may comprise strip/raft foundations under the main footprint of the building with possibly a basement/pit for cable connections.

Substation platforms are generally constructed using compacted Class 1/6F material or granular fill in accordance with Eirgrid/ESB network requirements on a suitable sub-formation to achieve the required bearing resistance.

The substation platforms will require to be founded on material underlying the peat deposits.

Given the ground conditions present at the proposed substations, it is envisaged that the foundations will require to be founded on till. The peat and lacustrine soils are not likely to be suitable founding stratums for the substation foundations.

Typical founding depth for substation platform likely to be 0.5 to 2.0m.

The typical make-up of the substation platform may include up to 1000mm of granular stone fill with possibly a layer of geotextile and/or geogrid. At the underside of the substation foundations, a layer of structural up-fill (class 6N/6P) in accordance with Eirgrid requirements will likely be required.

11.4 Temporary Construction Compound Platforms

The temporary construction compound platforms will be constructed using the founded technique (i.e. non-floated technique).

The platforms are generally constructed using compacted Class 1/6F material or granular fill in accordance with turbine manufacturer requirements on a suitable sub-formation to achieve the required bearing resistance.

The platforms will require to be founded on material underlying the peat deposits.

Typical founding depth for temporary construction compound platforms will require excavations from 1m to 3.5m bgl.

The typical make-up of the construction compound platform may include up to 1000mm of granular stone fill with possibly a layer of geotextile and/or geogrid.

11.5 Met Mast Foundations

The met mast foundations will likely comprise gravity type foundation and a piled foundation.

Based on the ground conditions present at proposed met mast 1, it is envisaged that the foundation will require a piled foundation. Given the thickness of peat and lacustrine soils present at this location a gravity type foundation is not likely to be a suitable solution. This will be determined following confirmatory site investigation works prior to the construction of the proposed development.

Based on the ground conditions present at proposed met mast 2, it is envisaged that the gravity type foundation will require to be founded on till. The peat and lacustrine soils are not likely to be suitable founding stratums for the met mast foundation. At the underside of the met mast foundation, a layer of structural up-fill (class 6N/6P) or granular fill in accordance with met mast supplier requirements will likely be required. This will be determined following confirmatory site investigation works prior to the construction of the proposed development.

11.6 Permanent Underpasses

Two new permanent underpasses are proposed as part of the proposed development.

The first underpass will traverse beneath the N62, immediately north of Derrinlough Briquette Factory. This underpass will provide amenity connectivity between Clongawny and Drinagh Bogs and will also be used during the operational phase for wind farm maintenance.

A second underpass is proposed in Clongawny bog beneath an existing Bord na Móna railway line. This underpass will also be used for amenity purposes and for wind farm maintenance during the operational phase.

The underpasses will take the form of precast concrete box culverts and will be founded on a competent stratum at depth. Given the ground conditions present across the site, the culvert foundations may need to be piled. This will be determined following confirmatory site investigation works prior to the construction of the proposed development.

At the underside of the culvert foundations, a layer of structural up-fill (class 6N/6P) in accordance with Transport Infrastructure Ireland (TII) requirements will be required.

12 SUMMARY AND RECOMMENDATIONS

12.1 Summary

The following summary is given.

FT was engaged by McCarthy Keville O'Sullivan on behalf of Bord na Móna Powergen 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 is typically flat consists predominantly of bare locally re-vegetated cut-away peat and intact shallow peat. The site has been extensively harvested and drained by Bord na Móna.

Peat thicknesses recorded during the FT walkover, ground investigation and from the ground penetrating radar surveys carried out by Bord na Móna within the proposed infrastructure footprint on site ranged from 0 to 4.7m with an average of 1.1m. It should be noted that the peat thickness within the proposed infrastructure footprint is generally less than 2m with localised deeper deposits of up to 4.7m. The deeper peat areas were generally avoided when optimising the wind farm layout for site.

Slope inclinations at the main infrastructure locations range from 0 to 4 degrees. The flat topography/nature of the terrain on site highlights the low risk of peat failure.

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. 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.

From the stability analyses for both the undrained and drained conditions, which analysed the turbine locations and other proposed infrastructure locations, the calculated values were above the minimum acceptable FoS of 1.3 at 576 no. of the 579 no. locations. 3 no. locations were calculated with FoS's of between 1.08 and 1.29. The 3 no. marginally low FoS's are located alongside proposed access roads between turbines T12 and T13 and one location along the proposed access road close to turbine T4. The proposed works at these locations entails the construction of a floated section of access road i.e. no excavation works are proposed at these locations. Peat instability at these locations is not envisaged to be an issue.

As presented above for both the undrained and drained conditions, 100% of calculated FoS's are above 1.0 and 99.5% of calculated FoS's are above 1.3 which highlights the low risk of peat failure on site.

The peat stability risk assessment at each infrastructure location identified a number of mitigation/control measures to reduce the potential risk of peat failure. Sections of access roads should be subject to the same mitigation/control measures that apply to the nearest infrastructure element. 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 Derrinlough wind farm site has an acceptable margin of safety, is suitable for the proposed wind farm 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.

12.2 Recommendations

The following general 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 should be taken into account and implemented throughout design and construction works (Appendix B).

The proposed construction method for the new proposed access roads at the wind farm is a floated type construction.

Figure 4-2 shows areas which have an elevated or higher construction risk due to the terrain and features encountered during the site reconnaissance i.e. presence of relatively deep peat. Figure 8-1 shows the results of the factor of safety (FoS) analysis for the peat slopes on site for the most critical load condition.

Recommendations and guidelines given in FT's report 'Peat and Spoil Management Plan - Derrinlough Wind Farm, County Offaly' (FT 2019) should 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 it is recommended that the Construction Method Statements (CMSs) for the project 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 Visit

Photo 1 Overview of site conditions (close to turbine T5 looking in a north-eastern direction)

Photo 2 Overview of site conditions (close to temporary construction compound 2 looking in a south-western direction)

Photo 3 Overview of site conditions (close to turbine T13 looking in a south-western direction)

Photo 4 Overview of site conditions (close to turbine T11 looking in a north-western direction)

Photo 5 Example of Bord na Móna existing rail lines on site (close to turbine T17 looking in a north-eastern direction)

Appendix B

Peat Stability Risk Registers




Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Turbine T1**

Grid Reference (Eastings, Northings):	**607027**	**715375**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.2 to 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 = 22.91 (u), 33.09 (d)	1	1	1	Negligible	No		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		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	See Below	1	1	1	Negligible
7	Evidence of very soft/soft clay at base of peat	1	1	1	Negligible	No		1	1	1	Negligible
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 T1**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Turbine T2**

Grid Reference (Eastings, Northings):	**607171**	**714768**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.8 to 1.4**	
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 = 9.55 (u), 10.92 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 T2**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Turbine T3**

Grid Reference (Eastings, Northings):	**606666**	**713348**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.8 to 1.4**	
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 = 14.33 (u), 16.37 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

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Location:	**Turbine T4**

Grid Reference (Eastings, Northings):	**605958**	**713100**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**1.1 to 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 = 6.14 (u), 6.37 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

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Location:	**Turbine T5**

Grid Reference (Eastings, Northings):	**606961**	**712824**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**1.7 to 2.3**	
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 = 10.42 (u), 9.97 (d)	1	1	1	Negligible	No		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		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	See Below	1	1	1	Negligible
7	Evidence of very soft/soft clay at base of peat	1	1	1	Negligible	No		1	1	1	Negligible
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	Relatively deep peat	3	1	3	Negligible	Yes		1	1	1	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T5**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

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Location:	**Turbine T6**

Grid Reference (Eastings, Northings):	**606452**	**714870**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**1.0 to 1.6**	
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 = 6.96 (u), 7.54 (d)	1	1	1	Negligible	No		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		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	See Below	1	1	1	Negligible
7	Evidence of very soft/soft clay at base of peat	1	1	1	Negligible	No		1	1	1	Negligible
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 T6**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

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Location:	**Turbine T7**

Grid Reference (Eastings, Northings):	**605724**	**714916**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**2.0 to 2.3**	
Control Required:	**Yes**	

		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 = 10.42 (u), 9.97 (d)	1	1	1	Negligible	No		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		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	See Below	1	1	1	Negligible
7	Evidence of very soft/soft clay at base of peat	1	1	1	Negligible	No		1	1	1	Negligible
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	Relatively deep peat	3	1	3	Negligible	Yes		1	1	1	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T7**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following may be required: - excavation side walls to be supported (eg. boulders, retaining wall units) or excavation face battered to shallow angle - temporary works designer may be required to provide excavation support design - daily detailed inspection of excavation faces - potential for greater water inflow into excavation requiring removal of water using pumping - increased exclusion zone around excavation to avoid accidental loading of crest of slope
ii	Maintain hydrology of area as far as possible;
iii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations;
iv	Use of experienced geotechnical staff for site investigation;
v	Use of experienced contractors and trained operators to carry out the work;
vi	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties;
vii	Based on available ground investigation information, piled turbine foundation may be required.

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.

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Location:	**Turbine T8**

Grid Reference (Eastings, Northings):	**605919**	**715618**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.7 to 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 = 12.28 (u), 12.73 (d)	1	1	1	Negligible	No		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		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	See Below	1	1	1	Negligible
7	Evidence of very soft/soft clay at base of peat	1	1	1	Negligible	No		1	1	1	Negligible
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	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

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Location:	**Turbine T9**

Grid Reference (Eastings, Northings):	**605954**	**714337**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**1.2 to 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 = 12.73 (u), 13.48 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 T9**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

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Location:	**Turbine T10**

Grid Reference (Eastings, Northings):	**605094**	**714562**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**1.0 to 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 = 6.88 (u), 7.65 (d)	1	1	1	Negligible	No		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		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	See Below	1	1	1	Negligible
7	Evidence of very soft/soft clay at base of peat	1	1	1	Negligible	No		1	1	1	Negligible
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 T10**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

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Location:	**Turbine T11**

Grid Reference (Eastings, Northings):	**605273**	**714023**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.8 to 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 = 3.97 (u), 4.12 (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		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	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	1	1	1	Negligible	No		1	1	1	Negligible
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 T11**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

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Location:	**Turbine T12**

Grid Reference (Eastings, Northings):	**609661**	**715257**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.3 to 0.8**	
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 = 19.10 (u), 27.58 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 T12**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

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Location:	**Turbine T13**

Grid Reference (Eastings, Northings):	**609600**	**714503**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.2 to 0.8**	
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 = 9.56 (u), 13.79 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 T13**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Turbine T14**

Grid Reference (Eastings, Northings):	**609982**	**714058**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**1.2 to 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 = 6.88 (u), 7.65 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 T14**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Turbine T15**

Grid Reference (Eastings, Northings):	**610807**	**714384**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.5 to 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 = 10.12 (u), 14.6 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 T15**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Turbine T16**

Grid Reference (Eastings, Northings):	**610313**	**714732**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.5 to 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 = 21.49 (u), 31.02 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 T16**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Turbine T17**

Grid Reference (Eastings, Northings):	**610068**	**715972**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.15 to 0.8**	
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 = 6.38 (u), 9.20 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 T17**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Turbine T18**

Grid Reference (Eastings, Northings):	**609958**	**716616**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.3 to 0.8**	
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 = 4.67 (u), 6.73 (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		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	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	1	1	1	Negligible	No		1	1	1	Negligible
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 T18**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Turbine T19**

Grid Reference (Eastings, Northings):	**609360**	**715724**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.2 to 1.2**	
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 = 15.63 (u), 19.10 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 T19**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Turbine T20**

Grid Reference (Eastings, Northings):	**609307**	**716406**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.8 to 1.1**	
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 = 16.37 (u), 20.84 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 T20**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Turbine T21**

Grid Reference (Eastings, Northings):	**609761**	**717087**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**1.2 to 1.6**	
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 = 4.57 (u), 4.95 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 T21**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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;
vi	Based on available ground investigation information, piled turbine foundation may be required.

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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Substation

Grid Reference (Eastings, Northings):	**610966**	**718547**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.3 to 1.1**	
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 = 16.37 (u), 20.84 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 **Substation**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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 E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Temp. Const. Comp. 1

Grid Reference (Eastings, Northings):	606260	714498
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	2.2 to 3.3	
Control Required:	Yes	

		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 = 8.00 (u), 6.95 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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	Relatively deep peat	3	1	3	Negligible	Yes		1	1	1	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Temporary Construction Compound 1**
i	Due to relatively deep peat at this temporary construction compound, additional construction measures such as the following may be required: - excavation side walls to be supported (eg. boulders, retaining wall units) or excavation face battered to shallow angle - temporary works designer may be required to provide excavation support design - daily detailed inspection of excavation faces - potential for greater water inflow into excavation requiring removal of water using pumping - increased exclusion zone around excavation to avoid accidental loading of crest of slope
ii	Maintain hydrology of area as far as possible;
iii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations;
iv	Use of experienced geotechnical staff for site investigation;
v	Use of experienced contractors and trained operators to carry out the work;
vi	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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Temp. Const. Comp. 2

Grid Reference (Eastings, Northings):	607630	715110
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.3 to 1.3	
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 = 14.95 (u), 17.63 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 **Temporary Construction Compound 2**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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 E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Temp. Const. Comp. 3**

Grid Reference (Eastings, Northings):	**609113**	**715577**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.4 to 2.1**	
Control Required:	**Yes**	

		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 = 11.09 (u), 10.92 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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	Relatively deep peat	2	1	2	Negligible	Yes		1	1	1	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Temporary Construction Compound 3**
i	Due to relatively deep peat at this temporary construction compound, additional construction measures such as the following may be required: - excavation side walls to be supported (eg. boulders, retaining wall units) or excavation face battered to shallow angle - temporary works designer may be required to provide excavation support design - daily detailed inspection of excavation faces - potential for greater water inflow into excavation requiring removal of water using pumping - increased exclusion zone around excavation to avoid accidental loading of crest of slope
ii	Maintain hydrology of area as far as possible;
iii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations;
iv	Use of experienced geotechnical staff for site investigation;
v	Use of experienced contractors and trained operators to carry out the work;
vi	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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Temp. Const. Comp. 4**

Grid Reference (Eastings, Northings):	**610305**	**715713**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.4 to 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 = 4.59 (u), 5.10 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 **Temporary Construction Compound 4**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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 E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Temp. Const. Comp. 5**

Grid Reference (Eastings, Northings):	**610858**	**718421**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.8 to 1.1**	
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 = 16.37 (u), 20.84 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 **Temporary Construction Compound 5**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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 E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Met. Mast 1**

Grid Reference (Eastings, Northings):	**606638**	**712525**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**2.7 to 3.5**	
Control Required:	**Yes**	

		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 = 7.64 (u), 6.55 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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	Relatively deep peat	3	1	3	Negligible	Yes		1	1	1	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Met Mast 1**
i	Due to relatively deep peat at this met mast location, additional construction measures such as the following may be required: - excavation side walls to be supported (eg. boulders, retaining wall units) or excavation face battered to shallow angle - temporary works designer may be required to provide excavation support design - daily detailed inspection of excavation faces - potential for greater water inflow into excavation requiring removal of water using pumping - increased exclusion zone around excavation to avoid accidental loading of crest of slope
ii	Maintain hydrology of area as far as possible;
iii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations;
iv	Use of experienced geotechnical staff for site investigation;
v	Use of experienced contractors and trained operators to carry out the work;
vi	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties;
vil	Based on available ground investigation information, a piled met mast foundation may be required.

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.

Derrinlough Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Met. Mast 2**

Grid Reference (Eastings, Northings):	**609210**	**714421**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**0.3 to 1.1**	
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 = 16.37 (u), 20.84 (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		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	1	1	1	Negligible	No		1	1	1	Negligible
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 2**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage 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 E.
(3) Impact based on distance of infrastructure element to nearest watercourse.

Appendix C

Calculated FOS for Peat Slopes On Site

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - 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)
T01	607027	715375	1	6	10	0.5	1.5	**68.77**	**22.92**
T02	607206	714769	1.5	6	10	1.4	2.4	**16.38**	**9.55**
T03	606666	713348	1	6	10	1.4	2.4	**24.56**	**14.33**
T04	605958	713100	2	6	10	1.8	2.8	**9.56**	**6.14**
T05	606961	712824	1	6	10	2.3	3.3	**14.95**	**10.42**
T06	606452	714870	1.9	6	10	1.6	2.6	**11.32**	**6.96**
T07	605724	714916	1	6	10	2.3	3.3	**14.95**	**10.42**
T08	605919	715618	1	6	10	1.8	2.8	**19.10**	**12.28**
T09	605954	714337	1	6	10	1.7	2.7	**20.23**	**12.73**
T10	605094	714562	2	6	10	1.5	2.5	**11.47**	**6.88**
T11	605273	714023	3.1	6	10	1.8	2.8	**6.17**	**3.97**
T12	609661	715257	1	6	10	0.8	1.8	**42.98**	**19.10**
T13	609600	714503	2	6	10	0.8	1.8	**21.50**	**9.56**
T14	609982	714058	2	6	10	1.5	2.5	**11.47**	**6.88**
T15	610807	714384	2	6	10	0.7	1.7	**24.58**	**10.12**
T16	610313	714732	1	6	10	0.6	1.6	**57.31**	**21.49**
T17	610068	715972	3	6	10	0.8	1.8	**14.35**	**6.38**
T18	609958	716616	4.1	6	10	0.8	1.8	**10.52**	**4.67**
T19	609360	715724	1	6	10	1.2	2.2	**28.65**	**15.63**
T20	609307	716406	1	6	10	1.1	2.1	**31.26**	**16.37**
T21	609761	717087	2.9	6	10	1.6	2.6	**7.42**	**4.57**
Substation	610966	718547	1	6	10	1.1	2.1	**31.26**	**16.37**
TCC1	606260	714498	1	6	10	3.3	4.3	**10.42**	**8.00**
TCC2	607630	715110	1	6	10	1.3	2.3	**26.45**	**14.95**
TCC3	609113	715577	1	6	10	2.1	3.1	**16.37**	**11.09**
TCC4	610305	715713	3	6	10	1.5	2.5	**7.65**	**4.59**
TCC5	610858	718421	1	6	10	1.1	2.1	**31.26**	**16.37**
MM1	606638	712525	1	6	10	3.5	4.5	**9.82**	**7.64**
MM2	609210	714421	1	6	10	1.1	2.1	**31.26**	**16.37**
FOS_1	606871	713320	3.2	6	10	0.9	1.9	**11.71**	**5.61**
FOS_2	606847	713362	2.6	6	10	0.7	1.7	**17.64**	**7.51**
FOS_3	606800	713376	1.0	6	10	0.9	1.9	**37.10**	**17.85**
FOS_4	606754	713358	1.7	6	10	0.9	1.9	**22.37**	**10.75**
FOS_5	606708	713338	1.0	6	10	2.3	3.3	**14.80**	**10.35**
FOS_6	606660	713324	1.0	6	10	2.9	3.9	**11.77**	**8.77**
FOS_7	606612	713310	1.0	6	10	2.3	3.3	**14.80**	**10.34**
FOS_8	606564	713296	1.0	6	10	0.9	1.9	**36.83**	**17.78**
FOS_9	606516	713282	1.5	6	10	1.2	2.2	**18.99**	**10.24**
FOS_10	606468	713268	2.7	6	10	1.3	2.3	**9.85**	**5.52**
FOS_11	606420	713254	1.0	6	10	1.6	2.6	**21.99**	**13.41**
FOS_12	606372	713240	1.7	6	10	1.4	2.4	**14.67**	**8.46**
FOS_13	606324	713226	2.5	6	10	1.7	2.7	**8.21**	**5.17**
FOS_14	606276	713212	2.9	6	10	2.1	3.1	**5.72**	**3.88**
FOS_15	606228	713199	5.9	6	10	1.3	2.3	**4.48**	**2.53**
FOS_16	606180	713185	1.0	6	10	1.4	2.4	**24.67**	**14.37**
FOS_17	606131	713172	3.4	6	10	1.6	2.6	**6.16**	**3.82**
FOS_18	606083	713158	3.5	6	10	0.7	1.7	**15.08**	**5.97**
FOS_19	606035	713145	1.0	6	10	1.1	2.1	**30.66**	**16.21**
FOS_20	605987	713131	1.0	6	10	1.0	2.0	**33.39**	**16.94**
FOS_21	605939	713118	3.1	6	10	2.1	3.1	**5.41**	**3.64**
FOS_22	605904	713108	5.1	6	10	4.2	5.2	**1.62**	**1.31**
FOS_23	607141	714895	1.0	6	10	1.8	2.8	**19.45**	**12.42**
FOS_24	607190	714894	2.3	6	10	1.3	2.3	**11.45**	**6.50**
FOS_25	607225	714860	1.0	6	10	2.6	3.6	**13.20**	**9.54**
FOS_26	607230	714811	4.1	6	10	1.5	2.5	**5.68**	**3.40**
FOS_27	607229	714761	1.7	6	10	1.0	2.0	**19.16**	**9.79**
FOS_28	607227	714711	2.4	6	10	0.9	1.9	**15.58**	**7.46**
FOS_29	607226	714661	3.3	6	10	0.4	1.4	**27.24**	**7.52**
FOS_30	607225	714611	1.0	6	10	0.4	1.4	**87.03**	**24.65**
FOS_31	607224	714561	2.6	6	10	0.5	1.5	**23.85**	**8.44**
FOS_32	607222	714511	6.4	6	10	0.7	1.7	**7.40**	**3.11**
FOS_33	607221	714461	1.9	6	10	0.9	1.9	**20.77**	**9.70**
FOS_34	607220	714411	1.0	6	10	1.2	2.2	**28.65**	**15.63**
FOS_35	607218	714361	1.0	6	10	1.5	2.5	**23.01**	**13.78**
FOS_36	607217	714311	1.8	6	10	0.8	1.8	**24.67**	**10.66**
FOS_37	607216	714261	3.5	6	10	0.8	1.8	**11.80**	**5.37**
FOS_38	607215	714211	3.7	6	10	0.9	1.9	**10.84**	**5.04**
FOS_39	607213	714161	4.9	6	10	1.5	2.5	**4.57**	**2.77**
FOS_40	607212	714111	3.9	6	10	1.6	2.6	**5.53**	**3.39**
FOS_41	607211	714061	1.0	6	10	1.5	2.5	**22.58**	**13.63**
FOS_42	607210	714011	1.0	6	10	1.8	2.8	**19.55**	**12.46**
FOS_43	607208	713961	1.0	6	10	1.5	2.5	**22.35**	**13.55**
FOS_44	607207	713911	1.8	6	10	1.5	2.5	**13.26**	**7.87**
FOS_45	607206	713861	1.0	6	10	1.4	2.4	**24.52**	**14.31**
FOS_46	607204	713811	1.0	6	10	2.1	3.1	**16.65**	**11.22**
FOS_47	607182	713768	1.0	6	10	2.1	3.1	**16.77**	**11.27**
FOS_48	607149	713731	1.0	6	10	2.0	3.0	**17.18**	**11.45**
FOS_49	607115	713694	1.7	6	10	2.0	3.0	**10.25**	**6.78**
FOS_50	607081	713657	1.6	6	10	1.9	2.9	**11.26**	**7.38**
FOS_51	607048	713620	1.0	6	10	1.6	2.6	**20.88**	**12.99**
FOS_52	607014	713583	1.0	6	10	1.2	2.2	**27.93**	**15.41**
FOS_53	606980	713546	0.8	6	10	1.0	2.0	**44.81**	**21.91**
FOS_54	606947	713509	1.4	6	10	1.0	2.0	**22.92**	**11.73**
FOS_55	606913	713472	1.0	6	10	0.6	1.6	**58.98**	**21.72**
FOS_56	606879	713435	2.1	6	10	1.0	2.0	**16.03**	**8.07**
FOS_57	606862	713389	4.1	6	10	0.7	1.7	**12.11**	**4.99**
FOS_58	606868	713340	1.0	6	10	0.8	1.8	**43.07**	**19.12**
FOS_59	606875	713290	5.0	6	10	1.6	2.6	**4.32**	**2.65**
FOS_60	606882	713241	1.0	6	10	1.1	2.1	**30.60**	**16.19**
FOS_61	606889	713191	1.0	6	10	2.0	3.0	**17.63**	**11.65**

