FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

GEOTECHNICAL & PEAT STABILITY REPORT

SHESKIN SOUTH WIND FARM

Prepared for: **MKO Ltd**

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GEOTECHNICAL & PEAT STABILITY ASSESSMENT REPORT
SHESKIN SOUTH WIND FARM

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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 Sheskin South 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. The findings of the geotechnical and peat stability assessment showed that the site has an acceptable margin of safety and is suitable for the proposed wind farm development.

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1. NON-TECHNCIAL SUMMARY

Fehily Timoney and Company (FT) was engaged by MKO (on behalf of Sheskin South Renewables Power DAC) to undertake a geotechnical and peat stability assessment of the proposed Sheskin South wind farm site the 'Proposed Development'), located in north Co. Mayo. In accordance with planning guidelines compiled by the Department of the Environment, Heritage and Local Government (Draft Revised Wind Energy Development Guidelines, DoHPLG, 2019), where peat >0.5m thickness is present on a proposed wind farm development, a peat stability assessment is required.

A walkover including intrusive peat depth probing, 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, Scottish Government, 2017).

The findings, which involved a stability analysis of approximately 310 locations, show that the site has an acceptable margin of safety, a low risk of peat failure and is suitable for the proposed wind farm project. 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. A detailed description of the Proposed Development is included in Chapter 4 of the EIAR.

The site slopes steadily from the northwest to the southeast, ranging in elevation from 290 to 105mOD, with drainage channels running typically northwest to southeast. The land use within the Proposed Development site comprises commercial forestry.

Slope inclinations at the main infrastructure locations range from 2 to 8 degrees. The relatively uniform topography on site reflects the low risk of peat failure that has been determined following this peat stability assessment. Ground conditions comprised mainly of blanket peat overlying clay and gravel overlying bedrock.

Between March 2021 and May 2022, 960 no. peat depth readings were taken within the proposed development site. Peat depth recorded during the site walkovers and from the ground investigation ranged from 0.2 to 5.7m with an average peat depth of 2.1m. 53% of the probes recorded peat depths of less than 2.0m with 83% of peat depth probes recorded peat depths of less than 3.0m. A number of localised readings recorded peat depths from 3.0 to 5.7m. The average peat depth at any of the proposed turbine locations is 3.0m.

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

The risk assessment uses the results of the stability analysis in combination with qualitative factors, which cannot be reasonably included in a stability calculation but nevertheless may affect the occurrence of peat instability, to assess the risk of peat failure at the site. The results of the risk assessment are given in Appendix B. A construction buffer zone plan based on qualitative factors identified during the site walkover is included as Figure 4.2.

In summary, the Sheskin South wind farm site has an acceptable margin of safety, and therefore is considered to be at **low** risk of peat failure and is suitable for wind farm development.

2. INTRODUCTION

2.1 Fehily Timoney and Company

Fehily Timoney and Company (FT) is an Irish engineering, environmental science and planning consultancy with offices in Cork, Dublin and Carlow. The practice was established in 1990 and currently has about 90 members of staff, including engineers, scientists, planners and technical support staff. FT deliver projects in Ireland and internationally in our core competency areas of Waste Management, Environment and Energy, Civils Infrastructure, Planning and GIS and Data Management.

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.

This Report was written by Ian Higgins (FT Principal Geotechnical Engineer, MSc in Geotechnical Engineering) and Alan Whelan (FT Project Engineer). Ian is a Principal Geotechnical Engineer with Fehily Timoney and has over 20 years' experience in geotechnical engineering. Alan is a Project Engineer with Fehily Timoney and has two years' experience in geotechnical engineering.

2.2 Project Description

FT was engaged in February 2021 by McCarthy Keville O'Sullivan (MKO) (on behalf of Sheskin South Renewables Power DAC) to undertake a geotechnical and peat stability assessment of the proposed Sheskin South Wind Farm.

The Proposed Development is located approximately 5km northwest of Bellacorrick, Co. Mayo

The Proposed Development site comprises predominantly commercial forestry underlain by blanket peat. The surrounding landscape to the east and north is predominately flat with land-use comprising forestry and blanket peatland.

The Proposed Development will comprise 21 no. wind turbines and associated hardstanding areas, 1 no. electricity substation, 2 no. borrow pits, 12 no. peat placement areas, 4 no. temporary construction compounds, upgrade of existing roads, construction of new site access roads, underground cabling connecting to the existing Bellacorrick substation, road widening and accommodation works along the turbine delivery route, 1 no. permanent meteorological mast, site drainage and all associated work as described in Chapter 4 of the EIAR.

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 (2nd edition, 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 aforementioned 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.

This peat stability assessment has been undertaken taking into account peat failures that have occurred on peatland sites (such as recent failures at Shass Mountain (2020), Co. Leitrim and Meenbog (2020), Co. Donegal). The lessons learned from both peat slide events have been incorporated into the design of this project and the construction methodologies to be implemented. The Meenbog failure occurred during the construction of a section of floating road on a wind farm on sidelong ground in an area of weak peat. This construction technique is not proposed on the Sheskin South site. It is important that the existing site drainage is maintained during construction to avoid a similar failure to that on Shass Mountain, which occurred following heavy rainfall, and this is referenced in the Risk Assessments for the turbines/access roads.

A constraints study was initially undertaken by the Environmental, Hydrogeological and Ecological members of the design team to determine the developable area on the site, prior to the site reconnaissance by engineering geologists/geotechnical engineers from FT. The extent and depth of ground investigation and peat stability analysis by FT have been undertaken in accordance with guidance within Eurocode 7 and PLHRAG (2nd Edition, 2017) to investigate peat slopes that have the potential to impact on the proposed development, as applicable. Sufficient peat depth data has been recorded during the site walkovers to enable the characterisation of the peat depth across the proposed development site as shown in Figure 4.1 of the EIAR, with additional detail at infrastructure locations. The peat stability assessment is undertaken to identify peat slopes at risk from the proposed development, and to identify peat slopes that may pose a risk to the proposed development.

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

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

(2) Site reconnaissance including shear strength and peat depth measurements undertaken following initial multidisciplinary constraints study (by the design team) to determine the proposed construction areas within the site i.e. the area within the overall site where development is possible following multidisciplinary review and assessment of constraints (refer to Chapter 3 of the EIAR).

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

(4) Peat contour depth plan – compiled based on the peat depth probes carried out across the site by FT (2021) and MKO (2021 and 2022).

(5) Factor of safety plan – compiled for the short-term critical condition (undrained) for approximately 290 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, as well as areas where construction works should be avoided.

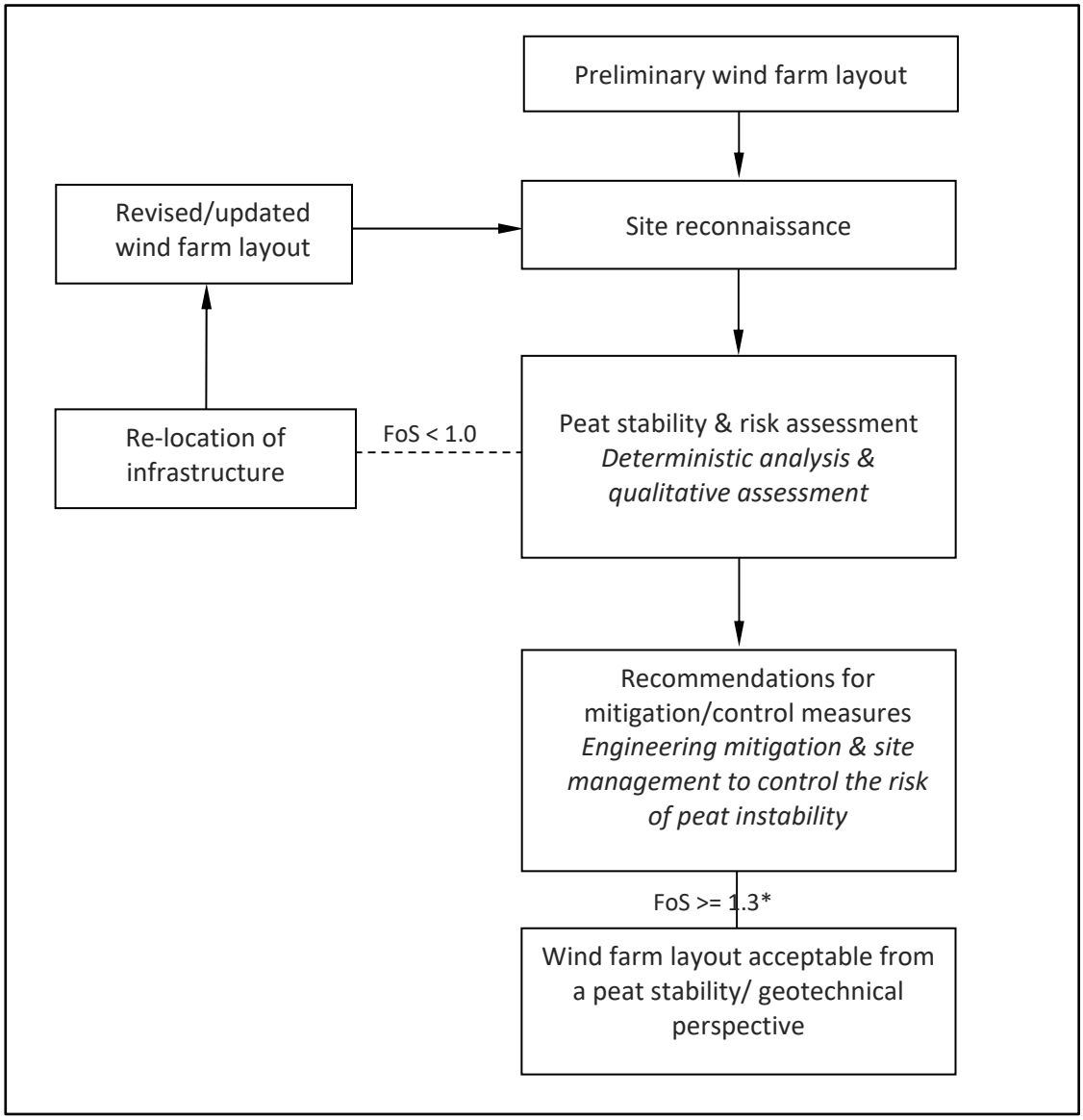
(7) A peat stability risk register was compiled to assess the potential design/construction risks at the infrastructure locations and determine adequate mitigation/control measures for each location to minimise the potential risks and ensure they are kept within an acceptable range, where necessary.

(8) Review of ground investigation carried out at the site by Irish Drilling Ltd. (IDL).

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

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

Figure 2.1: Methodology for Peat Stability Assessment



*An FoS of between 1.0 and 1.3 does not mean that a failure will occur, but that the area requires attention. Mitigation measures can be provided for areas with an FoS of between 1.0 and 1.3 to reduce the risk of failure.

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

2.4 Peat Failure Definition

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

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

2.5 Main Approaches to Assessing Peat Stability

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

(1) Geomorphological

(2) Qualitative (judgement)

(3) Index/Probabilistic (probability)

(4) Deterministic (factor of safety)

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

As part of FT's deterministic approach, a qualitative risk assessment is also carried out taking into account qualitative factors, which cannot necessarily be quantified, such as the presence of mechanically cut peat, quaking peat, bog pools, sub peat water flow, slope characteristics and numerous other factors. The qualitative factors used in the risk assessment are compiled based on FT's experience of assessments and construction in peat land sites and peat failures throughout Ireland and the UK. FT have been involved with in excess of 100 wind farm developments across Ireland and the UK at various stages of development, from preliminary feasibility stage through planning and from scheme development at tender design and detailed design stage, through to the construction and operational stages. This approach follows the guidelines for geotechnical risk management as given in Clayton (2001), as referenced in the best practice for Peat Landslide Hazard and Risk Assessment Guide (PLHRAG, 2017), and takes into account the approach of MacCulloch (2005).

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

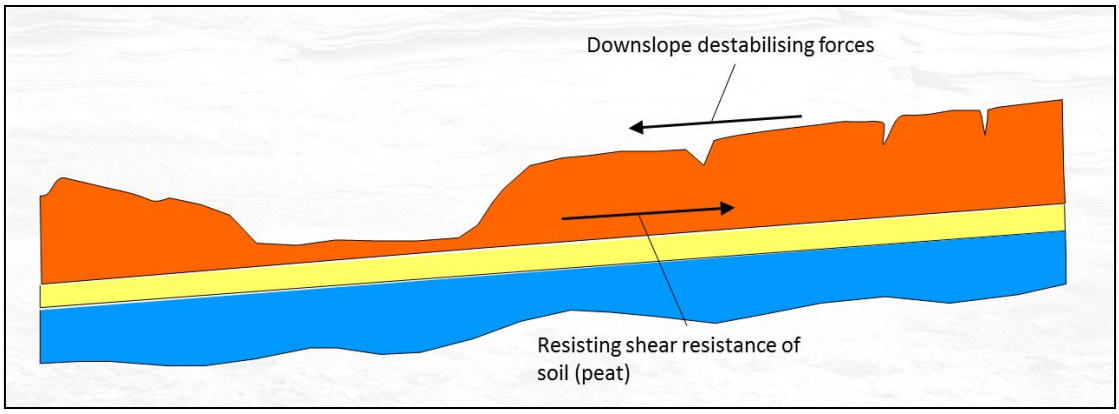
2.6 Peat Stability Assessment – Deterministic Approach

The peat stability assessment is carried out across a wide area of peatland to determine the stability of peat slopes and to identify areas of peatland that are suitable for development; this allows the layout of infrastructure on a particular wind farm site to be optimised. The assessment provides a numerical value (factor of safety) of the stability of individual parcels of peatland. The findings of the assessment discriminate between areas of stable and unstable peat, and areas of marginal stability where restrictions may apply. This allows for the identification of the most suitable locations for turbines, access roads and infrastructure.

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

3. DESK STUDY

3.1 Desk Study

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

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

The Geological Survey of Ireland online dataset viewer (GSI, 2022) for the site were used to verify the soil and bedrock conditions.

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

The desk study also includes a review of both published literature and GSI online dataset viewer (GSI, 2022) on peat failures/landslides in the vicinity of the site.

3.2 Soils, Subsoil & Bedrock

A review of the Geological Survey of Ireland online database and published documents from GSI was carried out.

The GSI subsoils maps indicates that the site is underlain predominantly of blanket peat, with some pockets of till derived from Devonian and Carboniferous sandstones.

In relation to bedrock, the site location and surrounding area is underlain by the following formations:

- Downpatrick Formation, described as a cross bedded sandstone and siltstone
- Minnaun Sandstone Formation, described as a grey cross bedded sandstone and siltstone

There are 2 no. fault lines identified running southwest to northeast through the site boundary. Both have been described as a structural linework feature.

The nearest quarry is located approximately 6km west of the site location in Bangor Erris, Co. Mayo.

No karst features were identified within 5km of the Proposed Development site.

No geological heritage sites are noted within the site boundary, the closest geological heritage site is located approximately 2.5km east of the proposed development and is described as meandering river channels within an extensive area of Atlantic blanket bog that has an irregular/deranged pattern.

The landslide susceptibility of the Proposed Development site was classified by the GSI (2022) as approximately “moderately low” but ranges from “low” to “high” susceptibility, which is expected given the terrain present.

3.3 Previous Failures

There are 2 no. recorded peat failures within the Proposed Development site (GSI, 2022). The type of landslide has been undefined in each case. An additional failure has been recorded immediately to the west of the proposed development site, which occurred on open peatland. An additional two failures have been recorded approximately 3km to the west and southwest of the Proposed Development site.

The largest failure occurred in 1988 and is reported in a paper by Hendrick (1990). This failure occurred on a concave section of slope where the peat depth was approximately 1.8m. Slope angles ranged from 3 to 7 degrees. A number of forestry drains were present in the area upslope of the failure. The failure occurred following two to three weeks of heavy rain, which had been preceded by two months of relatively dry weather. The preceding dry weather is likely to have led to some cracking of the surface peat and opening of the drains. The heavy rainfall would then have saturated the peat and filled the drains, which it appears were not large enough to allow the water to drain from the slope. Once saturated, the more amorphous peat present at the base of the peat layer began to flow down the slope, crossing a forestry road. This failure can be attributed to a combination of heavy rainfall and inadequate drainage, which trapped water on the slope, saturating and weakening the peat and ultimately leading to the peat failure.

The heads of the relict failures within the site have been avoided when developing the layout of the Proposed Development. An existing access road (to be upgraded) crosses the failure scar of the 1988 failure, however the walkover survey recorded no evidence of instability in this area, and there is not considered to be at risk of failure. No site infrastructure (roads/turbine bases) is proposed within 200m of the head of either of the on-site failures.

4. FINDINGS OF SITE RECONNAISSANCE

4.1 Site Reconnaissance

As part of the assessment of potential peat failure at the Proposed Development site, FT carried out a site reconnaissance in conjunction with the desk study review described in Section 3. This comprised walkover inspections of the site with recording of salient geomorphological features with respect to the wind farm development which included peat depth and preliminary assessment of peat strength. General photographs of the site are included at the end of the main text.

The following salient geomorphological features were considered:

- Active, incipient or relict instability (where present) within the peat deposits
- Presence of shallow valley or drainage line
- Wet areas
- Any change in vegetation
- Peat depth (peat depth data was also collected by MKO in March and June 2021 and April and May 2022)
- 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 experienced practitioners carrying out a visual assessment of the site supplemented with measurement of slope inclinations.

4.2 Findings of Site Reconnaissance

The site reconnaissance undertaken by FT comprised a walkover inspection of the site from the 6th to the 10th September 2021. Weather conditions for the site visits were predominately overcast and rain. Site visits were also undertaken by MKO during March and July 2021 and April and May 2022.

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

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

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

(2) A total of approximately 960 no. peat depth probes were carried out on site during the various site visits. Peat depths recorded across the site ranged from 0.2 to 5.7m with an average depth of 2.1m (Figure 4-1). Approximately 83 percent of peat depth probes recorded peat depths of less than 3.0m. A number of localised readings were recorded where peat depths were between 3.0 and 5.7m.

(3) The peat depths recorded at the turbine locations varied from 1.1 to 3.6m with an average depth of 2.3m.

(4) With respect to the proposed new access roads, peat depths are typically less than 2.0m (average 1.7m) with localised depths of up to 3.9m recorded.

(5) The Proposed Development will comprise both the upgrade of existing internal forestry roads and the construction of new proposed access roads, as well as widening of the local public road. The construction of new proposed access roads will be carried out using an excavate and replace construction technique which involves the removal and replacement of peat or soft ground where encountered, and replacement with granular fill.

(6) Slope angles at the turbine locations ranged from 2 to 6 degrees. These slope angle readings were obtained using a combination of readings taken during the site reconnaissance by FT using handheld equipment, such as the Silva Clino Master which has an accuracy of +/- 0.25 degrees and from contour survey plans for the site.

(7) 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.

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

(9) Two past failures are present on site and these have been described earlier. No evidence of ongoing peat instability was noted in these areas, or elsewhere on the site, during the site walkovers.

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

(a) The site is typically covered in a layer of peat with undulating terrain and widespread mature and young forestry and open peatland. Peat depths recorded across the site ranged from 0.2 to 5.7m with an average depth of 2.1m.

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

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

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

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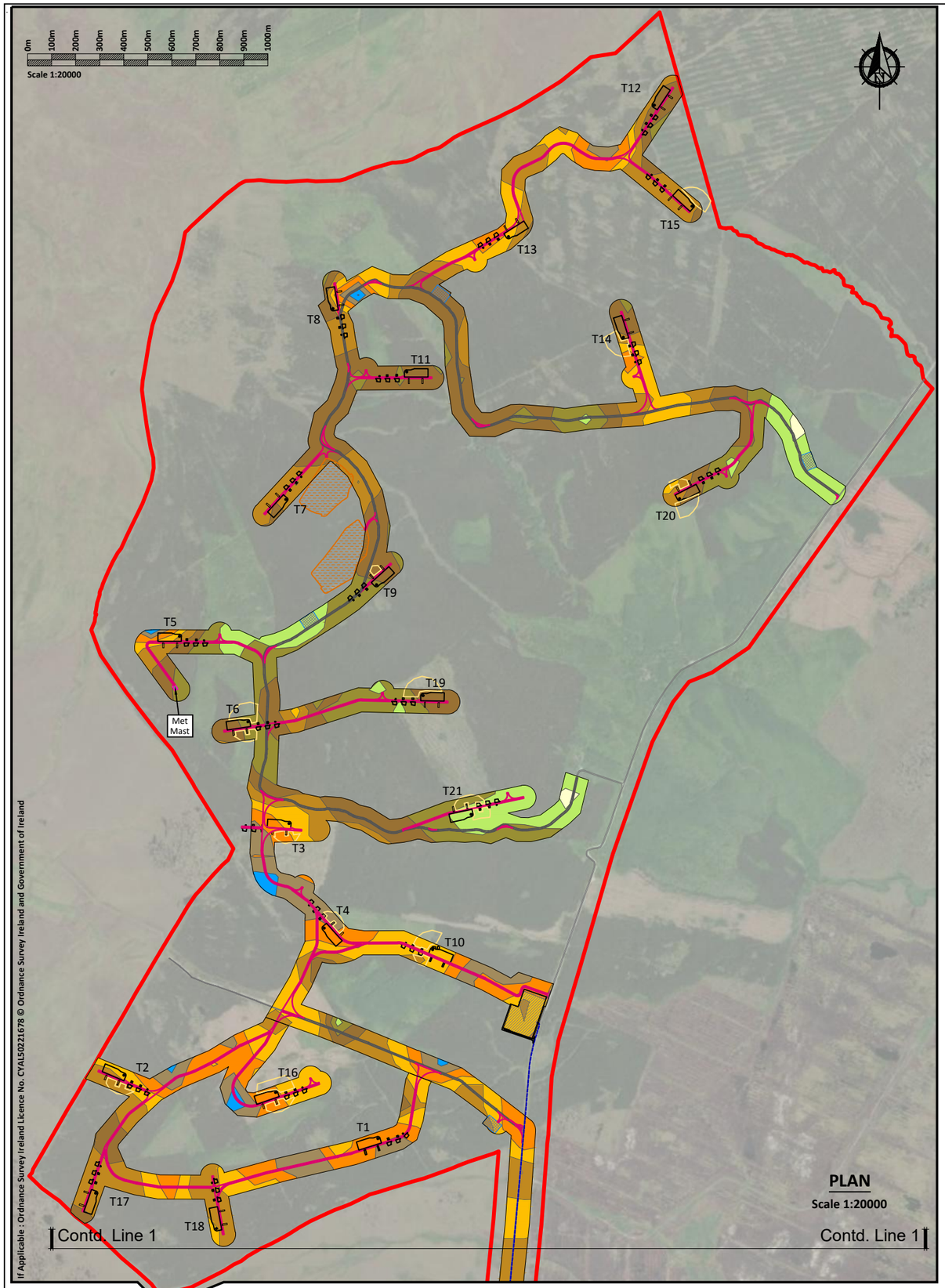

PLAN
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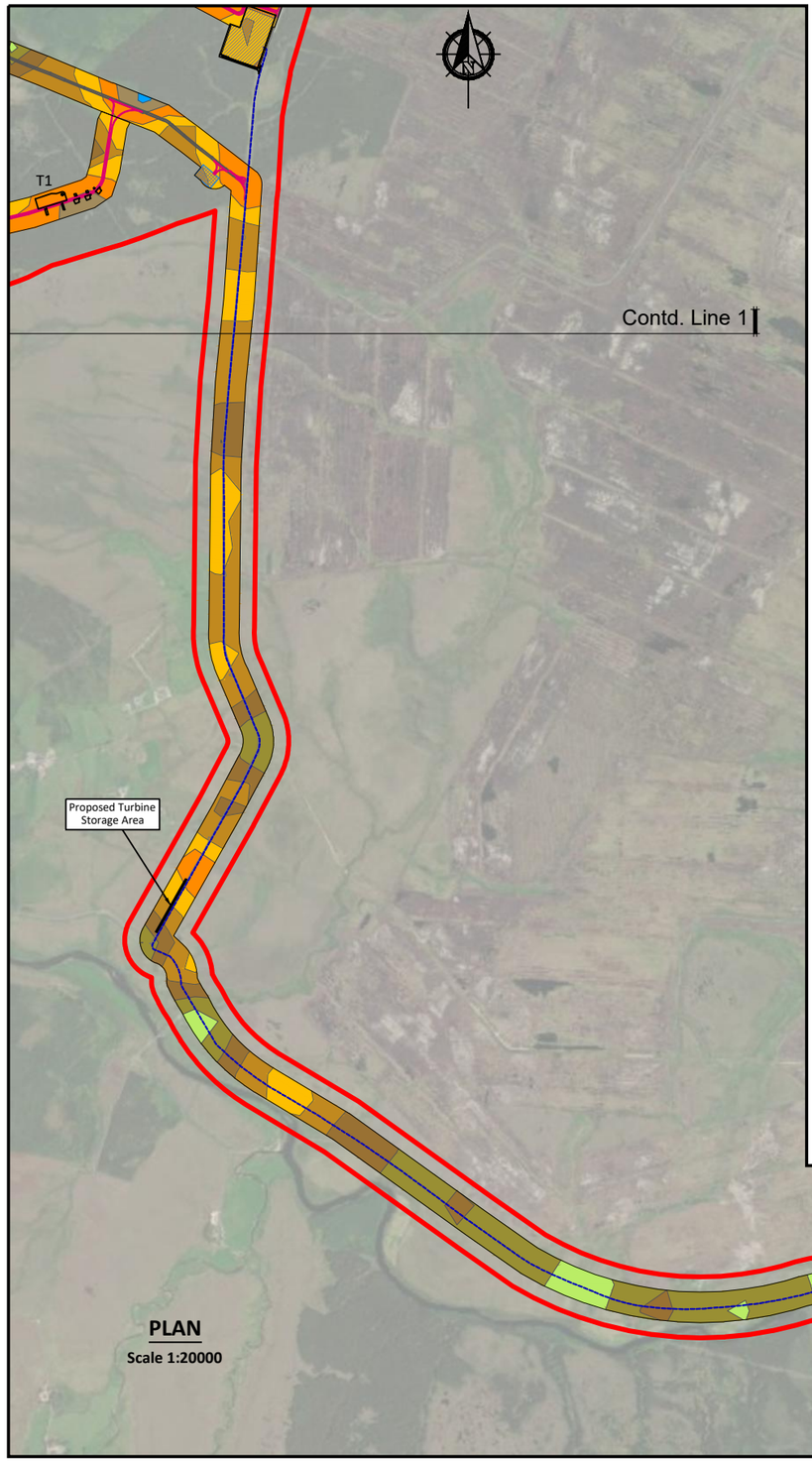

PLAN
Scale 1:20000

Legend:

- EIAR Site Boundary
- Proposed Access Track
- Existing Access Track To Be Upgraded
- Existing Access Track
- Proposed Grid Connection Route
- Proposed Turbine
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Borrow Pit
- Proposed Peat Placement

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
- ≥ 4.5 < 5

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Date - 16.02.23

FIGURE 4.1 - PEAT DEPTH CONTOUR PLAN

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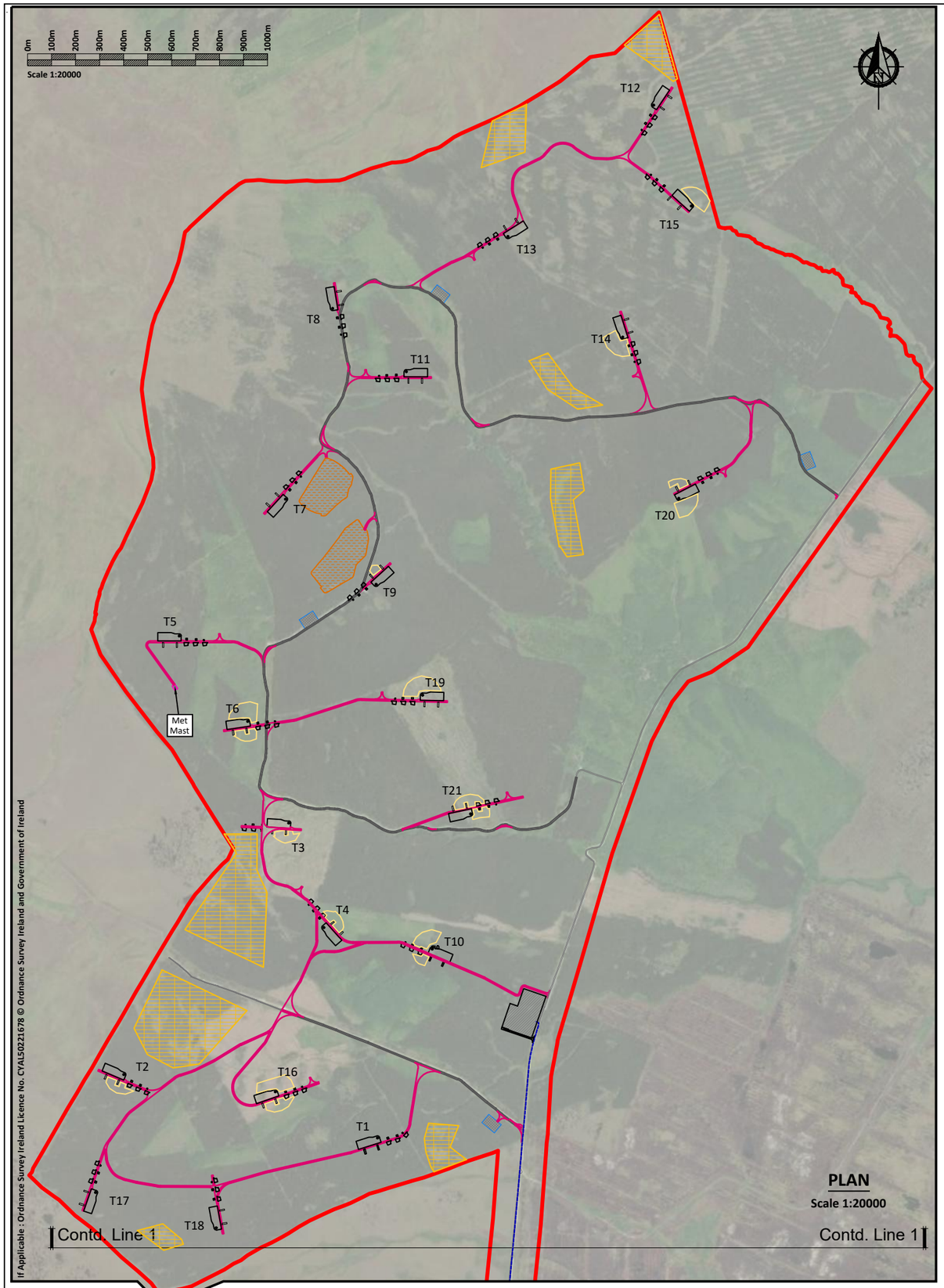

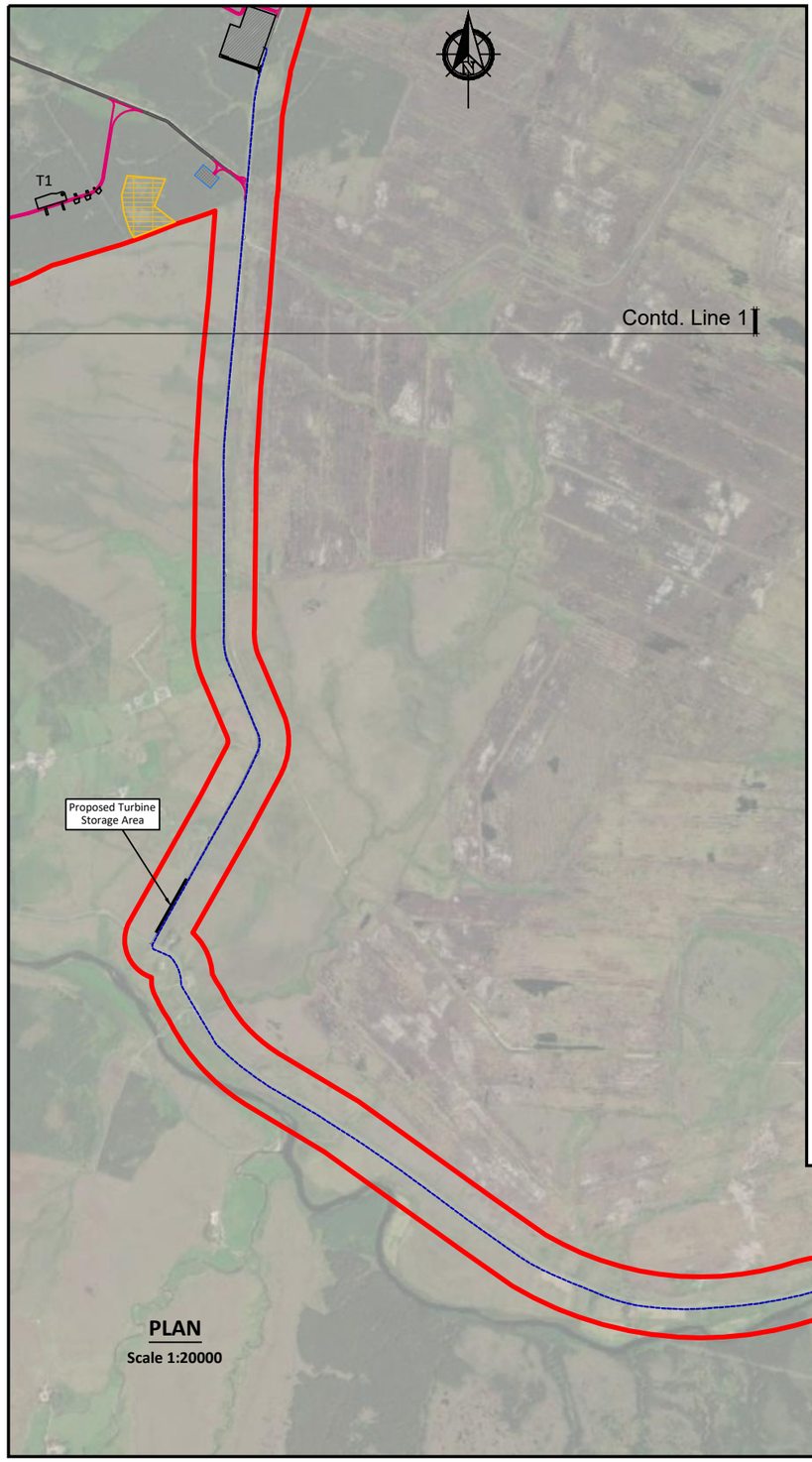

Legend:

- EIAR Site Boundary
- Proposed Access Track
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- Existing Access Track
- Proposed Grid Connection Route
- Proposed Turbine
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Borrow Pit
- Proposed Peat Placement

Construction Buffer Zone Legend:

- Marginal buffer zones which may need supervision should construction works take place in these areas.

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FIGURE 4.2 - CONSTRUCTION BUFFER ZONE PLAN

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5. GROUND INVESTIGATION

Ground investigations were carried out at the Proposed Development site by Irish Drilling Limited (IDL) under the supervision of FT in November 2021. Ground investigation in the form of trial pits were carried out on the 1st and 2nd of November 2021.:

The ground investigations by IDL comprised 12 no. trial pits with associated laboratory testing. The trial pits were carried out at various locations across the Proposed Development site to provide information on the ground conditions, and to investigate the potential to develop borrow pits within the site.

The laboratory testing included the following:

- Classification testing for overburden material
- Determination of dry density/moisture content relationship

The trial pits logs, photographs and associated laboratory testing are included within Appendix E of this report. 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 categorised into the following deposits:

Peat – Typically described as black & brown fibrous peat. Peat thicknesses from the trial pits ranged from 0.2 to 3.5m.

Glacial Till – Soft to firm brown slightly sandy gravelly Silt with cobbles. The thickness of the layer is variable across the site.

Glacial Sands and Gravels – grey clayey coarse Sand and subrounded to subangular medium to coarse Gravel.

Groundwater recorded in the trial pits varied from none to seepages and inflows between 0.9 and 3.2m 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 samples classify the cohesive material as Clay of low to intermediate plasticity.

5.3 Summary of Geotechnical Parameters

Table 5-1 contains characteristic geotechnical parameters for the main material types likely to be encountered on the Proposed Development 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/m^3)	c_u (kPa)	φ' (°)[4]	c' (kPa)
Peat	10	5 [3]	25	4
Glacial Till	19	30	30	0
Glacial Sand and Gravel	21	-	32	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, c_u for the peat of 5kPa was selected. The lowest recorded value on the Sheskin South wind farm site was 5kPa, recorded in one location, hence a value of 5kPa is a conservative value.

Note (4) φ' (°) – internal angle of shearing resistance

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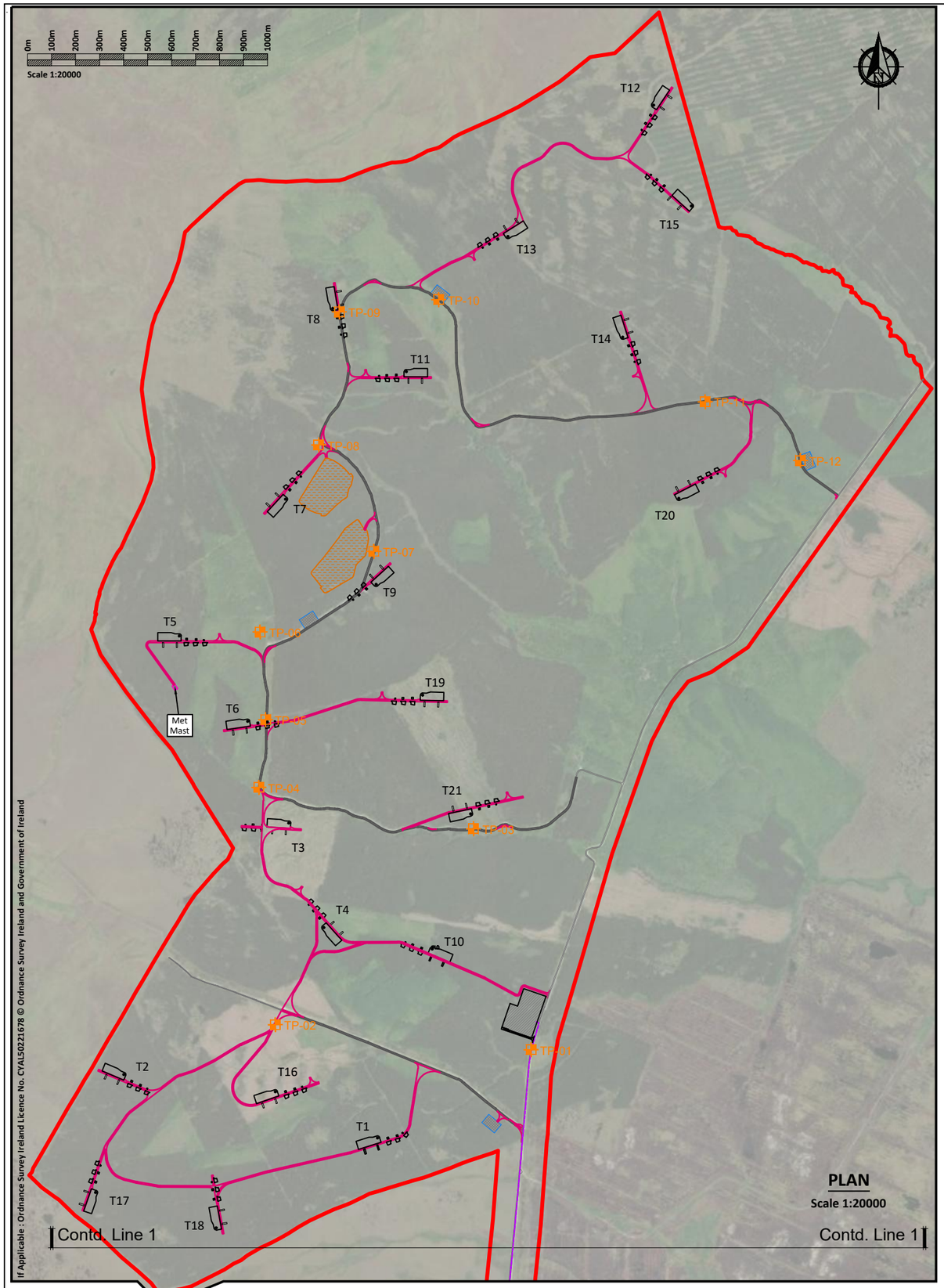

PLAN
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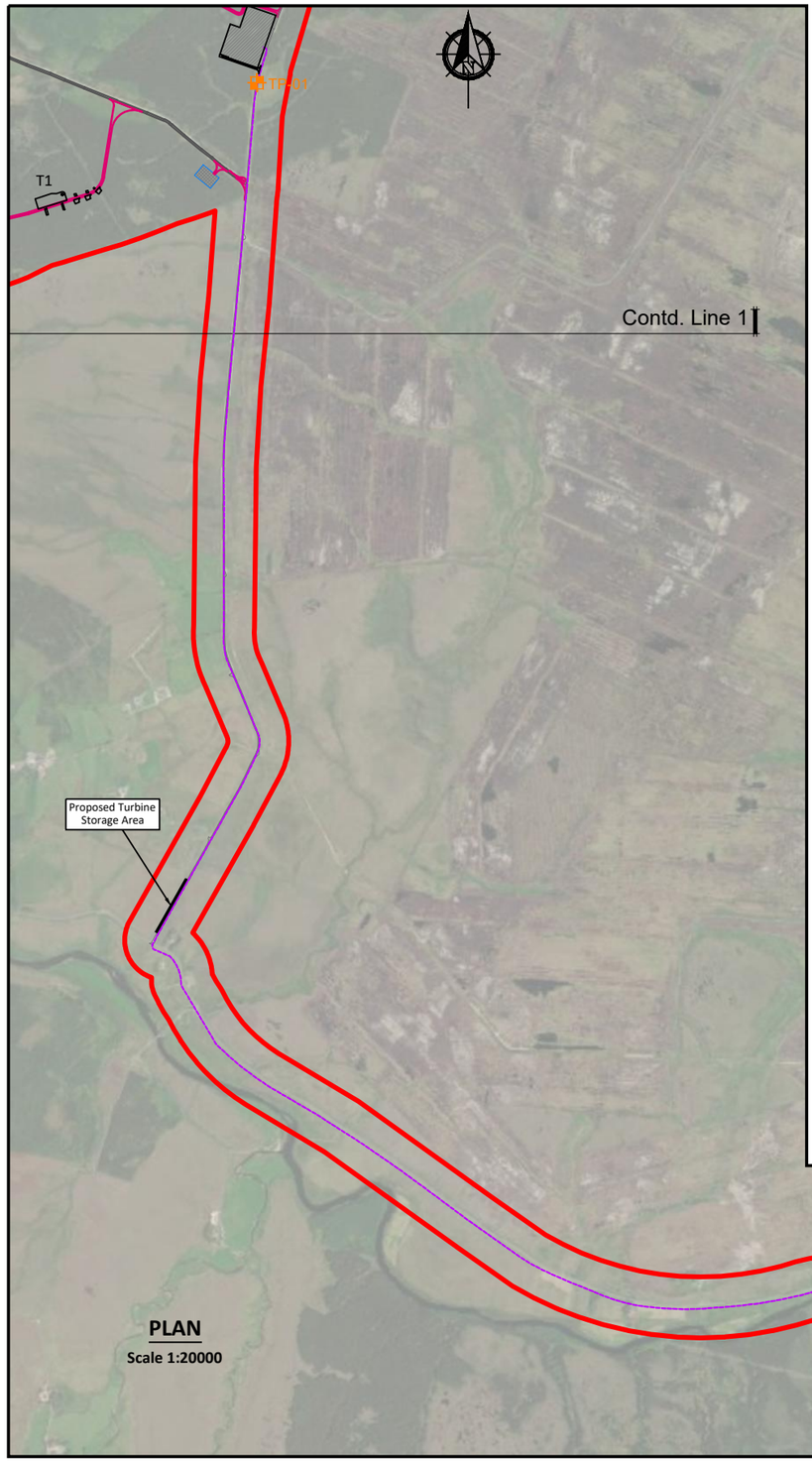

PLAN
Scale 1:20000

Legend:

- EIAR Site Boundary
- Proposed Access Track
- Existing Access Track To Be Upgraded
- Existing Access Track
- Proposed Grid Connection Route
- Proposed Turbine
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Borrow Pit
- Proposed Peat Placement

Ground Investigation Legend:

- TP... Trial Pit Location

Scale (@ A3) 1:20000

Date - 16.02.23

FIGURE 5.1 - GROUND INVESTIGATION LOCATION PLAN

Drawn - POR

Checked - IH

Rev - C

Thursday 16 February 2023

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6. PEAT DEPTHS, STRENGTH & 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.

6.1 Peat Depth

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

6.2 Peat Strength

The strength testing was carried out in-situ using a Geonor H-60 Hand-Field Vane Tester. From FT's experience hand vanes give indicative results for in-situ strength of peat and would be considered best practice for the field assessment of peat strength.

6.3 Slope Angle

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

The slope angle quoted typically reflects the slope within the footprint of each infrastructure location. It should be noted that slope angles derived from contour survey plans 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 would generally be deemed more accurate and representative of local topography.

6.4 Summary of Findings

Based on the peat depths recorded across the site by FT and MKO, the peat varied in depth from 0.2 to 5.7m with an average depth of 2.1m. All peat depth probes carried out on site have been utilised to produce a peat depth contour plan for the site (Figure 4.1).

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

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

Turbine	Easting	Northing	Peat Depth Range (m) (1)	Average Peat Depth (m)	Slope Angle (°) (2)
T01	493541	824049	2.7 – 3.0	2.8	3
T02	492484	824313	1.2 – 2.0	1.7	3
T03	493171	825359	1.0 – 1.6	1.3	5
T04	493318	824924	2.7 – 3.4	3.0	2
T05	492715	826139	2.4 – 2.8	2.6	5
T06	493000	825783	0.7 – 1.2	1.0	5
T07	493158	826709	1.8 – 2.3	2.1	5
T08	493355	827503	1.2 – 1.7	1.5	6
T09	493535	826353	0.9 – 1.1	1.0	6
T10	493769	824835	2.0 – 2.5	2.4	4
T11	493661	827239	0.9 – 1.8	1.3	4
T12	494691	828349	2.1 – 3.6	2.6	4
T13	494085	827802	1.8 – 2.8	2.4	3
T14	494563	827383	1.8 – 2.5	2.1	3
T15	494848	827929	1.8 – 2.6	2.0	4
T16	493115	824241	2.2 – 2.7	2.6	2
T17	492366	823822	2.0 – 2.4	2.2	3
T18	492870	823674	2.5 – 3.0	2.8	3
T19	493729	825892	1.3 – 1.8	1.4	5
T20	494796	826712	2.0 – 2.9	2.4	5
T21	493929	825397	0.3 – 1.4	0.6	4
Met Mast	492700	825934	0.7 – 1.9	1.2	4
Construction Compound (1)	494058	824104	1.9 – 3.0	2.5	3
Construction Compound (2)	493275	826243	0.8 – 1.7	1.2	4
Construction Compound (3)	493790	827608	0.6 – 1.8	1.2	4
Construction Compound (4)	495340	826865	0.4 – 1.3	0.8	5
Substation	494111	824433	1.3 – 3.3	2.4	3
Borrow Pit (1)	493341	826777	0.9	0.9	5
Borrow Pit (2)	493436	826478	1.6	1.6	4

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

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

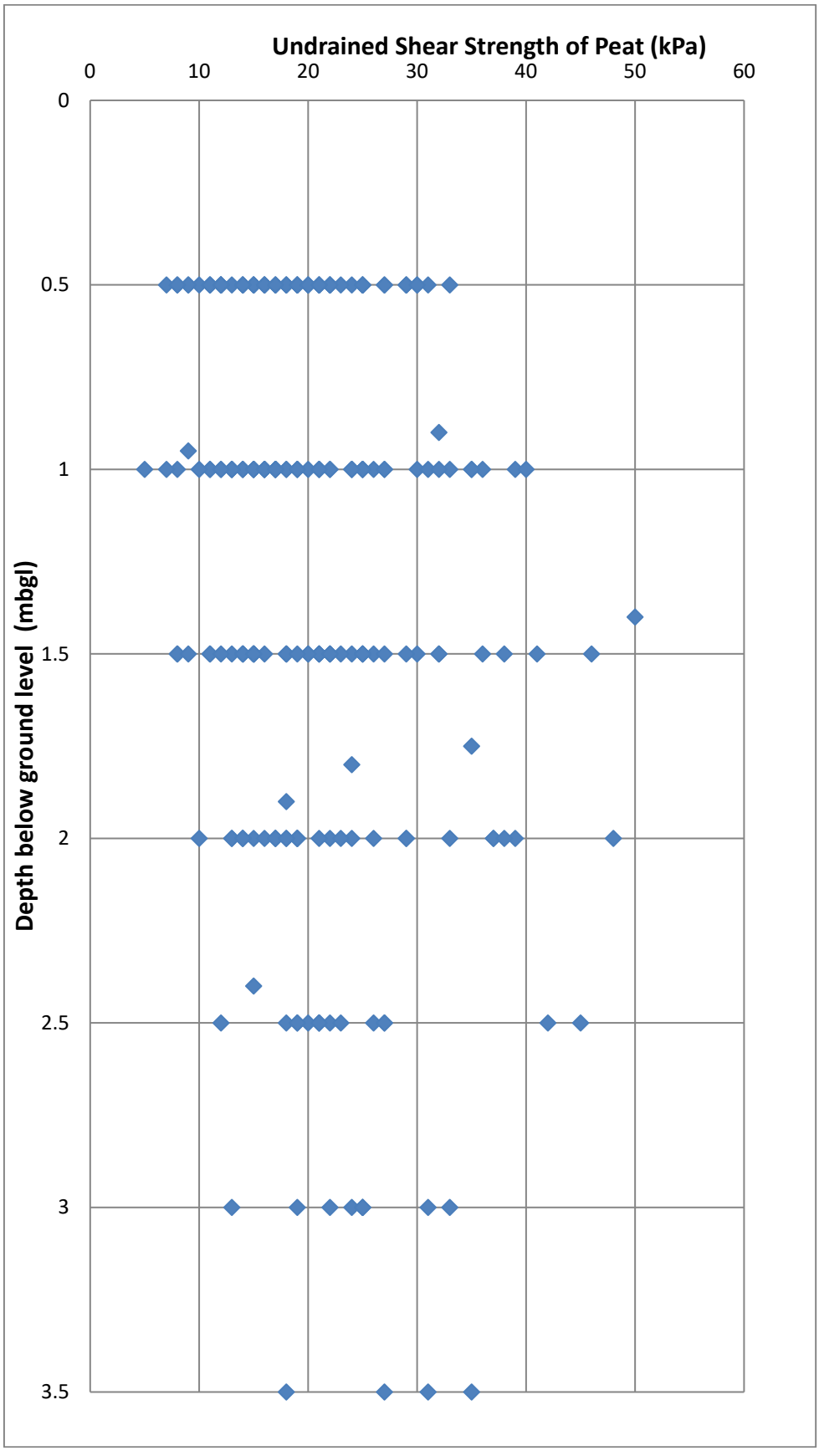
Note (3) The data presented in the Table above is used in the peat stability assessment of the site.