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - 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)
FOS_62	606896	713142	1.0	6	10	1.6	2.6	**21.79**	**13.34**
FOS_63	606902	713092	2.2	6	10	2.6	3.6	**5.88**	**4.25**
FOS_64	606909	713042	1.0	6	10	2.9	3.9	**11.81**	**8.79**
FOS_65	606916	712993	1.0	6	10	3.3	4.3	**10.27**	**7.91**
FOS_66	606923	712943	1.0	6	10	2.3	3.3	**14.88**	**10.39**
FOS_67	606930	712894	2.3	6	10	1.1	2.1	**13.69**	**7.08**
FOS_68	606936	712844	1.0	6	10	2.2	3.2	**15.70**	**10.78**
FOS_69	606943	712795	1.9	6	10	2.6	3.6	**7.01**	**5.06**
FOS_70	606935	712747	1.4	6	10	2.9	3.9	**8.28**	**6.16**
FOS_71	606898	712714	3.1	6	10	3.3	4.3	**3.32**	**2.54**
FOS_72	606857	712685	1.5	6	10	2.6	3.6	**8.67**	**6.24**
FOS_73	606816	712656	1.0	6	10	3.6	4.6	**9.48**	**7.43**
FOS_74	606775	712627	1.0	6	10	2.8	3.8	**12.26**	**9.04**
FOS_75	606735	712598	1.0	6	10	2.6	3.6	**13.38**	**9.63**
FOS_76	606694	712569	1.0	6	10	2.5	3.5	**13.67**	**9.78**
FOS_77	606653	712540	1.0	6	10	2.9	3.9	**11.91**	**8.84**
FOS_78	606641	712532	1.0	6	10	3.4	4.4	**10.23**	**7.88**
FOS_79	607185	714986	1.8	6	10	1.0	2.0	**18.70**	**9.52**
FOS_80	607187	714937	1.0	6	10	1.0	2.0	**34.02**	**17.10**
FOS_81	607155	714900	1.0	6	10	1.6	2.6	**21.51**	**13.23**
FOS_82	607109	714881	1.0	6	10	2.2	3.2	**15.40**	**10.63**
FOS_83	607062	714863	1.0	6	10	2.9	3.9	**11.71**	**8.73**
FOS_84	607016	714844	1.0	6	10	2.7	3.7	**12.52**	**9.18**
FOS_85	606969	714825	1.8	6	10	1.6	2.6	**12.07**	**7.44**
FOS_86	606923	714806	1.0	6	10	1.0	2.0	**34.37**	**17.19**
FOS_87	606877	714788	1.0	6	10	1.0	2.0	**34.38**	**17.19**
FOS_88	606830	714769	2.3	6	10	1.0	2.0	**14.32**	**7.24**
FOS_89	606784	714750	3.5	6	10	1.1	2.1	**9.06**	**4.69**
FOS_90	606738	714731	1.0	6	10	1.3	2.3	**25.98**	**14.80**
FOS_91	606691	714715	1.0	6	10	1.2	2.2	**29.61**	**15.91**
FOS_92	606644	714729	1.0	6	10	1.1	2.1	**31.08**	**16.32**
FOS_93	606622	714759	3.0	6	10	1.4	2.4	**8.29**	**4.83**
FOS_94	605897	715669	1.0	6	10	1.1	2.1	**31.26**	**16.37**
FOS_95	605897	715619	1.0	6	10	0.6	1.6	**56.31**	**21.35**
FOS_96	605897	715569	1.0	6	10	0.9	1.9	**39.40**	**18.36**
FOS_97	605897	715519	1.0	6	10	0.4	1.4	**78.88**	**23.95**
FOS_98	605897	715469	1.0	6	10	0.4	1.4	**86.28**	**24.59**
FOS_99	605897	715419	1.0	6	10	0.8	1.8	**41.32**	**18.77**
FOS_100	605897	715369	1.0	6	10	1.2	2.2	**29.52**	**15.88**
FOS_101	605897	715319	1.0	6	10	1.9	2.9	**18.23**	**11.92**
FOS_102	605897	715269	1.4	6	10	0.6	1.6	**40.50**	**15.46**
FOS_103	605897	715219	3.3	6	10	0.1	1.1	**139.51**	**9.66**
FOS_104	605897	715169	7.2	6	10	0.4	1.4	**12.82**	**3.51**
FOS_105	605897	715119	1.0	6	10	1.2	2.2	**28.63**	**15.62**
FOS_106	605897	715069	1.0	6	10	2.1	3.1	**16.73**	**11.26**
FOS_107	605897	715019	1.0	6	10	1.7	2.7	**20.00**	**12.64**
FOS_108	605919	714976	1.0	6	10	0.8	1.8	**41.68**	**18.84**
FOS_109	605965	714958	1.0	6	10	0.2	1.2	**145.20**	**27.80**
FOS_110	606014	714952	0.9	6	10	0.3	1.3	**133.05**	**30.76**
FOS_111	606064	714945	1.1	6	10	0.4	1.4	**85.72**	**22.23**
FOS_112	606113	714939	1.0	6	10	1.2	2.2	**27.81**	**15.37**
FOS_113	606163	714932	1.0	6	10	1.2	2.2	**27.64**	**15.32**
FOS_114	606212	714926	1.0	6	10	0.7	1.7	**48.03**	**20.04**
FOS_115	606262	714919	1.0	6	10	0.6	1.6	**53.09**	**20.87**
FOS_116	606312	714912	1.0	6	10	1.0	2.0	**36.12**	**17.62**
FOS_117	606361	714906	1.0	6	10	1.8	2.8	**18.59**	**12.07**
FOS_118	606411	714899	2.3	6	10	2.0	3.0	**7.69**	**5.09**
FOS_119	606460	714893	2.0	6	10	1.5	2.5	**11.27**	**6.80**
FOS_120	606510	714886	1.0	6	10	1.5	2.5	**23.51**	**13.96**
FOS_121	606559	714877	1.0	6	10	0.6	1.6	**53.32**	**20.90**
FOS_122	606594	714843	3.0	6	10	1.0	2.0	**11.49**	**5.71**
FOS_123	606610	714796	1.9	6	10	0.7	1.7	**23.58**	**10.10**
FOS_124	606625	714748	2.1	6	10	2.1	3.1	**7.67**	**5.21**
FOS_125	606613	714701	1.0	6	10	1.5	2.5	**22.87**	**13.74**
FOS_126	606572	714674	1.0	6	10	1.7	2.7	**20.23**	**12.74**
FOS_127	606525	714658	1.0	6	10	1.5	2.5	**22.41**	**13.57**
FOS_128	606478	714641	1.0	6	10	1.6	2.6	**21.46**	**13.21**
FOS_129	606433	714618	1.9	6	10	1.8	2.8	**10.13**	**6.51**
FOS_130	606388	714596	1.0	6	10	2.0	3.0	**17.39**	**11.55**
FOS_131	606344	714574	1.0	6	10	2.0	3.0	**16.86**	**11.31**
FOS_132	606299	714552	3.4	6	10	2.0	3.0	**4.95**	**3.32**
FOS_133	606254	714530	1.0	6	10	1.5	2.5	**22.76**	**13.70**
FOS_134	606209	714508	3.6	6	10	1.0	2.0	**10.04**	**4.90**
FOS_135	606164	714486	2.4	6	10	1.8	2.8	**7.79**	**5.04**
FOS_136	606119	714464	4.9	6	10	1.9	2.9	**3.66**	**2.41**
FOS_137	606076	714440	1.0	6	10	1.5	2.5	**23.20**	**13.85**
FOS_138	606033	714413	2.6	6	10	0.9	1.9	**14.09**	**6.78**
FOS_139	605991	714386	1.0	6	10	0.4	1.4	**82.38**	**24.26**
FOS_140	605949	714360	3.3	6	10	1.1	2.1	**9.86**	**5.10**
FOS_141	605906	714333	1.0	6	10	1.5	2.5	**23.67**	**14.02**
FOS_142	605859	714321	1.0	6	10	1.3	2.3	**25.73**	**14.72**
FOS_143	605815	714344	2.6	6	10	0.5	1.5	**26.01**	**8.70**
FOS_144	605774	714372	1.7	6	10	1.3	2.3	**14.98**	**8.57**
FOS_145	605733	714401	1.0	6	10	1.5	2.5	**23.10**	**13.82**
FOS_146	605692	714430	1.0	6	10	1.2	2.2	**29.73**	**15.94**
FOS_147	605651	714459	1.1	6	10	1.0	2.0	**29.66**	**14.92**
FOS_148	605611	714488	1.9	6	10	1.6	2.6	**11.53**	**7.06**
FOS_149	605570	714516	1.0	6	10	3.0	4.0	**11.34**	**8.53**
FOS_150	605529	714545	1.0	6	10	2.7	3.7	**12.92**	**9.39**
FOS_151	605488	714574	1.0	6	10	1.4	2.4	**24.29**	**14.24**

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - 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)
FOS_152	605447	714603	1.0	6	10	1.4	2.4	**24.60**	**14.34**
FOS_153	605406	714632	1.0	6	10	1.1	2.1	**32.02**	**16.58**
FOS_154	605369	714664	2.4	6	10	0.9	1.9	**16.04**	**7.56**
FOS_155	605361	714712	1.7	6	10	0.7	1.7	**29.38**	**11.91**
FOS_156	605389	714752	3.8	6	10	0.5	1.5	**20.14**	**6.28**
FOS_157	605432	714777	1.1	6	10	0.8	1.8	**36.19**	**16.41**
FOS_158	605476	714801	1.7	6	10	1.0	2.0	**20.78**	**10.20**
FOS_159	605519	714826	1.0	6	10	1.1	2.1	**32.21**	**16.63**
FOS_160	605563	714850	1.8	6	10	0.6	1.6	**32.21**	**11.86**
FOS_161	605607	714875	1.0	6	10	0.6	1.6	**53.90**	**20.99**
FOS_162	605650	714899	1.0	6	10	1.1	2.1	**31.25**	**16.37**
FOS_163	605694	714924	1.0	6	10	2.3	3.3	**14.83**	**10.36**
FOS_164	605737	714948	1.0	6	10	1.5	2.5	**23.50**	**13.96**
FOS_165	605781	714972	7.0	6	10	0.2	1.2	**30.81**	**4.30**
FOS_166	605825	714997	1.0	6	10	1.0	2.0	**32.82**	**16.79**
FOS_167	605868	715022	1.0	6	10	1.9	2.9	**18.30**	**11.94**
FOS_168	605895	715062	1.0	6	10	2.0	3.0	**17.58**	**11.63**
FOS_169	605897	715088	1.0	6	10	1.4	2.4	**24.68**	**14.37**
FOS_170	605382	714649	2.0	6	10	0.9	1.9	**19.00**	**9.02**
FOS_171	605344	714681	1.0	6	10	0.9	1.9	**36.68**	**17.75**
FOS_172	605297	714695	1.8	6	10	1.0	2.0	**19.28**	**9.51**
FOS_173	605251	714676	4.6	6	10	0.9	1.9	**8.17**	**3.90**
FOS_174	605208	714651	4.3	6	10	1.1	2.1	**7.08**	**3.76**
FOS_175	605164	714627	3.0	6	10	1.4	2.4	**8.19**	**4.79**
FOS_176	605121	714602	1.0	6	10	1.5	2.5	**23.68**	**14.02**
FOS_177	605077	714578	1.0	6	10	1.7	2.7	**20.54**	**12.86**
FOS_178	605033	714554	1.0	6	10	1.7	2.7	**20.52**	**12.85**
FOS_179	604990	714529	1.0	6	10	1.9	2.9	**18.39**	**11.98**
FOS_180	604962	714489	2.5	6	10	0.6	1.6	**24.77**	**8.94**
FOS_181	604971	714441	1.0	6	10	0.5	1.5	**72.12**	**23.28**
FOS_182	604998	714399	1.3	6	10	0.5	1.5	**57.34**	**17.94**
FOS_183	605026	714357	1.0	6	10	0.4	1.4	**94.23**	**25.19**
FOS_184	605053	714315	2.0	6	10	0.1	1.1	**173.37**	**15.62**
FOS_185	605081	714274	1.5	6	10	0.2	1.2	**136.32**	**19.75**
FOS_186	605108	714232	1.0	6	10	0.7	1.7	**51.23**	**20.57**
FOS_187	605136	714190	2.7	6	10	0.9	1.9	**14.47**	**6.79**
FOS_188	605164	714149	1.0	6	10	0.8	1.8	**43.27**	**19.16**
FOS_189	605191	714107	1.0	6	10	0.8	1.8	**42.82**	**19.07**
FOS_190	605219	714065	1.0	6	10	1.3	2.3	**26.63**	**15.01**
FOS_191	605246	714024	3.9	6	10	1.6	2.6	**5.53**	**3.40**
FOS_192	605274	713982	1.0	6	10	0.7	1.7	**49.16**	**20.23**
FOS_193	605283	713969	2.7	6	10	0.7	1.7	**17.71**	**7.43**
FOS_194	608015	715068	1.0	6	10	1.3	2.3	**25.90**	**14.77**
FOS_195	607965	715063	11.3	6	10	1.4	2.4	**2.30**	**1.32**
FOS_196	607915	715059	1.0	6	10	1.6	2.6	**21.91**	**13.38**
FOS_197	607865	715054	1.9	6	10	2.0	3.0	**9.20**	**6.11**
FOS_198	607816	715050	2.2	6	10	1.2	2.2	**12.86**	**7.09**
FOS_199	607772	715070	1.0	6	10	1.6	2.6	**21.49**	**13.22**
FOS_200	607735	715104	8.4	6	10	2.1	3.1	**1.97**	**1.34**
FOS_201	607686	715096	1.0	6	10	1.2	2.2	**27.55**	**15.29**
FOS_202	607639	715080	1.0	6	10	0.4	1.4	**81.40**	**24.17**
FOS_203	607592	715063	0.7	6	10	0.6	1.6	**90.10**	**32.16**
FOS_204	607545	715046	0.7	6	10	0.9	1.9	**58.49**	**26.96**
FOS_205	607498	715029	1.0	6	10	0.9	1.9	**41.23**	**19.02**
FOS_206	607451	715012	1.0	6	10	0.8	1.8	**42.65**	**19.04**
FOS_207	607404	714995	3.7	6	10	0.7	1.7	**13.16**	**5.49**
FOS_208	607357	714978	1.0	6	10	0.6	1.6	**55.88**	**21.29**
FOS_209	607310	714961	1.0	6	10	1.8	2.8	**19.22**	**12.33**
FOS_210	607263	714944	1.0	6	10	3.2	4.2	**10.81**	**8.22**
FOS_211	607214	714950	1.0	6	10	1.8	2.8	**19.07**	**12.26**
FOS_212	607184	714989	1.8	6	10	1.0	2.0	**18.36**	**9.37**
FOS_213	607168	715036	1.0	6	10	1.1	2.1	**30.69**	**16.22**
FOS_214	607151	715083	1.0	6	10	1.1	2.1	**32.18**	**16.62**
FOS_215	607135	715130	1.9	6	10	1.0	2.0	**17.33**	**8.75**
FOS_216	607119	715178	1.8	6	10	1.2	2.2	**16.74**	**8.98**
FOS_217	607102	715225	1.0	6	10	1.5	2.5	**23.47**	**13.95**
FOS_218	607086	715272	1.0	6	10	2.4	3.4	**14.18**	**10.04**
FOS_219	607069	715319	1.0	6	10	1.7	2.7	**21.36**	**13.31**
FOS_220	607053	715367	1.2	6	10	0.9	1.9	**32.33**	**15.17**
FOS_221	607037	715414	1.0	6	10	0.6	1.6	**58.77**	**21.69**
FOS_222	607031	715430	1.0	6	10	0.7	1.7	**49.25**	**20.25**
FOS_223	607725	715105	1.0	6	10	1.9	2.9	**17.87**	**11.76**
FOS_224	607774	715113	3.0	6	10	2.2	3.2	**5.17**	**3.55**
FOS_225	607823	715121	2.4	6	10	1.3	2.3	**10.86**	**6.17**
FOS_226	607873	715129	1.0	6	10	2.7	3.7	**12.95**	**9.41**
FOS_227	607922	715136	1.0	6	10	1.9	2.9	**17.99**	**11.81**
FOS_228	607932	715138	1.0	6	10	1.8	2.8	**19.57**	**12.47**
FOS_229	607964	714964	1.0	6	10	0.5	1.5	**64.31**	**22.40**
FOS_230	607996	714993	1.0	6	10	0.2	1.2	**174.36**	**28.72**
FOS_231	608045	715003	1.0	6	10	0.1	1.1	**246.13**	**30.17**
FOS_232	608087	715022	1.0	6	10	0.2	1.2	**175.07**	**28.74**
FOS_233	608049	715053	1.0	6	10	0.9	1.9	**36.68**	**17.75**
FOS_234	608003	715067	9.1	6	10	1.3	2.3	**2.86**	**1.63**
FOS_235	607965	715038	1.0	6	10	0.9	1.9	**38.67**	**18.20**
FOS_236	607962	714989	17.4	6	10	0.1	1.1	**15.11**	**1.84**
FOS_237	607964	714965	1.0	6	10	0.5	1.5	**64.62**	**22.44**
FOS_238	609728	717166	2.7	6	10	0.8	1.8	**16.04**	**7.12**
FOS_239	609728	717116	1.4	6	10	0.8	1.8	**30.92**	**13.52**
FOS_240	609744	717069	2.3	6	10	1.4	2.4	**11.03**	**6.36**
FOS_241	609761	717022	3.1	6	10	1.0	2.0	**11.39**	**5.63**

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - 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)
FOS_242	609777	716975	2.2	6	10	1.1	2.1	**14.18**	**7.48**
FOS_243	609794	716928	2.1	6	10	1.0	2.0	**16.66**	**8.34**
FOS_244	609811	716881	3.2	6	10	1.1	2.1	**10.10**	**5.21**
FOS_245	609833	716836	2.9	6	10	1.1	2.1	**11.10**	**5.72**
FOS_246	609854	716791	5.0	6	10	1.7	2.7	**3.99**	**2.52**
FOS_247	609846	716742	3.7	6	10	1.3	2.3	**7.30**	**4.11**
FOS_248	609808	716711	0.5	6	10	0.9	1.9	**70.28**	**34.22**
FOS_249	609764	716687	0.5	6	10	1.2	2.2	**62.75**	**34.17**
FOS_250	609720	716663	0.4	6	10	0.8	1.8	**102.94**	**46.77**
FOS_251	609677	716638	1.0	6	10	0.8	1.8	**40.61**	**18.62**
FOS_252	609633	716614	1.0	6	10	1.3	2.3	**26.28**	**14.90**
FOS_253	609590	716589	0.6	6	10	1.5	2.5	**40.19**	**24.07**
FOS_254	609546	716565	0.7	6	10	1.4	2.4	**31.87**	**18.85**
FOS_255	609502	716540	1.8	6	10	1.3	2.3	**14.59**	**8.32**
FOS_256	609459	716516	1.0	6	10	1.6	2.6	**20.93**	**13.01**
FOS_257	609415	716492	1.0	6	10	1.5	2.5	**24.03**	**14.30**
FOS_258	609371	716467	0.8	6	10	1.1	2.1	**39.29**	**20.50**
FOS_259	609328	716443	0.7	6	10	1.0	2.0	**47.79**	**24.44**
FOS_260	609284	716418	1.1	6	10	1.0	2.0	**32.74**	**16.08**
FOS_261	609249	716385	1.4	6	10	0.6	1.6	**38.63**	**15.18**
FOS_262	609245	716336	1.2	6	10	0.5	1.5	**61.08**	**19.47**
FOS_263	609253	716286	0.9	6	10	0.4	1.4	**108.57**	**29.24**
FOS_264	609260	716237	1.0	6	10	0.6	1.6	**61.65**	**22.07**
FOS_265	609268	716187	1.1	6	10	0.6	1.6	**46.21**	**18.20**
FOS_266	609275	716138	1.0	6	10	1.0	2.0	**33.21**	**16.89**
FOS_267	609283	716088	0.9	6	10	0.7	1.7	**55.15**	**23.19**
FOS_268	609290	716039	3.2	6	10	1.8	2.8	**5.89**	**3.81**
FOS_269	609298	715990	1.0	6	10	2.6	3.6	**13.12**	**9.49**
FOS_270	609305	715940	2.5	6	10	1.5	2.5	**8.99**	**5.42**
FOS_271	609313	715891	2.4	6	10	0.7	1.7	**21.77**	**8.63**
FOS_272	609320	715841	1.0	6	10	0.5	1.5	**75.21**	**23.60**
FOS_273	609328	715792	1.0	6	10	0.8	1.8	**40.55**	**18.61**
FOS_274	609335	715742	1.0	6	10	1.3	2.3	**26.48**	**14.96**
FOS_275	609343	715693	1.0	6	10	0.5	1.5	**72.93**	**23.37**
FOS_276	609332	715645	1.0	6	10	0.9	1.9	**38.44**	**18.15**
FOS_277	609292	715617	3.1	6	10	1.4	2.4	**7.88**	**4.61**
FOS_278	609246	715598	1.0	6	10	1.0	2.0	**35.11**	**17.37**
FOS_279	609200	715578	3.1	6	10	1.8	2.8	**6.20**	**3.96**
FOS_280	609154	715559	4.0	6	10	1.3	2.3	**6.82**	**3.81**
FOS_281	609108	715539	1.0	6	10	1.6	2.6	**21.48**	**13.22**
FOS_282	609062	715520	4.1	6	10	1.0	2.0	**8.38**	**4.22**
FOS_283	609016	715501	1.9	6	10	1.2	2.2	**15.51**	**8.37**
FOS_284	608967	715490	2.4	6	10	1.1	2.1	**13.16**	**6.86**
FOS_285	608918	715482	2.6	6	10	0.9	1.9	**14.28**	**6.90**
FOS_286	608868	715474	1.4	6	10	0.5	1.5	**49.15**	**16.13**
FOS_287	608819	715466	1.0	6	10	0.1	1.1	**329.35**	**31.13**
FOS_288	608774	715445	1.0	6	10	0.1	1.1	**513.97**	**32.23**
FOS_289	608735	715414	2.0	6	10	0.0	1.0	**57212.86**	**17.16**
FOS_290	608695	715384	1.0	6	10	0.0	1.0	**8596.11**	**34.25**
FOS_291	608655	715354	1.0	6	10	0.0	1.0	**85961.13**	**34.37**
FOS_292	608614	715326	1.0	6	10	0.0	1.0	**57307.42**	**34.36**
FOS_293	608573	715297	1.0	6	10	0.0	1.0	**42980.56**	**34.36**
FOS_294	608537	715263	3.6	6	10	0.0	1.0	**1542.20**	**9.50**
FOS_295	608502	715226	1.0	6	10	0.0	1.0	**343844.50**	**34.38**
FOS_296	608467	715191	1.0	6	10	0.0	1.0	**10745.14**	**34.27**
FOS_297	608432	715155	5.4	6	10	0.0	1.0	**9103.98**	**6.37**
FOS_298	608398	715119	5.4	6	10	0.0	1.0	**295.38**	**6.30**
FOS_299	608354	715096	1.0	6	10	0.0	1.0	**34384.45**	**34.35**
FOS_300	608307	715079	3.1	6	10	0.0	1.0	**15919.30**	**11.14**
FOS_301	608260	715061	23.2	6	10	0.0	1.0	**295.71**	**1.65**
FOS_302	608213	715044	5.0	6	10	0.1	1.1	**124.98**	**6.58**
FOS_303	608165	715029	1.0	6	10	0.1	1.1	**251.16**	**30.24**
FOS_304	608117	715019	1.0	6	10	0.1	1.1	**667.66**	**32.70**
FOS_305	608077	715010	2.3	6	10	0.0	1.0	**410.49**	**14.49**
FOS_306	609716	715253	2.9	6	10	1.1	2.1	**11.13**	**5.73**
FOS_307	609672	715276	0.6	6	10	0.4	1.4	**144.21**	**42.37**
FOS_308	609628	715300	0.5	6	10	0.8	1.8	**94.52**	**41.82**
FOS_309	609583	715323	0.5	6	10	0.4	1.4	**182.36**	**53.15**
FOS_310	609539	715347	1.0	6	10	0.5	1.5	**70.33**	**23.09**
FOS_311	609495	715370	2.3	6	10	0.4	1.4	**33.16**	**10.17**
FOS_312	609451	715393	1.6	6	10	0.3	1.3	**65.18**	**16.14**
FOS_313	609411	715423	1.0	6	10	0.5	1.5	**73.33**	**23.41**
FOS_314	609395	715470	1.0	6	10	0.3	1.3	**117.07**	**26.58**
FOS_315	609384	715518	1.0	6	10	0.4	1.4	**77.22**	**23.79**
FOS_316	609372	715567	3.1	6	10	1.0	2.0	**11.01**	**5.54**
FOS_317	609345	715607	6.7	6	10	1.2	2.2	**4.34**	**2.37**
FOS_318	609297	715617	3.1	6	10	1.8	2.8	**6.25**	**4.00**
FOS_319	609283	715613	4.1	6	10	1.6	2.6	**5.31**	**3.25**
FOS_320	609680	714336	3.9	6	10	0.6	1.6	**15.61**	**5.60**
FOS_321	609653	714377	1.0	6	10	1.3	2.3	**25.96**	**14.79**
FOS_322	609641	714426	1.0	6	10	0.4	1.4	**84.46**	**24.44**
FOS_323	609630	714475	1.0	6	10	0.5	1.5	**62.79**	**22.22**
FOS_324	609618	714523	1.0	6	10	0.7	1.7	**47.02**	**19.86**
FOS_325	609607	714572	1.0	6	10	0.7	1.7	**49.07**	**20.22**
FOS_326	609595	714621	6.5	6	10	1.7	2.7	**3.10**	**1.96**
FOS_327	609584	714669	1.0	6	10	2.2	3.2	**15.56**	**10.71**
FOS_328	609572	714718	7.5	6	10	2.7	3.7	**1.74**	**1.26**
FOS_329	609561	714767	11.0	6	10	1.7	2.7	**1.94**	**1.21**
FOS_330	609549	714815	15.0	6	10	0.8	1.8	**2.83**	**1.30**
FOS_331	609538	714864	2.3	6	10	0.6	1.6	**24.99**	**9.24**

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - 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)
FOS_332	609527	714913	1.0	6	10	0.9	1.9	**39.61**	**18.41**
FOS_333	609515	714961	1.0	6	10	0.9	1.9	**36.29**	**17.65**
FOS_334	609504	715010	1.0	6	10	0.7	1.7	**46.68**	**19.80**
FOS_335	609492	715059	1.2	6	10	0.6	1.6	**48.18**	**17.94**
FOS_336	609481	715107	1.0	6	10	0.9	1.9	**37.77**	**18.00**
FOS_337	609469	715156	1.2	6	10	0.9	1.9	**33.61**	**15.45**
FOS_338	609458	715205	1.0	6	10	1.0	2.0	**35.57**	**17.48**
FOS_339	609446	715253	2.8	6	10	0.8	1.8	**15.69**	**6.89**
FOS_340	609435	715302	1.0	6	10	0.7	1.7	**48.17**	**20.06**
FOS_341	609423	715351	1.0	6	10	0.9	1.9	**39.70**	**18.43**
FOS_342	609412	715399	3.1	6	10	0.9	1.9	**11.90**	**5.70**
FOS_343	609401	715445	1.0	6	10	0.4	1.4	**79.59**	**24.01**
FOS_344	610491	714779	1.0	6	10	1.0	2.0	**36.03**	**17.59**
FOS_345	610540	714780	1.0	6	10	1.6	2.6	**22.01**	**13.42**
FOS_346	610576	714748	1.0	6	10	0.9	1.9	**38.42**	**18.15**
FOS_347	610581	714699	1.0	6	10	1.1	2.1	**32.44**	**16.69**
FOS_348	610575	714649	1.0	6	10	1.2	2.2	**29.18**	**15.78**
FOS_349	610569	714600	1.0	6	10	1.0	2.0	**33.11**	**16.87**
FOS_350	610563	714550	1.0	6	10	1.2	2.2	**28.48**	**15.58**
FOS_351	610557	714500	1.0	6	10	1.4	2.4	**24.62**	**14.35**
FOS_352	610551	714451	1.0	6	10	1.5	2.5	**22.30**	**13.53**
FOS_353	610545	714401	1.0	6	10	1.4	2.4	**23.72**	**14.04**
FOS_354	610539	714351	1.0	6	10	1.4	2.4	**23.77**	**14.05**
FOS_355	610533	714302	1.0	6	10	1.6	2.6	**21.73**	**13.32**
FOS_356	610517	714255	1.8	6	10	1.4	2.4	**13.34**	**7.80**
FOS_357	610475	714229	1.0	6	10	1.1	2.1	**30.60**	**16.19**
FOS_358	610429	714211	1.0	6	10	1.3	2.3	**27.09**	**15.15**
FOS_359	610382	714193	2.5	6	10	0.7	1.7	**20.96**	**8.39**
FOS_360	610336	714174	1.0	6	10	0.1	1.1	**312.02**	**30.97**
FOS_361	610289	714156	1.2	6	10	0.5	1.5	**62.90**	**19.65**
FOS_362	610243	714138	1.0	6	10	0.8	1.8	**41.73**	**18.85**
FOS_363	610196	714119	2.2	6	10	0.9	1.9	**18.35**	**8.49**
FOS_364	610150	714101	1.0	6	10	0.9	1.9	**40.12**	**18.52**
FOS_365	610103	714083	1.0	6	10	0.8	1.8	**43.57**	**19.22**
FOS_366	610056	714064	1.0	6	10	1.0	2.0	**33.82**	**17.05**
FOS_367	610010	714046	1.0	6	10	0.9	1.9	**37.00**	**17.82**
FOS_368	609963	714029	1.9	6	10	1.7	2.7	**10.83**	**6.79**
FOS_369	609915	714040	1.0	6	10	1.0	2.0	**35.90**	**17.56**
FOS_370	609883	714077	1.0	6	10	0.6	1.6	**53.15**	**20.88**
FOS_371	609852	714117	7.9	6	10	0.5	1.5	**9.71**	**3.04**
FOS_372	609821	714156	1.4	6	10	0.5	1.5	**45.19**	**15.68**
FOS_373	609790	714195	1.0	6	10	2.7	3.7	**12.72**	**9.28**
FOS_374	609759	714235	6.3	6	10	0.4	1.4	**13.46**	**3.92**
FOS_375	609728	714274	1.0	6	10	0.2	1.2	**142.61**	**27.70**
FOS_376	609697	714313	3.6	6	10	0.3	1.3	**34.41**	**7.48**
FOS_377	609664	714350	1.0	6	10	1.1	2.1	**30.26**	**16.09**
FOS_378	609616	714363	1.6	6	10	0.5	1.5	**39.71**	**13.92**
FOS_379	609567	714370	1.0	6	10	0.5	1.5	**69.97**	**23.06**
FOS_380	609517	714378	1.0	6	10	0.5	1.5	**69.25**	**22.98**
FOS_381	609468	714385	1.0	6	10	0.2	1.2	**222.12**	**29.78**
FOS_382	609418	714392	1.0	6	10	0.7	1.7	**52.02**	**20.70**
FOS_383	609369	714400	1.0	6	10	0.8	1.8	**41.77**	**18.86**
FOS_384	609319	714407	2.2	6	10	1.9	2.9	**8.24**	**5.42**
FOS_385	609270	714414	1.0	6	10	2.4	3.4	**14.62**	**10.26**
FOS_386	609221	714422	1.0	6	10	1.2	2.2	**27.55**	**15.29**
FOS_387	609216	714422	1.0	6	10	0.9	1.9	**38.63**	**18.19**
FOS_388	610862	714382	1.0	6	10	0.7	1.7	**50.73**	**20.49**
FOS_389	610816	714364	8.4	6	10	0.9	1.9	**4.53**	**2.17**
FOS_390	610769	714346	1.0	6	10	0.5	1.5	**75.54**	**23.63**
FOS_391	610723	714327	1.0	6	10	0.9	1.9	**38.44**	**18.15**
FOS_392	610676	714309	1.0	6	10	0.8	1.8	**42.97**	**19.10**
FOS_393	610630	714290	0.7	6	10	1.3	2.3	**36.85**	**21.06**
FOS_394	610581	714290	0.7	6	10	1.4	2.4	**32.52**	**19.08**
FOS_395	610545	714323	1.0	6	10	1.6	2.6	**21.93**	**13.39**
FOS_396	610541	714372	1.0	6	10	1.1	2.1	**31.29**	**16.38**
FOS_397	610541	714373	1.0	6	10	1.1	2.1	**31.59**	**16.46**
FOS_398	610070	716252	1.0	6	10	0.4	1.4	**91.04**	**24.96**
FOS_399	610088	716206	1.5	6	10	0.8	1.8	**28.83**	**12.55**
FOS_400	610105	716159	1.6	6	10	0.5	1.5	**40.51**	**14.02**
FOS_401	610123	716112	1.0	6	10	0.7	1.7	**48.23**	**20.07**
FOS_402	610141	716065	3.3	6	10	0.5	1.5	**20.98**	**6.94**
FOS_403	610158	716018	1.0	6	10	0.1	1.1	**373.34**	**31.48**
FOS_404	610176	715972	4.3	6	10	0.9	1.9	**9.03**	**4.25**
FOS_405	610193	715925	2.9	6	10	1.6	2.6	**7.23**	**4.48**
FOS_406	610211	715878	1.0	6	10	0.8	1.8	**42.21**	**18.95**
FOS_407	610228	715831	1.9	6	10	0.7	1.7	**25.85**	**10.68**
FOS_408	610246	715784	3.1	6	10	0.3	1.3	**39.77**	**8.58**
FOS_409	610263	715737	2.1	6	10	0.5	1.5	**30.94**	**10.65**
FOS_410	610281	715691	1.0	6	10	0.6	1.6	**61.04**	**21.99**
FOS_411	610299	715644	1.0	6	10	0.9	1.9	**36.29**	**17.66**
FOS_412	610316	715597	1.0	6	10	1.0	2.0	**35.90**	**17.56**
FOS_413	610334	715550	1.8	6	10	0.6	1.6	**31.89**	**11.81**
FOS_414	610351	715503	1.1	6	10	0.1	1.1	**283.58**	**28.42**
FOS_415	610369	715457	1.5	6	10	0.3	1.3	**76.87**	**17.76**
FOS_416	610386	715410	2.5	6	10	0.5	1.5	**27.09**	**9.22**
FOS_417	610404	715363	1.0	6	10	0.9	1.9	**36.89**	**17.80**
FOS_418	610421	715316	3.3	6	10	0.7	1.7	**15.28**	**6.24**
FOS_419	610439	715269	4.1	6	10	1.0	2.0	**8.23**	**4.15**
FOS_420	610457	715222	4.9	6	10	0.8	1.8	**9.08**	**3.99**
FOS_421	610474	715176	4.1	6	10	0.6	1.6	**13.20**	**5.17**

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - 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)
FOS_422	610492	715129	4.3	6	10	0.7	1.7	**10.82**	**4.61**
FOS_423	610509	715082	5.5	6	10	0.6	1.6	**10.83**	**3.96**
FOS_424	610527	715035	3.3	6	10	0.9	1.9	**11.66**	**5.49**
FOS_425	610544	714988	1.3	6	10	1.3	2.3	**19.36**	**11.12**
FOS_426	610562	714942	1.0	6	10	2.6	3.6	**13.06**	**9.47**
FOS_427	610579	714895	1.0	6	10	1.6	2.6	**21.04**	**13.05**
FOS_428	610586	714846	1.0	6	10	1.5	2.5	**23.52**	**13.97**
FOS_429	610558	714806	1.0	6	10	1.5	2.5	**22.43**	**13.58**
FOS_430	610512	714787	1.0	6	10	1.1	2.1	**30.16**	**16.07**
FOS_431	610465	714768	1.0	6	10	1.2	2.2	**29.64**	**15.92**
FOS_432	610419	714750	1.0	6	10	1.1	2.1	**30.82**	**16.25**
FOS_433	610372	714732	1.0	6	10	1.2	2.2	**28.47**	**15.57**
FOS_434	610326	714713	0.6	6	10	0.9	1.9	**66.80**	**31.61**
FOS_435	610279	714695	0.9	6	10	0.7	1.7	**55.45**	**23.24**
FOS_436	610275	714693	0.9	6	10	0.4	1.4	**91.51**	**27.84**
FOS_437	609810	716712	2.2	6	10	1.0	2.0	**14.86**	**7.56**
FOS_438	609857	716725	4.9	6	10	0.9	1.9	**7.42**	**3.61**
FOS_439	609900	716702	1.7	6	10	0.5	1.5	**38.55**	**13.47**
FOS_440	609920	716656	1.0	6	10	0.1	1.1	**311.45**	**30.97**
FOS_441	609938	716609	1.0	6	10	0.3	1.3	**106.75**	**26.01**
FOS_442	609955	716562	4.3	6	10	1.3	2.3	**6.34**	**3.53**
FOS_443	609972	716516	2.8	6	10	0.7	1.7	**18.57**	**7.39**
FOS_444	609990	716469	1.4	6	10	0.6	1.6	**43.15**	**15.83**
FOS_445	610007	716422	1.0	6	10	0.9	1.9	**39.31**	**18.60**
FOS_446	610024	716375	0.9	6	10	0.6	1.6	**60.46**	**23.15**
FOS_447	610042	716328	1.3	6	10	0.6	1.6	**42.17**	**16.57**
FOS_448	610060	716281	1.0	6	10	0.7	1.7	**49.49**	**20.29**
FOS_449	610074	716234	1.0	6	10	0.5	1.5	**66.44**	**22.66**
FOS_450	610070	716184	1.0	6	10	1.1	2.1	**31.92**	**16.55**
FOS_451	610064	716134	3.4	6	10	0.7	1.7	**14.28**	**5.93**
FOS_452	610058	716085	1.0	6	10	0.5	1.5	**74.90**	**23.57**
FOS_453	610053	716035	1.0	6	10	0.4	1.4	**81.52**	**24.18**
FOS_454	610047	715985	1.0	6	10	0.7	1.7	**49.35**	**20.26**
FOS_455	610041	715936	1.0	6	10	0.4	1.4	**86.00**	**24.56**
FOS_456	610040	715925	2.3	6	10	0.5	1.5	**27.68**	**9.58**
FOS_457	610903	718466	1.0	6	10	1.0	2.0	**33.79**	**17.04**
FOS_458	610855	718452	1.0	6	10	0.9	1.9	**37.40**	**17.92**
FOS_459	610807	718439	1.0	6	10	0.8	1.8	**41.90**	**18.89**
FOS_460	610759	718425	1.0	6	10	1.0	2.0	**35.20**	**17.39**
FOS_461	610710	718411	2.1	6	10	1.2	2.2	**13.69**	**7.43**
FOS_462	610668	718387	1.0	6	10	1.4	2.4	**25.31**	**14.58**
FOS_463	610653	718341	2.6	6	10	1.2	2.2	**10.71**	**5.89**
FOS_464	610668	718293	1.0	6	10	1.1	2.1	**30.29**	**16.10**
FOS_465	610686	718246	2.3	6	10	1.1	2.1	**14.18**	**7.29**
FOS_466	610703	718200	4.1	6	10	1.0	2.0	**8.51**	**4.25**
FOS_467	610721	718153	9.6	6	10	1.0	2.0	**3.65**	**1.83**
FOS_468	610739	718106	3.8	6	10	1.0	2.0	**9.09**	**4.56**
FOS_469	610702	718104	1.0	6	10	0.8	1.8	**44.84**	**19.46**
FOS_470	610657	718125	1.0	6	10	0.4	1.4	**82.91**	**24.31**
FOS_471	610610	718143	1.0	6	10	0.5	1.5	**69.86**	**23.04**
FOS_472	610564	718133	1.0	6	10	0.4	1.4	**92.83**	**25.09**
FOS_473	610522	718105	3.0	6	10	0.2	1.2	**68.43**	**9.74**
FOS_474	610480	718078	3.5	6	10	0.0	1.0	**413.08**	**9.64**
FOS_475	610462	718038	3.0	6	10	0.1	1.1	**181.91**	**10.88**
FOS_476	610482	717992	2.4	6	10	0.2	1.2	**69.47**	**11.87**
FOS_477	610502	717946	1.0	6	10	0.1	1.1	**587.77**	**32.48**
FOS_478	610509	717899	2.7	6	10	0.1	1.1	**158.59**	**11.61**
FOS_479	610488	717853	4.9	6	10	0.4	1.4	**18.08**	**5.10**
FOS_480	610467	717808	10.1	6	10	0.7	1.7	**5.14**	**2.07**
FOS_481	610445	717763	14.1	6	10	1.0	2.0	**2.64**	**1.30**
FOS_482	610422	717718	12.5	6	10	1.2	2.2	**2.43**	**1.31**
FOS_483	610392	717678	7.5	6	10	1.0	2.0	**4.65**	**2.32**
FOS_484	610355	717646	10.1	6	10	0.8	1.8	**4.46**	**1.95**
FOS_485	610315	717616	2.5	6	10	0.5	1.5	**26.30**	**8.99**
FOS_486	610283	717577	2.5	6	10	0.4	1.4	**34.09**	**9.91**
FOS_487	610265	717531	2.5	6	10	0.4	1.4	**32.00**	**9.73**
FOS_488	610249	717484	2.3	6	10	0.5	1.5	**32.77**	**10.30**
FOS_489	610209	717456	1.0	6	10	0.5	1.5	**64.71**	**22.45**
FOS_490	610164	717436	1.0	6	10	0.6	1.6	**56.01**	**21.31**
FOS_491	610118	717415	1.8	6	10	0.7	1.7	**28.32**	**11.50**
FOS_492	610073	717395	1.0	6	10	0.8	1.8	**45.59**	**19.60**
FOS_493	610027	717374	1.0	6	10	0.8	1.8	**41.72**	**18.85**
FOS_494	609979	717368	1.6	6	10	1.0	2.0	**22.06**	**10.87**
FOS_495	609931	717362	2.5	6	10	1.3	2.3	**10.66**	**5.99**
FOS_496	609885	717343	4.2	6	10	1.6	2.6	**5.32**	**3.24**
FOS_497	609860	717382	1.0	6	10	1.8	2.8	**18.85**	**12.18**
FOS_498	609841	717429	2.0	6	10	2.0	3.0	**8.62**	**5.74**
FOS_499	609800	717443	1.3	6	10	2.0	3.0	**13.06**	**8.70**
FOS_500	609750	717439	2.9	6	10	1.7	2.7	**7.03**	**4.40**
FOS_501	609700	717434	2.2	6	10	1.2	2.2	**13.16**	**7.18**
FOS_502	609660	717412	2.1	6	10	0.9	1.9	**18.95**	**8.75**
FOS_503	609674	717364	1.0	6	10	0.9	1.9	**38.45**	**18.15**
FOS_504	609687	717315	1.0	6	10	0.9	1.9	**36.94**	**17.81**
FOS_505	609700	717267	1.0	6	10	1.0	2.0	**35.56**	**17.48**
FOS_506	609713	717219	1.0	6	10	1.0	2.0	**35.47**	**17.46**
FOS_507	609727	717171	3.4	6	10	0.8	1.8	**12.53**	**5.62**
FOS_508	609728	717166	1.0	6	10	0.8	1.8	**43.10**	**19.13**
FOS_517	610971	719039	1.0	6	10	0.1	1.1	**420.86**	**31.79**
FOS_518	610955	718992	1.0	6	10	0.2	1.2	**206.64**	**29.48**
FOS_519	610933	718947	1.0	6	10	0.3	1.3	**103.66**	**25.82**

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - 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)
FOS_520	610908	718904	1.0	6	10	0.5	1.5	**71.43**	**23.21**
FOS_521	610883	718861	1.0	6	10	0.6	1.6	**56.57**	**21.39**
FOS_522	610858	718817	1.0	6	10	0.5	1.5	**65.10**	**22.50**
FOS_523	610833	718774	1.0	6	10	0.3	1.3	**115.97**	**26.52**
FOS_524	610808	718731	2.7	6	10	0.5	1.5	**25.60**	**8.41**
FOS_525	610782	718688	2.6	6	10	0.9	1.9	**15.07**	**7.00**
FOS_526	610757	718644	2.1	6	10	1.3	2.3	**12.15**	**6.95**
FOS_527	610735	718600	1.0	6	10	1.8	2.8	**19.14**	**12.29**
FOS_528	610719	718553	3.7	6	10	1.8	2.8	**5.18**	**3.34**
FOS_529	610703	718505	3.6	6	10	1.5	2.5	**6.35**	**3.82**
FOS_530	610714	718458	5.0	6	10	1.3	2.3	**5.53**	**3.08**
FOS_531	610755	718431	1.0	6	10	1.0	2.0	**34.27**	**17.16**
FOS_532	610793	718435	1.0	6	10	0.8	1.8	**41.48**	**18.80**
FOS_533	610790	718434	1.0	6	10	0.8	1.8	**40.96**	**18.69**
FOS_534	610827	718467	1.0	6	10	0.9	1.9	**39.82**	**18.45**
FOS_535	610872	718488	1.0	6	10	1.0	2.0	**36.05**	**17.60**
FOS_536	610895	718494	1.0	6	10	1.0	2.0	**34.64**	**17.26**
FOS_537	605839	714975	5.5	6	10	1.1	2.1	**5.51**	**2.94**
FOS_538	605889	714968	4.1	6	10	0.8	1.8	**10.95**	**4.75**
FOS_539	605337	714723	2.1	6	10	0.8	1.8	**19.50**	**8.86**
FOS_540	606613	714688	1.0	6	10	1.2	2.2	**27.78**	**15.36**
FOS_541	606656	714701	1.0	6	10	1.0	2.0	**33.73**	**17.03**
FOS_542	606241	713131	3.3	6	10	2.3	3.3	**4.48**	**3.14**
FOS_543	606969	713109	1.0	6	10	2.8	3.8	**12.35**	**9.09**
FOS_544	606835	713406	3.2	6	10	0.2	1.2	**55.03**	**8.99**
FOS_545	607232	714892	1.0	6	10	2.9	3.9	**11.97**	**8.88**
FOS_546	607241	714921	1.0	6	10	3.0	4.0	**11.44**	**8.59**
FOS_547	610560	714263	1.0	6	10	1.3	2.3	**25.79**	**14.74**
FOS_548	610593	714791	1.0	6	10	0.6	1.6	**55.03**	**21.16**
FOS_549	609355	715638	1.0	6	10	1.1	2.1	**32.02**	**16.58**
FOS_550	609875	716752	5.1	6	10	1.3	2.3	**5.37**	**2.99**
FOS_551	610959	718907	2.0	6	10	0.1	1.1	**133.99**	**15.21**
FOS_552	610913	718829	1.0	6	10	0.4	1.4	**88.87**	**24.79**
FOS_553	610915	718765	1.0	6	10	0.2	1.2	**148.27**	**27.91**
FOS_554	610917	718691	1.0	6	10	0.5	1.5	**69.13**	**22.96**
FOS_555	610918	718618	1.0	6	10	1.0	2.0	**35.52**	**17.47**
FOS_556	605828	715369	11.5	6	10	1.3	2.3	**2.29**	**1.31**
FOS_557	607064	715123	1.0	6	10	1.0	2.0	**33.69**	**17.02**
FOS_558	605021	714220	1.5	6	10	0.8	1.8	**28.94**	**12.58**
							Minimum =	**1.62**	**1.21**
							Maximum =	**343844.50**	**53.15**
							Average =	**1194.54**	**13.76**

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 topographical survey data.