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

The hand vane results indicate undrained shear strengths in the range 5 to 50kPa, with an average value of about 20kPa. The strengths recorded would be typical of well drained peat as is present on the Proposed Development site.

Peat strength at sites of known peat failures (assuming undrained loading failure) are generally very low, for example the undrained shear strength at the Derrybrien failure (AGEC, 2004) as derived from back-analysis, was estimated at 2.5kPa. The recorded undrained strength at Sheskin South 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 Proposed Development site.

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



7. PEAT STABILITY ASSESSMENTS

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

7.1 Methodology for Peat Stability Assessment

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

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

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

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

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

Undrained shear strength values (c_u) for peat are used for the total stress analysis. Based on the findings of the 2003 Derrybrien failure and other failures in peat, undrained loading during construction was found to be the critical failure mechanism.

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

From Table 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°

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

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

7.2 Analysis to Determine Factor of Safety (Deterministic Approach)

The purpose of the analysis was to determine the Factor of Safety (FoS) of the peat slopes using infinite slope analysis. The analysis was carried out at the turbine locations, 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 1.0 indicates that a slope is unstable, a FoS of greater than 1.0 indicates a stable slope.

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

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

Table 7.2: Factor of Safety Limits for Slopes

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

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

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

A lower bound undrained shear strength, c_u for the peat of 6kPa was selected for the assessment based on the c_u values recorded at the site. 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 generally has a higher undrained strength.

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

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

Where:

F = Factor of Safety

c_u = Undrained strength

γ = Bulk unit weight of material
z = Depth to failure plane assumed as depth of peat
α = Slope angle

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

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

Where:

F = Factor of Safety
c' = Effective cohesion
γ = Bulk unit weight of material (Peat)
z = Depth to failure plane assumed as depth of peat
γ_w = Unit weight of water
h_w = Height of water table above failure plane
α = Slope angle
ϕ' = Effective friction angle

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

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

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

(2) The slope angles used in the peat stability assessment were obtained using a combination of readings taken during the site reconnaissance by FT using handheld equipment and from contour survey plans for site. It should be noted that slope angles derived from contour survey plans 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.

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

(4) A lower bound undrained shear strength, c_u for the peat of 5kPa and 6kPa, depending on the location, was selected for the assessment. The value of 6kPa was used in areas with steeper slopes. The lowest recorded value on the Sheskin South wind farm site during the site walkover was 5kPa. It should be noted that a c_u of 5/6kPa 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 majority of the peat has a significantly higher undrained strength as a result of the extensive drainage present within the forestry across the site.

For the stability analysis two load conditions were examined, namely

Condition (1): no surcharge loading
Condition (2): surcharge of 10 kPa, equivalent to 1m of stockpiled peat assumed as a worst case.

7.3 Results of Analysis

7.3.1 Undrained Analysis for the Peat

The results of the undrained analysis for the natural peat slopes at all locations analysed are presented in Appendix C and the results of the undrained analysis for the most critical load case (load condition 2) are shown on Figure 7.1. The undrained analysis for load condition 2 is considered the most critical load case as most peat failures occur in the short term upon loading of the peat surface. The results from the main infrastructure locations, including along access roads and in areas of peat placement, are summarised in Table 7.3 to 7.5.

The calculated FoS for load condition 1 is in excess of 1.30 for each of the locations (313 no. locations) analysed with a range of FoS of 1.75 to 71.68, 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 (313 no. locations) analysed with a range of FoS of 1.31 to 11.95, again indicating a low risk of peat instability.

Table 7.3: Factor of Safety Results (Undrained Condition)

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T01	493540	824053	**3.19**	**2.39**
T02	492485	824313	**4.78**	**3.19**
T03	493171	825360	**3.60**	**2.21**
T04	493318	824925	**4.22**	**3.26**
T05	492715	826139	**2.06**	**1.52**
T06	493000	825784	**4.80**	**2.62**
T07	493158	826709	**2.50**	**1.75**
T08	493355	827503	**2.83**	**1.78**
T09	493535	826354	**4.37**	**2.29**
T10	493830	824773	**2.87**	**2.05**
T11	493662	827239	**3.99**	**2.57**
T12	494692	828350	**2.00**	**1.56**
T13	494085	827802	**3.42**	**2.52**
T14	494563	827383	**3.83**	**2.73**

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T15	494849	827929	**2.76**	**2.00**
T16	493115	824241	**5.31**	**3.87**
T17	492367	823822	**3.99**	**2.81**
T18	492870	823674	**3.19**	**2.39**
T19	493729	825893	**3.20**	**2.06**
T20	494797	826713	**1.99**	**1.48**
T21	493929	825398	**5.13**	**2.99**
Met Mast	492700	825934	**3.78**	**2.48**
Construction Compound (1)	494058	824104	**3.19**	**2.39**
Construction Compound (2)	493275	826243	**4.23**	**2.66**
Construction Compound (3)	493790	827608	**3.99**	**2.57**
Construction Compound (4)	495340	826865	**4.43**	**2.50**
Substation	494111	824433	**2.90**	**2.22**
Borrow Pit (1)	493341	826777	**6.40**	**3.03**
Borrow Pit (2)	493436	826478	**4.49**	**2.76**

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

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
Main Spine Road	Varies		**2.83**	**1.78**
Site Entrance to Southern Loop	Varies		**2.04**	**1.68**
Southern Loop	Varies		**2.00**	**1.56**
Spur to T2	Varies		**3.99**	**2.81**
Spur to T17	Varies		**3.99**	**2.81**
Spur to T18	Varies		**3.99**	**2.39**
T3 to T16	Varies		**1.87**	**1.38**
T4 to Substation	Varies		**1.94**	**1.53**
Spur to T12, T13 & T15	Varies		**1.96**	**1.42**
Spur to T20	Varies		**2.18**	**1.45**
Spur to T14	Varies		**2.40**	**1.80**

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
Spur to T11	Varies		3.03	1.99
Spur to T7	Varies		1.94	1.42
Spur to T5 & Met. Mast	Varies		1.98	1.42
Spur to T21	Varies		5.13	2.99
T6 to T19	Varies		2.91	1.87

Table 7.5: Factor of Safety Results Peat Placement Areas (Undrained Condition)

Location	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T2	Varies		4.78	3.19
T3	Varies		3.60	2.21
T4	Varies		4.22	3.26
T6	Varies		4.80	2.62
T9	Varies		4.37	2.29
T10	Varies		2.87	2.05
T14	Varies		3.83	2.73
T15	Varies		2.76	2.00
T16	Varies		5.31	3.87
T19	Varies		3.20	2.06
T20	Varies		1.99	1.48
T21	Varies		5.13	2.99

Table 7.6: Factor of Safety Results Settlement Ponds (Undrained Condition)

Location	Settlement Pond Number	Factor of Safety for Load Condition	
		Condition (1)	Condition (2)
T1	tbc	3.09	2.33
T2	tbc	2.90	2.22
T3	tbc	1.92	1.44
T4	tbc	3.19	2.49
T5	tbc	2.19	1.50

Location	Settlement Pond Number	Factor of Safety for Load Condition	
		Condition (1)	Condition (2)
T6	tbc	3.03	1.99
T7	tbc	2.62	1.80
T8	tbc	3.21	1.92
T9	tbc	2.34	1.53
T10	tbc	1.89	1.50
T11	tbc	2.12	1.43
T12	tbc	4.23	2.66
T13	tbc	3.83	2.73
T14	tbc	3.09	2.33
T15	tbc	3.59	2.40
T16	tbc	4.10	3.19
T17	tbc	4.56	3.09
T18	tbc	2.76	2.00
T19	tbc	3.39	2.13
T20	tbc	3.84	2.30
T21	tbc	5.53	3.12
Met Mast	tbc	3.78	2.48
Substation	tbc	2.90	2.22
Construction Compound (1)	tbc	3.19	2.39
Construction Compound (2)	tbc	4.23	2.66
Construction Compound (3)	tbc	4.79	2.87
Construction Compound (4)	tbc	4.43	2.50
Borrow Pit (1)	tbc	2.40	1.60
Borrow Pit (2)	tbc	2.29	1.55

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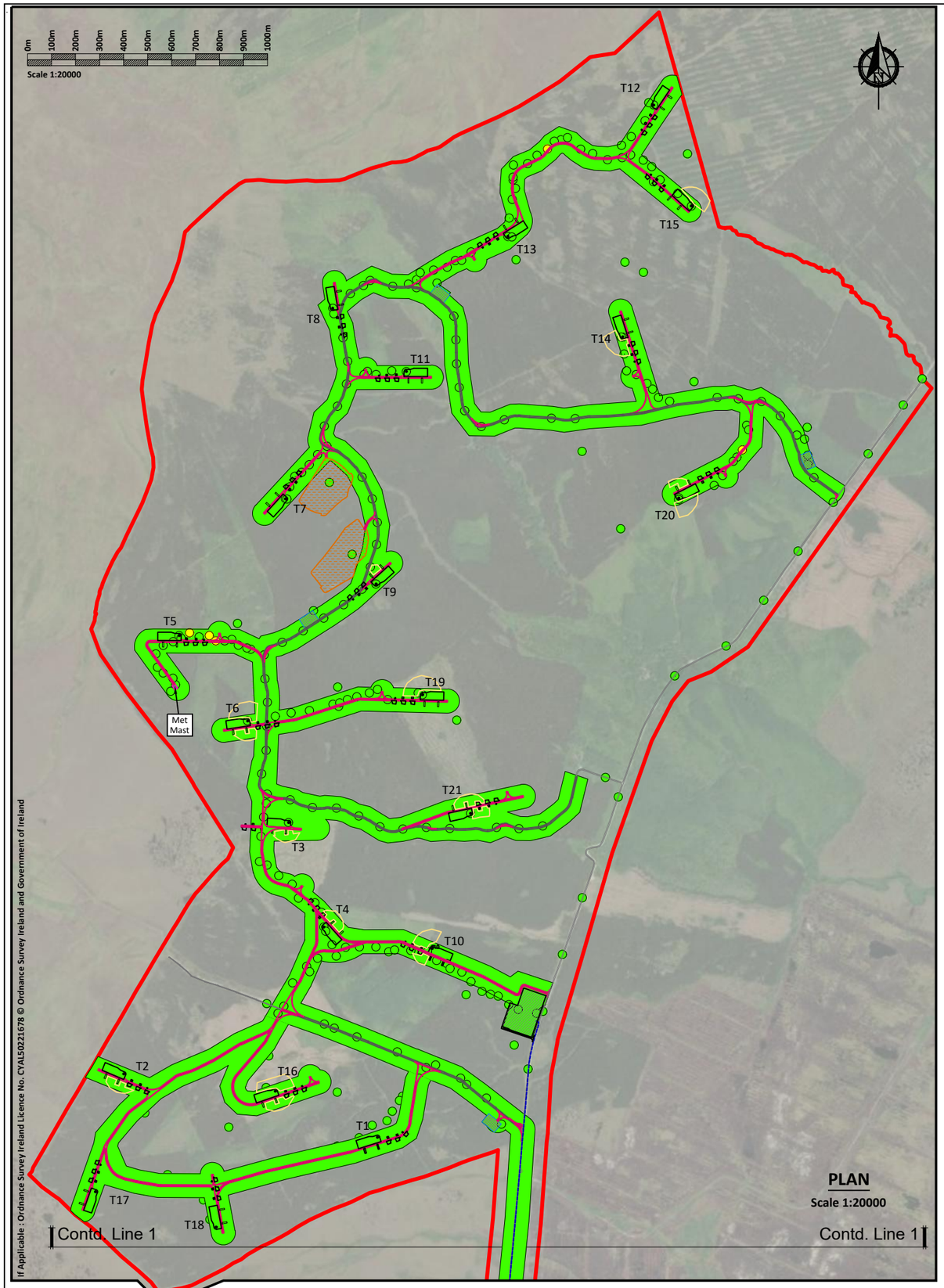

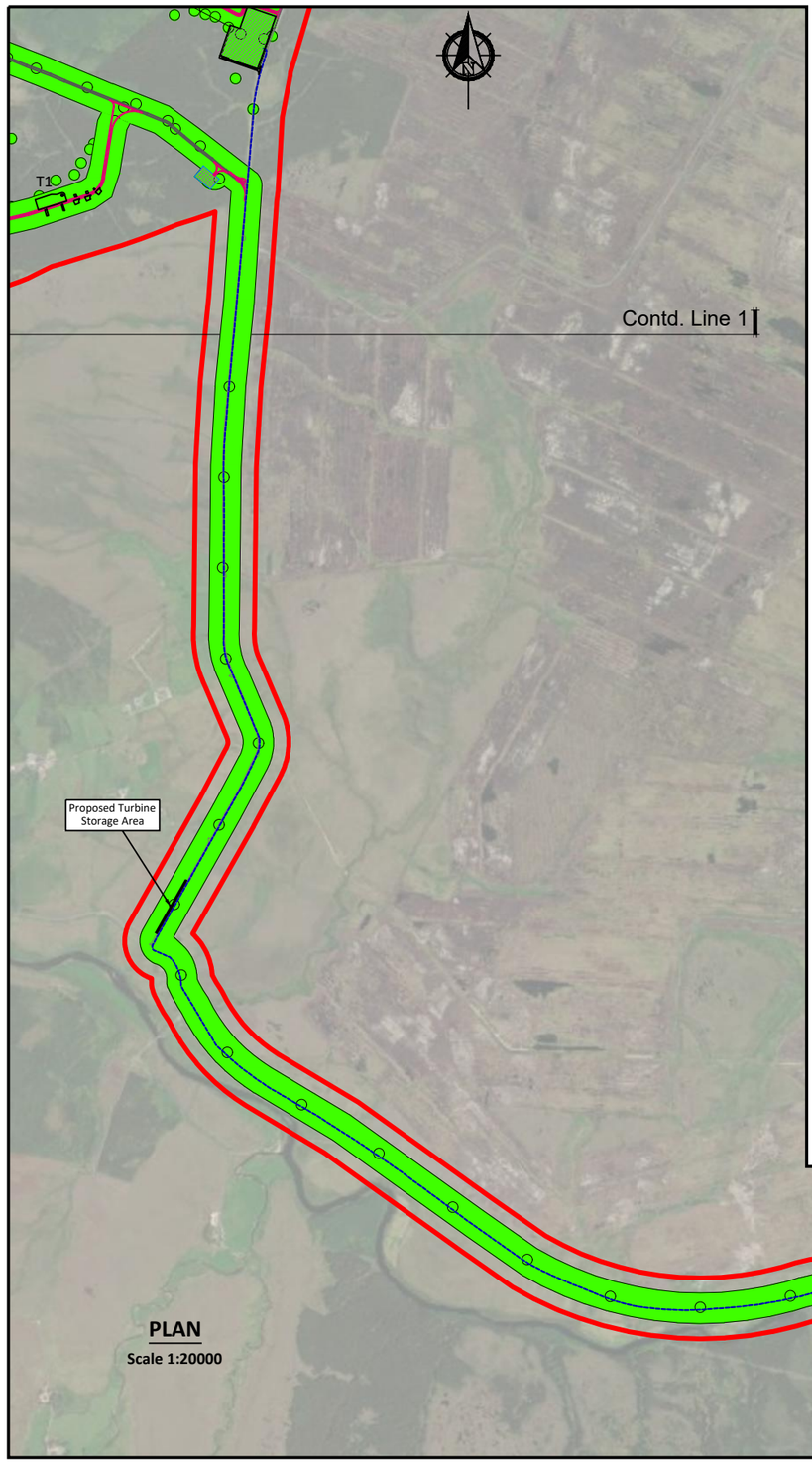

Legend:

- EIAR Site Boundary
- Proposed Access Track
- Existing Access Track To Be Upgraded
- Existing Access Track
- Proposed Grid Connection Route
- Proposed Turbine
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Borrow Pit
- Proposed Peat Placement

Factor of Safety Legend:

- 0 < 1.0
- ≥ 1.0 < 1.3
- ≥ 1.3

Increasing Stability

No Peat Recorded At This Location

Scale (@ A3) 1:20000

Date - 16.02.23

FIGURE 7.1 - FACTOR OF SAFETY PLAN - SHORT TERM CRITICAL CONDITION (UNDRAINED)

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7.3.2 Drained Analysis for the Peat

The results of the drained analysis for the peat are presented in Appendix C. The results from the main infrastructure locations, including along access roads and in areas of peat placement, are summarised in Table 7.6 to 7.8. As stated previously, the drained loading condition examines the effect of in particular, rainfall on the existing stability of the natural peat slopes and represents the post construction phase of the development.

The calculated FoS for load condition 1 is in excess of 1.30 for each of the locations (313 no. locations) analysed with a range of FoS of 1.59 to 57.34, 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 (313 no. locations) analysed with a range of FoS of 2.55 to 20.68, indicating a low risk of peat instability.

Table 7.7: Factor of Safety Results (Drained Conditions)

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T01	493540	824053	**2.55**	**4.14**
T02	492485	824313	**3.83**	**5.52**
T03	493171	825360	**2.88**	**3.82**
T04	493318	824925	**3.37**	**5.64**
T05	492715	826139	**1.65**	**2.61**
T06	493000	825784	**3.84**	**4.52**
T07	493158	826709	**2.00**	**3.01**
T08	493355	827503	**2.26**	**3.07**
T09	493535	826354	**3.50**	**3.94**
T10	493830	824773	**2.30**	**3.55**
T11	493662	827239	**3.19**	**4.43**
T12	494692	828350	**1.60**	**2.70**
T13	494085	827802	**2.73**	**4.36**
T14	494563	827383	**3.06**	**4.73**
T15	494849	827929	**2.21**	**3.45**
T16	493115	824241	**4.25**	**6.71**
T17	492367	823822	**3.19**	**4.87**
T18	492870	823674	**2.55**	**4.14**
T19	493729	825893	**2.56**	**3.55**
T20	494797	826713	**1.59**	**2.55**
T21	493929	825398	**4.11**	**5.17**
Met Mast	492700	825934	**3.03**	**4.28**

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
Construction Compound (1)	494058	824104	2.55	4.14
Construction Compound (2)	493275	826243	3.38	4.60
Construction Compound (3)	493790	827608	3.19	4.43
Construction Compound (4)	495340	826865	3.54	4.32
Substation	494111	824433	2.32	3.94
Borrow Pit (1)	493341	826777	5.12	5.23
Borrow Pit (2)	493436	826478	3.59	4.78

Table 7.8: Factor of Safety Results along access roads (Drained Condition)

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
Main Spine Road	Varies		1.87	2.64
Site Entrance to Southern Loop	Varies		1.63	2.90
Southern Loop	Varies		1.60	2.70
Spur to T2	Varies		3.19	4.87
Spur to T17	Varies		3.19	4.87
Spur to T18	Varies		2.55	4.14
T3 to T16	Varies		1.50	2.38
T4 to Substation	Varies		1.55	2.64
Spur to T12, T13 & T15	Varies		1.31	2.03
Spur to T20	Varies		1.45	2.07
Spur to T14	Varies		1.92	3.10
Spur to T11	Varies		2.42	3.43
Spur to T7	Varies		1.55	2.44
Spur to T5 & Met. Mast	Varies		1.32	2.03
Spur to T21	Varies		4.11	5.17
T6 to T19	Varies		2.33	3.23

Table 7.9: Factor of Safety Results Peat Placement Areas (Drained Condition)

Location	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T2	Varies		3.83	5.52
T3	Varies		2.88	3.82
T4	Varies		3.37	5.64
T6	Varies		3.84	4.52
T9	Varies		2.26	3.07
T10	Varies		2.30	3.55
T14	Varies		3.06	4.73
T15	Varies		2.21	3.45
T16	Varies		4.25	6.71
T19	Varies		2.56	3.55
T20	Varies		1.59	2.55
T21	Varies		4.11	5.17

Table 7.10: Factor of Safety Results Settlement Ponds (Drained Condition)

Location	Settlement Pond Number	Factor of Safety for Load Condition	
		Condition (1)	Condition (2)
T1	tbc	2.47	4.04
T2	tbc	2.32	3.85
T3	tbc	1.54	2.48
T4	tbc	2.55	4.32
T5	tbc	1.75	2.59
T6	tbc	2.42	3.43
T7	tbc	2.09	3.11
T8	tbc	2.57	3.31
T9	tbc	1.87	2.64
T10	tbc	1.51	2.59
T11	tbc	1.69	2.47
T12	tbc	3.38	4.60
T13	tbc	3.06	4.73

Location	Settlement Pond Number	Factor of Safety for Load Condition	
		Condition (1)	Condition (2)
T14	tbc	2.47	4.04
T15	tbc	2.87	4.14
T16	tbc	3.28	5.52
T17	tbc	3.64	5.34
T18	tbc	2.21	3.45
T19	tbc	2.71	3.68
T20	tbc	3.07	3.97
T21	tbc	4.42	5.40
Met Mast	tbc	3.03	4.28
Substation	tbc	2.32	3.85
Construction Compound (1)	tbc	2.55	4.14
Construction Compound (2)	tbc	3.38	4.60
Construction Compound (3)	tbc	3.83	4.97
Construction Compound (4)	tbc	3.54	4.32
Borrow Pit (1)	tbc	1.92	2.76
Borrow Pit (2)	tbc	1.83	2.67

7.4 Stability of Borrow Pit Berm

A stability check has been undertaken to demonstrate the stability of the proposed perimeter berms around the proposed borrow pits. The perimeter berm is considered to be more critical than any internal buttresses, as peat is only present on one side of the buttress. Slope stability has been checked using SlopeW© slope stability software. The analysis was carried out to EC7 design standards. 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. Rather, it provides a result in terms of an overdesign ratio (ODR), where an ODR of >1 is stable, and an ODR of <1 is unstable.

The following material properties have been used in the stability assessment. A low strength for the peat retained within the borrow pit/repositories has been used to model the effect of disturbance on the saturated peat mass.

Table 7.11: Material Properties

Material	Unit Weight (kN/m^3)	Undrained Shear Strength, c_u (kPa)	Angle of Shearing Resistance, ϕ (degrees)	Effective Cohesive, c' (kPa)
Intact Peat	10.5	8	25	4
Granular fill (berm)	21	-	42	0
Retained Peat within Borrow Pit (disturbed)	10.5	2	5	2
Glacial Sand and Gravel	20	-	32	-
Bedrock	21	-	34	250

The berm along the southeastern side of the borrow pits will be up to 6m in height. Bedrock has been assessed at 2m below ground level based on the available ground investigation information, overlain by 0.75m of peat and 1.25m of granular glacial material. All peat and any soft clay that may be present will be excavated from below the perimeter berm. The base of the rock berm will be benched into the glacial till to create a level platform (not shown in stability output). The inside slope of the perimeter berm has been modelled as a 60 degree slope in intact bedrock, and the outside slope as 40 degrees. Groundwater has been assumed at ground level on the downslope side of the berm.