(4) A lower bound undrained shear strength, cu for the peat of 6kPa was selected for the assessment. It should be noted that a cu of 6kPa 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 from the GPR survey carried out by BnM.

(6) For load conditions see report text.

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - Drained Analysis

Turbine No./Waypoint	Slope	Design c'	Bulk unit weight of Peat	Unit weight of Water	Depth of In situ Peat	Friction Angle	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 (1)	Condition (2)
								100% Water	100% Water
T01	1	4	10.0	10.0	0.5	25	1.5	**45.85**	**33.09**
T02	1.5	4	10.0	10.0	1.4	25	2.4	**10.92**	**13.79**
T03	1	4	10.0	10.0	1.4	25	2.4	**16.37**	**20.68**
T04	2	4	10.0	10.0	1.8	25	2.8	**6.37**	**8.86**
T05	1	4	10.0	10.0	2.3	25	3.3	**9.97**	**15.04**
T06	1.9	4	10.0	10.0	1.6	25	2.6	**7.54**	**10.05**
T07	1	4	10.0	10.0	2.3	25	3.3	**9.97**	**15.04**
T08	1	4	10.0	10.0	1.8	25	2.8	**12.73**	**17.73**
T09	1	4	10.0	10.0	1.7	25	2.7	**13.48**	**18.38**
T10	2	4	10.0	10.0	1.5	25	2.5	**7.65**	**9.93**
T11	3.1	4	10.0	10.0	1.8	25	2.8	**4.12**	**5.72**
T12	1	4	10.0	10.0	0.8	25	1.8	**28.65**	**27.58**
T13	2	4	10.0	10.0	0.8	25	1.8	**14.34**	**13.79**
T14	2	4	10.0	10.0	1.5	25	2.5	**7.65**	**9.93**
T15	2	4	10.0	10.0	0.7	25	1.7	**16.38**	**14.60**
T16	1	4	10.0	10.0	0.6	25	1.6	**38.20**	**31.02**
T17	3	4	10.0	10.0	0.8	25	1.8	**9.57**	**9.20**
T18	4.1	4	10.0	10.0	0.8	25	1.8	**7.01**	**6.73**
T19	1	4	10.0	10.0	1.2	25	2.2	**19.10**	**22.56**
T20	1	4	10.0	10.0	1.1	25	2.1	**20.84**	**23.64**
T21	2.9	4	10.0	10.0	1.6	25	2.6	**4.95**	**6.59**
Substation	1	4	10.0	10.0	1.1	25	2.1	**20.84**	**23.64**
TCC1	1	4	10.0	10.0	3.3	25	4.3	**6.95**	**11.54**
TCC2	1	4	10.0	10.0	1.3	25	2.3	**17.63**	**21.58**
TCC3	1	4	10.0	10.0	2.1	25	3.1	**10.92**	**16.01**
TCC4	3	4	10.0	10.0	1.5	25	2.5	**5.10**	**6.62**
TCC5	1	4	10.0	10.0	1.1	25	2.1	**20.84**	**23.64**
MM1	1	4	10.0	10.0	3.5	25	4.5	**6.55**	**11.03**
MM2	1	4	10.0	10.0	1.1	25	2.1	**20.84**	**23.64**
FOS_1	3.2	4	10.0	10.0	0.9	25	1.9	**7.81**	**8.08**
FOS_2	2.6	4	10.0	10.0	0.7	25	1.7	**11.76**	**10.83**
FOS_3	1.0	4	10.0	10.0	0.9	25	1.9	**24.74**	**25.76**
FOS_4	1.7	4	10.0	10.0	0.9	25	1.9	**14.91**	**15.52**
FOS_5	1.0	4	10.0	10.0	2.3	25	3.3	**9.87**	**14.94**
FOS_6	1.0	4	10.0	10.0	2.9	25	3.9	**7.85**	**12.66**
FOS_7	1.0	4	10.0	10.0	2.3	25	3.3	**9.86**	**14.93**
FOS_8	1.0	4	10.0	10.0	0.9	25	1.9	**24.55**	**25.67**
FOS_9	1.5	4	10.0	10.0	1.2	25	2.2	**12.66**	**14.78**
FOS_10	2.7	4	10.0	10.0	1.3	25	2.3	**6.57**	**7.95**
FOS_11	1.0	4	10.0	10.0	1.6	25	2.6	**14.66**	**19.36**
FOS_12	1.7	4	10.0	10.0	1.4	25	2.4	**9.78**	**12.22**
FOS_13	2.5	4	10.0	10.0	1.7	25	2.7	**5.47**	**7.46**
FOS_14	2.9	4	10.0	10.0	2.1	25	3.1	**3.82**	**5.59**
FOS_15	5.9	4	10.0	10.0	1.3	25	2.3	**2.99**	**3.64**
FOS_16	1.0	4	10.0	10.0	1.4	25	2.4	**16.45**	**20.74**
FOS_17	3.4	4	10.0	10.0	1.6	25	2.6	**4.11**	**5.50**
FOS_18	3.5	4	10.0	10.0	0.7	25	1.7	**10.05**	**8.60**
FOS_19	1.0	4	10.0	10.0	1.1	25	2.1	**20.44**	**23.40**
FOS_20	1.0	4	10.0	10.0	1.0	25	2.0	**22.26**	**24.46**
FOS_21	3.1	4	10.0	10.0	2.1	25	3.1	**3.61**	**5.25**
FOS_22	5.1	4	10.0	10.0	4.2	25	5.2	**1.08**	**1.88**
FOS_23	1.0	4	10.0	10.0	1.8	25	2.8	**12.96**	**17.93**
FOS_24	2.3	4	10.0	10.0	1.3	25	2.3	**7.63**	**9.37**
FOS_25	1.0	4	10.0	10.0	2.6	25	3.6	**8.80**	**13.77**
FOS_26	4.1	4	10.0	10.0	1.5	25	2.5	**3.79**	**4.90**
FOS_27	1.7	4	10.0	10.0	1.0	25	2.0	**12.77**	**14.13**
FOS_28	2.4	4	10.0	10.0	0.9	25	1.9	**10.39**	**10.76**
FOS_29	3.3	4	10.0	10.0	0.4	25	1.4	**18.16**	**10.83**
FOS_30	1.0	4	10.0	10.0	0.4	25	1.4	**58.02**	**35.58**
FOS_31	2.6	4	10.0	10.0	0.5	25	1.5	**15.90**	**12.18**
FOS_32	6.4	4	10.0	10.0	0.7	25	1.7	**4.94**	**4.47**
FOS_33	1.9	4	10.0	10.0	0.9	25	1.9	**13.85**	**14.00**
FOS_34	1.0	4	10.0	10.0	1.2	25	2.2	**19.10**	**22.56**
FOS_35	1.0	4	10.0	10.0	1.5	25	2.5	**15.34**	**19.90**
FOS_36	1.8	4	10.0	10.0	0.8	25	1.8	**16.45**	**15.38**
FOS_37	3.5	4	10.0	10.0	0.8	25	1.8	**7.87**	**7.75**
FOS_38	3.7	4	10.0	10.0	0.9	25	1.9	**7.23**	**7.26**
FOS_39	4.9	4	10.0	10.0	1.5	25	2.5	**3.05**	**3.98**
FOS_40	3.9	4	10.0	10.0	1.6	25	2.6	**3.69**	**4.88**
FOS_41	1.0	4	10.0	10.0	1.5	25	2.5	**15.05**	**19.68**
FOS_42	1.0	4	10.0	10.0	1.8	25	2.8	**13.03**	**17.99**
FOS_43	1.0	4	10.0	10.0	1.5	25	2.5	**14.90**	**19.55**
FOS_44	1.8	4	10.0	10.0	1.5	25	2.5	**8.84**	**11.36**
FOS_45	1.0	4	10.0	10.0	1.4	25	2.4	**16.35**	**20.66**
FOS_46	1.0	4	10.0	10.0	2.1	25	3.1	**11.10**	**16.19**
FOS_47	1.0	4	10.0	10.0	2.1	25	3.1	**11.18**	**16.27**
FOS_48	1.0	4	10.0	10.0	2.0	25	3.0	**11.45**	**16.53**
FOS_49	1.7	4	10.0	10.0	2.0	25	3.0	**6.83**	**9.78**
FOS_50	1.6	4	10.0	10.0	1.9	25	2.9	**7.51**	**10.66**
FOS_51	1.0	4	10.0	10.0	1.6	25	2.6	**13.92**	**18.76**
FOS_52	1.0	4	10.0	10.0	1.2	25	2.2	**18.62**	**22.25**
FOS_53	0.8	4	10.0	10.0	1.0	25	2.0	**29.87**	**31.63**
FOS_54	1.4	4	10.0	10.0	1.0	25	2.0	**15.28**	**16.93**
FOS_55	1.0	4	10.0	10.0	0.6	25	1.6	**39.32**	**31.36**
FOS_56	2.1	4	10.0	10.0	1.0	25	2.0	**10.69**	**11.64**
FOS_57	4.1	4	10.0	10.0	0.7	25	1.7	**8.07**	**7.19**
FOS_58	1.0	4	10.0	10.0	0.8	25	1.8	**28.71**	**27.60**
FOS_59	5.0	4	10.0	10.0	1.6	25	2.6	**2.88**	**3.81**
FOS_60	1.0	4	10.0	10.0	1.1	25	2.1	**20.40**	**23.38**
FOS_61	1.0	4	10.0	10.0	2.0	25	3.0	**11.75**	**16.82**
FOS_62	1.0	4	10.0	10.0	1.6	25	2.6	**14.53**	**19.26**
FOS_63	2.2	4	10.0	10.0	2.6	25	3.6	**3.92**	**6.14**
FOS_64	1.0	4	10.0	10.0	2.9	25	3.9	**7.87**	**12.69**
FOS_65	1.0	4	10.0	10.0	3.3	25	4.3	**6.85**	**11.41**

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - Drained Analysis

Turbine No./Waypoint	Slope	Design c'	Bulk unit weight of Peat	Unit weight of Water	Depth of In situ Peat	Friction Angle	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 (1)	Condition (2)
								100% Water	100% Water
FOS_66	1.0	4	10.0	10.0	2.3	25	3.3	**9.92**	**14.99**
FOS_67	2.3	4	10.0	10.0	1.1	25	2.1	**9.13**	**10.21**
FOS_68	1.0	4	10.0	10.0	2.2	25	3.2	**10.47**	**15.56**
FOS_69	1.9	4	10.0	10.0	2.6	25	3.6	**4.67**	**7.30**
FOS_70	1.4	4	10.0	10.0	2.9	25	3.9	**5.52**	**8.89**
FOS_71	3.1	4	10.0	10.0	3.3	25	4.3	**2.21**	**3.67**
FOS_72	1.5	4	10.0	10.0	2.6	25	3.6	**5.78**	**9.00**
FOS_73	1.0	4	10.0	10.0	3.6	25	4.6	**6.32**	**10.73**
FOS_74	1.0	4	10.0	10.0	2.8	25	3.8	**8.17**	**13.04**
FOS_75	1.0	4	10.0	10.0	2.6	25	3.6	**8.92**	**13.91**
FOS_76	1.0	4	10.0	10.0	2.5	25	3.5	**9.11**	**14.12**
FOS_77	1.0	4	10.0	10.0	2.9	25	3.9	**7.94**	**12.77**
FOS_78	1.0	4	10.0	10.0	3.4	25	4.4	**6.82**	**11.38**
FOS_79	1.8	4	10.0	10.0	1.0	25	2.0	**12.47**	**13.73**
FOS_80	1.0	4	10.0	10.0	1.0	25	2.0	**22.68**	**24.69**
FOS_81	1.0	4	10.0	10.0	1.6	25	2.6	**14.34**	**19.10**
FOS_82	1.0	4	10.0	10.0	2.2	25	3.2	**10.26**	**15.35**
FOS_83	1.0	4	10.0	10.0	2.9	25	3.9	**7.80**	**12.61**
FOS_84	1.0	4	10.0	10.0	2.7	25	3.7	**8.35**	**13.25**
FOS_85	1.8	4	10.0	10.0	1.6	25	2.6	**8.05**	**10.73**
FOS_86	1.0	4	10.0	10.0	1.0	25	2.0	**22.92**	**24.82**
FOS_87	1.0	4	10.0	10.0	1.0	25	2.0	**22.92**	**24.82**
FOS_88	2.3	4	10.0	10.0	1.0	25	2.0	**9.55**	**10.45**
FOS_89	3.5	4	10.0	10.0	1.1	25	2.1	**6.04**	**6.76**
FOS_90	1.0	4	10.0	10.0	1.3	25	2.3	**17.32**	**21.36**
FOS_91	1.0	4	10.0	10.0	1.2	25	2.2	**19.74**	**22.97**
FOS_92	1.0	4	10.0	10.0	1.1	25	2.1	**20.72**	**23.57**
FOS_93	3.0	4	10.0	10.0	1.4	25	2.4	**5.53**	**6.97**
FOS_94	1.0	4	10.0	10.0	1.1	25	2.1	**20.84**	**23.64**
FOS_95	1.0	4	10.0	10.0	0.6	25	1.6	**37.54**	**30.82**
FOS_96	1.0	4	10.0	10.0	0.9	25	1.9	**26.27**	**26.51**
FOS_97	1.0	4	10.0	10.0	0.4	25	1.4	**52.59**	**34.57**
FOS_98	1.0	4	10.0	10.0	0.4	25	1.4	**57.52**	**35.49**
FOS_99	1.0	4	10.0	10.0	0.8	25	1.8	**27.55**	**27.09**
FOS_100	1.0	4	10.0	10.0	1.2	25	2.2	**19.68**	**22.93**
FOS_101	1.0	4	10.0	10.0	1.9	25	2.9	**12.16**	**17.20**
FOS_102	1.4	4	10.0	10.0	0.6	25	1.6	**27.00**	**22.32**
FOS_103	3.3	4	10.0	10.0	0.1	25	1.1	**93.01**	**13.92**
FOS_104	7.2	4	10.0	10.0	0.4	25	1.4	**8.55**	**5.03**
FOS_105	1.0	4	10.0	10.0	1.2	25	2.2	**19.09**	**22.55**
FOS_106	1.0	4	10.0	10.0	2.1	25	3.1	**11.15**	**16.25**
FOS_107	1.0	4	10.0	10.0	1.7	25	2.7	**13.33**	**18.25**
FOS_108	1.0	4	10.0	10.0	0.8	25	1.8	**27.79**	**27.20**
FOS_109	1.0	4	10.0	10.0	0.2	25	1.2	**96.80**	**40.13**
FOS_110	0.9	4	10.0	10.0	0.3	25	1.3	**88.70**	**44.41**
FOS_111	1.1	4	10.0	10.0	0.4	25	1.4	**57.15**	**32.09**
FOS_112	1.0	4	10.0	10.0	1.2	25	2.2	**18.54**	**22.19**
FOS_113	1.0	4	10.0	10.0	1.2	25	2.2	**18.42**	**22.12**
FOS_114	1.0	4	10.0	10.0	0.7	25	1.7	**32.02**	**28.93**
FOS_115	1.0	4	10.0	10.0	0.6	25	1.6	**35.39**	**30.13**
FOS_116	1.0	4	10.0	10.0	1.0	25	2.0	**24.08**	**25.43**
FOS_117	1.0	4	10.0	10.0	1.8	25	2.8	**12.39**	**17.42**
FOS_118	2.3	4	10.0	10.0	2.0	25	3.0	**5.13**	**7.34**
FOS_119	2.0	4	10.0	10.0	1.5	25	2.5	**7.51**	**9.81**
FOS_120	1.0	4	10.0	10.0	1.5	25	2.5	**15.67**	**20.15**
FOS_121	1.0	4	10.0	10.0	0.6	25	1.6	**35.54**	**30.18**
FOS_122	3.0	4	10.0	10.0	1.0	25	2.0	**7.66**	**8.23**
FOS_123	1.9	4	10.0	10.0	0.7	25	1.7	**15.72**	**14.57**
FOS_124	2.1	4	10.0	10.0	2.1	25	3.1	**5.12**	**7.52**
FOS_125	1.0	4	10.0	10.0	1.5	25	2.5	**15.25**	**19.83**
FOS_126	1.0	4	10.0	10.0	1.7	25	2.7	**13.49**	**18.39**
FOS_127	1.0	4	10.0	10.0	1.5	25	2.5	**14.94**	**19.58**
FOS_128	1.0	4	10.0	10.0	1.6	25	2.6	**14.31**	**19.07**
FOS_129	1.9	4	10.0	10.0	1.8	25	2.8	**6.75**	**9.39**
FOS_130	1.0	4	10.0	10.0	2.0	25	3.0	**11.59**	**16.67**
FOS_131	1.0	4	10.0	10.0	2.0	25	3.0	**11.24**	**16.33**
FOS_132	3.4	4	10.0	10.0	2.0	25	3.0	**3.30**	**4.78**
FOS_133	1.0	4	10.0	10.0	1.5	25	2.5	**15.17**	**19.77**
FOS_134	3.6	4	10.0	10.0	1.0	25	2.0	**6.70**	**7.06**
FOS_135	2.4	4	10.0	10.0	1.8	25	2.8	**5.19**	**7.27**
FOS_136	4.9	4	10.0	10.0	1.9	25	2.9	**2.44**	**3.46**
FOS_137	1.0	4	10.0	10.0	1.5	25	2.5	**15.47**	**20.00**
FOS_138	2.6	4	10.0	10.0	0.9	25	1.9	**9.39**	**9.78**
FOS_139	1.0	4	10.0	10.0	0.4	25	1.4	**54.92**	**35.02**
FOS_140	3.3	4	10.0	10.0	1.1	25	2.1	**6.57**	**7.35**
FOS_141	1.0	4	10.0	10.0	1.5	25	2.5	**15.78**	**20.24**
FOS_142	1.0	4	10.0	10.0	1.3	25	2.3	**17.15**	**21.24**
FOS_143	2.6	4	10.0	10.0	0.5	25	1.5	**17.34**	**12.55**
FOS_144	1.7	4	10.0	10.0	1.3	25	2.3	**9.99**	**12.37**
FOS_145	1.0	4	10.0	10.0	1.5	25	2.5	**15.40**	**19.95**
FOS_146	1.0	4	10.0	10.0	1.2	25	2.2	**19.82**	**23.02**
FOS_147	1.1	4	10.0	10.0	1.0	25	2.0	**19.77**	**21.53**
FOS_148	1.9	4	10.0	10.0	1.6	25	2.6	**7.69**	**10.19**
FOS_149	1.0	4	10.0	10.0	3.0	25	4.0	**7.56**	**12.31**
FOS_150	1.0	4	10.0	10.0	2.7	25	3.7	**8.61**	**13.56**
FOS_151	1.0	4	10.0	10.0	1.4	25	2.4	**16.20**	**20.55**
FOS_152	1.0	4	10.0	10.0	1.4	25	2.4	**16.40**	**20.70**
FOS_153	1.0	4	10.0	10.0	1.1	25	2.1	**21.34**	**23.93**
FOS_154	2.4	4	10.0	10.0	0.9	25	1.9	**10.69**	**10.91**
FOS_155	1.7	4	10.0	10.0	0.7	25	1.7	**19.59**	**17.18**
FOS_156	3.8	4	10.0	10.0	0.5	25	1.5	**13.43**	**9.05**
FOS_157	1.1	4	10.0	10.0	0.8	25	1.8	**24.12**	**23.68**
FOS_158	1.7	4	10.0	10.0	1.0	25	2.0	**13.85**	**14.71**
FOS_159	1.0	4	10.0	10.0	1.1	25	2.1	**21.47**	**24.01**
FOS_160	1.8	4	10.0	10.0	0.6	25	1.6	**21.47**	**17.11**