The stability analysis has been undertaken using both undrained (short term) and drained (long term) strength parameters and shows that the berm is stable in both cases.

Table 7.12: Borrow Pit Stability Analysis

Borrow Pit	Over Design Ratio (ODR)	
	DA1C1	DA1C2
Undrained Analysis	1.43	1.14
Drained Analysis	1.44	1.15

8. PEAT STABILITY RISK ASSESSMENT

A peat stability risk assessment was carried out for the main infrastructure elements at the Proposed Development. 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 8.1. Where a subsection is rated 'Medium' or 'High', control measures are required to reduce the risk to at least a 'Low' risk rating. Where a subsection is rated 'Low' or 'Negligible', only routine control measures are required.

Table 8.1: Risk Rating Legend

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

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

8.1 Summary of Risk Assessment Results

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

The risk rating for each infrastructure element at the Proposed Development is designated Negligible or Low following some general mitigation/control measures being implemented. Sections of access roads to the nearest infrastructure element will be subject to the same mitigation/control measures that apply to the nearest infrastructure element.

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

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

Table 8.2: Summary of Peat Stability Risk Register

Infrastructure	Pre-Control Measure Implementation Risk Rating	Pre-Control Measure Implementation Risk Rating Category	Notable Control Measures Required	Post-General Control Measure Implementation Risk Rating	Post-General Control Measure Implementation Risk Rating Category
T01	Low	5 to 10	No	Negligible	1 to 4
T02	Negligible	1 to 4	No	Negligible	1 to 4
T03	Low	5 to 10	No	Low	5 to 10
T04	Low	5 to 10	No	Low	5 to 10
T05	Low	5 to 10	No	Low	5 to 10
T06	Low	5 to 10	No	Low	5 to 10
T07	Negligible	1 to 4	No	Negligible	1 to 4
T08	Negligible	1 to 4	No	Negligible	1 to 4
T09	Negligible	1 to 4	No	Negligible	1 to 4
T10	Low	5 to 10	No	Negligible	1 to 4
T11	Low	5 to 10	No	Low	5 to 10
T12	Negligible	1 to 4	No	Negligible	1 to 4
T13	Low	5 to 10	No	Negligible	1 to 4
T14	Negligible	1 to 4	No	Negligible	1 to 4
T15	Low	5 to 10	No	Low	5 to 10
T16	Low	5 to 10	No	Negligible	1 to 4
T17	Negligible	1 to 4	No	Negligible	1 to 4
T18	Low	5 to 10	No	Low	5 to 10
T19	Negligible	1 to 4	No	Negligible	1 to 4
T20	Low	5 to 10	No	Low	5 to 10
T21	Low	5 to 10	No	Low	5 to 10
Met Mast	Low	5 to 10	No	Low	5 to 10
Construction Compound (1)	Low	5 to 10	No	Low	5 to 10
Construction Compound (2)	Low	5 to 10	No	Negligible	1 to 4
Construction Compound (3)	Low	5 to 10	No	Negligible	1 to 4

Construction Compound (4)	Negligible	1 to 4	No	Negligible	1 to 4
Substation	Low	5 to 10	No	Low	5 to 10
Borrow Pit (1)	Low	5 to 10	No	Low	5 to 10
Borrow Pit (2)	Low	5 to 10	No	Low	5 to 10
Main Spine Road	Medium	11 to 16	No	Low	5 to 10
Site Entrance to Southern Loop	Medium	11 to 16	No	Low	5 to 10
Southern Loop	Medium	11 to 16	No	Low	5 to 10
Spur to T2	Low	5 to 10	No	Negligible	1 to 4
Spur to T17	Negligible	1 to 4	No	Negligible	1 to 4
Spur to T18	Medium	11 to 16	No	Low	5 to 10
T3 to T16	Medium	11 to 16	No	Low	5 to 10
T4 to Substation	Low	5 to 10	No	Low	5 to 10
Spur to T12, T13 & T15	Medium	11 to 16	No	Low	5 to 10
Spur to T20	Low	5 to 10	No	Low	5 to 10
Spur to T14	Low	5 to 10	No	Low	5 to 10
Spur to T11	Low	5 to 10	No	Low	5 to 10
Spur to T7	Medium	11 to 16	No	Low	5 to 10
Spur to T5 & Met. Mast	Medium	11 to 16	No	Low	5 to 10
Spur to T21	Low	5 to 10	No	Low	5 to 10
T6 to T19	Medium	11 to 16	No	Low	5 to 10

9. INDICTATIVE FOUNDATION TYPE AND FOUNDATION DEPTH FOR TURBINES

9.1 Summary

Based on a review of the ground investigation and walkover information for the Proposed Development site, an assessment of the likely foundation type and founding depths for each turbine location was carried out. A summary of this assessment is provided in Table 9-1.

Table 9-1: Summary of Indicative Turbine Foundation Type and Founding Depths

Turbine No.	Turbine Foundation Type	Relevant GI	Indicative founding depth (m bgl)	Comment
T01	Gravity foundation	Peat probes	4.0m	
T02	Gravity foundation	Peat probes	3.0m	
T03	Gravity foundation	Peat probes	3.0m	
T04	Gravity foundation	Peat probes	4.5m	
T05	Gravity foundation	Peat probes	4.0m	
T06	Gravity foundation	Peat probes / TP05	>2.0m	Soft sandy slightly gravelly Silt to 1.9m. Bottom of layer not encountered.
T07	Gravity foundation	Peat probes	3.5m	
T08	Gravity foundation	Peat probes / TP09	2.5m	Soft brown Silt to 0.9m overlying probable weathered bedrock.
T09	Gravity foundation	Peat probes / TP07	3.0m	
T10	Gravity foundation	Peat probes	3.5m	
T11	Gravity foundation	Peat probes	3.0m	
T12	Gravity foundation	Peat probes	4.5m	

Turbine No.	Turbine Foundation Type	Relevant GI	Indicative founding depth (m bgl)	Comment
T13	Gravity foundation	Peat probes	4.0m	
T14	Gravity foundation	Peat probes	3.5m	
T15	Gravity foundation	Peat probes	3.5m	
T16	Gravity foundation	Peat probes	4.0m	
T17	Gravity foundation	Peat probes	3.5m	
T18	Gravity foundation	Peat probes	4.0m	
T19	Gravity foundation	Peat probes	3.0m	
T20	Gravity foundation	Peat probes	4.0m	
T21	Gravity foundation	Peat probes / TP03	3.0m	Peat to 2.3m underlain by clayey coarse Sand and Gravel with cobbles and boulders.
Met Mast	Gravity foundation	Peat probes	3.0m	

It should be noted that confirmatory 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 indicated in Table 9-1. It is likely that following the completion of further ground investigation prior to construction that the turbine bases will be deemed suitable for gravity type foundations. Alternatively, piled foundations may be required at certain locations.

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 16 no. 900mm rotary bored piles.

10. FOUNDING DETAILS FOR INFRASTRUCTURE ELEMENTS (EXCEPT TURBINES)

This section provides a summary of the founding details for various elements of the proposed infrastructure across the Proposed Development site. The detailed methodologies for the construction these elements of the Proposed Development are included in Chapter 4 of the EIAR.

10.1 Access Roads

The access roads on site will be constructed as excavate and replace (founded) type construction, which, given the ground conditions and type of terrain present, is deemed the most appropriate construction approach. Floating road construction will not be undertaken on the Proposed Development.

The total length of new proposed access road to be constructed on site is 9.7km (see Figure 1.1 of the Peat and Spoil Management Plan – Appendix 4-2 of the EIAR).

The proposed make-up of the founded access roads is a minimum stone thickness of 500mm. The requirement for a layer of geotextile and geogrid and the necessary stone thickness will be confirmed at pre-construction stage.

See the Peat & Spoil Management Plan for the Proposed Development for further details on the proposed access roads on site.

10.2 Crane Hardstands

The crane hardstands will be constructed using the founded technique (i.e. not floated) technique

Crane hardstands are constructed using compacted Class 1/6F material 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 competent material underlying the peat deposits. The founding levels for the hardstands will be variable across the site and will be confirmed at pre-construction stage.

The make-up of the hardstands will include a minimum of 1000mm of granular stone fill with a layer of geotextile and/or geogrid, if deemed necessary by the Designer.

10.3 Substation Foundations & Platforms

The substation platform will be constructed using the founded technique (i.e. not floated technique). The substation foundations will comprise strip/raft foundations under the main footprint of the building with a basement/pit for cable connections.

Substation platforms are constructed using compacted Class 1/6F material on a suitable sub-formation to achieve the required bearing resistance.

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

Given the ground conditions present at the proposed substation, the foundations will require to be founded on firm glacial till or medium dense granular material. The peat will not be a be a suitable founding stratum for the substation foundations. The founding depth for substation platforms is to be 1.5-2.0m.

The make-up of the substation platform will include up to 1000mm of granular stone fill with a layer of geotextile and/or geogrid if deemed necessary by the Designer. At the underside of the substation foundations, a layer of structural up-fill (class 6N) will be required.

10.4 Construction Compound Platforms

The construction compound platforms will be constructed using the founded technique (i.e. not floated technique).

The construction compound platforms are constructed using compacted Class 1/6F material on a suitable sub-formation to achieve the required bearing resistance.

The construction compound platforms will be founded on material underlying the peat deposits.

Typical founding depth for construction compound platforms will require excavations from 1.0m to 3.0m bgl.

The typical make-up of the construction compound platform will include up to 750mm of granular stone fill with possibly a layer of geotextile and/or geogrid.

10.5 Met Mast Foundations

The met mast foundation will comprise a gravity type foundation.

Given the ground conditions present at the proposed met mast, the foundation will be founded on glacial till, glacial granular material or bedrock.

The founding depth for the met mast foundation is envisaged to be 2.0 to 3.0m bgl. At the underside of the met mast foundation, a layer of structural up-fill (class 6N) will be required.

10.6 Peat Placement Areas

A number of peat storage/remediation locations were reviewed as part of the assessment of the site. These are located within clear fell area around a number of the turbines in the Proposed Development. The placement of peat in these areas will be limited to a maximum of 1m in height, and the stability of these areas is covered under load condition 2 as reported in Section 7 of this report.

Additional discussion of the peat placement areas is provided in the Peat and Spoil Management Plan (FT, 2022) for the Proposed Development.

11. SUMMARY AND RECOMMENDATIONS

11.1 Summary

The following summary is given.

FT was engaged by MKO to undertake a geotechnical and peat stability assessment of the Proposed Development site.

The findings of the peat assessment showed that the site has a low risk of peat failure and is suitable for the proposed wind farm development. The findings include recommendations and control measures for construction work in peat lands, all of which will be implemented in full to ensure that all works adhere to an acceptable standard of safety.

The site is typically covered in blanket peat with undulating terrain and widespread mature and young forestry.

Peat thicknesses recorded during the site walkovers from 960 probes ranged from 0.2 to 5.7m with an average depth of 2.1m. 53% of the probes recorded peat depths of less than 2.0m, with 83% of peat depth probes recorded peat depths of less than 3.0m. The deeper peat areas were avoided, where possible, when optimising the wind farm layout for site. The average peat depth at any of the proposed turbine locations is 3.0m.

Slope inclinations at the main infrastructure locations range from 2 to 8 degrees.

An analysis of peat sliding was carried out at the main infrastructure locations across the Proposed Development 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.

An undrained analysis was carried out, which applies in the short-term during construction. For the undrained condition, the calculated FoS for load conditions 1 and 2 for the locations analysed, showed that all locations have an acceptable FoS of greater than 1.3, indicating a low risk of peat failure. The undrained analysis is considered the most critical condition for the peat slopes.

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

The peat stability risk assessment at each infrastructure location, along access roads, in peat placement areas and at settlement pond locations identified a number of mitigation/control measures to reduce the potential risk of peat failure. See Appendix B for details of the required mitigation/control measures for each infrastructure element.

In summary, the findings of the peat assessment showed that the Proposed Development 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 provided appropriate mitigation measures, such as implementing and maintaining an appropriate drainage system are implemented. The findings include recommendations and mitigation/control measures for construction work in peat lands, all of which will be implemented in full to ensure that all works adhere to an acceptable standard of safety.

11.2 Recommendations

The following recommendations are given, all of which will be implemented in full.

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

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

The measures prescribed given in FT's report 'Peat & Spoil Management Plan - Sheskin South Wind Farm, County Mayo' (FT, 2022) will be implemented in full during the design and construction stage of the wind farm development.

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

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APPENDIX A

Photos from Site Walkover

Photo 1: Existing access track through site

Photo 2: Existing access track along gas pipeline wayleave

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APPENDIX B

Peat Stability Risk Registers

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T1

Grid Reference (Eastings, Northings):	493540	824053
Distance to Watercourse (m)	100 - 150	
Min & Max Measured Peat Depth (m):	2.7 - 3.0	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.39 (u), 2.55 (d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		1	2	2	Negligible
4	Evidence of previous failures/slips	3	2	6	Low	No		2	2	4	Negligible
5	Type of vegetation	2	2	4	Negligible	No		2	2	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	2	4	Negligible	No		2	2	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		2	2	4	Negligible
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Relatively deep peat	3	2	6	Low	No		2	2	4	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T1**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T2

Grid Reference (Eastings, Northings):	492485	824313
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.2 - 2.0	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 3.19 (u), 3.83 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	3	1	3	Negligible	No		2	1	2	Negligible
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T3

Grid Reference (Eastings, Northings):	493171	825360
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	1.0 - 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 = 2.21 (u), 2.88 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Other	0	3	0	Not Applicable	No		0	3	0	Not Applicable

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T4

Grid Reference (Eastings, Northings):	493318	824925
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	2.7 - 3.4	
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 = 3.26 (u), 3.37 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Relatively deep peat	3	3	9	Low	No		2	3	6	Low

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T4**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T5

Grid Reference (Eastings, Northings):	492715	826139
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	2.4 - 2.8	
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 = 1.52 (u), 1.65 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	3	3	9	Low	No		2	3	6	Low
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Relatively deep peat	3	3	9	Low	No		2	3	6	Low

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T5**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T6

Grid Reference (Eastings, Northings):	493000	825784
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	0.7 - 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 = 2.62 (u), 3.84 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Other	0	3	0	Not Applicable	No		0	3	0	Not Applicable

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T7

Grid Reference (Eastings, Northings):	493158	826709
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.8 - 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 = 1.75 (u), 2.00 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	3	1	3	Negligible	No		2	1	2	Negligible
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T8

Grid Reference (Eastings, Northings):	493355	827503
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.2 - 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 = 1.78 (u), 2.26 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	3	1	3	Negligible	No		2	1	2	Negligible
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T9

Grid Reference (Eastings, Northings):	493535	826354
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.9 - 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 = 2.29 (u), 3.50 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	3	1	3	Negligible	No		2	1	2	Negligible
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T9**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T10

Grid Reference (Eastings, Northings):	493830	824773
Distance to Watercourse (m)	100 - 150	
Min & Max Measured Peat Depth (m):	2.0 - 2.5	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.05 (u), 2.30 (d)	1	2	2	Negligible	No		1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		2	2	4	Negligible
4	Evidence of previous failures/slips	3	2	6	Low	No		2	2	4	Negligible
5	Type of vegetation	2	2	4	Negligible	No		2	2	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	2	4	Negligible	No	See Below	2	2	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Relatively deep peat	3	2	6	Low	No		2	2	4	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T10**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T11

Grid Reference (Eastings, Northings):	493662	827239
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	0.9 - 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 = 2.57 (u), 3.19 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		2	3	6	Low
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Other	0	3	0	Not Applicable	No		0	3	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T11**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T12

Grid Reference (Eastings, Northings):	494692	828350
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	2.1 - 3.6	
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 = 1.56 (u), 1.60 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	3	1	3	Negligible	No		2	1	2	Negligible
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	3	1	3	Negligible	No		2	1	2	Negligible
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	3	1	3	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T12**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T13

Grid Reference (Eastings, Northings):	494085	827802
Distance to Watercourse (m)	100 - 150	
Min & Max Measured Peat Depth (m):	1.8 - 2.8	
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 = 2.52 (u), 2.73 (d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		2	2	4	Negligible
4	Evidence of previous failures/slips	3	2	6	Low	No		2	2	4	Negligible
5	Type of vegetation	2	2	4	Negligible	No		2	2	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	2	4	Negligible	No		2	2	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Relatively deep peat	3	2	6	Low	No		2	2	4	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T13**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T14

Grid Reference (Eastings, Northings):	494563	827383
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.8 - 2.5	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.73 (u), 3.06 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	3	1	3	Negligible	No		2	1	2	Negligible
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	3	1	3	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T14**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T15

Grid Reference (Eastings, Northings):	494849	827929
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	1.8 - 2.6	
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 = 2.00 (u), 2.21 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Relatively deep peat	3	3	9	Low	No		2	3	6	Low

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T15**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T16

Grid Reference (Eastings, Northings):	493115	824241
Distance to Watercourse (m)	100 - 150	
Min & Max Measured Peat Depth (m):	2.2 - 2.7	
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 = 3.87 (u), 4.25 (d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		2	2	4	Negligible
4	Evidence of previous failures/slips	3	2	6	Low	No		2	2	4	Negligible
5	Type of vegetation	2	2	4	Negligible	No		2	2	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	2	4	Negligible	No		2	2	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Relatively deep peat	3	2	6	Low	No		2	2	4	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T16**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T17

Grid Reference (Eastings, Northings):	492367	823822
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	2.0 - 2.4	
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 = 2.81 (u), 3.19 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	3	1	3	Negligible	No		2	1	2	Negligible
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T17**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T18

Grid Reference (Eastings, Northings):	492870	823674
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	2.5 - 3.0	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.39 (u), 2.55 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Relatively deep peat	3	3	9	Low	No		2	3	6	Low

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T18**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T19

Grid Reference (Eastings, Northings):	493729	825893
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.3 - 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 = 2.06 (u), 2.56 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	3	1	3	Negligible	No		2	1	2	Negligible
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T19**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T20

Grid Reference (Eastings, Northings):	494797	826713
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	2.0 - 2.9	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 1.48 (u), 1.59 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Relatively deep peat	3	3	9	Low	No		2	3	6	Low

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T20**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Turbine T21

Grid Reference (Eastings, Northings):	493929	825398
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	0.3 - 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 = 2.99 (u), 4.11 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Other	0	3	0	Not Applicable	No		0	3	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T21**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Met. Mast

Grid Reference (Eastings, Northings):	492700	825934
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	0.7 - 1.9	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.48 (u), 3.03 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	3	3	9	Low	No		2	3	6	Low
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Other	0	3	0	Not Applicable	No		0	3	0	Not Applicable

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Const. Comp. (1)

Grid Reference (Eastings, Northings):	494058	824104
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	1.9 - 3.0	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.39 (u), 2.55 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Relatively deep peat	3	3	9	Low	No		2	3	6	Low

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound (1)**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Const. Comp. (2)

Grid Reference (Eastings, Northings):	493275	826243
Distance to Watercourse (m)	100 - 150	
Min & Max Measured Peat Depth (m):	0.6 - 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 = 2.66 (u), 3.38 (d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		2	2	4	Negligible
4	Evidence of previous failures/slips	3	2	6	Low	No		2	2	4	Negligible
5	Type of vegetation	2	2	4	Negligible	No		2	2	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	2	4	Negligible	No		2	2	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Other	0	2	0	Not Applicable	No		0	2	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound (2)**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Const. Comp. (3)

Grid Reference (Eastings, Northings):	493790	827608
Distance to Watercourse (m)	100 - 150	
Min & Max Measured Peat Depth (m):	0.6 - 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 = 2.57 (u), 3.19 (d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		2	2	4	Negligible
4	Evidence of previous failures/slips	3	2	6	Low	No		2	2	4	Negligible
5	Type of vegetation	2	2	4	Negligible	No		2	2	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	2	4	Negligible	No		2	2	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Other	0	2	0	Not Applicable	No		0	2	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound (3)**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Const. Comp. (4)

Grid Reference (Eastings, Northings):	495340	826865
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.4 - 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 = 2.50 (u), 3.54 (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	3	1	3	Negligible	No		2	1	2	Negligible
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		1	1	1	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound (4)**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Substation

Grid Reference (Eastings, Northings):	494111	824433
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	1.3 - 3.3	
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 = 2.22 (u), 2.32 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Relatively deep peat	3	3	9	Low	No		2	3	6	Low

	Control Measures to be Implemented Prior to/and During Construction for **Substation**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Borrow Pit (1)

Grid Reference (Eastings, Northings):	493341	826777
Distance to Watercourse (m)	50 - 100	
Min & Max Measured Peat Depth (m):	0.9	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 3.03 (u), 5.12 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Other	0	3	0	Not Applicable	No		0	3	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for Borrow Pit (1)
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Borrow Pit (2)

Grid Reference (Eastings, Northings):	493436	826478
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	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 = 2.76 (u), 3.59 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Other	0	3	0	Not Applicable	No		0	3	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Borrow Pit (2)**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm 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.

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Main Spine Road

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**0.2 - 4.0**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 1.78 (u), 1.87 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		2	4	8	Low
4	Evidence of previous failures/slips	3	4	12	Medium	No		2	4	8	Low
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		2	4	8	Low
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively deep peat	3	4	12	Medium	No		2	4	8	Low

	Control Measures to be Implemented Prior to/and During Construction for **Main Spine Road**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

Note

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Site Entrance to Southern Loop

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**0.8 - 4.7**
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 = 1.68 (u), 1.63 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		2	4	8	Low
4	Evidence of previous failures/slips	3	4	12	Medium	No		2	4	8	Low
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		2	4	8	Low
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively deep peat	3	4	12	Medium	No		2	4	8	Low

	Control Measures to be Implemented Prior to/and During Construction for **Site Entrance to Southern Loop**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Southern Loop

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**0.8 - 4.5**
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 = 1.56 (u), 1.60 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		2	4	8	Low
4	Evidence of previous failures/slips	3	4	12	Medium	No		2	4	8	Low
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		2	4	8	Low
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively deep peat	3	4	12	Medium	No		2	4	8	Low

	Control Measures to be Implemented Prior to/and During Construction for **Southern Loop**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Spur to T2

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**100 - 150**
Min & Max Measured Peat Depth (m):	**2.0 - 3.0**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.81 (u), 3.19 (d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		2	2	4	Negligible
4	Evidence of previous failures/slips	3	2	6	Low	No		2	2	4	Negligible
5	Type of vegetation	2	2	4	Negligible	No		2	2	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	2	4	Negligible	No		2	2	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Relatively deep peat	3	2	6	Low	No		2	2	4	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Spur to T2**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Spur to T17

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**100 - 150**
Min & Max Measured Peat Depth (m):	**1.9 - 2.4**
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 = 2.81 (u), 3.19 (d)	1	2	2	Negligible	No	See Below	1	2	2	Negligible
2	Evidence of sub peat water flow	1	2	2	Negligible	No		1	2	2	Negligible
3	Evidence of surface water flow	2	2	4	Negligible	No		2	2	4	Negligible
4	Evidence of previous failures/slips	3	2	6	Low	No		2	2	4	Negligible
5	Type of vegetation	2	2	4	Negligible	No		2	2	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	2	4	Negligible	No		2	2	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
8	Evidence of mechanically cut peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	2	0	Not Applicable	No		0	2	0	Not Applicable
10	Evidence of bog pools	0	2	0	Not Applicable	No		0	2	0	Not Applicable
11	Other	0	2	0	Not Applicable	No		0	2	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Spur to T17**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm peat, mineral soil and bedrock condition and properties.