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - Drained Analysis

Turbine No./Waypoint	Slope	Design c'	Bulk unit weight of Peat	Unit weight of Water	Depth of In situ Peat	Friction Angle	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 (1)	Condition (2)
								100% Water	100% Water
FOS_161	1.0	4	10.0	10.0	0.6	25	1.6	**35.94**	**30.31**
FOS_162	1.0	4	10.0	10.0	1.1	25	2.1	**20.84**	**23.63**
FOS_163	1.0	4	10.0	10.0	2.3	25	3.3	**9.89**	**14.96**
FOS_164	1.0	4	10.0	10.0	1.5	25	2.5	**15.67**	**20.15**
FOS_165	7.0	4	10.0	10.0	0.2	25	1.2	**20.54**	**6.15**
FOS_166	1.0	4	10.0	10.0	1.0	25	2.0	**21.88**	**24.24**
FOS_167	1.0	4	10.0	10.0	1.9	25	2.9	**12.20**	**17.24**
FOS_168	1.0	4	10.0	10.0	2.0	25	3.0	**11.72**	**16.80**
FOS_169	1.0	4	10.0	10.0	1.4	25	2.4	**16.45**	**20.74**
FOS_170	2.0	4	10.0	10.0	0.9	25	1.9	**12.67**	**13.01**
FOS_171	1.0	4	10.0	10.0	0.9	25	1.9	**24.46**	**25.62**
FOS_172	1.8	4	10.0	10.0	1.0	25	2.0	**12.85**	**13.72**
FOS_173	4.6	4	10.0	10.0	0.9	25	1.9	**5.45**	**5.61**
FOS_174	4.3	4	10.0	10.0	1.1	25	2.1	**4.72**	**5.42**
FOS_175	3.0	4	10.0	10.0	1.4	25	2.4	**5.46**	**6.91**
FOS_176	1.0	4	10.0	10.0	1.5	25	2.5	**15.78**	**20.24**
FOS_177	1.0	4	10.0	10.0	1.7	25	2.7	**13.70**	**18.56**
FOS_178	1.0	4	10.0	10.0	1.7	25	2.7	**13.68**	**18.55**
FOS_179	1.0	4	10.0	10.0	1.9	25	2.9	**12.26**	**17.29**
FOS_180	2.5	4	10.0	10.0	0.6	25	1.6	**16.51**	**12.89**
FOS_181	1.0	4	10.0	10.0	0.5	25	1.5	**48.08**	**33.61**
FOS_182	1.3	4	10.0	10.0	0.5	25	1.5	**38.23**	**25.89**
FOS_183	1.0	4	10.0	10.0	0.4	25	1.4	**62.82**	**36.37**
FOS_184	2.0	4	10.0	10.0	0.1	25	1.1	**115.58**	**22.53**
FOS_185	1.5	4	10.0	10.0	0.2	25	1.2	**90.88**	**28.50**
FOS_186	1.0	4	10.0	10.0	0.7	25	1.7	**34.15**	**29.70**
FOS_187	2.7	4	10.0	10.0	0.9	25	1.9	**9.65**	**9.79**
FOS_188	1.0	4	10.0	10.0	0.8	25	1.8	**28.84**	**27.66**
FOS_189	1.0	4	10.0	10.0	0.8	25	1.8	**28.55**	**27.53**
FOS_190	1.0	4	10.0	10.0	1.3	25	2.3	**17.75**	**21.66**
FOS_191	3.9	4	10.0	10.0	1.6	25	2.6	**3.68**	**4.90**
FOS_192	1.0	4	10.0	10.0	0.7	25	1.7	**32.78**	**29.21**
FOS_193	2.7	4	10.0	10.0	0.7	25	1.7	**11.81**	**10.71**
FOS_194	1.0	4	10.0	10.0	1.3	25	2.3	**17.27**	**21.33**
FOS_195	11.3	4	10.0	10.0	1.4	25	2.4	**1.53**	**1.87**
FOS_196	1.0	4	10.0	10.0	1.6	25	2.6	**14.61**	**19.32**
FOS_197	1.9	4	10.0	10.0	2.0	25	3.0	**6.14**	**8.82**
FOS_198	2.2	4	10.0	10.0	1.2	25	2.2	**8.57**	**10.23**
FOS_199	1.0	4	10.0	10.0	1.6	25	2.6	**14.33**	**19.09**
FOS_200	8.4	4	10.0	10.0	2.1	25	3.1	**1.31**	**1.91**
FOS_201	1.0	4	10.0	10.0	1.2	25	2.2	**18.36**	**22.08**
FOS_202	1.0	4	10.0	10.0	0.4	25	1.4	**54.27**	**34.90**
FOS_203	0.7	4	10.0	10.0	0.6	25	1.6	**60.07**	**46.43**
FOS_204	0.7	4	10.0	10.0	0.9	25	1.9	**38.99**	**38.92**
FOS_205	1.0	4	10.0	10.0	0.9	25	1.9	**27.49**	**27.46**
FOS_206	1.0	4	10.0	10.0	0.8	25	1.8	**28.43**	**27.48**
FOS_207	3.7	4	10.0	10.0	0.7	25	1.7	**8.77**	**7.91**
FOS_208	1.0	4	10.0	10.0	0.6	25	1.6	**37.25**	**30.73**
FOS_209	1.0	4	10.0	10.0	1.8	25	2.8	**12.81**	**17.80**
FOS_210	1.0	4	10.0	10.0	3.2	25	4.2	**7.21**	**11.87**
FOS_211	1.0	4	10.0	10.0	1.8	25	2.8	**12.71**	**17.71**
FOS_212	1.8	4	10.0	10.0	1.0	25	2.0	**12.24**	**13.51**
FOS_213	1.0	4	10.0	10.0	1.1	25	2.1	**20.46**	**23.41**
FOS_214	1.0	4	10.0	10.0	1.1	25	2.1	**21.45**	**24.00**
FOS_215	1.9	4	10.0	10.0	1.0	25	2.0	**11.56**	**12.62**
FOS_216	1.8	4	10.0	10.0	1.2	25	2.2	**11.16**	**12.96**
FOS_217	1.0	4	10.0	10.0	1.5	25	2.5	**15.64**	**20.13**
FOS_218	1.0	4	10.0	10.0	2.4	25	3.4	**9.45**	**14.49**
FOS_219	1.0	4	10.0	10.0	1.7	25	2.7	**14.24**	**19.21**
FOS_220	1.2	4	10.0	10.0	0.9	25	1.9	**21.56**	**21.90**
FOS_221	1.0	4	10.0	10.0	0.6	25	1.6	**39.18**	**31.32**
FOS_222	1.0	4	10.0	10.0	0.7	25	1.7	**32.83**	**29.23**
FOS_223	1.0	4	10.0	10.0	1.9	25	2.9	**11.91**	**16.97**
FOS_224	3.0	4	10.0	10.0	2.2	25	3.2	**3.45**	**5.12**
FOS_225	2.4	4	10.0	10.0	1.3	25	2.3	**7.24**	**8.91**
FOS_226	1.0	4	10.0	10.0	2.7	25	3.7	**8.63**	**13.58**
FOS_227	1.0	4	10.0	10.0	1.9	25	2.9	**11.99**	**17.05**
FOS_228	1.0	4	10.0	10.0	1.8	25	2.8	**13.05**	**18.01**
FOS_229	1.0	4	10.0	10.0	0.5	25	1.5	**42.87**	**32.34**
FOS_230	1.0	4	10.0	10.0	0.2	25	1.2	**116.24**	**41.46**
FOS_231	1.0	4	10.0	10.0	0.1	25	1.1	**164.09**	**43.55**
FOS_232	1.0	4	10.0	10.0	0.2	25	1.2	**116.72**	**41.49**
FOS_233	1.0	4	10.0	10.0	0.9	25	1.9	**24.46**	**25.62**
FOS_234	9.1	4	10.0	10.0	1.3	25	2.3	**1.90**	**2.33**
FOS_235	1.0	4	10.0	10.0	0.9	25	1.9	**25.78**	**26.27**
FOS_236	17.4	4	10.0	10.0	0.1	25	1.1	**10.08**	**2.53**
FOS_237	1.0	4	10.0	10.0	0.5	25	1.5	**43.08**	**32.40**
FOS_238	2.7	4	10.0	10.0	0.8	25	1.8	**10.69**	**10.26**
FOS_239	1.4	4	10.0	10.0	0.8	25	1.8	**20.61**	**19.51**
FOS_240	2.3	4	10.0	10.0	1.4	25	2.4	**7.35**	**9.18**
FOS_241	3.1	4	10.0	10.0	1.0	25	2.0	**7.59**	**8.12**
FOS_242	2.2	4	10.0	10.0	1.1	25	2.1	**9.45**	**10.79**
FOS_243	2.1	4	10.0	10.0	1.0	25	2.0	**11.11**	**12.03**
FOS_244	3.2	4	10.0	10.0	1.1	25	2.1	**6.74**	**7.51**
FOS_245	2.9	4	10.0	10.0	1.1	25	2.1	**7.40**	**8.25**
FOS_246	5.0	4	10.0	10.0	1.7	25	2.7	**2.66**	**3.63**
FOS_247	3.7	4	10.0	10.0	1.3	25	2.3	**4.87**	**5.92**
FOS_248	0.5	4	10.0	10.0	0.9	25	1.9	**46.86**	**49.40**
FOS_249	0.5	4	10.0	10.0	1.2	25	2.2	**41.83**	**49.33**
FOS_250	0.4	4	10.0	10.0	0.8	25	1.8	**68.63**	**67.53**
FOS_251	1.0	4	10.0	10.0	0.8	25	1.8	**27.08**	**26.88**
FOS_252	1.0	4	10.0	10.0	1.3	25	2.3	**17.52**	**21.50**
FOS_253	0.6	4	10.0	10.0	1.5	25	2.5	**26.79**	**34.75**
FOS_254	0.7	4	10.0	10.0	1.4	25	2.4	**21.24**	**27.22**
FOS_255	1.8	4	10.0	10.0	1.3	25	2.3	**9.73**	**12.01**

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - Drained Analysis

Turbine No./Waypoint	Slope	Design c'	Bulk unit weight of Peat	Unit weight of Water	Depth of In situ Peat	Friction Angle	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 (1)	Condition (2)
								100% Water	100% Water
FOS_256	1.0	4	10.0	10.0	1.6	25	2.6	**13.95**	**18.78**
FOS_257	1.0	4	10.0	10.0	1.5	25	2.5	**16.02**	**20.64**
FOS_258	0.8	4	10.0	10.0	1.1	25	2.1	**26.19**	**29.59**
FOS_259	0.7	4	10.0	10.0	1.0	25	2.0	**31.86**	**35.28**
FOS_260	1.1	4	10.0	10.0	1.0	25	2.0	**21.83**	**23.21**
FOS_261	1.4	4	10.0	10.0	0.6	25	1.6	**25.75**	**21.92**
FOS_262	1.2	4	10.0	10.0	0.5	25	1.5	**40.72**	**28.11**
FOS_263	0.9	4	10.0	10.0	0.4	25	1.4	**72.38**	**42.21**
FOS_264	1.0	4	10.0	10.0	0.6	25	1.6	**41.10**	**31.87**
FOS_265	1.1	4	10.0	10.0	0.6	25	1.6	**30.81**	**26.27**
FOS_266	1.0	4	10.0	10.0	1.0	25	2.0	**22.14**	**24.39**
FOS_267	0.9	4	10.0	10.0	0.7	25	1.7	**36.76**	**33.47**
FOS_268	3.2	4	10.0	10.0	1.8	25	2.8	**3.93**	**5.49**
FOS_269	1.0	4	10.0	10.0	2.6	25	3.6	**8.74**	**13.71**
FOS_270	2.5	4	10.0	10.0	1.5	25	2.5	**5.99**	**7.82**
FOS_271	2.4	4	10.0	10.0	0.7	25	1.7	**14.51**	**12.45**
FOS_272	1.0	4	10.0	10.0	0.5	25	1.5	**50.14**	**34.06**
FOS_273	1.0	4	10.0	10.0	0.8	25	1.8	**27.03**	**26.86**
FOS_274	1.0	4	10.0	10.0	1.3	25	2.3	**17.65**	**21.60**
FOS_275	1.0	4	10.0	10.0	0.5	25	1.5	**48.62**	**33.73**
FOS_276	1.0	4	10.0	10.0	0.9	25	1.9	**25.62**	**26.20**
FOS_277	3.1	4	10.0	10.0	1.4	25	2.4	**5.25**	**6.65**
FOS_278	1.0	4	10.0	10.0	1.0	25	2.0	**23.41**	**25.08**
FOS_279	3.1	4	10.0	10.0	1.8	25	2.8	**4.13**	**5.71**
FOS_280	4.0	4	10.0	10.0	1.3	25	2.3	**4.55**	**5.48**
FOS_281	1.0	4	10.0	10.0	1.6	25	2.6	**14.32**	**19.08**
FOS_282	4.1	4	10.0	10.0	1.0	25	2.0	**5.58**	**6.07**
FOS_283	1.9	4	10.0	10.0	1.2	25	2.2	**10.34**	**12.08**
FOS_284	2.4	4	10.0	10.0	1.1	25	2.1	**8.77**	**9.89**
FOS_285	2.6	4	10.0	10.0	0.9	25	1.9	**9.52**	**9.95**
FOS_286	1.4	4	10.0	10.0	0.5	25	1.5	**32.77**	**23.29**
FOS_287	1.0	4	10.0	10.0	0.1	25	1.1	**219.57**	**44.95**
FOS_288	1.0	4	10.0	10.0	0.1	25	1.1	**342.65**	**46.53**
FOS_289	2.0	4	10.0	10.0	0.0	25	1.0	**38141.90**	**24.76**
FOS_290	1.0	4	10.0	10.0	0.0	25	1.0	**5730.74**	**49.44**
FOS_291	1.0	4	10.0	10.0	0.0	25	1.0	**57307.42**	**49.62**
FOS_292	1.0	4	10.0	10.0	0.0	25	1.0	**38204.94**	**49.61**
FOS_293	1.0	4	10.0	10.0	0.0	25	1.0	**28653.71**	**49.60**
FOS_294	3.6	4	10.0	10.0	0.0	25	1.0	**1028.13**	**13.69**
FOS_295	1.0	4	10.0	10.0	0.0	25	1.0	**229229.67**	**49.63**
FOS_296	1.0	4	10.0	10.0	0.0	25	1.0	**7163.43**	**49.48**
FOS_297	5.4	4	10.0	10.0	0.0	25	1.0	**6069.32**	**9.15**
FOS_298	5.4	4	10.0	10.0	0.0	25	1.0	**196.92**	**9.06**
FOS_299	1.0	4	10.0	10.0	0.0	25	1.0	**22922.97**	**49.59**
FOS_300	3.1	4	10.0	10.0	0.0	25	1.0	**10612.87**	**16.05**
FOS_301	23.2	4	10.0	10.0	0.0	25	1.0	**197.14**	**2.18**
FOS_302	5.0	4	10.0	10.0	0.1	25	1.1	**83.32**	**9.47**
FOS_303	1.0	4	10.0	10.0	0.1	25	1.1	**167.44**	**43.66**
FOS_304	1.0	4	10.0	10.0	0.1	25	1.1	**445.11**	**47.21**
FOS_305	2.3	4	10.0	10.0	0.0	25	1.0	**273.66**	**20.91**
FOS_306	2.9	4	10.0	10.0	1.1	25	2.1	**7.42**	**8.26**
FOS_307	0.6	4	10.0	10.0	0.4	25	1.4	**96.14**	**61.18**
FOS_308	0.5	4	10.0	10.0	0.8	25	1.8	**63.02**	**60.38**
FOS_309	0.5	4	10.0	10.0	0.4	25	1.4	**121.57**	**76.73**
FOS_310	1.0	4	10.0	10.0	0.5	25	1.5	**46.89**	**33.34**
FOS_311	2.3	4	10.0	10.0	0.4	25	1.4	**22.11**	**14.66**
FOS_312	1.6	4	10.0	10.0	0.3	25	1.3	**43.46**	**23.29**
FOS_313	1.0	4	10.0	10.0	0.5	25	1.5	**48.89**	**33.79**
FOS_314	1.0	4	10.0	10.0	0.3	25	1.3	**78.05**	**38.37**
FOS_315	1.0	4	10.0	10.0	0.4	25	1.4	**51.48**	**34.34**
FOS_316	3.1	4	10.0	10.0	1.0	25	2.0	**7.34**	**7.98**
FOS_317	6.7	4	10.0	10.0	1.2	25	2.2	**2.90**	**3.39**
FOS_318	3.1	4	10.0	10.0	1.8	25	2.8	**4.17**	**5.77**
FOS_319	4.1	4	10.0	10.0	1.6	25	2.6	**3.54**	**4.68**
FOS_320	3.9	4	10.0	10.0	0.6	25	1.6	**10.41**	**8.07**
FOS_321	1.0	4	10.0	10.0	1.3	25	2.3	**17.31**	**21.35**
FOS_322	1.0	4	10.0	10.0	0.4	25	1.4	**56.31**	**35.28**
FOS_323	1.0	4	10.0	10.0	0.5	25	1.5	**41.86**	**32.07**
FOS_324	1.0	4	10.0	10.0	0.7	25	1.7	**31.35**	**28.67**
FOS_325	1.0	4	10.0	10.0	0.7	25	1.7	**32.71**	**29.19**
FOS_326	6.5	4	10.0	10.0	1.7	25	2.7	**2.07**	**2.81**
FOS_327	1.0	4	10.0	10.0	2.2	25	3.2	**10.38**	**15.47**
FOS_328	7.5	4	10.0	10.0	2.7	25	3.7	**1.16**	**1.81**
FOS_329	11.0	4	10.0	10.0	1.7	25	2.7	**1.29**	**1.71**
FOS_330	15.0	4	10.0	10.0	0.8	25	1.8	**1.89**	**1.81**
FOS_331	2.3	4	10.0	10.0	0.6	25	1.6	**16.66**	**13.33**
FOS_332	1.0	4	10.0	10.0	0.9	25	1.9	**26.41**	**26.57**
FOS_333	1.0	4	10.0	10.0	0.9	25	1.9	**24.19**	**25.49**
FOS_334	1.0	4	10.0	10.0	0.7	25	1.7	**31.12**	**28.58**
FOS_335	1.2	4	10.0	10.0	0.6	25	1.6	**32.12**	**25.90**
FOS_336	1.0	4	10.0	10.0	0.9	25	1.9	**25.18**	**25.98**
FOS_337	1.2	4	10.0	10.0	0.9	25	1.9	**22.41**	**22.30**
FOS_338	1.0	4	10.0	10.0	1.0	25	2.0	**23.71**	**25.24**
FOS_339	2.8	4	10.0	10.0	0.8	25	1.8	**10.46**	**9.93**
FOS_340	1.0	4	10.0	10.0	0.7	25	1.7	**32.11**	**28.96**
FOS_341	1.0	4	10.0	10.0	0.9	25	1.9	**26.47**	**26.60**
FOS_342	3.1	4	10.0	10.0	0.9	25	1.9	**7.94**	**8.22**
FOS_343	1.0	4	10.0	10.0	0.4	25	1.4	**53.06**	**34.66**
FOS_344	1.0	4	10.0	10.0	1.0	25	2.0	**24.02**	**25.40**
FOS_345	1.0	4	10.0	10.0	1.6	25	2.6	**14.67**	**19.37**
FOS_346	1.0	4	10.0	10.0	0.9	25	1.9	**25.62**	**26.20**
FOS_347	1.0	4	10.0	10.0	1.1	25	2.1	**21.63**	**24.10**
FOS_348	1.0	4	10.0	10.0	1.2	25	2.2	**19.45**	**22.79**
FOS_349	1.0	4	10.0	10.0	1.0	25	2.0	**22.07**	**24.35**
FOS_350	1.0	4	10.0	10.0	1.2	25	2.2	**18.99**	**22.49**

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - Drained Analysis

Turbine No./Waypoint	Slope	Design c'	Bulk unit weight of Peat	Unit weight of Water	Depth of In situ Peat	Friction Angle	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 (1)	Condition (2)
								100% Water	100% Water
FOS_351	1.0	4	10.0	10.0	1.4	25	2.4	**16.41**	**20.71**
FOS_352	1.0	4	10.0	10.0	1.5	25	2.5	**14.87**	**19.53**
FOS_353	1.0	4	10.0	10.0	1.4	25	2.4	**15.81**	**20.26**
FOS_354	1.0	4	10.0	10.0	1.4	25	2.4	**15.84**	**20.29**
FOS_355	1.0	4	10.0	10.0	1.6	25	2.6	**14.49**	**19.22**
FOS_356	1.8	4	10.0	10.0	1.4	25	2.4	**8.90**	**11.25**
FOS_357	1.0	4	10.0	10.0	1.1	25	2.1	**20.40**	**23.37**
FOS_358	1.0	4	10.0	10.0	1.3	25	2.3	**18.06**	**21.87**
FOS_359	2.5	4	10.0	10.0	0.7	25	1.7	**13.97**	**12.10**
FOS_360	1.0	4	10.0	10.0	0.1	25	1.1	**208.01**	**44.71**
FOS_361	1.2	4	10.0	10.0	0.5	25	1.5	**41.94**	**28.37**
FOS_362	1.0	4	10.0	10.0	0.8	25	1.8	**27.82**	**27.21**
FOS_363	2.2	4	10.0	10.0	0.9	25	1.9	**12.23**	**12.25**
FOS_364	1.0	4	10.0	10.0	0.9	25	1.9	**26.75**	**26.73**
FOS_365	1.0	4	10.0	10.0	0.8	25	1.8	**29.05**	**27.74**
FOS_366	1.0	4	10.0	10.0	1.0	25	2.0	**22.55**	**24.61**
FOS_367	1.0	4	10.0	10.0	0.9	25	1.9	**24.66**	**25.73**
FOS_368	1.9	4	10.0	10.0	1.7	25	2.7	**7.22**	**9.80**
FOS_369	1.0	4	10.0	10.0	1.0	25	2.0	**23.94**	**25.36**
FOS_370	1.0	4	10.0	10.0	0.6	25	1.6	**35.44**	**30.14**
FOS_371	7.9	4	10.0	10.0	0.5	25	1.5	**6.47**	**4.35**
FOS_372	1.4	4	10.0	10.0	0.5	25	1.5	**30.13**	**22.63**
FOS_373	1.0	4	10.0	10.0	2.7	25	3.7	**8.48**	**13.40**
FOS_374	6.3	4	10.0	10.0	0.4	25	1.4	**8.98**	**5.62**
FOS_375	1.0	4	10.0	10.0	0.2	25	1.2	**95.08**	**39.99**
FOS_376	3.6	4	10.0	10.0	0.3	25	1.3	**22.94**	**10.78**
FOS_377	1.0	4	10.0	10.0	1.1	25	2.1	**20.17**	**23.23**
FOS_378	1.6	4	10.0	10.0	0.5	25	1.5	**26.47**	**20.10**
FOS_379	1.0	4	10.0	10.0	0.5	25	1.5	**46.65**	**33.28**
FOS_380	1.0	4	10.0	10.0	0.5	25	1.5	**46.17**	**33.17**
FOS_381	1.0	4	10.0	10.0	0.2	25	1.2	**148.08**	**42.98**
FOS_382	1.0	4	10.0	10.0	0.7	25	1.7	**34.68**	**29.88**
FOS_383	1.0	4	10.0	10.0	0.8	25	1.8	**27.85**	**27.23**
FOS_384	2.2	4	10.0	10.0	1.9	25	2.9	**5.49**	**7.81**
FOS_385	1.0	4	10.0	10.0	2.4	25	3.4	**9.75**	**14.81**
FOS_386	1.0	4	10.0	10.0	1.2	25	2.2	**18.36**	**22.08**
FOS_387	1.0	4	10.0	10.0	0.9	25	1.9	**25.76**	**26.26**
FOS_388	1.0	4	10.0	10.0	0.7	25	1.7	**33.82**	**29.59**
FOS_389	8.4	4	10.0	10.0	0.9	25	1.9	**3.02**	**3.10**
FOS_390	1.0	4	10.0	10.0	0.5	25	1.5	**50.36**	**34.11**
FOS_391	1.0	4	10.0	10.0	0.9	25	1.9	**25.63**	**26.20**
FOS_392	1.0	4	10.0	10.0	0.8	25	1.8	**28.65**	**27.57**
FOS_393	0.7	4	10.0	10.0	1.3	25	2.3	**24.57**	**30.40**
FOS_394	0.7	4	10.0	10.0	1.4	25	2.4	**21.68**	**27.54**
FOS_395	1.0	4	10.0	10.0	1.6	25	2.6	**14.62**	**19.33**
FOS_396	1.0	4	10.0	10.0	1.1	25	2.1	**20.86**	**23.65**
FOS_397	1.0	4	10.0	10.0	1.1	25	2.1	**21.06**	**23.77**
FOS_398	1.0	4	10.0	10.0	0.4	25	1.4	**60.69**	**36.03**
FOS_399	1.5	4	10.0	10.0	0.8	25	1.8	**19.22**	**18.12**
FOS_400	1.6	4	10.0	10.0	0.5	25	1.5	**27.01**	**20.24**
FOS_401	1.0	4	10.0	10.0	0.7	25	1.7	**32.15**	**28.98**
FOS_402	3.3	4	10.0	10.0	0.5	25	1.5	**13.99**	**10.01**
FOS_403	1.0	4	10.0	10.0	0.1	25	1.1	**248.89**	**45.45**
FOS_404	4.3	4	10.0	10.0	0.9	25	1.9	**6.02**	**6.12**
FOS_405	2.9	4	10.0	10.0	1.6	25	2.6	**4.82**	**6.46**
FOS_406	1.0	4	10.0	10.0	0.8	25	1.8	**28.14**	**27.35**
FOS_407	1.9	4	10.0	10.0	0.7	25	1.7	**17.23**	**15.41**
FOS_408	3.1	4	10.0	10.0	0.3	25	1.3	**26.52**	**12.37**
FOS_409	2.1	4	10.0	10.0	0.5	25	1.5	**20.63**	**15.36**
FOS_410	1.0	4	10.0	10.0	0.6	25	1.6	**40.69**	**31.75**
FOS_411	1.0	4	10.0	10.0	0.9	25	1.9	**24.20**	**25.49**
FOS_412	1.0	4	10.0	10.0	1.0	25	2.0	**23.93**	**25.35**
FOS_413	1.8	4	10.0	10.0	0.6	25	1.6	**21.26**	**17.05**
FOS_414	1.1	4	10.0	10.0	0.1	25	1.1	**189.05**	**41.03**
FOS_415	1.5	4	10.0	10.0	0.3	25	1.3	**51.25**	**25.63**
FOS_416	2.5	4	10.0	10.0	0.5	25	1.5	**18.06**	**13.30**
FOS_417	1.0	4	10.0	10.0	0.9	25	1.9	**24.60**	**25.69**
FOS_418	3.3	4	10.0	10.0	0.7	25	1.7	**10.19**	**9.00**
FOS_419	4.1	4	10.0	10.0	1.0	25	2.0	**5.49**	**5.98**
FOS_420	4.9	4	10.0	10.0	0.8	25	1.8	**6.05**	**5.73**
FOS_421	4.1	4	10.0	10.0	0.6	25	1.6	**8.80**	**7.44**
FOS_422	4.3	4	10.0	10.0	0.7	25	1.7	**7.21**	**6.64**
FOS_423	5.5	4	10.0	10.0	0.6	25	1.6	**7.22**	**5.69**
FOS_424	3.3	4	10.0	10.0	0.9	25	1.9	**7.77**	**7.91**
FOS_425	1.3	4	10.0	10.0	1.3	25	2.3	**12.91**	**16.04**
FOS_426	1.0	4	10.0	10.0	2.6	25	3.6	**8.71**	**13.67**
FOS_427	1.0	4	10.0	10.0	1.6	25	2.6	**14.03**	**18.84**
FOS_428	1.0	4	10.0	10.0	1.5	25	2.5	**15.68**	**20.16**
FOS_429	1.0	4	10.0	10.0	1.5	25	2.5	**14.95**	**19.60**
FOS_430	1.0	4	10.0	10.0	1.1	25	2.1	**20.11**	**23.19**
FOS_431	1.0	4	10.0	10.0	1.2	25	2.2	**19.76**	**22.98**
FOS_432	1.0	4	10.0	10.0	1.1	25	2.1	**20.54**	**23.46**
FOS_433	1.0	4	10.0	10.0	1.2	25	2.2	**18.98**	**22.48**
FOS_434	0.6	4	10.0	10.0	0.9	25	1.9	**44.53**	**45.64**
FOS_435	0.9	4	10.0	10.0	0.7	25	1.7	**36.97**	**33.55**
FOS_436	0.9	4	10.0	10.0	0.4	25	1.4	**61.01**	**40.19**
FOS_437	2.2	4	10.0	10.0	1.0	25	2.0	**9.91**	**10.91**
FOS_438	4.9	4	10.0	10.0	0.9	25	1.9	**4.95**	**5.19**
FOS_439	1.7	4	10.0	10.0	0.5	25	1.5	**25.70**	**19.44**
FOS_440	1.0	4	10.0	10.0	0.1	25	1.1	**207.64**	**44.70**
FOS_441	1.0	4	10.0	10.0	0.3	25	1.3	**71.17**	**37.54**
FOS_442	4.3	4	10.0	10.0	1.3	25	2.3	**4.23**	**5.08**
FOS_443	2.8	4	10.0	10.0	0.7	25	1.7	**12.38**	**10.66**
FOS_444	1.4	4	10.0	10.0	0.6	25	1.6	**28.77**	**22.86**
FOS_445	1.0	4	10.0	10.0	0.9	25	1.9	**26.21**	**26.85**