Note

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Spur to T18

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**2.0 - 3.0**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.39 (u), 2.55 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		2	4	8	Low
4	Evidence of previous failures/slips	3	4	12	Medium	No		2	4	8	Low
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		2	4	8	Low
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively deep peat	3	4	12	Medium	No		2	4	8	Low

	Control Measures to be Implemented Prior to/and During Construction for **Spur to T18**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	T3 to T16

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**1.6 - 4.0**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 1.38 (u), 1.50 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		2	4	8	Low
4	Evidence of previous failures/slips	3	4	12	Medium	No		2	4	8	Low
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		2	4	8	Low
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively deep peat	3	4	12	Medium	No		2	4	8	Low

	Control Measures to be Implemented Prior to/and During Construction for **T3 to T16**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

Note

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	T4 to Substation

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**50 - 100**
Min & Max Measured Peat Depth (m):	**1.5 - 4.1**
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 = 1.53 (u), 1.55 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Relatively deep peat	3	3	9	Low	No		2	3	6	Low

	Control Measures to be Implemented Prior to/and During Construction for **T4 to Substation**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Spur to T12, T13 & T15

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**0.8 - 4.6**
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 = 1.18 (u), 1.31 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		2	4	8	Low
4	Evidence of previous failures/slips	3	4	12	Medium	No		2	4	8	Low
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		2	4	8	Low
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	3	4	12	Medium	No		2	4	8	Low
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively deep peat	3	4	12	Medium	No		2	4	8	Low

	Control Measures to be Implemented Prior to/and During Construction for **Spur to T12, T13 & T15**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

Note

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Spur to T20

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**50 - 100**
Min & Max Measured Peat Depth (m):	**0.8 - 2.9**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 1.21 (u), 1.45 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		1	3	3	Negligible
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		1	3	3	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		1	3	3	Negligible
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Relatively deep peat	3	3	9	Low	No		2	3	6	Low

	Control Measures to be Implemented Prior to/and During Construction for **Spur to T20**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Spur to T14

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**1.6 - 3.5**
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 = 1.80 (u), 1.92 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Relatively deep peat	3	3	9	Low	No		2	3	6	Low

	Control Measures to be Implemented Prior to/and During Construction for **Spur to T14**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

Note

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Spur to T11**

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**50 - 100**
Min & Max Measured Peat Depth (m):	**0.8 - 1.9**
Control Required:	**No**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 1.99 (u), 2.42 (d)	1	3	3	Negligible	No	See Below	1	3	3	Negligible
2	Evidence of sub peat water flow	1	3	3	Negligible	No		1	3	3	Negligible
3	Evidence of surface water flow	2	3	6	Low	No		2	3	6	Low
4	Evidence of previous failures/slips	3	3	9	Low	No		2	3	6	Low
5	Type of vegetation	2	3	6	Low	No		2	3	6	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	3	6	Low	No		2	3	6	Low
7	Evidence of very soft/soft clay at base of peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
8	Evidence of mechanically cut peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	3	0	Not Applicable	No		0	3	0	Not Applicable
10	Evidence of bog pools	0	3	0	Not Applicable	No		0	3	0	Not Applicable
11	Other	0	3	0	Not Applicable	No		0	3	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Spur to T11**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm peat, mineral soil and bedrock condition and properties.

Note

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Spur to T7

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**1.6 - 2.7**
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 = 1.42 (u), 1.55 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		2	4	8	Low
4	Evidence of previous failures/slips	3	4	12	Medium	No		2	4	8	Low
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		2	4	8	Low
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively deep peat	3	4	12	Medium	No		2	4	8	Low

	Control Measures to be Implemented Prior to/and During Construction for **Spur to T7**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	Spur to T5 & Met. Mast

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**0.5 - 2.8**
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 = 1.18 (u), 1.32 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		2	4	8	Low
4	Evidence of previous failures/slips	3	4	12	Medium	No		2	4	8	Low
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		2	4	8	Low
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	3	4	12	Medium	No		2	4	8	Low
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively deep peat	3	4	12	Medium	No		2	4	8	Low

	Control Measures to be Implemented Prior to/and During Construction for **Spur to T5 & Met. Mast**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	**Spur to T21**

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**0.4 - 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 = 2.99 (u), 4.11 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		2	4	8	Low
4	Evidence of previous failures/slips	3	4	12	Medium	No		2	4	8	Low
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		2	4	8	Low
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Other	0	4	0	Not Applicable	No		0	4	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Spur to T21**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to confirm peat, mineral soil and bedrock condition and properties.

Note

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

Sheskin South Wind Farm - Peat Stability Risk Register (Rev 0)

Location:	T6 to T19

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**0.5 - 3.1**
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 = 1.87 (u), 2.33 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		2	4	8	Low
4	Evidence of previous failures/slips	3	4	12	Medium	No		2	4	8	Low
5	Type of vegetation	2	4	8	Low	No		2	4	8	Low
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		2	4	8	Low
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively deep peat	3	4	12	Medium	No		2	4	8	Low

	Control Measures to be Implemented Prior to/and During Construction for **T6 to T19**
i	Due to relatively deep peat at this location, additional construction measures such as the following will be required: - excavation side walls to be supported (e.g. boulders, sheet piles) or excavation face battered to a 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	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 confirm peat, mineral soil and bedrock condition and properties.

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

FEHILY TIMONEY

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APPENDIX C

Calculated FOS for Peat Slopes on Site

Calculated FoS of Natural Peat Slopes for Sheskin South 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	493540	824053	3	5	10	3.0	4.0	**3.19**	**2.39**
T02	492485	824313	3	5	10	2.0	3.0	**4.78**	**3.19**
T03	493171	825360	5	5	10	1.6	2.6	**3.60**	**2.21**
T04	493318	824925	2	5	10	3.4	4.4	**4.22**	**3.26**
T05	492715	826139	5	5	10	2.8	3.8	**2.06**	**1.52**
T06	493000	825784	5	5	10	1.2	2.2	**4.80**	**2.62**
T07	493158	826709	5	5	10	2.3	3.3	**2.50**	**1.75**
T08	493355	827503	6	5	10	1.7	2.7	**2.83**	**1.78**
T09	493535	826354	6	5	10	1.1	2.1	**4.37**	**2.29**
T10	493769	824835	4	5	10	2.5	3.5	**2.87**	**2.05**
T11	493662	827239	4	5	10	1.8	2.8	**3.99**	**2.57**
T12	494692	828350	4	5	10	3.6	4.6	**2.00**	**1.56**
T13	494085	827802	3	5	10	2.8	3.8	**3.42**	**2.52**
T14	494563	827383	3	5	10	2.5	3.5	**3.83**	**2.73**
T15	494849	827929	4	5	10	2.6	3.6	**2.76**	**2.00**
T16	493115	824241	2	5	10	2.7	3.7	**5.31**	**3.87**
T17	492367	823822	3	5	10	2.4	3.4	**3.99**	**2.81**
T18	492870	823674	3	5	10	3.0	4.0	**3.19**	**2.39**
T19	493729	825893	5	5	10	1.8	2.8	**3.20**	**2.06**
T20	494797	826713	5	5	10	2.9	3.9	**1.99**	**1.48**
T21	493929	825398	4	5	10	1.4	2.4	**5.13**	**2.99**
Met Mast	492700	825934	4	5	10	1.9	2.9	**3.78**	**2.48**
Substation (1)	494111	824433	3	5	10	3.3	4.3	**2.90**	**2.22**
Substation (2)	495332	827007	5	5	10	1.8	2.8	**3.20**	**2.06**
Construction Compound (1)	494058	824104	3	5	10	3.0	4.0	**3.19**	**2.39**
Construction Compound (2)	493275	826243	4	5	10	1.7	2.7	**4.23**	**2.66**
Construction Compound (3)	493790	827608	4	5	10	1.8	2.8	**3.99**	**2.57**
Construction Compound (4)	495340	826865	5	5	10	1.3	2.3	**4.43**	**2.50**
Borrow Pit 1	494573	827695	6	5	10	1.4	2.4	**3.44**	**2.00**
Borrow Pit 2	494860	827197	6	5	10	1.6	2.6	**3.01**	**1.85**
Borrow Pit 3	493341	826777	5	5	10	0.9	1.9	**6.40**	**3.03**
Borrow Pit 4	493436	826478	4	5	10	1.6	2.6	**4.49**	**2.76**
Borrow Pit 5	492958	826190	5	5	10	0.3	1.3	**19.20**	**4.43**
Borrow Pit 6	493376	825925	6	5	10	1.9	2.9	**2.53**	**1.66**
3	493913	824269	3	5	10	0.8	1.8	**11.96**	**5.31**
6	493361	824503	4	5	10	3.3	4.3	**2.18**	**1.67**
9	493080	824606	5	5	10	0.8	1.8	**7.20**	**3.20**
13	494230	825346	3	5	10	1.2	2.2	**7.97**	**4.35**
14	494131	825335	3	5	10	0.7	1.7	**13.67**	**5.63**
15	494038	825340	3	5	10	0.4	1.4	**23.92**	**6.83**
17	493843	825336	3	5	10	0.5	1.5	**19.13**	**6.38**
18	493745	825340	4	5	10	0.3	1.3	**23.95**	**5.53**
19	493647	825333	3	5	10	0.4	1.4	**23.92**	**6.83**
20	493552	825342	3	5	10	0.9	1.9	**10.63**	**5.04**
21	493464	825387	4	5	10	0.3	1.3	**23.95**	**5.53**
22	493371	825420	3	5	10	1.6	2.6	**5.98**	**3.68**
23	493271	825423	3	5	10	0.3	1.3	**31.89**	**7.36**
24	493178	825455	3	5	10	0.3	1.3	**31.89**	**7.36**
25	493082	825479	4	5	10	0.3	1.3	**23.95**	**5.53**
26	493059	825563	3	5	10	0.4	1.4	**23.92**	**6.83**
27	493078	825661	4	5	10	0.4	1.4	**17.96**	**5.13**
28	493080	825761	4	5	10	0.5	1.5	**14.37**	**4.79**
29	493083	825861	5	5	10	1.1	2.1	**5.24**	**2.74**
30	493073	825959	4	5	10	0.9	1.9	**7.98**	**3.78**
31	493069	826059	4	5	10	1.0	2.0	**7.19**	**3.59**
32	493145	826111	4	5	10	0.5	1.5	**14.37**	**4.79**
33	493232	826159	3	5	10	0.8	1.8	**11.96**	**5.31**
34	493317	826212	3	5	10	1.0	2.0	**9.57**	**4.78**
35	493400	826268	4	5	10	1.1	2.1	**6.53**	**3.42**
36	493476	826332	3	5	10	1.2	2.2	**7.97**	**4.35**
37	493512	826425	3	5	10	1.6	2.6	**5.98**	**3.68**
38	493537	826519	2	5	10	1.2	2.2	**11.95**	**6.52**
39	493541	826611	2	5	10	1.1	2.1	**13.03**	**6.83**
40	493520	826709	3	5	10	1.0	2.0	**9.57**	**4.78**
41	493477	826799	4	5	10	1.6	2.6	**4.49**	**2.76**
43	493331	826928	4	5	10	2.2	3.2	**3.27**	**2.25**
44	493320	827012	3	5	10	1.6	2.6	**5.98**	**3.68**
45	493375	827095	3	5	10	1.4	2.4	**6.83**	**3.99**
46	493412	827187	4	5	10	1.6	2.6	**4.49**	**2.76**
47	493417	827282	4	5	10	0.4	1.4	**17.96**	**5.13**
48	493398	827380	3	5	10	1.6	2.6	**5.98**	**3.68**
50	493428	827564	3	5	10	2.7	3.7	**3.54**	**2.59**
51	493511	827619	2	5	10	0.2	1.2	**71.68**	**11.95**
52	493605	827594	3	5	10	1.2	2.2	**7.97**	**4.35**
53	493704	827588	4	5	10	0.8	1.8	**8.98**	**3.99**
55	493860	827470	3	5	10	1.1	2.1	**8.70**	**4.56**
56	493868	827372	3	5	10	2.0	3.0	**4.78**	**3.19**
57	493871	827272	3	5	10	1.3	2.3	**7.36**	**4.16**
58	493882	827173	3	5	10	1.8	2.8	**5.31**	**3.42**
59	493905	827076	2	5	10	1.3	2.3	**11.03**	**6.23**
60	493974	827010	3	5	10	1.7	2.7	**5.63**	**3.54**
61	494070	827038	3	5	10	1.8	2.8	**5.31**	**3.42**
62	494266	827045	3	5	10	1.5	2.5	**6.38**	**3.83**
63	494365	827043	2	5	10	0.2	1.2	**71.68**	**11.95**

Calculated FoS of Natural Peat Slopes for Sheskin South 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)
69	494957	827131	4	5	10	1.9	2.9	**3.78**	**2.48**
70	495045	827125	4	5	10	1.3	2.3	**5.53**	**3.12**
71	495141	827114	4	5	10	2.2	3.2	**3.34**	**2.28**
72	495220	827054	3	5	10	0.3	1.3	**31.89**	**7.36**
75	495360	826797	4	5	10	0.2	1.2	**35.93**	**5.99**
88	494169	824333	4	5	10	0.4	1.4	**17.96**	**5.13**
89	494231	824574	4	5	10	2.3	3.3	**3.12**	**2.18**
90	494312	824811	3	5	10	1.8	2.8	**5.31**	**3.42**
91	494395	825047	3	5	10	2.5	3.5	**3.83**	**2.73**
93	494545	825467	2	5	10	3.0	4.0	**4.78**	**3.58**
94	494491	825548	3	5	10	1.2	2.2	**7.97**	**4.35**
96	494780	825971	2	5	10	0.2	1.2	**71.68**	**11.95**
97	494994	826096	2	5	10	0.9	1.9	**15.93**	**7.55**
98	495151	826286	3	5	10	1.8	2.8	**5.31**	**3.42**
99	495294	826491	3	5	10	1.8	2.8	**5.31**	**3.42**
100	495440	826694	3	5	10	0.4	1.4	**23.92**	**6.83**
101	495586	826897	2	5	10	2.2	3.2	**6.52**	**4.48**
102	495732	827100	3	5	10	0.4	1.4	**23.92**	**6.83**
103	495811	827209	2	5	10	0.5	1.5	**28.67**	**9.56**
104	493675	824256	2	5	10	2.0	3.0	**7.17**	**4.78**
108	492973	823877	4	5	10	3.6	4.6	**2.00**	**1.56**
111	492922	824091	2	5	10	2.1	3.1	**6.83**	**4.62**
114	492613	823851	3	5	10	3.3	4.3	**2.90**	**2.22**
117	492464	824111	4	5	10	2.1	3.1	**3.42**	**2.32**
127	493246	824761	3	5	10	2.1	3.1	**4.56**	**3.09**
130	493588	824822	3	5	10	2.3	3.3	**4.16**	**2.90**
133	494012	824645	3	5	10	2.3	3.3	**4.16**	**2.90**
142	493380	825844	4	5	10	0.5	1.5	**14.37**	**4.79**
149	493499	827240	6	5	10	0.8	1.8	**6.01**	**2.67**
152	493866	827702	5	5	10	2.1	3.1	**2.74**	**1.86**
155	494106	828038	5	5	10	1.3	2.3	**4.43**	**2.50**
157	494306	828205	8	5	10	1.2	2.2	**3.02**	**1.65**
165	494650	827653	3	5	10	1.7	2.7	**5.63**	**3.54**
173	495039	826882	5	5	10	0.8	1.8	**7.20**	**3.20**
WP1	493374	824237	3	5	10	3.9	4.9	**2.45**	**1.95**
WP2	494688	827166	4	5	10	1.6	2.6	**4.49**	**2.76**
WP3	494833	828146	4	5	10	2.7	3.7	**2.66**	**1.94**
WP4	494119	827705	4	5	10	1.7	2.7	**4.23**	**2.66**
WP5	493872	825787	4	5	10	1.7	2.7	**4.23**	**2.66**
WP7	494394	826907	5	5	10	1.8	2.8	**3.20**	**2.06**
WP8	494555	826584	4	5	10	1.6	2.6	**4.49**	**2.76**
MKO Probes									
1	493486	827227	5	5	10	1.2	2.2	**4.80**	**2.62**
2	493536	827227	5	5	10	1.9	2.9	**3.03**	**1.99**
3	493601	827242	5	5	10	1.0	2.0	**5.76**	**2.88**
10	493360	827480	8	5	10	1.3	2.3	**2.79**	**1.58**
36	495080	827015	5	5	10	1.6	2.6	**3.60**	**2.21**
43	494759	827115	4	5	10	3.0	4.0	**2.40**	**1.80**
45	494712	827131	4	5	10	2.2	3.2	**3.27**	**2.25**
46	494664	827190	2	5	10	2.7	3.7	**5.31**	**3.87**
47	494620	827227	2	5	10	3.1	4.1	**4.62**	**3.50**
48	494579	827242	2	5	10	3.0	4.0	**4.78**	**3.58**
51	494569	827312	2	5	10	3.5	4.5	**4.10**	**3.19**
53	494557	827383	3	5	10	2.0	3.0	**4.78**	**3.19**
64	494793	827981	3	5	10	2.1	3.1	**4.56**	**3.09**
68	494719	828038	5	5	10	3.2	4.2	**1.80**	**1.37**
90	492631	824247	2	5	10	3.0	4.0	**4.78**	**3.58**
91	492572	824150	4	5	10	2.3	3.3	**3.12**	**2.18**
94	492418	823982	3	5	10	2.1	3.1	**4.56**	**3.09**
100	492534	823875	2.5	5	10	2.0	3.0	**5.74**	**3.82**
101	492667	823893	2.5	5	10	4.1	5.1	**2.80**	**2.25**
102	492761	823866	2.5	5	10	2.3	3.3	**4.99**	**3.48**
103	492812	823827	3.5	5	10	2.1	3.1	**3.91**	**2.65**
104	492816	823788	3.5	5	10	2.0	3.0	**4.10**	**2.74**
113	493078	824256	3	5	10	2.8	3.8	**3.42**	**2.52**
119	493089	824388	2.5	5	10	4.0	5.0	**2.87**	**2.29**
120	493062	824443	5	5	10	2.0	3.0	**2.88**	**1.92**
121	493127	824565	4	5	10	1.8	2.8	**3.99**	**2.57**
130	493711	825900	5.5	5	10	1.8	2.8	**2.91**	**1.87**
133	495334	826852	5	5	10	0.5	1.5	**11.52**	**3.84**
134	495334	826891	4	5	10	1.3	2.3	**5.53**	**3.12**
135	495321	826958	3	5	10	0.4	1.4	**23.92**	**6.83**
136	495289	826975	3	5	10	0.3	1.3	**31.89**	**7.36**
141	494796	826706	4	5	10	1.9	2.9	**3.78**	**2.48**
190	493670	827604	4	5	10	1.5	2.5	**4.79**	**2.87**
191	493704	827621	4	5	10	2.3	3.3	**3.12**	**2.18**
192	493719	827651	4	5	10	1.8	2.8	**3.99**	**2.57**
193	493775	827662	5	5	10	1.9	2.9	**3.03**	**1.99**
194	493832	827674	5	5	10	2.8	3.8	**2.06**	**1.52**
195	493892	827703	5	5	10	2.6	3.6	**2.21**	**1.60**
196	493932	827737	5	5	10	2.5	3.5	**2.30**	**1.65**
201	494101	827800	2.5	5	10	2.8	3.8	**4.10**	**3.02**
202	494090	827879	2	5	10	2.8	3.8	**5.12**	**3.77**
203	494103	827957	5	5	10	3.0	4.0	**1.92**	**1.44**
204	494116	828002	3	5	10	2.5	3.5	**3.83**	**2.73**

Calculated FoS of Natural Peat Slopes for Sheskin South 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)
205	494106	828049	5	5	10	2.5	3.5	**2.30**	**1.65**
206	494108	828100	4	5	10	2.2	3.2	**3.27**	**2.25**
207	494167	828106	5	5	10	2.5	3.5	**2.30**	**1.65**
208	494206	828140	4	5	10	2.2	3.2	**3.27**	**2.25**
209	494250	828167	7	6	10	2.6	3.6	**1.96**	**1.42**
210	494278	828199	5.5	5	10	3.0	4.0	**1.75**	**1.31**
211	494333	828214	4	5	10	1.8	2.8	**3.99**	**2.57**
212	494388	828166	3.5	5	10	3.3	4.3	**2.49**	**1.91**
213	494438	828147	3	5	10	3.8	4.8	**2.52**	**1.99**
214	494500	828122	4	5	10	3.2	4.2	**2.25**	**1.71**
215	494561	828130	3	5	10	3.2	4.2	**2.99**	**2.28**
216	494558	828182	3	5	10	4.6	5.6	**2.08**	**1.71**
217	494599	828218	5.5	5	10	2.2	3.2	**2.38**	**1.64**
229	494672	828360	5	5	10	2.0	3.0	**2.88**	**1.92**
230	494656	828284	7	5	10	1.7	2.7	**2.43**	**1.53**
233	494684	828093	5.5	5	10	1.8	2.8	**2.91**	**1.87**
234	494649	828120	5.5	5	10	1.8	2.8	**2.91**	**1.87**
235	494596	828142	5.5	5	10	2.2	3.2	**2.38**	**1.64**
252	493151	824595	5.5	5	10	2.8	3.8	**1.87**	**1.38**
253	493188	824692	3.5	5	10	3.4	4.4	**2.41**	**1.86**
254	493259	824739	3.5	5	10	2.2	3.2	**3.73**	**2.56**
255	493292	824795	2.5	5	10	1.8	2.8	**6.37**	**4.10**
256	494204	824565	3	5	10	3.1	4.1	**3.09**	**2.33**
259	494128	824581	2.5	5	10	1.5	2.5	**7.65**	**4.59**
260	494088	824602	1	5	10	2.0	3.0	**14.33**	**9.55**
261	494044	824637	1	5	10	3.8	4.8	**7.54**	**5.97**
262	493977	824657	1	5	10	2.8	3.8	**10.23**	**7.54**
263	493911	824643	1	5	10	4.1	5.1	**6.99**	**5.62**
264	493931	824697	1	5	10	3.8	4.8	**7.54**	**5.97**
266	493893	824737	4	5	10	3.7	4.7	**1.94**	**1.53**
267	493844	824752	4	5	10	2.8	3.8	**2.57**	**1.89**
268	493788	824785	4	5	10	2.6	3.6	**2.76**	**2.00**
269	493750	824823	2.5	5	10	2.4	3.4	**4.78**	**3.37**
270	493680	824827	2.5	5	10	2.5	3.5	**4.59**	**3.28**
271	493613	824829	2.5	5	10	2.5	3.5	**4.59**	**3.28**
272	493535	824842	2.5	5	10	2.7	3.7	**4.25**	**3.10**
273	493466	824842	2	5	10	3.1	4.1	**4.62**	**3.50**
274	493409	824840	2	5	10	3.2	4.2	**4.48**	**3.41**
275	493370	824804	2	5	10	2.1	3.1	**6.83**	**4.62**
276	493352	824851	2	5	10	3.3	4.3	**4.34**	**3.33**
277	493326	824907	2	5	10	3.4	4.4	**4.22**	**3.26**
278	493308	824986	2.5	5	10	3.5	4.5	**3.28**	**2.55**
279	493281	825026	2.5	5	10	3.7	4.7	**3.10**	**2.44**
280	493212	825045	2.5	5	10	3.8	4.8	**3.02**	**2.39**
281	493186	825103	2	5	10	3.6	4.6	**3.98**	**3.12**
282	493130	825139	2	5	10	4.0	5.0	**3.58**	**2.87**
283	493081	825183	2	5	10	3.9	4.9	**3.68**	**2.93**
290	493744	824339	2	5	10	3.5	4.5	**4.10**	**3.19**
291	493714	824295	2	5	10	3.0	4.0	**4.78**	**3.58**
292	493670	824260	2	5	10	2.0	3.0	**7.17**	**4.78**
293	493646	824220	2	5	10	2.5	3.5	**5.73**	**4.10**
294	493633	824202	2	5	10	0.8	1.8	**17.92**	**7.96**
295	493603	824157	2	5	10	3.0	4.0	**4.78**	**3.58**
296	493581	824118	2	5	10	3.6	4.6	**3.98**	**3.12**
297	493520	824040	2	5	10	3.0	4.0	**4.78**	**3.58**
298	493551	823997	2	5	10	3.8	4.8	**3.77**	**2.99**
299	493540	824053	2	5	10	3.0	4.0	**4.78**	**3.58**
300	493520	824099	3	5	10	3.0	4.0	**3.19**	**2.39**
301	493465	824047	2	5	10	3.4	4.4	**4.22**	**3.26**
302	493374	824012	1	5	10	2.6	3.6	**11.02**	**7.96**
303	493280	823985	2	5	10	3.9	4.9	**3.68**	**2.93**
304	493179	823929	2	5	10	3.4	4.4	**4.22**	**3.26**
305	493090	823924	2	5	10	3.6	4.6	**3.98**	**3.12**
306	492977	823894	2	5	10	3.6	4.6	**3.98**	**3.12**
325	492618	826063	5	5	10	2.5	3.5	**2.30**	**1.65**
326	492625	826007	2.5	5	10	1.8	2.8	**6.37**	**4.10**
327	492649	825983	2.5	5	10	2.2	3.2	**5.22**	**3.59**
328	492689	825961	2.5	5	10	1.0	2.0	**11.47**	**5.74**
329	492680	825907	2.5	5	10	1.6	2.6	**7.17**	**4.41**
348	493292	826893	5.5	5	10	2.5	3.5	**2.10**	**1.50**
349	493257	826851	5.5	5	10	1.6	2.6	**3.28**	**2.02**
350	493226	826820	5.5	5	10	2.5	3.5	**2.10**	**1.50**
351	493197	826803	5.5	5	10	2.4	3.4	**2.18**	**1.54**
352	493176	826759	5.5	5	10	2.7	3.7	**1.94**	**1.42**
355	493164	826708	6	5	10	1.7	2.7	**2.83**	**1.78**
361	493995	824212	2.5	5	10	2.7	3.7	**4.25**	**3.10**
362	493888	824295	2.5	5	10	2.7	3.7	**4.25**	**3.10**
363	493784	824350	3	5	10	4.7	5.7	**2.04**	**1.68**
364	493624	824404	3.5	5	10	2.6	3.6	**3.16**	**2.28**
365	493455	824467	3.5	5	10	2.1	3.1	**3.91**	**2.65**
366	493320	824520	3.5	5	10	2.7	3.7	**3.04**	**2.22**
446	494691	828030	6	5	10	2.0	3.0	**2.40**	**1.60**
495	493116	825803	3	5	10	1.7	2.7	**5.63**	**3.54**
496	493182	825817	3	5	10	3.1	4.1	**3.09**	**2.33**
497	493258	825827	3	5	10	2.0	3.0	**4.78**	**3.19**
498	493356	825853	3	5	10	0.7	1.7	**13.67**	**5.63**