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - Drained Analysis

Turbine No./Waypoint	Slope	Design c'	Bulk unit weight of Peat	Unit weight of Water	Depth of In situ Peat	Friction Angle	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 (1)	Condition (2)
								100% Water	100% Water
FOS_446	0.9	4	10.0	10.0	0.6	25	1.6	**40.31**	**33.42**
FOS_447	1.3	4	10.0	10.0	0.6	25	1.6	**28.11**	**23.91**
FOS_448	1.0	4	10.0	10.0	0.7	25	1.7	**32.99**	**29.29**
FOS_449	1.0	4	10.0	10.0	0.5	25	1.5	**44.30**	**32.71**
FOS_450	1.0	4	10.0	10.0	1.1	25	2.1	**21.28**	**23.90**
FOS_451	3.4	4	10.0	10.0	0.7	25	1.7	**9.52**	**8.54**
FOS_452	1.0	4	10.0	10.0	0.5	25	1.5	**49.93**	**34.02**
FOS_453	1.0	4	10.0	10.0	0.4	25	1.4	**54.35**	**34.91**
FOS_454	1.0	4	10.0	10.0	0.7	25	1.7	**32.90**	**29.25**
FOS_455	1.0	4	10.0	10.0	0.4	25	1.4	**57.34**	**35.46**
FOS_456	2.3	4	10.0	10.0	0.5	25	1.5	**18.45**	**13.82**
FOS_457	1.0	4	10.0	10.0	1.0	25	2.0	**22.53**	**24.60**
FOS_458	1.0	4	10.0	10.0	0.9	25	1.9	**24.94**	**25.86**
FOS_459	1.0	4	10.0	10.0	0.8	25	1.8	**27.93**	**27.26**
FOS_460	1.0	4	10.0	10.0	1.0	25	2.0	**23.47**	**25.11**
FOS_461	2.1	4	10.0	10.0	1.2	25	2.2	**9.13**	**10.72**
FOS_462	1.0	4	10.0	10.0	1.4	25	2.4	**16.87**	**21.05**
FOS_463	2.6	4	10.0	10.0	1.2	25	2.2	**7.14**	**8.49**
FOS_464	1.0	4	10.0	10.0	1.1	25	2.1	**20.19**	**23.25**
FOS_465	2.3	4	10.0	10.0	1.1	25	2.1	**9.45**	**10.52**
FOS_466	4.1	4	10.0	10.0	1.0	25	2.0	**5.67**	**6.12**
FOS_467	9.6	4	10.0	10.0	1.0	25	2.0	**2.43**	**2.60**
FOS_468	3.8	4	10.0	10.0	1.0	25	2.0	**6.06**	**6.56**
FOS_469	1.0	4	10.0	10.0	0.8	25	1.8	**29.89**	**28.09**
FOS_470	1.0	4	10.0	10.0	0.4	25	1.4	**55.28**	**35.09**
FOS_471	1.0	4	10.0	10.0	0.5	25	1.5	**46.57**	**33.26**
FOS_472	1.0	4	10.0	10.0	0.4	25	1.4	**61.89**	**36.22**
FOS_473	3.0	4	10.0	10.0	0.2	25	1.2	**45.62**	**14.04**
FOS_474	3.5	4	10.0	10.0	0.0	25	1.0	**275.39**	**13.89**
FOS_475	3.0	4	10.0	10.0	0.1	25	1.1	**121.28**	**15.68**
FOS_476	2.4	4	10.0	10.0	0.2	25	1.2	**46.31**	**17.12**
FOS_477	1.0	4	10.0	10.0	0.1	25	1.1	**391.85**	**46.89**
FOS_478	2.7	4	10.0	10.0	0.1	25	1.1	**105.73**	**16.74**
FOS_479	4.9	4	10.0	10.0	0.4	25	1.4	**12.05**	**7.34**
FOS_480	10.1	4	10.0	10.0	0.7	25	1.7	**3.43**	**2.95**
FOS_481	14.1	4	10.0	10.0	1.0	25	2.0	**1.76**	**1.81**
FOS_482	12.5	4	10.0	10.0	1.2	25	2.2	**1.62**	**1.84**
FOS_483	7.5	4	10.0	10.0	1.0	25	2.0	**3.10**	**3.32**
FOS_484	10.1	4	10.0	10.0	0.8	25	1.8	**2.98**	**2.78**
FOS_485	2.5	4	10.0	10.0	0.5	25	1.5	**17.53**	**12.97**
FOS_486	2.5	4	10.0	10.0	0.4	25	1.4	**22.73**	**14.30**
FOS_487	2.5	4	10.0	10.0	0.4	25	1.4	**21.34**	**14.03**
FOS_488	2.3	4	10.0	10.0	0.5	25	1.5	**21.85**	**14.86**
FOS_489	1.0	4	10.0	10.0	0.5	25	1.5	**43.14**	**32.41**
FOS_490	1.0	4	10.0	10.0	0.6	25	1.6	**37.34**	**30.76**
FOS_491	1.8	4	10.0	10.0	0.7	25	1.7	**18.88**	**16.60**
FOS_492	1.0	4	10.0	10.0	0.8	25	1.8	**30.39**	**28.30**
FOS_493	1.0	4	10.0	10.0	0.8	25	1.8	**27.81**	**27.21**
FOS_494	1.6	4	10.0	10.0	1.0	25	2.0	**14.71**	**15.70**
FOS_495	2.5	4	10.0	10.0	1.3	25	2.3	**7.11**	**8.64**
FOS_496	4.2	4	10.0	10.0	1.6	25	2.6	**3.55**	**4.66**
FOS_497	1.0	4	10.0	10.0	1.8	25	2.8	**12.57**	**17.58**
FOS_498	2.0	4	10.0	10.0	2.0	25	3.0	**5.74**	**8.28**
FOS_499	1.3	4	10.0	10.0	2.0	25	3.0	**8.70**	**12.56**
FOS_500	2.9	4	10.0	10.0	1.7	25	2.7	**4.69**	**6.35**
FOS_501	2.2	4	10.0	10.0	1.2	25	2.2	**8.77**	**10.36**
FOS_502	2.1	4	10.0	10.0	0.9	25	1.9	**12.63**	**12.62**
FOS_503	1.0	4	10.0	10.0	0.9	25	1.9	**25.63**	**26.20**
FOS_504	1.0	4	10.0	10.0	0.9	25	1.9	**24.63**	**25.71**
FOS_505	1.0	4	10.0	10.0	1.0	25	2.0	**23.71**	**25.24**
FOS_506	1.0	4	10.0	10.0	1.0	25	2.0	**23.64**	**25.20**
FOS_507	3.4	4	10.0	10.0	0.8	25	1.8	**8.35**	**8.11**
FOS_508	1.0	4	10.0	10.0	0.8	25	1.8	**28.73**	**27.61**
FOS_517	1.0	4	10.0	10.0	0.1	25	1.1	**280.57**	**45.89**
FOS_518	1.0	4	10.0	10.0	0.2	25	1.2	**137.76**	**42.56**
FOS_519	1.0	4	10.0	10.0	0.3	25	1.3	**69.11**	**37.27**
FOS_520	1.0	4	10.0	10.0	0.5	25	1.5	**47.62**	**33.51**
FOS_521	1.0	4	10.0	10.0	0.6	25	1.6	**37.71**	**30.87**
FOS_522	1.0	4	10.0	10.0	0.5	25	1.5	**43.40**	**32.48**
FOS_523	1.0	4	10.0	10.0	0.3	25	1.3	**77.31**	**38.29**
FOS_524	2.7	4	10.0	10.0	0.5	25	1.5	**17.06**	**12.13**
FOS_525	2.6	4	10.0	10.0	0.9	25	1.9	**10.05**	**10.10**
FOS_526	2.1	4	10.0	10.0	1.3	25	2.3	**8.10**	**10.03**
FOS_527	1.0	4	10.0	10.0	1.8	25	2.8	**12.76**	**17.75**
FOS_528	3.7	4	10.0	10.0	1.8	25	2.8	**3.45**	**4.81**
FOS_529	3.6	4	10.0	10.0	1.5	25	2.5	**4.23**	**5.50**
FOS_530	5.0	4	10.0	10.0	1.3	25	2.3	**3.68**	**4.43**
FOS_531	1.0	4	10.0	10.0	1.0	25	2.0	**22.85**	**24.78**
FOS_532	1.0	4	10.0	10.0	0.8	25	1.8	**27.65**	**27.14**
FOS_533	1.0	4	10.0	10.0	0.8	25	1.8	**27.31**	**26.99**
FOS_534	1.0	4	10.0	10.0	0.9	25	1.9	**26.55**	**26.64**
FOS_535	1.0	4	10.0	10.0	1.0	25	2.0	**24.03**	**25.40**
FOS_536	1.0	4	10.0	10.0	1.0	25	2.0	**23.09**	**24.91**
FOS_537	5.5	4	10.0	10.0	1.1	25	2.1	**3.67**	**4.23**
FOS_538	4.1	4	10.0	10.0	0.8	25	1.8	**7.30**	**6.83**
FOS_539	2.1	4	10.0	10.0	0.8	25	1.8	**13.00**	**12.78**
FOS_540	1.0	4	10.0	10.0	1.2	25	2.2	**18.52**	**22.18**
FOS_541	1.0	4	10.0	10.0	1.0	25	2.0	**22.49**	**24.58**
FOS_542	3.3	4	10.0	10.0	2.3	25	3.3	**2.99**	**4.52**
FOS_543	1.0	4	10.0	10.0	2.8	25	3.8	**8.24**	**13.12**
FOS_544	3.2	4	10.0	10.0	0.2	25	1.2	**36.69**	**12.96**
FOS_545	1.0	4	10.0	10.0	2.9	25	3.9	**7.98**	**12.82**
FOS_546	1.0	4	10.0	10.0	3.0	25	4.0	**7.63**	**12.39**
FOS_547	1.0	4	10.0	10.0	1.3	25	2.3	**17.20**	**21.28**
FOS_548	1.0	4	10.0	10.0	0.6	25	1.6	**36.69**	**30.55**

Calculated FoS of Natural Peat Slopes for Derrinlough Wind Farm - Drained Analysis

Turbine No./Waypoint	Slope	Design c'	Bulk unit weight of Peat	Unit weight of Water	Depth of In situ Peat	Friction Angle	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 (1)	Condition (2)
								100% Water	100% Water
FOS_549	1.0	4	10.0	10.0	1.1	25	2.1	**21.34**	**23.93**
FOS_550	5.1	4	10.0	10.0	1.3	25	2.3	**3.58**	**4.29**
FOS_551	2.0	4	10.0	10.0	0.1	25	1.1	**89.33**	**21.95**
FOS_552	1.0	4	10.0	10.0	0.4	25	1.4	**59.25**	**35.79**
FOS_553	1.0	4	10.0	10.0	0.2	25	1.2	**98.85**	**40.29**
FOS_554	1.0	4	10.0	10.0	0.5	25	1.5	**46.09**	**33.15**
FOS_555	1.0	4	10.0	10.0	1.0	25	2.0	**23.68**	**25.22**
FOS_556	11.5	4	10.0	10.0	1.3	25	2.3	**1.53**	**1.85**
FOS_557	1.0	4	10.0	10.0	1.0	25	2.0	**22.46**	**24.56**
FOS_558	1.5	4	10.0	10.0	0.8	25	1.8	**19.29**	**18.15**
							Minimum =	**1.08**	**1.71**
							Maximum =	**229229.67**	**76.73**
							Average =	**796.36**	**19.86**

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 topographical survey data.
(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 a GPR survey carried out by BnM.
(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.

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	
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	

Qualitative Factor	Type of Feature/Indicator for each Qualitative Factor [1]	Explanation/Description of Qualitative Factor
	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 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.
	Yes	
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	

Qualitative Factor	Type of Feature/Indicator for each Qualitative Factor (1)	Explanation/Description of Qualitative Factor
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: $R = P \times I$

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 and 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 C.

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.

Appendix E

Ground Investigation (January 2019): Trial Pit Logs, Photographs and Laboratory Test Results

Photo 1 Trial pit TP1

Photo 2 Trial pit TP2

Photo 3 Excavated arisings from trial pit TP2

Photo 4 Trial pit TP3

Photo 5 Trial pit TP4

Photo 6 Trial pit TP5

Photo 7 Trial pit TP6

Photo 8 Excavated arisings from trial pit TP6

Photo 9 Trial pit TP7

Photo 10 Trial pit TP8

Photo 11 Trial pit TP9

Photo 12 Trial pit TP10

Photo 13 Trial pit TP11

Photo 14 Trial pit TP12

Photo 15 Trial pit TP13

Photo 16 Trial pit TP14

Photo 17 Excavated arisings from trial pit TP14

Photo 18 Trial pit TP15

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Trial Pit Log

TrialPit No
TP1
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No.	Coords (E,N):	607659.00 714995.00	Date
		1901	Level:	171.60	29/01/2019
Location:	County Offaly		Dimensions (m):		Scale 1:25
Client:	Bord na Móna		Depth 2.30		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.60	171.00		Spongy and firm brown amorphous Peat
▼	2.10 - 2.20	B	Sample B1	2.10	169.50		Firm, locally soft and locally stiff, grey slightly gravelly sandy Silt/Clay with low boulder and cobble content. Cobbles and boulders are sub-rounded and angular.
				2.30	169.30		Light grey sandy gravelly Silt/Clay with high cobble and boulder content. Cobbles and boulders are sub-rounded and angular. Material saturated upon excavation End of Pit at 2.300m

1
2
3
4

Remarks: Groundwater - steady flow of groundwater at 1.9m bgl
Excavator unable to excavate deeper due to presence of large boulders

Plant Used:
12tN Tracked Excavator

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Trial Pit Log

TrialPit No
TP2
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. 1901	Coords (E,N): 607714.00 715008.00 Level: 165.17	Date 29/01/2019
Location:	County Offaly	Dimensions (m): Depth 3.20		Scale 1:25
Client:	Bord na Móna			Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.00	165.17		Spongy and firm amorphous Peat
				0.60	164.57		Firm, locally soft and locally stiff, sandy gravelly Silt/Clay with low cobble and boulder content. Cobbles and boulders are sub-rounded and angular.
▼	1.50 - 1.70	B	Sample B2				
				2.10	163.07		Light grey sandy gravelly Silt/Clay with high cobble and boulder content. Cobbles and boulders are sub-rounded and angular. Material saturated upon excavation
				3.20	161.97		End of Pit at 3.200m

1
2
3
4

Remarks: Groundwater - steady flow of groundwater at 2m bgl
Trial pit terminated due to instability of excavation faces

Plant Used:
12tN Tracked Excavator

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Trial Pit Log

TrialPit No
TP3
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. 1901	Coords (E,N): 606241.00 715046.00 Level: 195.05	Date 29/01/2019
Location:	County Offaly	Dimensions (m):		Scale 1:25
Client:	Bord na Móna	Depth 3.70		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Spongy brown amorphous Peat
				1.10	193.95		Soft and firm grey gravelly sandy Silt/Clay with low cobble content. Cobbles are sub-rounded and angular.
▼	1.40 - 1.70	B	Sample B3				
				3.10	191.95		Light grey sandy gravelly Silt/Clay with high cobble and boulder content. Cobbles and boulders are sub-rounded and angular. Material saturated upon excavation
				3.70	191.35		End of Pit at 3.700m

1
2
3
4

Remarks: Groundwater - steady flow of groundwater at 2.8m bgl
Trial pit terminated due to instability of excavation faces

Plant Used:
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Trial Pit Log

TrialPit No
TP4
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No.	Coords (E,N):	606193.00 714987.00	Date
		1901	Level:	194.88	29/01/2019
Location:	County Offaly		Dimensions (m):		Scale 1:25
Client:	Bord na Móna		Depth 4.20		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Spongy brown pseudo fibrous and amorphous Peat
				2.60	192.28		Firm, locally soft, grey very gravelly sandy Silt/Clay with low cobble and boulder content. Cobbles and boulders are sub-rounded and angular. Material was saturated upon excavation
▼	3.30 - 3.50	B	Sample B4				
				4.20	190.68		End of Pit at 4.200m

Remarks: Groundwater - steady flow of groundwater at 3.4m bgl
Trial pit terminated due to depth of dig

Plant Used:
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Trial Pit Log

TrialPit No
TP5
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. 1901	Coords (E,N): 605907.00 714957.00 Level: 193.34	Date 29/01/2019
Location:	County Offaly	Dimensions (m):		Scale 1:25
Client:	Bord na Móna	Depth 2.80		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Spongy black/brown amorphous Peat
				0.60	192.74		Soft light brown/grey sandy Silt/Clay
				0.80	192.54		Soft and firm light grey sandy gravelly Silt/Clay with low cobble and boulder content. Cobbles and boulders are sub-rounded and angular.
▼	1.80 - 2.00	B	Sample B5	2.10	191.24		Light grey sandy gravelly Silt/Clay with high cobble and boulder content. Cobbles and boulders are sub-rounded and angular. Material was saturated upon excavation.
				2.80	190.54		End of Pit at 2.800m

1
2
3
4

Remarks: Groundwater - steady flow of groundwater at 2.2m bgl
Trial pit terminated due to instability of excavation faces

Plant Used:
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Trial Pit Log

TrialPit No
TP6
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. 1901	Coords (E,N): 605957.00 714934.00 Level: 202.25	Date 29/01/2019
Location:	County Offaly	Dimensions (m):		Scale 1:25
Client:	Bord na Móna	Depth 2.70		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.20	202.05		Firm amorphous Peat
				0.50	201.75		Firm light brown/grey sandy Silt/Clay
▼				2.70	199.55		Firm and stiff light grey sandy gravelly Silt/Clay with low cobble content and medium boulder content. Cobbles and boulders are sub-rounded and angular. At base of trial pit, material was saturated upon excavation End of Pit at 2.700m

1
2
3
4

Remarks: Groundwater - steady flow of groundwater at 2.3m bgl
Trial pit terminated due to instability of excavation faces

Plant Used:
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Trial Pit Log

TrialPit No
TP7
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. 1901	Coords (E,N): 605040.00 715150.00 Level: 190.26	Date 29/01/2019
Location:	County Offaly	Dimensions (m):		Scale 1:25
Client:	Bord na Móna	Depth 3.60		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Spongy brown amorphous Peat
				0.40	189.86		Firm light brown sandy Silt/Clay
				0.60	189.66		Firm, locally soft, light grey sandy gravelly Silt/Clay with low cobble and boulder content. Cobbles and boulders are sub-rounded.
	2.10 - 2.30	B	Sample B6				
▼				2.40	187.86		Firm, locally stiff, light grey sandy gravelly Silt/Clay with low cobble and boulder content. Cobble and boulders are sub-rounded and angular
				3.60	186.66		End of Pit at 3.600m

1
2
3
4

Remarks: Groundwater - steady flow of groundwater at 3.4m bgl
Trial pit terminated due to instability of excavation faces

Plant Used:
12tN Tracked Excavator

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Trial Pit Log

TrialPit No
TP8
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. 1901	Coords (E,N): 604954.00 715073.00 Level: 181.03	Date 29/01/2019
Location:	County Offaly	Dimensions (m):		Scale 1:25
Client:	Bord na Móna	Depth 3.40		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Spongy brown amorphous Peat
				0.80	180.23		Firm, locally soft and stiff, light brown very sandy very gravelly Silt/Clay with medium cobble and boulder content. Cobbles and boulders and sub-rounded and angular.
				1.00	180.03		Firm, locally stiff, light grey very sandy very gravelly Silt/ Clay with high cobble and boulder content. Cobbles and boulders and sub-rounded and angular. At base of trial pit, material was saturated upon excavation
▼	3.20 - 3.40	B	Sample B7				
				3.40	177.63		End of Pit at 3.400m

1
2
3
4

Remarks: Groundwater - slow seepage of groundwater at 2.4m bgl
Trial pit terminated due to instability of excavation faces

Plant Used:
12tN Tracked Excavator

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Trial Pit Log

TrialPit No
TP9
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No.	Coords (E,N):	605505.00 712927.00	Date
		1901	Level:	165.10	30/01/2019
Location:	County Offaly		Dimensions (m):		Scale 1:25
Client:	Bord na Móna		Depth 3.60		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Spongy black/brown pseudo-fibrous and amorphous Peat
				1.10	164.00		Spongy brown amorphous Peat
				1.60	163.50		Firm brown amorphous Peat
				3.60	161.50		End of Pit at 3.600m