Calculated FoS of Natural Peat Slopes for Sheskin South 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)
499	493384	825859	3	5	10	2.0	3.0	**4.78**	**3.19**
500	493416	825872	3	5	10	1.2	2.2	**7.97**	**4.35**
501	493455	825884	3	5	10	0.7	1.7	**13.67**	**5.63**
509	493508	825900	3	5	10	1.0	2.0	**9.57**	**4.78**
510	493542	825915	3	5	10	0.9	1.9	**10.63**	**5.04**
511	493584	825872	5	5	10	1.8	2.8	**3.20**	**2.06**
557	493120	824517	4	5	10	2.2	3.2	**3.27**	**2.25**
558	493075	824481	4	5	10	2.8	3.8	**2.57**	**1.89**
559	492976	824443	1	5	10	3.8	4.8	**7.54**	**5.97**
560	492881	824375	2	5	10	3.0	4.0	**4.78**	**3.58**
561	492813	824335	2.5	5	10	2.7	3.7	**4.25**	**3.10**
562	492669	824315	2	5	10	4.5	5.5	**3.19**	**2.61**
564	492537	824261	3	5	10	2.4	3.4	**3.99**	**2.81**
574	492384	824023	3	5	10	1.9	2.9	**5.04**	**3.30**
576	492426	823917	4	5	10	2.1	3.1	**3.42**	**2.32**
592	492843	823707	3	5	10	2.6	3.6	**3.68**	**2.66**
658	494944	826765	3.5	5	10	1.0	2.0	**8.21**	**4.10**
659	494980	826806	3.5	5	10	1.3	2.3	**6.31**	**3.57**
660	495024	826865	10	5	10	0.7	1.7	**4.18**	**1.72**
661	495062	826913	8	6	10	2.0	3.0	**2.18**	**1.45**
663	495088	826997	5.5	5	10	1.3	2.3	**4.03**	**2.28**
679	493013	826082	5	5	10	1.6	2.6	**3.60**	**2.21**
680	492997	826087	5	5	10	0.7	1.7	**8.23**	**3.39**
681	492962	826099	5	5	10	0.5	1.5	**11.52**	**3.84**
682	492935	826123	11	5	10	0.7	1.7	**3.81**	**1.57**
683	492905	826117	11	5	10	1.0	2.0	**2.67**	**1.33**
684	492868	826117	11	6	10	1.1	2.1	**2.91**	**1.53**
685	492841	826139	8	6	10	2.0	3.0	**2.18**	**1.45**
686	492798	826134	8	5	10	1.3	2.3	**2.79**	**1.58**
687	492759	826151	7	6	10	2.5	3.5	**1.98**	**1.42**
688	492723	826129	6	5	10	2.2	3.2	**2.19**	**1.50**
689	492690	826114	6	5	10	2.2	3.2	**2.19**	**1.50**
690	492649	826098	6	5	10	2.4	3.4	**2.00**	**1.41**
700	493483	827598	3	5	10	4.0	5.0	**2.39**	**1.91**
710	493079	825440	6.5	5	10	1.9	2.9	**2.34**	**1.53**
711	493067	825383	2	5	10	3.8	4.8	**3.77**	**2.99**
712	493056	825303	2	5	10	4.0	5.0	**3.58**	**2.87**
713	493050	825198	2	5	10	3.2	4.2	**4.48**	**3.41**
Grid Connection									
pt 29	94171	324012	2	5	10	3.2	4.2	**4.48**	**3.41**
pt 31	94145	323713	2	5	10	3.5	4.5	**4.10**	**3.19**
pt 33	94117	323414	2	5	10	2.7	3.7	**5.31**	**3.87**
pt 35	94099	323115	2	5	10	2.8	3.8	**5.12**	**3.77**
pt 37	94095	322817	2	5	10	2.6	3.6	**5.51**	**3.98**
pt 39	94105	322519	2	5	10	2.8	3.8	**5.12**	**3.77**
pt 41	94213	322241	4	5	10	0.7	1.7	**10.26**	**4.23**
pt 43	94083	321972	4	5	10	1.8	2.8	**3.99**	**2.57**
pt 45	93936	321711	3	5	10	2.7	3.7	**3.54**	**2.59**
pt 47	93959	321478	3	5	10	3.0	4.0	**3.19**	**2.39**
pt 49	94110	321223	3	5	10	1.6	2.6	**5.98**	**3.68**
pt 51	94355	321052	3	5	10	2.7	3.7	**3.54**	**2.59**
pt 53	94609	320892	6	5	10	1.8	2.8	**2.67**	**1.72**
pt 55	94852	320715	3	5	10	1.7	2.7	**5.63**	**3.54**
pt 57	95097	320543	3	5	10	1.5	2.5	**6.38**	**3.83**
pt 59	95370	320421	3	5	10	0.9	1.9	**10.63**	**5.04**
pt 61	95666	320386	3	5	10	1.1	2.1	**8.70**	**4.56**
pt 63	95963	320423	3	5	10	1.6	2.6	**5.98**	**3.68**
pt 65	96259	320463	3	5	10	0.8	1.8	**11.96**	**5.31**
pt 67	96519	320328	3	5	10	1.5	2.5	**6.38**	**3.83**
pt 69	96739	320125	3	5	10	0.2	1.2	**47.83**	**7.97**
							Minimum =	**1.75**	**1.31**
							Maximum =	**71.68**	**11.95**
							Average =	**7.00**	**3.36**

Notes:

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

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

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

(4) A lower bound undrained shear strength, cu for the peat of 5/6kPa was selected for the assessment. It should be noted that a cu of 5/6kPa for the pea
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 highe
undrained strength.

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

(6) For load conditions see report text.

Calculated FoS of Natural Peat Slopes for Sheskin South 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	Surcharge Equivalent Placed Fill	Equivalent Total Depth of Peat (m)	Factor of Safety for Load Condition	
	α (deg)	c' (kPa)	γ (kN/m^3)	γ_w (kN/m^3)	(m)	ø' (deg)	Condition (2)	Condition (2)	Condition (1)	Condition (2)
									100% Water	100% Water
T01	3	4	10.0	10.0	3.0	25	1.0	4.0	**2.55**	**4.14**
T02	3	4	10.0	10.0	2.0	25	1.0	3.0	**3.83**	**5.52**
T03	5	4	10.0	10.0	1.6	25	1.0	2.6	**2.88**	**3.82**
T04	2	4	10.0	10.0	3.4	25	1.0	4.4	**3.37**	**5.64**
T05	5	4	10.0	10.0	2.8	25	1.0	3.8	**1.65**	**2.61**
T06	5	4	10.0	10.0	1.2	25	1.0	2.2	**3.84**	**4.52**
T07	5	4	10.0	10.0	2.3	25	1.0	3.3	**2.00**	**3.01**
T08	6	4	10.0	10.0	1.7	25	1.0	2.7	**2.26**	**3.07**
T09	6	4	10.0	10.0	1.1	25	1.0	2.1	**3.50**	**3.94**
T10	4	4	10.0	10.0	2.5	25	1.0	3.5	**2.30**	**3.55**
T11	4	4	10.0	10.0	1.8	25	1.0	2.8	**3.19**	**4.43**
T12	4	4	10.0	10.0	3.6	25	1.0	4.6	**1.60**	**2.70**
T13	3	4	10.0	10.0	2.8	25	1.0	3.8	**2.73**	**4.36**
T14	3	4	10.0	10.0	2.5	25	1.0	3.5	**3.06**	**4.73**
T15	4	4	10.0	10.0	2.6	25	1.0	3.6	**2.21**	**3.45**
T16	2	4	10.0	10.0	2.7	25	1.0	3.7	**4.25**	**6.71**
T17	3	4	10.0	10.0	2.4	25	1.0	3.4	**3.19**	**4.87**
T18	3	4	10.0	10.0	3.0	25	1.0	4.0	**2.55**	**4.14**
T19	5	4	10.0	10.0	1.8	25	1.0	2.8	**2.56**	**3.55**
T20	5	4	10.0	10.0	2.9	25	1.0	3.9	**1.59**	**2.55**
T21	4	4	10.0	10.0	1.4	25	1.0	2.4	**4.11**	**5.17**
Met Mast	4	4	10.0	10.0	1.9	25	1.0	2.9	**3.03**	**4.28**
Substation (1)	3	4	10.0	10.0	3.3	25	1.0	4.3	**2.32**	**3.85**
Substation (2)	5	4	10.0	10.0	1.8	25	1.0	2.8	**2.56**	**3.55**
Construction Compound (1)	3	4	10.0	10.0	3.0	25	1.0	4.0	**2.55**	**4.14**
Construction Compound (2)	4	4	10.0	10.0	1.7	25	1.0	2.7	**3.38**	**4.60**
Construction Compound (3)	4	4	10.0	10.0	1.8	25	1.0	2.8	**3.19**	**4.43**
Construction Compound (4)	5	4	10.0	10.0	1.3	25	1.0	2.3	**3.54**	**4.32**
Borrow Pit 1	6	4	10.0	10.0	1.4	25	1.0	2.4	**2.75**	**3.45**
Borrow Pit 2	6	4	10.0	10.0	1.6	25	1.0	2.6	**2.40**	**3.19**
Borrow Pit 3	5	4	10.0	10.0	0.9	25	1.0	1.9	**5.12**	**5.23**
Borrow Pit 4	4	4	10.0	10.0	1.6	25	1.0	2.6	**3.59**	**4.78**
Borrow Pit 5	5	4	10.0	10.0	0.3	25	1.0	1.3	**15.36**	**7.64**
Borrow Pit 6	6	4	10.0	10.0	1.9	25	1.0	2.9	**2.03**	**2.86**
3	3	4	10.0	10.0	0.8	25	1.0	1.8	**9.57**	**9.20**
6	4	4	10.0	10.0	3.3	25	1.0	4.3	**1.74**	**2.89**
9	5	4	10.0	10.0	0.8	25	1.0	1.8	**5.76**	**5.52**
13	3	4	10.0	10.0	1.2	25	1.0	2.2	**6.38**	**7.52**
14	3	4	10.0	10.0	0.7	25	1.0	1.7	**10.93**	**9.74**
15	3	4	10.0	10.0	0.4	25	1.0	1.4	**19.13**	**11.82**
17	3	4	10.0	10.0	0.5	25	1.0	1.5	**15.31**	**11.03**
18	4	4	10.0	10.0	0.3	25	1.0	1.3	**19.16**	**9.55**
19	3	4	10.0	10.0	0.4	25	1.0	1.4	**19.13**	**11.82**
20	3	4	10.0	10.0	0.9	25	1.0	1.9	**8.50**	**8.71**
21	4	4	10.0	10.0	0.3	25	1.0	1.3	**19.16**	**9.55**
22	3	4	10.0	10.0	1.6	25	1.0	2.6	**4.78**	**6.37**
23	3	4	10.0	10.0	0.3	25	1.0	1.3	**25.51**	**12.73**
24	3	4	10.0	10.0	0.3	25	1.0	1.3	**25.51**	**12.73**
25	4	4	10.0	10.0	0.3	25	1.0	1.3	**19.16**	**9.55**
26	3	4	10.0	10.0	0.4	25	1.0	1.4	**19.13**	**11.82**
27	4	4	10.0	10.0	0.4	25	1.0	1.4	**14.37**	**8.87**
28	4	4	10.0	10.0	0.5	25	1.0	1.5	**11.50**	**8.28**
29	5	4	10.0	10.0	1.1	25	1.0	2.1	**4.19**	**4.73**
30	4	4	10.0	10.0	0.9	25	1.0	1.9	**6.39**	**6.54**
31	4	4	10.0	10.0	1.0	25	1.0	2.0	**5.75**	**6.21**
32	4	4	10.0	10.0	0.5	25	1.0	1.5	**11.50**	**8.28**
33	3	4	10.0	10.0	0.8	25	1.0	1.8	**9.57**	**9.20**
34	3	4	10.0	10.0	1.0	25	1.0	2.0	**7.65**	**8.28**
35	4	4	10.0	10.0	1.1	25	1.0	2.1	**5.23**	**5.91**
36	3	4	10.0	10.0	1.2	25	1.0	2.2	**6.38**	**7.52**
37	3	4	10.0	10.0	1.6	25	1.0	2.6	**4.78**	**6.37**
38	2	4	10.0	10.0	1.2	25	1.0	2.2	**9.56**	**11.28**
39	2	4	10.0	10.0	1.1	25	1.0	2.1	**10.43**	**11.82**
40	3	4	10.0	10.0	1.0	25	1.0	2.0	**7.65**	**8.28**
41	4	4	10.0	10.0	1.6	25	1.0	2.6	**3.59**	**4.78**
43	4	4	10.0	10.0	2.2	25	1.0	3.2	**2.61**	**3.88**
44	3	4	10.0	10.0	1.6	25	1.0	2.6	**4.78**	**6.37**
45	3	4	10.0	10.0	1.4	25	1.0	2.4	**5.47**	**6.90**
46	4	4	10.0	10.0	1.6	25	1.0	2.6	**3.59**	**4.78**
47	4	4	10.0	10.0	0.4	25	1.0	1.4	**14.37**	**8.87**
48	3	4	10.0	10.0	1.6	25	1.0	2.6	**4.78**	**6.37**
50	3	4	10.0	10.0	2.7	25	1.0	3.7	**2.83**	**4.47**
51	2	4	10.0	10.0	0.2	25	1.0	1.2	**57.34**	**20.68**
52	3	4	10.0	10.0	1.2	25	1.0	2.2	**6.38**	**7.52**
53	4	4	10.0	10.0	0.8	25	1.0	1.8	**7.19**	**6.90**
55	3	4	10.0	10.0	1.1	25	1.0	2.1	**6.96**	**7.88**
56	3	4	10.0	10.0	2.0	25	1.0	3.0	**3.83**	**5.52**
57	3	4	10.0	10.0	1.3	25	1.0	2.3	**5.89**	**7.20**
58	3	4	10.0	10.0	1.8	25	1.0	2.8	**4.25**	**5.91**
59	2	4	10.0	10.0	1.3	25	1.0	2.3	**8.82**	**10.79**
60	3	4	10.0	10.0	1.7	25	1.0	2.7	**4.50**	**6.13**
61	3	4	10.0	10.0	1.8	25	1.0	2.8	**4.25**	**5.91**
62	3	4	10.0	10.0	1.5	25	1.0	2.5	**5.10**	**6.62**
63	2	4	10.0	10.0	0.2	25	1.0	1.2	**57.34**	**20.68**
69	4	4	10.0	10.0	1.9	25	1.0	2.9	**3.03**	**4.28**
70	4	4	10.0	10.0	1.3	25	1.0	2.3	**4.42**	**5.40**

Calculated FoS of Natural Peat Slopes for Sheskin South 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	Surcharge Equivalent Placed Fill	Equivalent Total Depth of Peat (m)	Factor of Safety for Load Condition	
	α (deg)	c' (kPa)	γ (kN/m^3)	γ_w (kN/m^3)	(m)	ø' (deg)	Condition (2)	Condition (2)	Condition (1)	Condition (2)
									100% Water	100% Water
71	4	4	10.0	10.0	2.2	25	1.0	3.2	**2.67**	**3.94**
72	3	4	10.0	10.0	0.3	25	1.0	1.3	**25.51**	**12.73**
75	4	4	10.0	10.0	0.2	25	1.0	1.2	**28.74**	**10.35**
88	4	4	10.0	10.0	0.4	25	1.0	1.4	**14.37**	**8.87**
89	4	4	10.0	10.0	2.3	25	1.0	3.3	**2.50**	**3.76**
90	3	4	10.0	10.0	1.8	25	1.0	2.8	**4.25**	**5.91**
91	3	4	10.0	10.0	2.5	25	1.0	3.5	**3.06**	**4.73**
93	2	4	10.0	10.0	3.0	25	1.0	4.0	**3.82**	**6.21**
94	3	4	10.0	10.0	1.2	25	1.0	2.2	**6.38**	**7.52**
96	2	4	10.0	10.0	0.2	25	1.0	1.2	**57.34**	**20.68**
97	2	4	10.0	10.0	0.9	25	1.0	1.9	**12.74**	**13.06**
98	3	4	10.0	10.0	1.8	25	1.0	2.8	**4.25**	**5.91**
99	3	4	10.0	10.0	1.8	25	1.0	2.8	**4.25**	**5.91**
100	3	4	10.0	10.0	0.4	25	1.0	1.4	**19.13**	**11.82**
101	2	4	10.0	10.0	2.2	25	1.0	3.2	**5.21**	**7.76**
102	3	4	10.0	10.0	0.4	25	1.0	1.4	**19.13**	**11.82**
103	2	4	10.0	10.0	0.5	25	1.0	1.5	**22.94**	**16.55**
104	2	4	10.0	10.0	2.0	25	1.0	3.0	**5.73**	**8.27**
108	4	4	10.0	10.0	3.6	25	1.0	4.6	**1.60**	**2.70**
111	2	4	10.0	10.0	2.1	25	1.0	3.1	**5.46**	**8.01**
114	3	4	10.0	10.0	3.3	25	1.0	4.3	**2.32**	**3.85**
117	4	4	10.0	10.0	2.1	25	1.0	3.1	**2.74**	**4.01**
127	3	4	10.0	10.0	2.1	25	1.0	3.1	**3.64**	**5.34**
130	3	4	10.0	10.0	2.3	25	1.0	3.3	**3.33**	**5.02**
133	3	4	10.0	10.0	2.3	25	1.0	3.3	**3.33**	**5.02**
142	4	4	10.0	10.0	0.5	25	1.0	1.5	**11.50**	**8.28**
149	6	4	10.0	10.0	0.8	25	1.0	1.8	**4.81**	**4.60**
152	5	4	10.0	10.0	2.1	25	1.0	3.1	**2.19**	**3.21**
155	5	4	10.0	10.0	1.3	25	1.0	2.3	**3.54**	**4.32**
157	8	4	10.0	10.0	1.2	25	1.0	2.2	**2.42**	**2.83**
165	3	4	10.0	10.0	1.7	25	1.0	2.7	**4.50**	**6.13**
173	5	4	10.0	10.0	0.8	25	1.0	1.8	**5.76**	**5.52**
WP1	3	4	10.0	10.0	3.9	25	1.0	4.9	**1.96**	**3.38**
WP2	4	4	10.0	10.0	1.6	25	1.0	2.6	**3.59**	**4.78**
WP3	4	4	10.0	10.0	2.7	25	1.0	3.7	**2.13**	**3.36**
WP4	4	4	10.0	10.0	1.7	25	1.0	2.7	**3.38**	**4.60**
WP5	4	4	10.0	10.0	1.7	25	1.0	2.7	**3.38**	**4.60**
WP7	5	4	10.0	10.0	1.8	25	1.0	2.8	**2.56**	**3.55**
WP8	4	4	10.0	10.0	1.6	25	1.0	2.6	**3.59**	**4.78**
MKO Probes										
1	5	4	10.0	10.0	1.2	25	1.0	2.2	**3.84**	**4.52**
2	5	4	10.0	10.0	1.9	25	1.0	2.9	**2.42**	**3.43**
3	5	4	10.0	10.0	1.0	25	1.0	2.0	**4.61**	**4.97**
10	8	4	10.0	10.0	1.3	25	1.0	2.3	**2.23**	**2.70**
36	5	4	10.0	10.0	1.6	25	1.0	2.6	**2.88**	**3.82**
43	4	4	10.0	10.0	3.0	25	1.0	4.0	**1.92**	**3.10**
45	4	4	10.0	10.0	2.2	25	1.0	3.2	**2.61**	**3.88**
46	2	4	10.0	10.0	2.7	25	1.0	3.7	**4.25**	**6.71**
47	2	4	10.0	10.0	3.1	25	1.0	4.1	**3.70**	**6.05**
48	2	4	10.0	10.0	3.0	25	1.0	4.0	**3.82**	**6.21**
51	2	4	10.0	10.0	3.5	25	1.0	4.5	**3.28**	**5.52**
53	3	4	10.0	10.0	2.0	25	1.0	3.0	**3.83**	**5.52**
64	3	4	10.0	10.0	2.1	25	1.0	3.1	**3.64**	**5.34**
68	5	4	10.0	10.0	3.2	25	1.0	4.2	**1.44**	**2.37**
90	2	4	10.0	10.0	3.0	25	1.0	4.0	**3.82**	**6.21**
91	4	4	10.0	10.0	2.3	25	1.0	3.3	**2.50**	**3.76**
94	3	4	10.0	10.0	2.1	25	1.0	3.1	**3.64**	**5.34**
100	2.5	4	10.0	10.0	2.0	25	1.0	3.0	**4.59**	**6.62**
101	2.5	4	10.0	10.0	4.1	25	1.0	5.1	**2.24**	**3.89**
102	2.5	4	10.0	10.0	2.3	25	1.0	3.3	**3.99**	**6.02**
103	3.5	4	10.0	10.0	2.1	25	1.0	3.1	**3.13**	**4.58**
104	3.5	4	10.0	10.0	2.0	25	1.0	3.0	**3.28**	**4.73**
113	3	4	10.0	10.0	2.8	25	1.0	3.8	**2.73**	**4.36**
119	2.5	4	10.0	10.0	4.0	25	1.0	5.0	**2.29**	**3.97**
120	5	4	10.0	10.0	2.0	25	1.0	3.0	**2.30**	**3.31**
121	4	4	10.0	10.0	1.8	25	1.0	2.8	**3.19**	**4.43**
130	5.5	4	10.0	10.0	1.8	25	1.0	2.8	**2.33**	**3.23**
133	5	4	10.0	10.0	0.5	25	1.0	1.5	**9.21**	**6.62**
134	4	4	10.0	10.0	1.3	25	1.0	2.3	**4.42**	**5.40**
135	3	4	10.0	10.0	0.4	25	1.0	1.4	**19.13**	**11.82**
136	3	4	10.0	10.0	0.3	25	1.0	1.3	**25.51**	**12.73**
141	4	4	10.0	10.0	1.9	25	1.0	2.9	**3.03**	**4.28**
190	4	4	10.0	10.0	1.5	25	1.0	2.5	**3.83**	**4.97**
191	4	4	10.0	10.0	2.3	25	1.0	3.3	**2.50**	**3.76**
192	4	4	10.0	10.0	1.8	25	1.0	2.8	**3.19**	**4.43**
193	5	4	10.0	10.0	1.9	25	1.0	2.9	**2.42**	**3.43**
194	5	4	10.0	10.0	2.8	25	1.0	3.8	**1.65**	**2.61**
195	5	4	10.0	10.0	2.6	25	1.0	3.6	**1.77**	**2.76**
196	5	4	10.0	10.0	2.5	25	1.0	3.5	**1.84**	**2.84**
201	2.5	4	10.0	10.0	2.8	25	1.0	3.8	**3.28**	**5.23**
202	2	4	10.0	10.0	2.8	25	1.0	3.8	**4.10**	**6.53**
203	5	4	10.0	10.0	3.0	25	1.0	4.0	**1.54**	**2.48**
204	3	4	10.0	10.0	2.5	25	1.0	3.5	**3.06**	**4.73**
205	5	4	10.0	10.0	2.5	25	1.0	3.5	**1.84**	**2.84**
206	4	4	10.0	10.0	2.2	25	1.0	3.2	**2.61**	**3.88**
207	5	4	10.0	10.0	2.5	25	1.0	3.5	**1.84**	**2.84**
208	4	4	10.0	10.0	2.2	25	1.0	3.2	**2.61**	**3.88**

Calculated FoS of Natural Peat Slopes for Sheskin South 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	Surcharge Equivalent Placed Fill	Equivalent Total Depth of Peat (m)	Factor of Safety for Load Condition	
	α (deg)	c' (kPa)	γ (kN/m^3)	γ_w (kN/m^3)	(m)	ø' (deg)	Condition (2)	Condition (2)	Condition (1)	Condition (2)
									100% Water	100% Water
209	7	4	10.0	10.0	2.6	25	1.0	3.6	**1.31**	**2.03**
210	5.5	4	10.0	10.0	3.0	25	1.0	4.0	**1.40**	**2.26**
211	4	4	10.0	10.0	1.8	25	1.0	2.8	**3.19**	**4.43**
212	3.5	4	10.0	10.0	3.3	25	1.0	4.3	**1.99**	**3.30**
213	3	4	10.0	10.0	3.8	25	1.0	4.8	**2.01**	**3.45**
214	4	4	10.0	10.0	3.2	25	1.0	4.2	**1.80**	**2.96**
215	3	4	10.0	10.0	3.2	25	1.0	4.2	**2.39**	**3.94**
216	3	4	10.0	10.0	4.6	25	1.0	5.6	**1.66**	**2.96**
217	5.5	4	10.0	10.0	2.2	25	1.0	3.2	**1.91**	**2.82**
229	5	4	10.0	10.0	2.0	25	1.0	3.0	**2.30**	**3.31**
230	7	4	10.0	10.0	1.7	25	1.0	2.7	**1.95**	**2.63**
233	5.5	4	10.0	10.0	1.8	25	1.0	2.8	**2.33**	**3.23**
234	5.5	4	10.0	10.0	1.8	25	1.0	2.8	**2.33**	**3.23**
235	5.5	4	10.0	10.0	2.2	25	1.0	3.2	**1.91**	**2.82**
252	5.5	4	10.0	10.0	2.8	25	1.0	3.8	**1.50**	**2.38**
253	3.5	4	10.0	10.0	3.4	25	1.0	4.4	**1.93**	**3.22**
254	3.5	4	10.0	10.0	2.2	25	1.0	3.2	**2.98**	**4.43**
255	2.5	4	10.0	10.0	1.8	25	1.0	2.8	**5.10**	**7.09**
256	3	4	10.0	10.0	3.1	25	1.0	4.1	**2.47**	**4.04**
259	2.5	4	10.0	10.0	1.5	25	1.0	2.5	**6.12**	**7.94**
260	1	4	10.0	10.0	2.0	25	1.0	3.0	**11.46**	**16.55**
261	1	4	10.0	10.0	3.8	25	1.0	4.8	**6.03**	**10.34**
262	1	4	10.0	10.0	2.8	25	1.0	3.8	**8.19**	**13.06**
263	1	4	10.0	10.0	4.1	25	1.0	5.1	**5.59**	**9.73**
264	1	4	10.0	10.0	3.8	25	1.0	4.8	**6.03**	**10.34**
266	4	4	10.0	10.0	3.7	25	1.0	4.7	**1.55**	**2.64**
267	4	4	10.0	10.0	2.8	25	1.0	3.8	**2.05**	**3.27**
268	4	4	10.0	10.0	2.6	25	1.0	3.6	**2.21**	**3.45**
269	2.5	4	10.0	10.0	2.4	25	1.0	3.4	**3.82**	**5.84**
270	2.5	4	10.0	10.0	2.5	25	1.0	3.5	**3.67**	**5.67**
271	2.5	4	10.0	10.0	2.5	25	1.0	3.5	**3.67**	**5.67**
272	2.5	4	10.0	10.0	2.7	25	1.0	3.7	**3.40**	**5.37**
273	2	4	10.0	10.0	3.1	25	1.0	4.1	**3.70**	**6.05**
274	2	4	10.0	10.0	3.2	25	1.0	4.2	**3.58**	**5.91**
275	2	4	10.0	10.0	2.1	25	1.0	3.1	**5.46**	**8.01**
276	2	4	10.0	10.0	3.3	25	1.0	4.3	**3.48**	**5.77**
277	2	4	10.0	10.0	3.4	25	1.0	4.4	**3.37**	**5.64**
278	2.5	4	10.0	10.0	3.5	25	1.0	4.5	**2.62**	**4.41**
279	2.5	4	10.0	10.0	3.7	25	1.0	4.7	**2.48**	**4.23**
280	2.5	4	10.0	10.0	3.8	25	1.0	4.8	**2.42**	**4.14**
281	2	4	10.0	10.0	3.6	25	1.0	4.6	**3.19**	**5.40**
282	2	4	10.0	10.0	4.0	25	1.0	5.0	**2.87**	**4.96**
283	2	4	10.0	10.0	3.9	25	1.0	4.9	**2.94**	**5.07**
290	2	4	10.0	10.0	3.5	25	1.0	4.5	**3.28**	**5.52**
291	2	4	10.0	10.0	3.0	25	1.0	4.0	**3.82**	**6.21**
292	2	4	10.0	10.0	2.0	25	1.0	3.0	**5.73**	**8.27**
293	2	4	10.0	10.0	2.5	25	1.0	3.5	**4.59**	**7.09**
294	2	4	10.0	10.0	0.8	25	1.0	1.8	**14.34**	**13.79**
295	2	4	10.0	10.0	3.0	25	1.0	4.0	**3.82**	**6.21**
296	2	4	10.0	10.0	3.6	25	1.0	4.6	**3.19**	**5.40**
297	2	4	10.0	10.0	3.0	25	1.0	4.0	**3.82**	**6.21**
298	2	4	10.0	10.0	3.8	25	1.0	4.8	**3.02**	**5.17**
299	2	4	10.0	10.0	3.0	25	1.0	4.0	**3.82**	**6.21**
300	3	4	10.0	10.0	3.0	25	1.0	4.0	**2.55**	**4.14**
301	2	4	10.0	10.0	3.4	25	1.0	4.4	**3.37**	**5.64**
302	1	4	10.0	10.0	2.6	25	1.0	3.6	**8.82**	**13.79**
303	2	4	10.0	10.0	3.9	25	1.0	4.9	**2.94**	**5.07**
304	2	4	10.0	10.0	3.4	25	1.0	4.4	**3.37**	**5.64**
305	2	4	10.0	10.0	3.6	25	1.0	4.6	**3.19**	**5.40**
306	2	4	10.0	10.0	3.6	25	1.0	4.6	**3.19**	**5.40**
325	5	4	10.0	10.0	2.5	25	1.0	3.5	**1.84**	**2.84**
326	2.5	4	10.0	10.0	1.8	25	1.0	2.8	**5.10**	**7.09**
327	2.5	4	10.0	10.0	2.2	25	1.0	3.2	**4.17**	**6.21**
328	2.5	4	10.0	10.0	1.0	25	1.0	2.0	**9.18**	**9.93**
329	2.5	4	10.0	10.0	1.6	25	1.0	2.6	**5.74**	**7.64**
348	5.5	4	10.0	10.0	2.5	25	1.0	3.5	**1.68**	**2.58**
349	5.5	4	10.0	10.0	1.6	25	1.0	2.6	**2.62**	**3.48**
350	5.5	4	10.0	10.0	2.5	25	1.0	3.5	**1.68**	**2.58**
351	5.5	4	10.0	10.0	2.4	25	1.0	3.4	**1.75**	**2.66**
352	5.5	4	10.0	10.0	2.7	25	1.0	3.7	**1.55**	**2.44**
355	6	4	10.0	10.0	1.7	25	1.0	2.7	**2.26**	**3.07**
361	2.5	4	10.0	10.0	2.7	25	1.0	3.7	**3.40**	**5.37**
362	2.5	4	10.0	10.0	2.7	25	1.0	3.7	**3.40**	**5.37**
363	3	4	10.0	10.0	4.7	25	1.0	5.7	**1.63**	**2.90**
364	3.5	4	10.0	10.0	2.6	25	1.0	3.6	**2.52**	**3.94**
365	3.5	4	10.0	10.0	2.1	25	1.0	3.1	**3.13**	**4.58**
366	3.5	4	10.0	10.0	2.7	25	1.0	3.7	**2.43**	**3.83**
446	6	4	10.0	10.0	2.0	25	1.0	3.0	**1.92**	**2.76**
495	3	4	10.0	10.0	1.7	25	1.0	2.7	**4.50**	**6.13**
496	3	4	10.0	10.0	3.1	25	1.0	4.1	**2.47**	**4.04**
497	3	4	10.0	10.0	2.0	25	1.0	3.0	**3.83**	**5.52**
498	3	4	10.0	10.0	0.7	25	1.0	1.7	**10.93**	**9.74**
499	3	4	10.0	10.0	2.0	25	1.0	3.0	**3.83**	**5.52**
500	3	4	10.0	10.0	1.2	25	1.0	2.2	**6.38**	**7.52**
501	3	4	10.0	10.0	0.7	25	1.0	1.7	**10.93**	**9.74**
509	3	4	10.0	10.0	1.0	25	1.0	2.0	**7.65**	**8.28**
510	3	4	10.0	10.0	0.9	25	1.0	1.9	**8.50**	**8.71**
511	5	4	10.0	10.0	1.8	25	1.0	2.8	**2.56**	**3.55**

Calculated FoS of Natural Peat Slopes for Sheskin South 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	Surcharge Equivalent Placed Fill	Equivalent Total Depth of Peat (m)	Factor of Safety for Load Condition	
	α (deg)	c' (kPa)	γ (kN/m^3)	γ_w (kN/m^3)	(m)	ø' (deg)	Condition (2)	Condition (2)	Condition (1)	Condition (2)
									100% Water	100% Water
557	4	4	10.0	10.0	2.2	25	1.0	3.2	**2.61**	**3.88**
558	4	4	10.0	10.0	2.8	25	1.0	3.8	**2.05**	**3.27**
559	1	4	10.0	10.0	3.8	25	1.0	4.8	**6.03**	**10.34**
560	2	4	10.0	10.0	3.0	25	1.0	4.0	**3.82**	**6.21**
561	2.5	4	10.0	10.0	2.7	25	1.0	3.7	**3.40**	**5.37**
562	2	4	10.0	10.0	4.5	25	1.0	5.5	**2.55**	**4.51**
564	3	4	10.0	10.0	2.4	25	1.0	3.4	**3.19**	**4.87**
574	3	4	10.0	10.0	1.9	25	1.0	2.9	**4.03**	**5.71**
576	4	4	10.0	10.0	2.1	25	1.0	3.1	**2.74**	**4.01**
592	3	4	10.0	10.0	2.6	25	1.0	3.6	**2.94**	**4.60**
658	3.5	4	10.0	10.0	1.0	25	1.0	2.0	**6.56**	**7.09**
659	3.5	4	10.0	10.0	1.3	25	1.0	2.3	**5.05**	**6.17**
660	10	4	10.0	10.0	0.7	25	1.0	1.7	**3.34**	**2.93**
661	8	4	10.0	10.0	2.0	25	1.0	3.0	**1.45**	**2.07**
663	5.5	4	10.0	10.0	1.3	25	1.0	2.3	**3.23**	**3.93**
679	5	4	10.0	10.0	1.6	25	1.0	2.6	**2.88**	**3.82**
680	5	4	10.0	10.0	0.7	25	1.0	1.7	**6.58**	**5.85**
681	5	4	10.0	10.0	0.5	25	1.0	1.5	**9.21**	**6.62**
682	11	4	10.0	10.0	0.7	25	1.0	1.7	**3.05**	**2.67**
683	11	4	10.0	10.0	1.0	25	1.0	2.0	**2.14**	**2.27**
684	11	4	10.0	10.0	1.1	25	1.0	2.1	**1.94**	**2.16**
685	8	4	10.0	10.0	2.0	25	1.0	3.0	**1.45**	**2.07**
686	8	4	10.0	10.0	1.3	25	1.0	2.3	**2.23**	**2.70**
687	7	4	10.0	10.0	2.5	25	1.0	3.5	**1.32**	**2.03**
688	6	4	10.0	10.0	2.2	25	1.0	3.2	**1.75**	**2.59**
689	6	4	10.0	10.0	2.2	25	1.0	3.2	**1.75**	**2.59**
690	6	4	10.0	10.0	2.4	25	1.0	3.4	**1.60**	**2.44**
700	3	4	10.0	10.0	4.0	25	1.0	5.0	**1.91**	**3.31**
710	6.5	4	10.0	10.0	1.9	25	1.0	2.9	**1.87**	**2.64**
711	2	4	10.0	10.0	3.8	25	1.0	4.8	**3.02**	**5.17**
712	2	4	10.0	10.0	4.0	25	1.0	5.0	**2.87**	**4.96**
713	2	4	10.0	10.0	3.2	25	1.0	4.2	**3.58**	**5.91**
Grid Connection										
pt 29	2	4	10.0	10.0	3.2	25	1.0	4.2	**3.58**	**5.91**
pt 31	2	4	10.0	10.0	3.5	25	1.0	4.5	**3.28**	**5.52**
pt 33	2	4	10.0	10.0	2.7	25	1.0	3.7	**4.25**	**6.71**
pt 35	2	4	10.0	10.0	2.8	25	1.0	3.8	**4.10**	**6.53**
pt 37	2	4	10.0	10.0	2.6	25	1.0	3.6	**4.41**	**6.89**
pt 39	2	4	10.0	10.0	2.8	25	1.0	3.8	**4.10**	**6.53**
pt 41	4	4	10.0	10.0	0.7	25	1.0	1.7	**8.21**	**7.30**
pt 43	4	4	10.0	10.0	1.8	25	1.0	2.8	**3.19**	**4.43**
pt 45	3	4	10.0	10.0	2.7	25	1.0	3.7	**2.83**	**4.47**
pt 47	3	4	10.0	10.0	3.0	25	1.0	4.0	**2.55**	**4.14**
pt 49	3	4	10.0	10.0	1.6	25	1.0	2.6	**4.78**	**6.37**
pt 51	3	4	10.0	10.0	2.7	25	1.0	3.7	**2.83**	**4.47**
pt 53	6	4	10.0	10.0	1.8	25	1.0	2.8	**2.14**	**2.96**
pt 55	3	4	10.0	10.0	1.7	25	1.0	2.7	**4.50**	**6.13**
pt 57	3	4	10.0	10.0	1.5	25	1.0	2.5	**5.10**	**6.62**
pt 59	3	4	10.0	10.0	0.9	25	1.0	1.9	**8.50**	**8.71**
pt 61	3	4	10.0	10.0	1.1	25	1.0	2.1	**6.96**	**7.88**
pt 63	3	4	10.0	10.0	1.6	25	1.0	2.6	**4.78**	**6.37**
pt 65	3	4	10.0	10.0	0.8	25	1.0	1.8	**9.57**	**9.20**
pt 67	3	4	10.0	10.0	1.5	25	1.0	2.5	**5.10**	**6.62**
pt 69	3	4	10.0	10.0	0.2	25	1.0	1.2	**38.27**	**13.79**
								Minimum =	**1.31**	**2.03**
								Maximum =	**57.34**	**20.68**
								Average =	**5.60**	**5.81**

Notes:

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

(2) Assuming a surcharge equivalent to fill depth of 1.0m.

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

(4) FoS is based on slope inclination and shear test results obtained from published data.

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

(6) For load conditions see Report text.

(7) Minimum acceptable factor of safety required of 1.3 for first-time failures based on BS: 6031:1981 Code of practice for Earthworks.

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APPENDIX D

Methodology for Peat Stability Risk Assessment

Methodology for Peat Stability Risk Assessment

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

The main approaches for assessing peat stability include the following:

(a) Geomorphological

(b) Qualitative (judgement)

(c) Index/Probabilistic (probability)

(d) Deterministic (factor of safety)

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

Probability

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

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

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

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

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

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

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

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

Table B: Probability Scale

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

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

Impact

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

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

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

Table C: Impact Scale

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

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

Risk Rating

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

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

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

Table D: Qualitative Risk Rating

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

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

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

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

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APPENDIX E

Ground Investigation Information (IDL, 2021)

IRISH DRILLING LIMITED

LOUGHREA, CO. GALWAY, IRELAND

CONTRACT DRILLING
SITE INVESTIGATION

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SHESKIN WIND FARM

SITE INVESTIGATION CONTRACT FACTUAL REPORT

MKO,
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Fehily Timoney & Company,
Consulting Engineers,
Singleton's Lane,
Bagenalstown,
Carlow.

	Prepared by	Approved by	Rev. Issue Date:	Revision No.
	Ronan Killeen	Declan Joyce	27th April 2022	21 _MO_111/01
Signature				

FOREWORD

The trial pit records have been compiled from an examination of the samples by a Geotechnical Engineer and from the Drillers' descriptions.

The report presents an opinion on the configuration of the strata within the site based on the trial pit results. The assumptions, though reasonable, are given for guidance only and no liability can be accepted for changes in conditions not revealed by the trial pits.

The fieldwork was carried out in accordance with IS EN 1997-2 and BS5930, 2015 Code of Practice for Site Investigations with precedence given to IS EN 1997-2 where applicable.

Contents:

1.0 Introduction.

Irish Drilling Ltd. (IDL) was instructed by Fehiliy Timoney & Partners, Consulting Engineers, on behalf of MKO, to carry out a site investigation at the site of the proposed Sheskin Wind Farm Project.

This site investigation was carried out to provide detailed factual geotechnical information of the underlying ground conditions at the location of the proposed works.

The fieldwork commenced on November 1st 2021 and was completed on November 2nd 2021.

2.0 Site & Geology

The site is located at Bellacorrick, County Mayo.

The site is agricultural in nature and the fieldwork was carried out predominantly on Coillte lands with dense forestation and/or fallen trees in place.

Weather conditions in general were quite variable with the majority of the fieldwork carried out over a typical winter period in Ireland.

Geological Survey maps of the area indicate that the site is underlain by Siltstone, Sandstone and Limestone Rock Formations.

A Site Plan, prepared by the client's representatives to show approximate fieldwork locations, is included with this report.

3.0 Fieldwork.

The following plant was mobilised to site to carry out fieldwork operations:

1nr Hitachi 120 Wide-Tracked Excavator.

Fieldwork carried out to date has included the following:

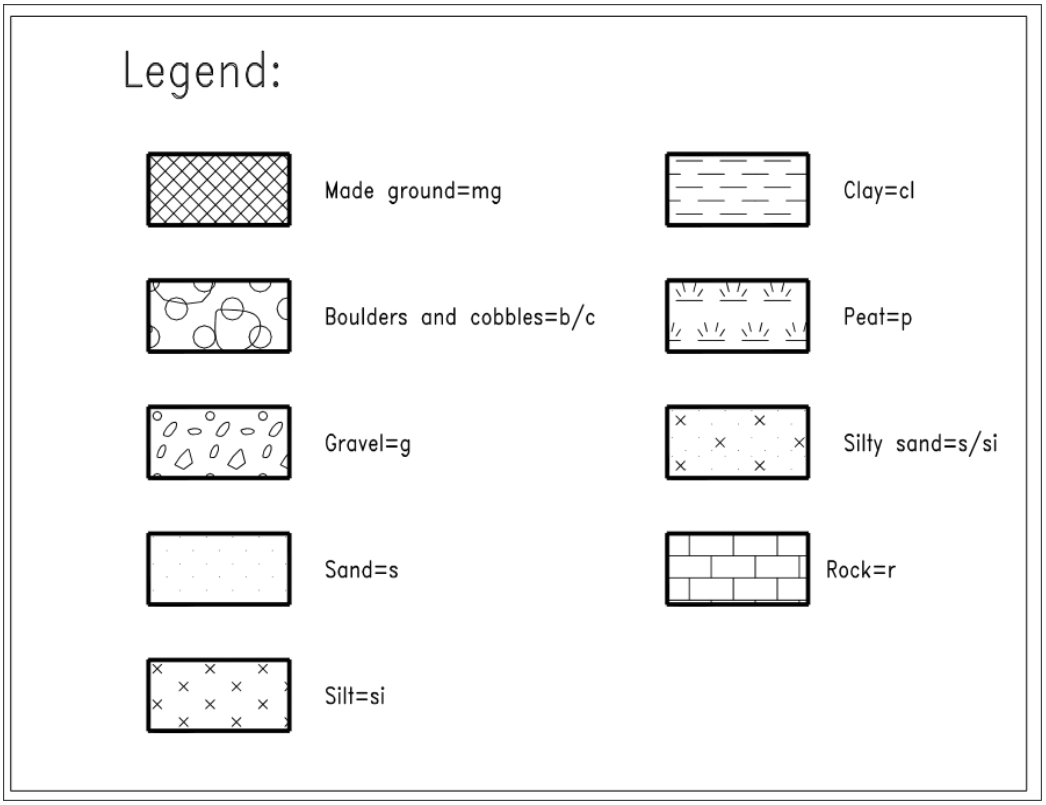
Twelve trial pits were excavated on site using a tracked excavator.

The pits were logged and photographed by an Engineer with observations made on ground conditions, pit stability, water ingress and services encountered.

Small and bulk disturbed soil samples were recovered at each change in strata and returned to the laboratory and presented for testing.

The pits were excavated to depths ranging from 0.90m to 4.10m below ground level.

The following Key Legend Table details the symbology used on the engineering logs to describe ground conditions encountered:



Ground conditions encountered during the completion of the fieldwork were typical and as expected for this region and predominantly consisted of Peat overlying Glacial Tills.

The Glacial Tills in general consisted of silty sands and gravels and/or slightly gravelly sandy silt with cobbles and boulders.

Soft brown fibrous peat was also encountered in many of the trial pits at depths ranging from 2.30m to 3.20m below ground level.

For detailed descriptions of the ground conditions encountered please refer to the engineering logs included as Appendix 1 to this report.

The fieldwork was carried out in accordance with IS EN 1997-2 and BS5930, 2015 Code of Practice for Site Investigations with precedence given to IS EN 1997-2 where applicable.

The trial pit locations were set out on site using a Garmin Handheld GPS Surveying Unit and using co-ordinates as received from the client's representatives.

All fieldwork co-ordinates are reported to Irish National Grid (ING).

4.0 Laboratory Testing

Representative samples recovered from the boreholes were scheduled for testing in the laboratory.

The test schedules were prepared by the Client's Engineer and included some or all of the following tests on disturbed soil samples:

* Moisture Content.
* Atterberg Limits.
* Particle Size Distribution.
* Chemical (pH, Sulphate, Chloride).
* Compaction.

The records of these laboratory tests are included as Appendix 2 of this factual report.

The soil descriptions as noted on the trial pit logs are in general visual descriptions as observed and logged by our Engineers and are described in accordance with IS EN 1997-2 and BS5930, 2015 Code of Practice for Site Investigations.

Soils descriptions (cohesive or otherwise) are also initially assessed based on the texture and 'feel' of the soil materials as witnessed by our Geotechnical Engineers and in accordance with IS EN 1997-2 and BS5930.

Where laboratory classification tests have been carried out on soil or rock samples then these visual descriptions have been amended accordingly to take into account the results of these classification tests.

The records of all fieldwork, laboratory test results and photographs are included in the appendices of this Factual Report.

Ronan Killeen

Ronan Killeen
Chartered Engineer
Irish Drilling Limited
April 27th 2022

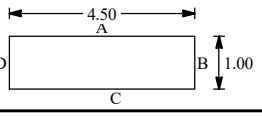
Appendix 01
Trial Pit Records

PROJECT: SSE Sheskin Wind Farm		**TRIALPIT: TP-01**
LOCATION: Co Mayo		**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**	**Rig: Hitachi 120 Bogmaster**
ENGINEER: FTCO	**E 494,182.0 N 824,417.0**	**Rev: FINAL**
Ground level: m O.D.		**DATE: 1.11.21**

GROUNDWATER

Water strikes: Rose to after:
1st: 3.10m 20min 2.90m
2nd:
3rd:

PIT DIRECTION: 180-360
PIT DIMENSION: 1.00 * 4.50m
LOGGED BY: DK



Shoring/Support: N/A
Stability: Pit unstable.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.10	TOPSOIL: Brown peaty CLAY with low cobble content.
			D 1	0.50-1.00					Soft brown fibrous PEAT. H2 B1 F1 R1 W0 TV1 TH0 A1.
1									
2			B 2	2.00-2.50					
3		1						3.10	
			B 3	3.20-3.50					Grey slightly silty medium SAND and subrounded to subangular medium GRAVEL with high cobble content. Cobbles are rounded to subrounded of grey schist.
			D 4	3.50-4.00					
4								4.00	
									END TP terminated at 4.00m bgl.
5									

Remarks: Ingress of surface water. Ingress of water at 3.10m bgl. TP backfilled with arisings.
Co-ordinates provided by client representative.