1
2
3
4

Remarks: Groundwater - no groundwater encountered
Trial pit terminated due to thickness of peat present

Plant Used:
12tN Tracked Excavator

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Trial Pit Log

TrialPit No
TP10
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. 1901	Coords (E,N): 605536.00 712897.00 Level: 176.90	Date 30/01/2019
Location:	County Offaly	Dimensions (m):		Scale 1:25
Client:	Bord na Móna	Depth 4.10		Logged GK

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results/Sample Ref				
							Spongy brown/black amorphous Peat
				1.50	175.40		Firm brown amorphous Peat
				3.30	173.60		Soft light brown organic Silt/Clay
	3.80 - 4.00	B	Sample B8				
				4.00	172.90		Soft light grey sandy Silt/Clay
				4.10	172.80		End of Pit at 4.100m

Remarks: Groundwater - no groundwater encountered
Trial pit terminated due to depth of dig

Plant Used:
12tN Tracked Excavator

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Trial Pit Log

TrialPit No
TP11
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. 1901	Coords (E,N): 607159.00 712182.00 Level: 183.38	Date 30/01/2019
Location:	County Offaly	Dimensions (m):		Scale 1:25
Client:	Bord na Móna	Depth 4.30		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Spongy brown/black amorphous Peat
				1.60	181.78		Spongy and firm brown pseudo-fibrous and amorphous Peat
▼				4.30	179.08		End of Pit at 4.300m

1
2
3
4

Remarks: Groundwater - slow seepage of groundwater at 4.3m bgl
Trial pit terminated due to thickness of peat present

Plant Used:
12tN Tracked Excavator

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Trial Pit Log

TrialPit No
TP12
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No.	Coords (E,N):	607106.00 712215.00	Date
		1901	Level:	184.76	30/01/2019
Location:	County Offaly		Dimensions (m):		Scale 1:25
Client:	Bord na Móna		Depth 4.20		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Spongy brown/black pseudo-fibrous and amorphous Peat
				1.40	183.36		Spongy and firm brown amorphous Peat
▼	3.70 - 3.90	B	Sample B9	3.60	181.16		Soft, locally firm, light grey sandy very gravelly Silt/Clay with low cobble and boulder content. Cobble and boulders are sub-rounded and angular. At base of trial pit, material was saturated upon excavation
				4.20	180.56		End of Pit at 4.200m

Remarks: Groundwater - steady flow of groundwater at 3.5m bgl
Trial pit terminated due to the depth of dig

Plant Used:
12tN Tracked Excavator

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Trial Pit Log

TrialPit No
TP13
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. 1901	Coords (E,N): 607400.00 712646.00 Level: 189.72	Date 30/01/2019
Location:	County Offaly	Dimensions (m):		Scale 1:25
Client:	Bord na Móna	Depth 4.10		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Spongy brown/black amorphous Peat
				1.40	188.32		Spongy brown pseudo-fibrous and amorphous Peat
				3.30	186.42		Light grey sandy very gravelly Silt/Clay with low cobble and boulder content. Cobbles and boulders are sub-rounded and angular
▼	3.80 - 4.00	B	Sample B10				
				4.10	185.62		End of Pit at 4.100m

1 2 3 4

Remarks: Groundwater - slow seepage of groundwater at 3.9m bgl
Trial pit terminated due to the depth of dig

Plant Used:
12tN Tracked Excavator

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Trial Pit Log

TrialPit No
TP14
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No.	Coords (E,N):	609041.00 715058.00	Date
		1901	Level:	161.08	30/01/2019
Location:	County Offaly		Dimensions (m):		Scale 1:25
Client:	Bord na Móna		Depth 3.30		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Spongy brown amorphous Peat
				0.60	160.48		Soft to firm light brown/white Silt/Clay
				0.70	160.38		Firm grey/brown slightly gravelly Silt/Clay with low cobble and boulder content. Cobbles and boulders are sub-rounded and angular
				1.20	159.88		Firm and stiff sandy very gravelly Silt/Clay with high cobble and boulder content. Cobbles and boulders are sub-rounded and angular
▼	2.00 - 2.20	B	Sample B11				
				3.30	157.78		End of Pit at 3.300m

1 2 3 4

Remarks: Groundwater - slow seepage of groundwater at 3.1m bgl
Trial pit terminated due to presence of boulders

Plant Used:
12tN Tracked Excavator

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Trial Pit Log

TrialPit No
TP15
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No.	Coords (E,N):	609092.00 714984.00	Date
		1901	Level:	161.54	30/01/2019
Location:	County Offaly		Dimensions (m):		Scale 1:25
Client:	Bord na Móna		Depth 3.70		Logged GK

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Spongy brown/black amorphous Peat
				1.70	159.84		Spongy brown amorphous Peat
				2.60	158.94		Soft light brown sandy Silt/Clay
▼				2.90	158.64		Firm, locally soft, light grey sandy Silt/Clay
				3.70	157.84		End of Pit at 3.700m

Remarks: Groundwater - steady flow of groundwater at 3.3m bgl
Trial pit terminated due to the depth of dig

Plant Used:
12tN Tracked Excavator

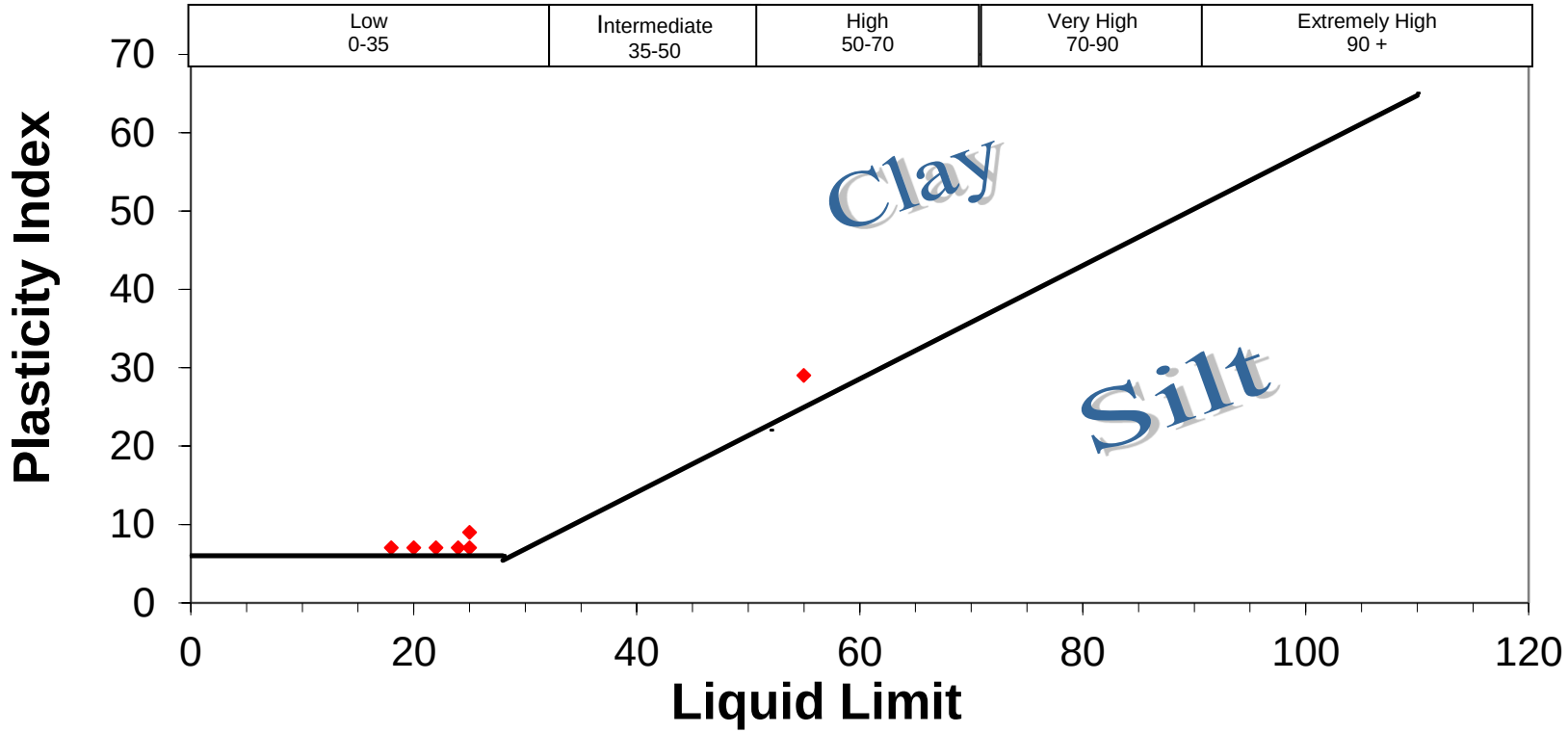
National Materials Testing Laboratory Ltd.

SUMMARY OF TEST RESULTS

				Particle			Index Properties				Maximum	Minimum	Lab	
BH/TP	Depth	sample	Moisture	Density	<425um	LL	PL	PI			Density	Density	Vane	Remarks
No	m	No.	%	Mg/m3	%	%	%	%			Mg/m3	Mg/m3	kPa	
TP1	2.1-2.2	B1	9.2											Insufficient for LL &PI
TP4	3.3-3.5	B4	17.9		50.3	25	16	9						
TP5	1.8-2.0	B5	18.6		59.5	24	17	7						
TP7	2.1-2.3	B6	12.3		48.1	20	13	7						
TP8	3.2-3.40	B7									2.14	1.55		
TP10	3.8-4.0	B8	54.1		99.3	55	26	29						
TP12	3.7-3.9	B9	15.4		26.6	25	18	7						
TP13	3.8-4.0	B10	13.8		38.4	22	15	7						
TP14	21-2.3	B11	8.2		55.0	18	11	7						

NMTL	Notes :	Job ref No.	NMTL2856	
	1. All BS tests carried out using preferred (definitive) method unless otherwise stated.	Location	Derrinlough Wind Farm. Co. Offlay	

NMTL LTD **Unit 18c, Tullow Industrial Estate** **Tullow** **County Carlow** **Tel: 00353 59 9180822** **Mob: 00353 872575508** billachana@eircom.net	**Contract:** Derrinlough Wind Farm. Co. Offlay **Client:** AGEC **Engineer:** N/A **AGEC PROJECT ID:** 1905_025 **Date:** 15/03/2019 **Tested By:** Tzr **Checked:** Bc **Job ref No.** NMTL2856



NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	100.0
14.000	95.6
10.000	87.0
6.300	79.9
5.000	76.3
3.350	72.1
2.000	65.8
1.180	60.9
0.600	55.9
0.425	53.7
0.300	51.4
0.212	49.1
0.150	46.9
0.063	41.8

Percentage Particle Size

Clay	Fine Silt	Medium Silt	Coarse Silt	Fine Sand	Medium Sand	Coarse Sand	Fine Gravel	Medium Gravel	Coarse Gravel	Cobbles	Boulder
		41.8			24.0			34.2		0.0	0.0

Sample Description	Dark grey slightly sandy slightly gravelly SILT/CLAY	Project No.	NMTL 2856
		BH/TP No.	TP1
Project	Derrinlough Wind Farm, Co. Offlay	Sample No.	B1
Operator Tzr	Checked Nc / Approved Bc / Date sample tested 06/03/2019	Depth	2.1-2.20

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Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	97.0
50.000	93.9
37.500	87.8
28.000	83.0
20.000	80.1
14.000	76.6
10.000	72.4
6.300	67.2
5.000	65.6
3.350	63.4
2.000	60.1
1.180	56.6
0.600	52.4
0.425	50.3
0.300	47.9
0.212	45.4
0.150	42.8
0.063	36.8
0.053	35.0
0.038	30.9
0.020	25.5
0.010	18.7
0.007	16.5
0.005	13.1
0.004	10.8
0.002	5.0

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
5.0		31.8			23.3			36.9		3.0	0.0

Sample Description	Light grey slightly sandy gravelly silty CLAY with occasional cobbles.	Project No.	NMTL 2856
		BH/TP No.	TP4
Project	Derrinlough Wind Farm, Co. Offlay	Sample No.	B4
Operator Tzr / Checked Nc / Approved Bc / Date sample tested 06/03/2019		Depth	3.3-3.50m

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Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	92.9
28.000	89.9
20.000	87.2
14.000	85.6
10.000	80.4
6.300	75.5
5.000	73.9
3.350	71.6
2.000	68.2
1.180	65.0
0.600	61.3
0.425	59.5
0.300	57.6
0.212	55.6
0.150	53.2
0.063	46.1

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
		46.1			22.1			31.8		0.0	0.0

Sample Description	Light grey/green slightly sandy slightly gravelly SILT/CLAY					Project No.	NMTL 2856
						BH/TP No.	TP5
Project	Derrinlough Wind Farm, Co. Offlay					Sample No.	B5
Operator	Tzr	Checked	Nc	Approved	Bc	Date sample tested	06/03/2019	Depth	1.8-2.0m

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Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	96.0
37.500	93.4
28.000	85.1
20.000	82.3
14.000	79.4
10.000	75.1
6.300	69.8
5.000	67.1
3.350	64.3
2.000	59.8
1.180	55.6
0.600	50.7
0.425	48.1
0.300	45.6
0.212	43.0
0.150	40.5
0.063	35.0
0.053	33.7
0.038	31.4
0.020	25.2
0.010	20.6
0.007	17.7
0.005	13.9
0.004	11.4
0.002	5.0

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
5.0		30.0			24.8			40.2		0.0	0.0

Sample Description	Light grey slightly sandy gravelly silty CLAY.					Project No.	NMTL 2856
						BH/TP No.	TP7
Project	Derrinlough Wind Farm, Co. Offlay					Sample No.	B6
Operator	Tzr	Checked	Nc	Approved	Bc	Date sample tested	06/03/2019	Depth	2.1-2.30m

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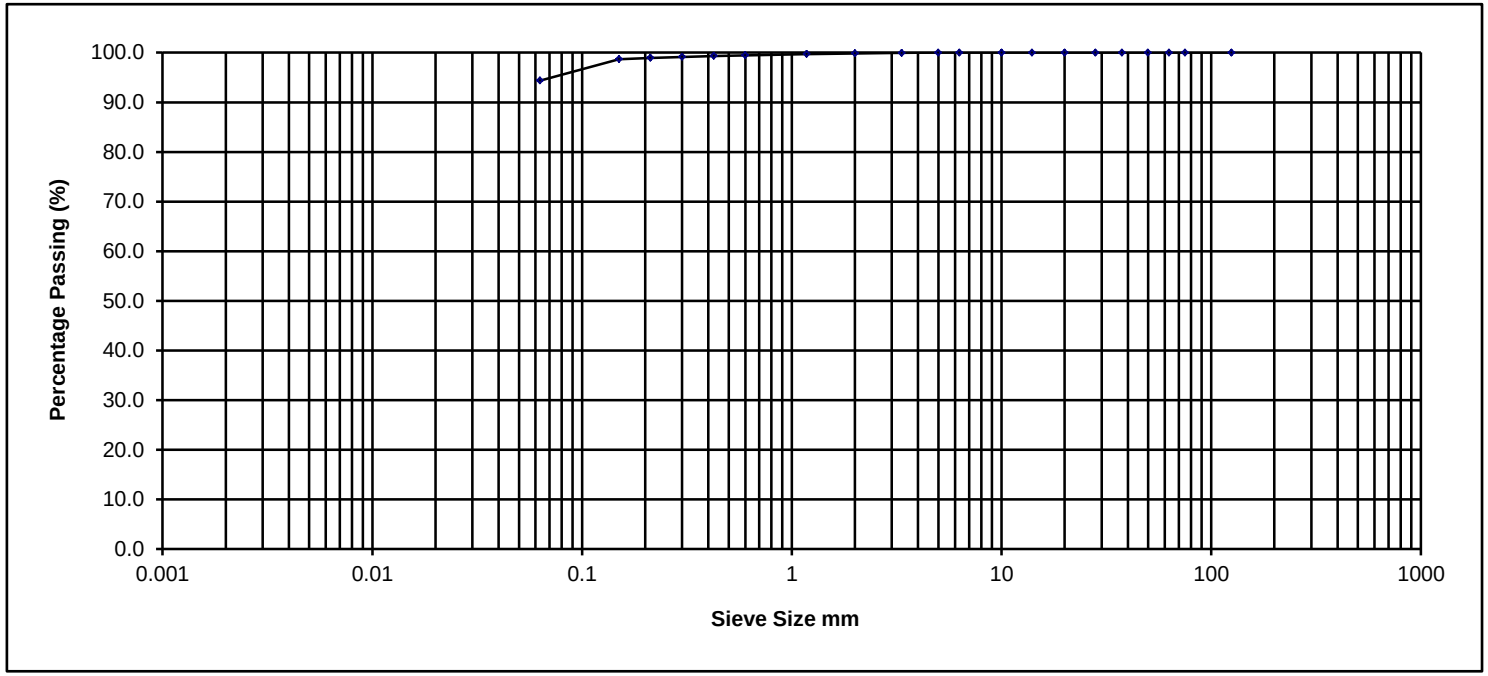
Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	100.0
14.000	100.0
10.000	100.0
6.300	100.0
5.000	100.0
3.350	100.0
2.000	99.9
1.180	99.7
0.600	99.5
0.425	99.3
0.300	99.2
0.212	98.9
0.150	98.7
0.063	94.4



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
		94.4			5.5			0.1		0.0	0.0

Sample Description	Brown/grey slightly sandy silty CLAY.					Project No.	NMTL 2856
						BH/TP No.	TP10
Project	Derrinlough Wind Farm, Co. Offlay					Sample No.	B8
Operator	Tzr	Checked	Nc	Approved	Bc	Date sample tested	06/03/2019	Depth	3.8-4.0m

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Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	93.2
63.000	84.8
50.000	78.7
37.500	71.1
28.000	63.1
20.000	57.2
14.000	54.2
10.000	48.3
6.300	44.1
5.000	41.9
3.350	39.0
2.000	35.4
1.180	31.8
0.600	28.2
0.425	26.6
0.300	24.9
0.212	23.2
0.150	21.5
0.063	17.7
0.055	16.8
0.039	14.3
0.020	10.5
0.011	7.3
0.008	5.9
0.006	4.0
0.004	2.9
0.002	1.8

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
1.8		15.9			17.7			49.4		15.2	0.0

Sample Description	Grey silty sandy fine to coarse GRAVEL with some cobbles.	Project No.	NMTL 2856
		BH/TP No.	TP12
Project	Derrinlough Wind Farm, Co. Offlay	Sample No.	B9
Operator Tzr	Checked Nc / Approved Bc / Date sample tested 06/03/2019	Depth	3.7-3.90m

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Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	94.8
50.000	93.6
37.500	85.4
28.000	79.3
20.000	76.4
14.000	69.9
10.000	65.8
6.300	61.2
5.000	58.3
3.350	54.8
2.000	49.8
1.180	45.4
0.600	40.7
0.425	38.4
0.300	36.0
0.212	33.6
0.150	31.2
0.063	26.1

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
		26.1			23.7			45.0		5.2	0.0

Sample Description	Light grey slightly sandy gravelly SILT/CLAY with some cobbles	Project No.	NMTL 2856
		BH/TP No.	TP13
Project	Derrinlough Wind Farm, Co. Offlay	Sample No.	B10
Operator Tzr	Checked Nc / Approved Bc / Date sample tested 06/03/2019	Depth	3.8-4.0m

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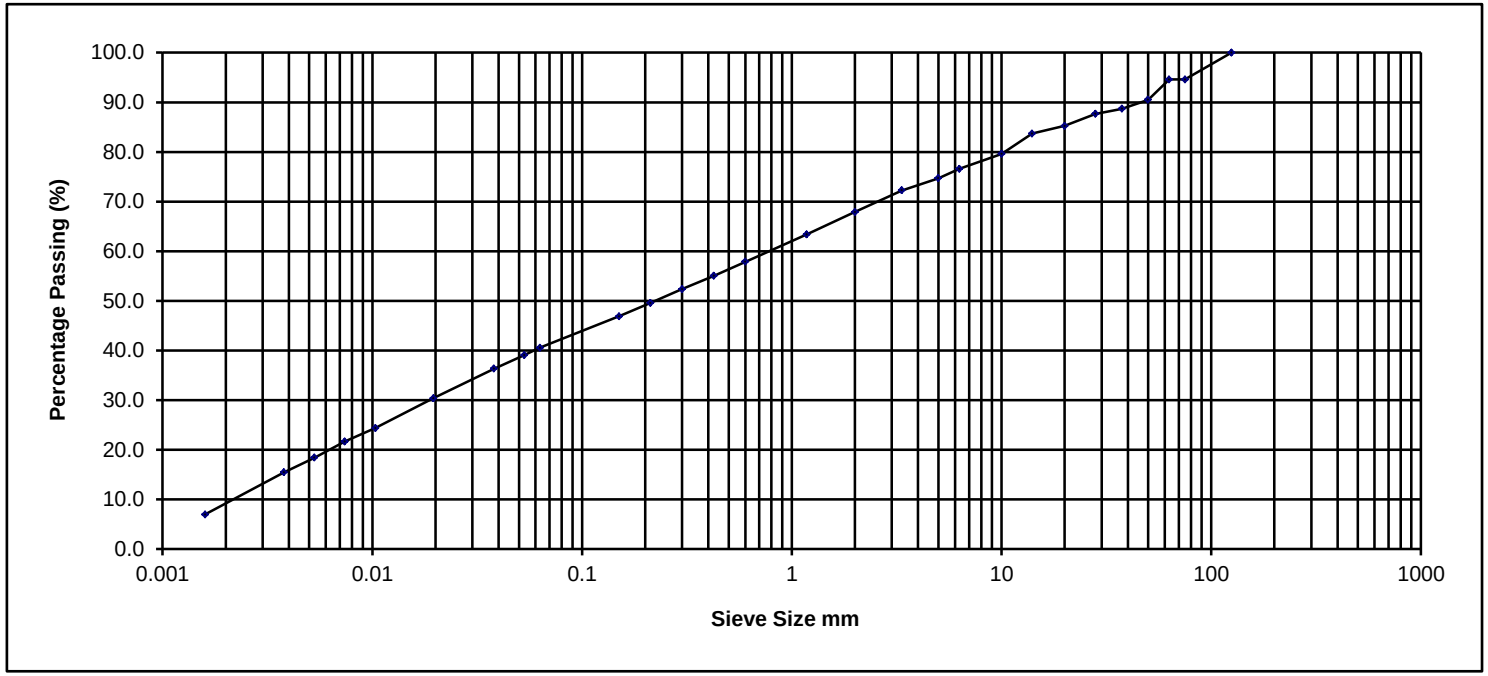
Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	94.6
63.000	94.6
50.000	90.5
37.500	88.7
28.000	87.7
20.000	85.2
14.000	83.7
10.000	79.6
6.300	76.6
5.000	74.7
3.350	72.2
2.000	67.9
1.180	63.4
0.600	57.9
0.425	55.0
0.300	52.4
0.212	49.6
0.150	46.9
0.063	40.6
0.053	39.1
0.038	36.3
0.020	30.4
0.010	24.4
0.007	21.7
0.005	18.4
0.004	15.4
0.002	7.0



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
7.0		33.6			27.3			26.7		5.4	0.0

Sample Description	Grey slightly gravelly slightly sandy SILT/CLAY with some cobbles.					Project No.	NMTL 2856
						BH/TP No.	TP14
Project	Derrinlough Wind Farm, Co. Offlay					Sample No.	B11
Operator	Tzr	Checked	Nc	Approved	Bc	Depth	2.10-2.30m
				Date sample tested	06/03/2019		

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Appendix F

Ground Investigation (August/October/November 2019): Trial Pit Logs and Photographs




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Trial Pit Log

TrialPit No
BP1/TP1
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 608812.61 716183.12 Level:	Date 12/08/2019
Location:		Dimensions (m): Depth 3.00		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft brown fibrous PEAT, colour change to brown at 1mbgl
				2.45			Grey slightly clayey gravelly SAND with rare cobbles
				3.00			End of Pit at 3.000m

1
2
3
4

Remarks: Pit dry, stable

Plant Used:

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Trial Pit Log

TrialPit No
BP1/TP2
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 608864.62 716178.21 Level:	Date 12/08/2019
Location:		Dimensions (m): Depth 2.20		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				2.20			Grey slightly silty slightly gravelly SAND. Gravel is subrounded, limestone. End of Pit at 2.200m

Remarks: Rapid water ingress at 1.8m, side unstable below 1.8m TP excavated in base of existing borrow area Sample taken at 1.5m

Plant Used:

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Trial Pit Log

TrialPit No
BP3/TP1
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 610917.03 714258.39 Level:	Date 13/08/2019
Location:		Dimensions (m): Depth 0.20		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			Soft brown PEAT
							End of Pit at 0.200m

1
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4

Remarks:

Plant Used:

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Trial Pit Log

TrialPit No
BP3/TP2
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 610874.79 714262.97 Level:	Date 13/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 3.00		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft brown PEAT
				0.40			Very soft to soft grey slightly sandy SILT firm at 1.5m
				3.00			End of Pit at 3.000m

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Remarks: No sample taken

Plant Used:

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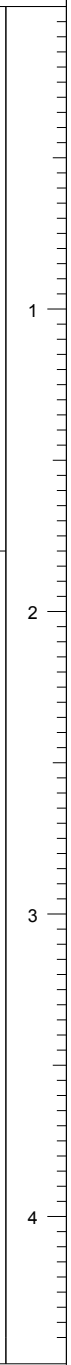
Trial Pit Log

TrialPit No
BP5/TP1
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 616827.00 717147.00 Level:	Date 07/10/2019
Location:		Dimensions (m): Depth 1.80		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				1.80			Grey clayey sandy Gravel with occasional subrounded cobbles
							End of Pit at 1.800m



Remarks: Samples taken at 1m

Plant Used:

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Trial Pit Log

TrialPit No
BP6/TP1
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 606489.82 714489.73 Level:	Date 15/08/2019
Location:		Dimensions (m): Depth 1.00		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				1.00			Firm grey gravelly Silt with large subrounded boulders of limestone End of Pit at 1.000m

Remarks:

Plant Used:

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Trial Pit Log

TrialPit No
BP7/TP1
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 610264.47 715941.17 Level:	Date 12/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 2.90		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft brown PEAT
				0.20			Soft to firm grey sandy gravelly SILT with subrounded to subangular cobbles and boulders
				2.90			End of Pit at 2.900m

1
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4

Remarks:

Plant Used:

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Trial Pit Log

TrialPit No
BP8/TP1
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 614794.00 719548.00 Level:	Date 08/10/2019
Location:		Dimensions (m): Depth 3.00		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft brown fibrous PEAT
				1.10			Soft grey slightly gravelly CLAY @2m, becoming firm to stiff
				2.50			Firm grey and brown laminated CLAY
				3.00			End of Pit at 3.000m

1
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Remarks: Groundwater seepage at 3m

Plant Used:

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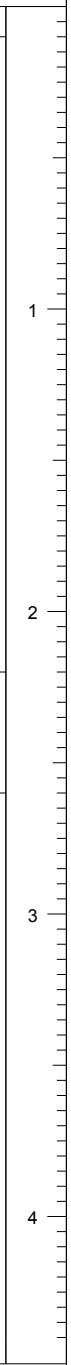
Trial Pit Log

TrialPit No
BP8/TP2
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 614815.00 719370.00 Level:	Date 08/10/2019
Location:		Dimensions (m): Depth 2.60		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			Brown peaty TOPSOIL
							Soft to firm grey slightly sandy CLAY with occasional subangular to subrounded gravel
				2.20			Firm grey laminated CLAY
				2.60			End of Pit at 2.600m



Remarks:

Plant Used:

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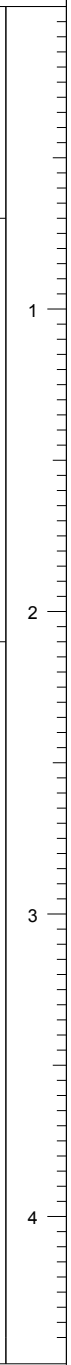
Trial Pit Log

TrialPit No
BP9/TP1
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 206008.00 215159.00 Level:	Date 06/11/2019
Location:		Dimensions (m): Depth 2.10		Scale 1:25
Client:				Logged

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Firm brown/black amorphous Peat
				0.70			Firm light brown/orange clayey Silt
				1.00			
				2.10			End of Pit at 2.100m



Remarks: No groundwater encountered. Trial pit terminated due to presence of boulders at base of trial pit and unable to excavate further. Trial pit noted as stable.

Plant Used:

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Trial Pit Log

TrialPit No
BP9/TP2
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 206008.00 215159.00 Level:	Date 06/11/2019
Location:		Dimensions (m): Depth 3.00		Scale 1:25
Client:				Logged

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Firm brown amorphous Peat
				1.50			Firm light brown/grey clayey Silt
				1.80			Firm grey slightly gravelly Silt/Clay with occasional cobbles. Cobble content increases with depth.
				3.00			End of Pit at 3.000m

1
2
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4

Remarks: No groundwater encountered.

Plant Used:

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Trial Pit Log

TrialPit No
SS/TP1
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 611002.07 718600.21 Level:	Date 16/08/2019
Location:		Dimensions (m): Depth 2.20		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.30			Very soft dark brown PEAT
							Firm grey slightly sandy CLAY with occasional subangular to subrounded cobbles
				2.20			End of Pit at 2.200m

1
2
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4

Remarks: Moderate groundwater inflow at 2.2m

Plant Used:

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Trial Pit Log

TrialPit No
SS/TP2
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 610958.79 718511.74 Level:	Date 16/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 3.00		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft dark brown PEAT
				1.10			Very soft grey slightly sandy CLAY with occasional subangular to subrounded cobbles 1.9m firm and slightly gravelly 2.1m - occasional boulders
				3.00			End of Pit at 3.000m

1
2
3
4

Remarks: Slow to moderate groundwater inflow at 2.3m

Plant Used:

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Trial Pit Log

TrialPit No
SS/TP3
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 610923.85 718598.36 Level:	Date 16/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 3.20		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft dark brown PEAT
				1.10			Very soft grey slightly sandy CLAY
				1.30			Very soft brown PEAT
				1.50			Soft grey sandy CLAY with occasional subrounded cobbles 2m - firm, frequent cobbles 2.4m - occasional boulders
				3.20			End of Pit at 3.200m

1
2
3
4

Remarks: Pit dry, sides stable

Plant Used:

FEHILY TIMONEY

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Trial Pit Log

TrialPit No
SS/TP4
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 610939.87 718751.21 Level:	Date 16/08/2019
Location:		Dimensions (m): Depth 2.70		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.15			Soft dark brown fibrous PEAT
							Firm grey slightly sandy gravelly CLAY with occasional subrounded cobbles 2m - firm to stiff
				2.70			End of Pit at 2.700m

1
2
3
4

Remarks: Clay damp to 2m bgl

Plant Used:

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Trial Pit Log

TrialPit No
TP/CC1
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 606261.61 714501.70 Level:	Date 15/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 3.40		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft dark brown and brown PEAT
				3.30		key key key incorrect incorrect incorrect	Grey sandy SILT with large boulder
				3.40			End of Pit at 3.400m

1
2
3
4

Remarks: Pit dry, stable

Plant Used:

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Trial Pit Log

TrialPit No
TP/CC2
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 607634.07 715108.69 Level:	Date 14/08/2019
Location:		Dimensions (m): Depth 2.30		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.30			Very soft dark brown PEAT
							Firm grey sandy SILT/CLAY with occasional subangular to subrounded cobbles and boulders 2.3m - boulders more frequent
				2.30			End of Pit at 2.300m

1
2
3
4

Remarks: Slow water inflow at 2.3m

Plant Used:

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Trial Pit Log

TrialPit No
TP/CC3
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 609190.66 715551.75 Level:	Date 12/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 3.50		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft brown PEAT
				1.30			Firm grey sandy SILT with rare gravel below 2.5m: more frequent gravel and occasional subangular to subrounded cobbles
				3.50			End of Pit at 3.500m

Remarks: Slow seepage at 3.5m Sample taken at 2.0m

Plant Used:

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Trial Pit Log

TrialPit No
TP/CC4
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 610220.87 715671.63 Level:	Date 14/08/2019
Location:		Dimensions (m): Depth 2.30		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			Soft dark brown PEAT
							Soft grey sandy SILT with occasional subangular to subrounded cobbles
				2.30			End of Pit at 2.300m

1
2
3
4

Remarks: Pit dry

Plant Used:

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Trial Pit Log

TrialPit No **TP/ CC5SS**
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 609071.50 715374.15 Level:	Date 12/08/2019
Location:		Dimensions (m): Depth 2.10		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft dark brown to brown PEAT
				0.90			Firm grey slightly sandy gravelly SILT with occasional boulders. Boulders are subangular to subrounded Limestone.
				2.10			End of Pit at 2.100m

Remarks: Pit dry, stable Hard digging at 2.1m

Plant Used:

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Trial Pit Log

TrialPit No
TP/CSH1
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 607855.94 715110.28 Level:	Date 14/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 2.85		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				2.85			Very soft dark brown and brown PEAT End of Pit at 2.850m

1
2
3
4

Remarks: Pit stopped due to possible archeology at 2.85m

Plant Used:

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Trial Pit Log

TrialPit No
TP/CSH2
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 608013.05 714987.63 Level:	Date 14/08/2019
Location:		Dimensions (m): Depth 3.50		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.30			Light brown gravelly CLAY
							Firm grey brown gravelly Clay with frequent subangular boulders
				3.50			End of Pit at 3.500m

1
2
3
4

Remarks:

Plant Used:

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Trial Pit Log

TrialPit No
TP/T1
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 607026.50 715375.32 Level:	Date 16/08/2019
Location:		Dimensions (m): Depth 3.00		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft brown PEAT
				1.10			Very soft grey very sandy CLAY
				3.00			End of Pit at 3.000m

1
2
3
4

Remarks: Slow groundwater inflow at 2.3mbgl

Plant Used:

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Trial Pit Log

TrialPit No
TP/T2
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 607239.98 714755.56 Level:	Date 16/08/2019
Location:		Dimensions (m): Depth 2.30		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft dark brown and brown PEAT
				1.20			Firm grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles, stiff at 2mbgl
				2.30			End of Pit at 2.300m

1
2
3
4

Remarks: Hard dig, sample taken at 1.8m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T3
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 6066666.00 713348.00 Level:	Date 07/10/2019
Location:		Dimensions (m): Depth 2.80		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft to firm brown fibrous PEAT
				0.50			Soft grey very sandy SILT with occasional subangular to subrounded cobbles
				2.80			End of Pit at 2.800m

1
2
3
4

Remarks: Sides of excavation unstable

Plant Used:

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Trial Pit Log

TrialPit No
TP/T4
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 605956.56 713099.06 Level:	Date 16/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 3.00		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft brown PEAT
				1.40			Very soft light grey slightly organic SILT (MARL)
				2.20			Firm grey slightly sandy CLAY with rare subangular to subrounded cobbles, stiff at 2.7mbgl
				3.00			End of Pit at 3.000m

1
2
3
4

Remarks: Sample taken at 2.5m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T5
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 606961.00 712823.00 Level:	Date 07/10/2019
Location:		Dimensions (m): Depth 2.40		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft brown fibrous PEAT
				1.70			Grey very silty SAND + GRAVEL with occasional subrounded cobbles
				2.40			End of Pit at 2.400m

1
2
3
4

Remarks: Slow groundwater inflow at 2.4m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T6
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 606452.00 714872.00 Level:	Date 07/10/2019
Location:		Dimensions (m): Depth 2.60		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft brown fibrous PEAT
				1.60			Soft to firm grey sandy gravelly CLAY with subrounded cobbles and boulders
				2.60			End of Pit at 2.600m

1
2
3
4

Remarks: Slow groundwater inflow at 2.6m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T7
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 605698.00 714983.37 Level:	Date 15/08/2019
Location:		Dimensions (m): Depth 2.90		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft dark brown PEAT
				1.20			Soft grey slightly sandy SILT with occasional gravel and boulders 2m - firm
				2.90			End of Pit at 2.900m

1
2
3
4

Remarks: Moderate groundwater inflow at 2.7m, sample taken at 2m, sides unstable below 2.7m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T8
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 605917.39 715616.94 Level:	Date 15/08/2019
Location:		Dimensions (m): Depth 2.20		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.40			Soft brown PEAT
				2.20			Soft grey sandy CLAY with occasional subangular to subrounded cobbles and boulders, damp. 2.2m - firm to stiff End of Pit at 2.200m

Remarks: Sides unstable below 0.7m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T9
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 605954.00 714337.00 Level:	Date 07/10/2019
Location:		Dimensions (m): Depth 2.90		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft brown fibrous PEAT
				1.90			Soft light grey sandy CLAY
				2.10			Very clayey sandy GRAVEL with occasional subangular to subrounded cobbles
				2.90			End of Pit at 2.900m

Remarks: Slow groundwater inflow at 2.9m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T10
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 605092.65 714561.42 Level:	Date 15/08/2019
Location:		Dimensions (m): Depth 3.20		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft dark brown and brown PEAT
				1.40			Firm grey slightly sandy slightly gravelly SILT with occasional subangular to subrounded cobbles and boulders
				3.20			End of Pit at 3.200m

1
2
3
4

Remarks: Slow groundwater inflow at 3.2m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T11
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 605273.00 714022.00 Level:	Date 07/10/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 2.20		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft to firm brown fibrous PEAT
				1.00			Soft to firm grey very sandy slightly gravelly SILT, damp, occasional subrounded cobbles
				2.20			End of Pit at 2.200m

Remarks: Slow groundwater inflow at 2.1m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T12
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 609662.00 715257.00 Level:	Date 08/10/2019
Location:		Dimensions (m): Depth 2.20		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			Soft dark brown PEAT
				1.00			Grey silty SAND with frequent subrounded boulders
				2.20			Grey silty SAND with occasional subrounded cobbles
							End of Pit at 2.200m

1
2
3
4

Remarks: Rapid groundwater inflow around boulders in upper 1m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T13
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 609599.89 714502.47 Level:	Date 13/08/2019
Location:		Dimensions (m): Depth 2.60		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.30			Soft brown PEAT
							Firm to stiff grey slightly sandy CLAY with occasional gravel and cobbles below 2m: some subangular to subrounded boulders
				2.60			End of Pit at 2.600m

Remarks: Minor groundwater inflow at 2m sample taken at 1.5m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T14
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 609981.31 714057.28 Level:	Date 13/08/2019
Location:		Dimensions (m): Depth 3.20		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft brown PEAT
				1.50			Grey silty SAND with occasional cobbles and boulders
				3.20			End of Pit at 3.200m

1
2
3
4

Remarks: Moderate water inflow at 3.1m, sample taken at 2.5m

Plant Used:

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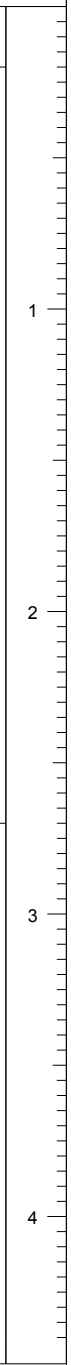
Trial Pit Log

TrialPit No
TP/T15
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 610807.05 714383.21 Level:	Date 13/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 2.70		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			Soft brown PEAT
							Soft grey slightly sandy CLAY with occasional gravel and cobbles firm at 1m more frequent boulders at 2m
				2.70			End of Pit at 2.700m



Remarks: Moderate groundwater inflow at 2.6m sample taken at 2m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T16
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 610312.71 714731.09 Level:	Date 14/08/2019
Location:		Dimensions (m): Depth 2.60		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft dark brown to brown PEAT
				0.50			Soft grey sandy SILT with frequent subangular to subrounded cobblesw and boulders firm at 1.2m stiff at 2m
				2.60			End of Pit at 2.600m

1
2
3
4

Remarks: Moderate groundwater inflow 2.4m, sample taken at 2m, side collapsing below 2m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T17
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 610067.27 715971.53 Level:	Date 12/08/2019
Location:		Dimensions (m): Depth 2.80		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.60			Soft brown PEAT with frequent roots
				2.80			Firm grey slightly gravelly sandy SILT with rare subangular cobbles 1.5m - some cobbles and boulders
							End of Pit at 2.800m

1
2
3
4

Remarks: Moderate groundwater inflow at 2.5m, sample taken at 2m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T18
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 609950.32 716635.67 Level:	Date 13/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 2.70		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft brown and dark brown PEAT
				1.10			Soft grey slightly sandy CLAY (damp) gravelly below 1.5m, with occasional subangular to subrounded cobbles
				2.70			End of Pit at 2.700m

1
2
3
4

Remarks: Slow groundwater inflow at 2.6m, sample taken at 2m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T19
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 609360.00 715723.00 Level:	Date 08/10/2019
Location:		Dimensions (m): Depth 2.20		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			Soft brown PEAT
							Firm to stiff grey slightly sandy slightly gravelly CLAY with occasional subrounded cobbles
				2.20			End of Pit at 2.200m

1
2
3
4

Remarks: Slow to moderate groundwater inflow at 2.2m

Sample taken at 1.2m

Plant Used:

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Trial Pit Log

TrialPit No
TP/T20
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 609307.00 716406.00 Level:	Date 08/10/2019
Location:		Dimensions (m): Depth 2.50		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft brown fibrous PEAT
				0.80			Firm grey sandy SILT with occasional subrounded boulders Occasional gravel and cobbles below 1.8m
				2.50			End of Pit at 2.500m

1
2
3
4

Remarks: Groundwater seepage around boulders

Plant Used:

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Trial Pit Log

TrialPit No
TP/T21
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 609720.90 717111.31 Level:	Date 13/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 2.80		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft dark brown and brown PEAT
				1.10			Soft grey sandy CLAY, damp gravelly below 1.5m occasional boulders at 2.3m
				2.80			End of Pit at 2.800m

1
2
3
4

Remarks: Moderate water inflow at 2.8m sample taken at 2m

Plant Used:

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Trial Pit Log

TrialPit No
TP/UP
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 607886.69 714954.59 Level:	Date 14/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 3.50		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft brown PEAT
				1.10			Firm grey sandy slightly gravelly SILT
				3.50			End of Pit at 3.500m

1
2
3
4

Remarks: Moderate groundater inflow at 3.3m

Plant Used:

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Trial Pit Log

TrialPit No
TP05a
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 605868.14 714315.48 Level:	Date 15/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 3.40		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft dark brown and brown PEAT
				1.80			Soft grey slightly sandy gravelly CLAY 2.4m - firm 3m - occasional boulders
				3.40			End of Pit at 3.400m

1
2
3
4

Remarks: Minor water inflow at 1.8m

Plant Used:

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Trial Pit Log

TrialPit No
TP06a
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 606519.93 714632.34 Level:	Date 15/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 3.30		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft dark brown and brown PEAT
				1.70			Soft grey sandy gravelly CLAY with occasional subrounded cobbles
				3.30			End of Pit at 3.300m

1
2
3
4

Remarks: Moderate groundwater inflow at 3.2m sample taken at 2.2m

Plant Used:

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Trial Pit Log

TrialPit No
TP08a
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 605216.89 713911.43 Level:	Date 15/08/2019
Location:		Dimensions (m): Depth 2.80		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft dark brown and brown PEAT
				1.10			Soft to firm grey slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles and boulders
				2.80			End of Pit at 2.800m

1
2
3
4

Remarks: Slow to moderate groundwater inflow at 2.6m

Plant Used:

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Trial Pit Log

TrialPit No
TP09a
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 607228.70 714024.93 Level:	Date 16/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 1.90		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft dark brown and brown PEAT
				1.90			Soft grey slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles and boulders
							End of Pit at 1.900m
				2.70			

1
2
3
4

Remarks: Moderate groundwater inflow at 2.5m sides unstable

Plant Used:

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Trial Pit Log

TrialPit No
TP10a
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 606830.81 713487.37 Level:	Date 16/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 3.00		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft dark brown and brown PEAT
				1.20			Soft grey slightly sandy gravelly CLAY with occasional subangular to subrounded boulders
				3.00			End of Pit at 3.000m

Remarks: Moderate groundwater inflow at 2.5m

Plant Used:

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Trial Pit Log

TrialPit No
TP13a
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 607039.52 712680.41 Level:	Date 16/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 2.60		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Very soft brown PEAT
				1.75			Soft to firm grey slightly sandy CLAY with occasional subangular to subrounded cobbles
				2.60			End of Pit at 2.600m

1
2
3
4

Remarks: Slow groundwater inflow at 2.4m, Peat/Clay boundary not horizontal

Plant Used:

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Trial Pit Log

TrialPit No
TP16a
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 609393.69 716168.52 Level:	Date 12/08/2019
Location:		Dimensions (m):		Scale 1:25
Client:		Depth 3.80		Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
							Soft dark and light brown PEAT
				1.10			Firm to stiff grey sandy SILT. Damp below 2m, also gravelly with occasional cobbles and rare boulders
				3.80			End of Pit at 3.800m

1
2
3
4

Remarks: Slow seepage at 2.8m, sample taken at 2.5m

Plant Used:

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Trial Pit Log

TrialPit No
TP19a
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 610115.43 715302.72 Level:	Date 14/08/2019
Location:		Dimensions (m): Depth 0.15		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.15			Soft dark brown PEAT
				1.60			Firm to stiff grey silty SAND with occasional subangular to subrounded cobbles and boulders below 1m - frequent boulders, hard dig End of Pit at 0.150m

1
2
3
4

Remarks: Pit dry, sample taken at 1m

Plant Used:

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Trial Pit Log

TrialPit No
TP20a
Sheet 1 of 1

Project Name:	**Derrinlough Wind Farm**	Project No. P1990	Coords (E,N): 609438.78 715001.22 Level:	Date 13/08/2019
Location:		Dimensions (m): Depth 2.60		Scale 1:25
Client:				Logged IH

Water Strike	Samples & In Situ Testing: Depth	Type	Results/Sample Ref	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			Soft dark brown PEAT
				0.50			Very soft / grey SILT (MARL)
				2.60			Firm to stiff grey slightly sandy CLAY with occasional subangular to subrounded cobbles and rare boulders
							End of Pit at 2.600m

1
2
3
4

Remarks: Hard dig at 2.6m sample taken at 2m

Plant Used:

Photo 1 Trial pit TP/T8

Photo 2 Trial pit TP/T10

Photo 3 Trial Pit TP/T13

Photo 4 Trial pit TP/T17

Photo 5 Excavated arisings from trial pit TP/T17

Photo 6 Trial pit SS/TP2

Photo 7 Trial pit TP/CSH2

Photo 8 Excavated arisings from trial pit TP/CSH2

Photo 9 Trial pit TP6a

Photo 10 Trial pit TP13a

Photo 11 Trial pit TP20a

Photo 12 Excavated arisings from trial pit BP1/TP1

Photo 13 Trial pit BP1/TP2

Photo 14 Trial pit BP3/TP2

Photo 15 Excavated arisings from trial pit BP3/TP2