Scale: 1:25

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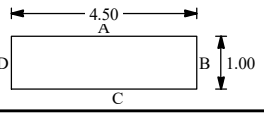
TRIAL PIT VANE & WL RISES SHESKIN WF NEW TPS FILE 1 NOV 4 2021.GPJ IRISHDRL.GDT 27/4/22

PROJECT: SSE Sheskin Wind Farm	**TRIALPIT: TP-02**
LOCATION: Co Mayo	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:** E 493,116.0 N 824,521.0
ENGINEER: FTCO	**Rig: Hitachi 120 Bogmaster**
Ground level: m O.D.	**Rev: FINAL**
GROUNDWATER	**DATE: 2.11.21**

Water strikes: **Rose to after:**
1st: 3.20m 20min 3.18m
2nd:
3rd:

PIT DIRECTION: 000-180
PIT DIMENSION: 1.00 * 4.50m
LOGGED BY: DK



Shoring/Support: N/A
Stability: Pit moderately stable.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.20	TOPSOIL: Brown peaty CLAY.
									Soft brown fibrous PEAT. H2 B1 F2 R1 W0 TV1 TH0 A1.
1			D 1	1.00-1.50					
2			B 2	2.00-2.50					
3		1.1						3.20	
			B 3	3.50-4.00					Grey silty fine SAND and subrounded to subangular coarse grey schist GRAVEL with medium cobble content. Cobbles are rounded to subrounded of grey schist.
4								4.10	
									END TP terminated at 4.10m bgl.
5									

Remarks: Ingress of water at 3.20m bgl. TP backfilled with arisings.
Co-ordinates provided by client representative.

Scale: 1:25

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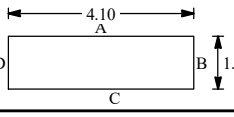
TRIAL PIT VANE & WL RISES SHESKIN WF NEW TPS FILE 1 NOV 4 2021.GPJ IRISHDRL.GDT 27/4/22

PROJECT: SSE Sheskin Wind Farm		**TRIALPIT: TP-03**
LOCATION: Co Mayo		**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**	**Rig: Hitachi 120 Bogmaster**
ENGINEER: FTCO	**E 493,942.0 N 825,337.0**	**Rev: FINAL**
Ground level: m O.D.		**DATE: 1.11.21**

GROUNDWATER

Water strikes: **Rose to after:**
1st: dry
2nd:
3rd:

PIT DIRECTION:
PIT DIMENSION: 1.00 * 4.10m
LOGGED BY: DK



Shoring/Support: N/A
Stability: Pit unstable. Sidewall collapse.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.30	TOPSOIL: Brown peaty CLAY.
			D 1	0.50-1.00					Soft brown fibrous PEAT. H3 B1 F2 R1 W1 TV1 TH1 A1.
1									
			B 2	1.50-2.00					
2								2.30	
			B 3	2.50-3.00					Grey clayey coarse SAND and subrounded to subangular coarse grey schist GRAVEL with high cobble content and medium boulder content. Cobbles are rounded to subrounded of grey schist. Boulders are rounded to subrounded of grey schist.
3								3.70	
									END TP terminated at 3.70m bgl.
4									
5									

Remarks: TP dry on excavation. TP backfilled with arisings.
Co-ordinates provided by client representative.

Scale: 1:25

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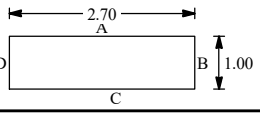
TRIAL PIT VANE & WL RISES SHESKIN WF NEW TPS FILE 1 NOV 4 2021.GPJ IRISHDRL.GDT 27/4/22

PROJECT: SSE Sheskin Wind Farm	**TRIALPIT: TP-04**
LOCATION: Co Mayo	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:** E 493,048.0 N 825,509.0
ENGINEER: FTCO	**Rig: Hitachi 120 Bogmaster**
Ground level: m O.D.	**Rev: FINAL**
GROUNDWATER	**DATE: 1.11.21**

Water strikes: **Rose to after:**
1st: 2.00m **20min** 1.96m
2nd:
3rd:

PIT DIRECTION: 270-090
PIT DIMENSION: 1.00 * 2.70m
LOGGED BY: DK



Shoring/Support: N/A
Stability: Pit unstable.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.10	TOPSOIL: Brown peaty CLAY.
			D 1	0.50-1.00					Grey very silty medium SAND and subrounded to subangular coarse grey schist GRAVEL with high cobble content and medium boulder content. Cobbles are subrounded to subangular of grey schist. Boulders are rounded to subrounded of grey schist.
1			B 2	1.00-1.50					
2		1 1	B 3	2.00-2.50				2.50	
						END			TP terminated at 2.50m bgl. Unable to keep TP open - sidewall collapse.
3									
4									
5									

Remarks: Ingress of surface water. Ingress of water at 2.00m bgl. TP backfilled with arisings.
Co-ordinates provided by client representative.

Scale: 1:25

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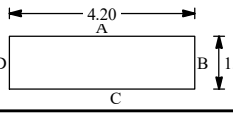
TRIAL PIT VANE & WL RISES SHESKIN WF NEW TPS FILE 1 NOV 4 2021.GPJ IRISHDRL.GDT 27/4/22

PROJECT: SSE Sheskin Wind Farm	**TRIALPIT: TP-05**
LOCATION: Co Mayo	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:** **Rig: Hitachi 120 Bogmaster**
ENGINEER: FTCO	**E 493,076.0 N 825,791.0** **Rev: FINAL**
Ground level: m O.D.	**DATE: 2.1.21**

GROUNDWATER

Water strikes: **Rose to after:**
1st: dry
2nd:
3rd:

PIT DIRECTION: 000-180
PIT DIMENSION: 1.00 * 4.20m
LOGGED BY: DK



Shoring/Support: N/A
Stability: Pit unstable. Sidewall collapse.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.10	TOPSOIL: Brown peaty CLAY.
			B 1	0.50-1.00					Soft grey slightly gravelly sandy SILT with high cobble content and medium boulder content. Sand is fine. Gravel is subrounded to subangular coarse of grey schist. Cobbles are rounded to subrounded of grey schist. Boulders are rounded to subrounded of grey schist.
1									
			B 2	1.50-1.90					
								1.90	
						END			TP terminated at 1.90m bgl. Unable to keep TP open - sidewall collapse.
2									
3									
4									
5									

Remarks: Ingress of surface water. TP backfilled with arisings.
Co-ordinates provided by client representative.

Scale: 1:25

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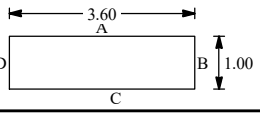
TRIAL PIT VANE & WL RISES SHESKIN WF NEW TPS FILE 1 NOV 4 2021.GPJ IRISHDRL.GDT 27/4/22

PROJECT: SSE Sheskin Wind Farm	**TRIALPIT: TP-06**
LOCATION: Co Mayo	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:** E 493,053.0 N 826,156.0
ENGINEER: FTCO	**Rig: Hitachi 120 Bogmaster**
Ground level: m O.D.	**Rev: FINAL**
GROUNDWATER	**DATE: 1.11.21**

Water strikes: **Rose to after:**
1st: 1.50m 20min 1.45m
2nd:
3rd:

PIT DIRECTION: 270-090
PIT DIMENSION: 1.00 * 3.60m
LOGGED BY: DK



Shoring/Support: N/A
Stability: Pit unstable.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.20	TOPSOIL: Soft brown peaty CLAY.
			B 1	0.50-1.00					Grey silty coarse SAND and subrounded to subangular coarse grey schist GRAVEL with high cobble content and high boulder content. Cobbles are rounded to subrounded of grey schist. Boulders are rounded to subrounded of grey schist. Sand is fine and medium.
1		1	B 2	1.00-1.50				1.50	
						END			TP terminated at 1.50m bgl. Unable to keep TP open - sidewall collapse due to ingress of water.
2									
3									
4									
5									

Remarks: Ingress of surface water. Ingress of water at 1.50m bgl. TP backfilled with arisings.
Co-ordinates provided by client representative.

Scale: 1:25

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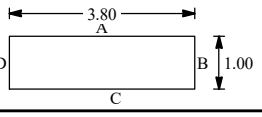
TRIAL PIT VANE & WL RISES SHESKIN WF NEW TPS FILE 1 NOV 4 2021.GPJ IRISHDRL.GDT 27/4/22

PROJECT: SSE Sheskin Wind Farm	**TRIALPIT: TP-07**
LOCATION: Co Mayo	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:** **Rig: Hitachi 120 Bogmaster**
ENGINEER: FTCO	**E 493,527.0 N 826,492.0** **Rev: FINAL**
Ground level: m O.D.	**DATE: 2.11.21**

GROUNDWATER

Water strikes: Rose to after:
1st: dry
2nd:
3rd:

PIT DIRECTION: 000-180
PIT DIMENSION: 1.00 * 3.80m
LOGGED BY: DK



Shoring/Support: N/A
Stability: Pit unstable.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.10	TOPSOIL: Brown peaty CLAY.
			B 1	0.50-1.00				1.00	Grey very silty medium SAND and subrounded to subangular coarse grey schist GRAVEL with high cobble content. Cobbles are rounded to subangular of grey schist.
1						END			TP terminated at 1.00m bgl. Unable to keep TP open - sidewall collapse due to ingress of water.
2									
3									
4									
5									

Remarks: Ingress of surface water. TP backfilled with arisings.
Co-ordinates provided by client representative.

Scale: 1:25

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TRIAL PIT VANE & WL RISES SHESKIN WF NEW TPS FILE 1 NOV 4 2021.GPJ IRISHDRL.GDT 27/4/22

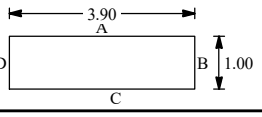
PROJECT: SSE Sheskin Wind Farm
LOCATION: Co Mayo
TRIALPIT: TP-08
Sheet 1 of 1

CLIENT: Coillte
ENGINEER: FTCO
Co-ordinates: E 493,297.0 N 826,935.0
Rig: Hitachi 120 Bogmaster
Rev: FINAL

Ground level: m O.D.
DATE: 2.11.21

GROUNDWATER
Water strikes: Rose to after:
1st: dry
2nd:
3rd:

PIT DIRECTION: 270-090
PIT DIMENSION: 1.00 * 3.90m
LOGGED BY: DK



Shoring/Support: N/A
Stability: Pit moderately stable.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.10	TOPSOIL: Brown peaty CLAY.
			B 1	0.50-1.00				1.10	Grey very silty medium SAND and subrounded to subangular coarse grey schist GRAVEL with high cobble content and high boulder content. Cobbles are rounded to subrounded of grey schist. Boulders are rounded to subrounded of grey schist.
1			B 2	1.50-1.80				1.80	Possible weathered rock. Recovered as angular to subangular gravel and cobble sized clasts of brown schist.
									END TP terminated at 1.80m bgl. Obstruction as possible rock.
2									
3									
4									
5									

Remarks: TP dry on excavation. TP backfilled with arisings.
Co-ordinates provided by client representative.

Scale: 1:25

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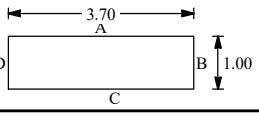
TRIAL PIT VANE & WL RISES SHESKIN WF NEW TPS FILE 1 NOV 4 2021.GPJ IRISHDRL.GDT 27/4/22

PROJECT: SSE Sheskin Wind Farm	**TRIALPIT: TP-09**
LOCATION: Co Mayo	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:** E 493,383.0 N 827,489.0
ENGINEER: FTCO	**Rig: Hitachi 120 Bogmaster**
Ground level: m O.D.	**Rev: FINAL**
GROUNDWATER	**DATE: 2.11.21**

Water strikes: **Rose to after:**
1st: 0.90m **20min** 0.70m
2nd:
3rd:

PIT DIRECTION: 270-090
PIT DIMENSION: 1.00 * 3.70m
LOGGED BY: DK



Shoring/Support: N/A
Stability: Pit unstable.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.20	TOPSOIL: Brown peaty CLAY.
		1	B 1	0.50-0.90				0.90	Soft brown slightly gravelly sandy SILT with high cobble content and medium boulder content. Sand is fine to medium. Gravel is angular to subangular coarse of grey schist. Cobbles are angular to subangular of grey schist. Boulders are angular to subangular of grey schist.
1		1				END			TP terminated at 0.90m bgl. Obstruction as possible rock.
2									
3									
4									
5									

Remarks: Ingress of water at 0.90m bgl. TP backfilled with arisings.
Co-ordinates provided by client representative.

Scale: 1:25

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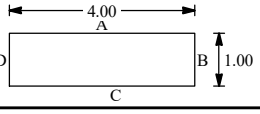
TRIAL PIT VANE & WL RISES SHESKIN WF NEW TPS FILE 1 NOV 4 2021.GPJ IRISHDRL.GDT 27/4/22

PROJECT: SSE Sheskin Wind Farm	**TRIALPIT: TP-10**
LOCATION: Co Mayo	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: FTCO	**E 493,797.0 N 827,540.0**
Rig: Hitachi 120 Bogmaster	
Rev: FINAL	
Ground level: m O.D.	**DATE: 2.11.21**

GROUNDWATER

Water strikes: **Rose to after:**
1st: dry
2nd:
3rd:

PIT DIRECTION: 180-360
PIT DIMENSION: 1.00 * 4.00m
LOGGED BY: DK



Shoring/Support: N/A
Stability: Pit unstable.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.20	TOPSOIL: Brown peaty CLAY.
			B 1	1.00-1.50					Soft brown slightly gravelly very sandy CLAY with high cobble content. Sand is fine. Gravel is rounded to subrounded coarse of grey schist. Cobbles are rounded to subrounded of grey schist.
1									1.50m; grey sandy silt.
2								2.20	
						END			TP terminated at 2.20m bgl. Unable to progress TP open due to ingress of surface water.
3									
4									
5									

Remarks: Ingress of surface water. TP backfilled with arisings.
Co-ordinates provided by client representative.

Scale: 1:25

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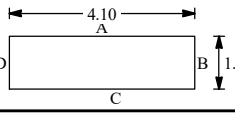
TRIAL PIT VANE & WL RISES SHESKIN WF NEW TPS FILE 1 NOV 4 2021.GPJ IRISHDRL.GDT 27/4/22

PROJECT: SSE Sheskin Wind Farm	**TRIALPIT: TP-11**
LOCATION: Co Mayo	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:** E 494,907.0 N 827,115.0
ENGINEER: FTCO	**Rig: Hitachi 120 Bogmaster**
Ground level: m O.D.	**Rev: FINAL**
GROUNDWATER	**DATE: 1.11.21**

Water strikes: **Rose to after:**
1st: 0.50m 20min 0.40m
2nd:
3rd:

PIT DIRECTION: 270-090
PIT DIMENSION: 1.00 * 4.10m
LOGGED BY: DK



Shoring/Support: N/A
Stability: Pit unstable. Sidewall collapse.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.10	TOPSOIL: Brown peaty CLAY.
		1	D 1	0.50-1.00					Soft brown fibrous PEAT. H3 B1 F3 R1 W1 TV0 TH1 A0.
1									
2			B 2	1.50-2.00				2.50	
			B 3	2.50-2.80				2.80	Light brown medium SAND and subrounded to subangular coarse GRAVEL.
3			B 4	3.00-3.50				3.70	Soft grey slightly gravelly very sandy CLAY with high cobble content. Sand is medium. Gravel is subrounded to subangular coarse of grey schist. Cobbles are rounded to subrounded of grey schist.
						END			TP terminated at 3.70m bgl.
4									
5									

Remarks: Ingress of water at 0.50m bgl. TP backfilled with arisings.
Co-ordinates provided by client representative.

Scale: 1:25

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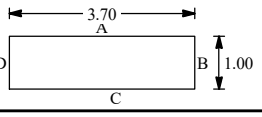
TRIAL PIT VANE & WL RISES SHESKIN WF NEW TPS FILE 1 NOV 4 2021.GPJ IRISHDRL.GDT 27/4/22

PROJECT: SSE Sheskin Wind Farm	**TRIALPIT: TP-12**
LOCATION: Co Mayo	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:** E 495,304.0 N 826,870.0
ENGINEER: FTCO	**Rig: Hitachi 120 Bogmaster**
Ground level: m O.D.	**Rev: FINAL**
	DATE: 1.11.21

GROUNDWATER

Water strikes: Rose to after:
1st: 1.20m 20min 1.00m
2nd:
3rd:

PIT DIRECTION: 000-180
PIT DIMENSION: 1.00 * 3.70m
LOGGED BY: DK



Shoring/Support: N/A
Stability: Pit unstable.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.20	TOPSOIL: Brown peaty CLAY.
			D 1	0.50-1.00				1.00	Soft light grey slightly gravelly sandy SILT. Gravel is subrounded to subangular medium of various lithologies.
1									Soft grey slightly gravelly very sandy CLAY with medium cobble content and low boulder content. Sand is coarse. Gravel is subrounded to subangular coarse of grey schist. Cobbles are rounded to subrounded of grey schist. Boulders are rounded to subrounded of grey schist.
2			B 2	1.50-2.00					
			B 3	2.50-3.00					
3								3.20	
									END TP terminated at 3.20m bgl. Obstruction as boulders.
4									
5									

Remarks: Ingress of water at 1.20m bgl. TP backfilled with arisings.
Co-ordinates provided by client representative.

Scale: 1:25

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Appendix 02
Laboratory Test Results

Project ID	2021MO111	Client	Coillte	Remarks	
Project Name	SSE Sheskin Wind Farm	Due Date	09/11/2021 09:00		
Schedule ID	2021MO111_1	Scheduled Date	09/11/2021 09:00		

Sample Details							Classification						Chemical / Concrete								Compaction					Compressibility				Strength (Total)							Strength (Effective Stress)			Rock		
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Py	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	Sulphate Water Gravimetric	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hamm	Moisture Condition Value	Moisture Condition Relations	CBR	Consolidation	Pressures	Swelling Pressure Test	Laboratory Vane test	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained (Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Consolidated Drained Triaxia	Consolidated Undrained Tria	Consolidated Undrained Tria	Rock Uniaxial compression	Point Load	
TP-01	0.50	1.00	D	1	01/11/21		1																																	
TP-01	2.00	2.50	B	2	01/11/21																																			
TP-01	3.20	3.50	B	3	01/11/21		1																																	
TP-01	3.50	4.00	D	4	01/11/21																																			
TP-02	1.00	1.50	D	1	02/11/21																																			
TP-02	2.00	2.50	B	2	02/11/21		1																																	
TP-02	3.50	4.00	B	3	02/11/21		1				1																													
TP-03	0.50	1.00	D	1	01/11/21																																			
TP-03	1.50	2.00	B	2	01/11/21		1																																	
TP-03	2.50	3.00	B	3	01/11/21						1																													
TP-04	0.50	1.00	D	1	01/11/21		1																																	
TP-04	1.00	1.50	B	2	01/11/21						1																													
TP-04	2.00	2.50	B	3	01/11/21										1	1		1	1																					ALS 211130-85
TP-05	0.50	1.00	B	1	02/11/21		1	1																															
TP-05	1.50	1.90	B	2	02/11/21										1	1		1	1																					ALS 211130-85
TP-06	0.50	1.00	B	1	01/11/21																																			
TP-06	1.00	1.50	B	2	01/11/21		1				1																													
TP-07	0.50	1.00	B	1	02/11/21		1				1																													
TP-08	0.50	1.00	B	1	02/11/21		1				1											1																		
TP-08	1.50	1.80	B	2	02/11/21																																			
TP-09	0.50	0.90	B	1	02/11/21		1	1																															
TP-10	1.00	1.50	B	1	02/11/21		1	1																															
TP-11	0.50	1.00	D	1	01/11/21		1	1																															
TP-11	1.50	2.00	B	2	01/11/21																																			
TP-11	2.50	2.80	B	3	01/11/21																																			
TP-11	3.00	3.50	B	4	01/11/21																																			
TP-12	0.50	1.00	D	1	01/11/21		1	1																															
TP-12	1.50	2.00	B	2	01/11/21																																			
TP-12	2.50	3.00	B	3	01/11/21																																			
Scheduled							14	5	0	0	6	0	0	0	2	2	0	2	2	0	0	1	0	0															
Reported 14.01.22							14	5	0	0	6	0	0	0	2	2	0	2	2	0	0	1	0	0															

0 = test scheduled,
1 = test completed as scheduled,
0* = sample not suitable for scheduled test

Summary of Classification Test Results

Project No.	Project Name
2021MO111	SSE Sheskin Wind Farm

Hole No.	Sample Ref	Top	Base	Type		Soil Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Remarks
TP-01	1	0.50	1.00	D		Black PEAT.			696.0						
TP-01	3	3.20	3.50	B		Grey gravelly SAND.			19.0						
TP-02	2	2.00	2.50	B		Black PEAT.			861.0						
TP-02	3	3.50	4.00	B		Grey gravelly very silty fine SAND.			22.0	88					
TP-03	2	1.50	2.00	B		Black PEAT.			737.0						
TP-04	1	0.50	1.00	D		Grey gravelly very silty fine and medium SAND.			13.0						
TP-05	1	0.50	1.00	B		Grey slightly gravelly sandy SILT.			15.0	73					NP
TP-06	2	1.00	1.50	B		Grey silty very gravelly fine and medium SAND.			14.0	49					
TP-07	1	0.50	1.00	B		Grey gravelly very silty fine SAND.			14.0	74					
TP-08	1	0.50	1.00	B		Grey very silty SAND and GRAVEL.			11.0	52					
TP-09	1	0.50	0.90	B		Brown slightly gravelly slightly sandy SILT.			21.0	48	29	17	12		CL
TP-10	1	1.00	1.50	B		Grey sandy SILT.			11.0	59					NP
TP-11	1	0.50	1.00	D		Black PEAT.			572.0	89	795	446	349		MEO
TP-12	1	0.50	1.00	D		Grey sandy SILT, sand is fine.			31.0	83	42	23	19		CI

All tests performed in accordance with BS1377:1990 unless specified otherwise

Key w = water content, LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index

Density test | Liquid Limit | Particle density

Linear measurement unless : | 4pt cone unless : | sp - small pyknometer

wd - water displacement | 1pt - single point test | gj - gas jar

wi - immersion in water | NP - Non Plastic

Date Printed 14/01/2022

QC From No: R1

Approved By Administrator

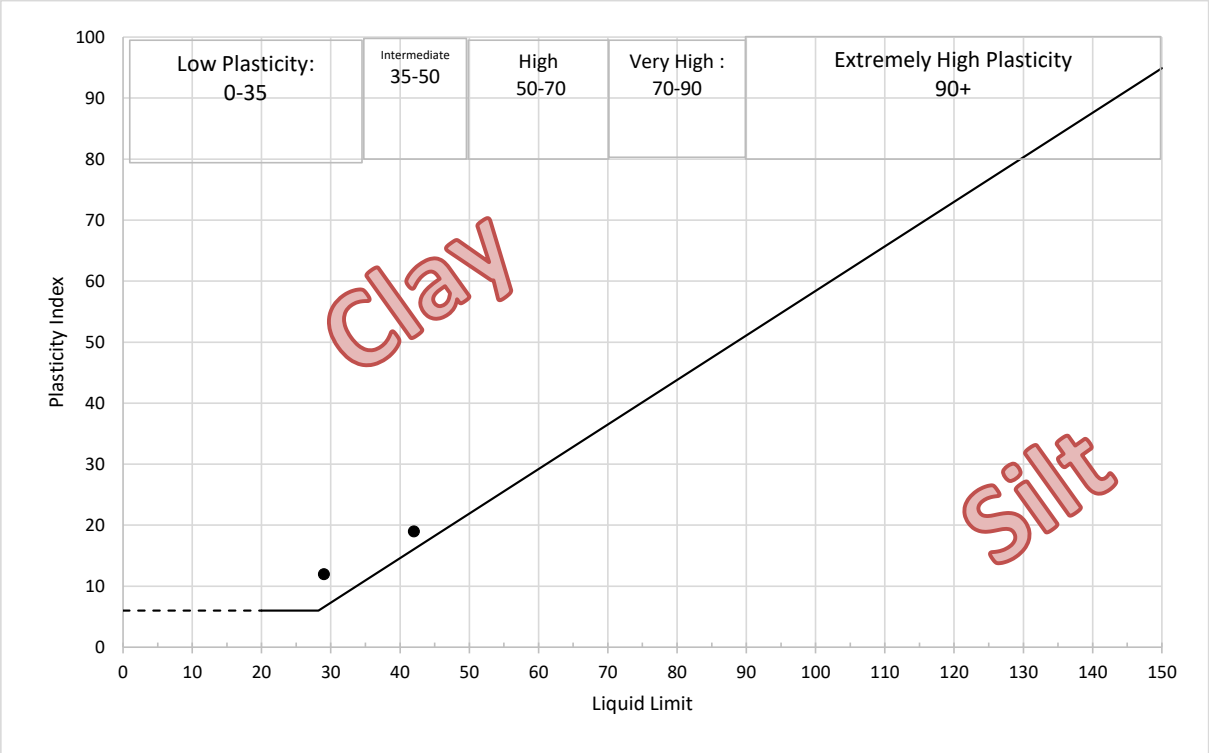
Table 1

sheet 1

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39

Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

	Plasticity (A-Line) Chart	Project Number
Project Name:	SSE Sheskin Wind Farm	
Location:		2021MO111



Abreviations in the remarks column of the Classification Summary Sheet: C = Clay, M = Silt

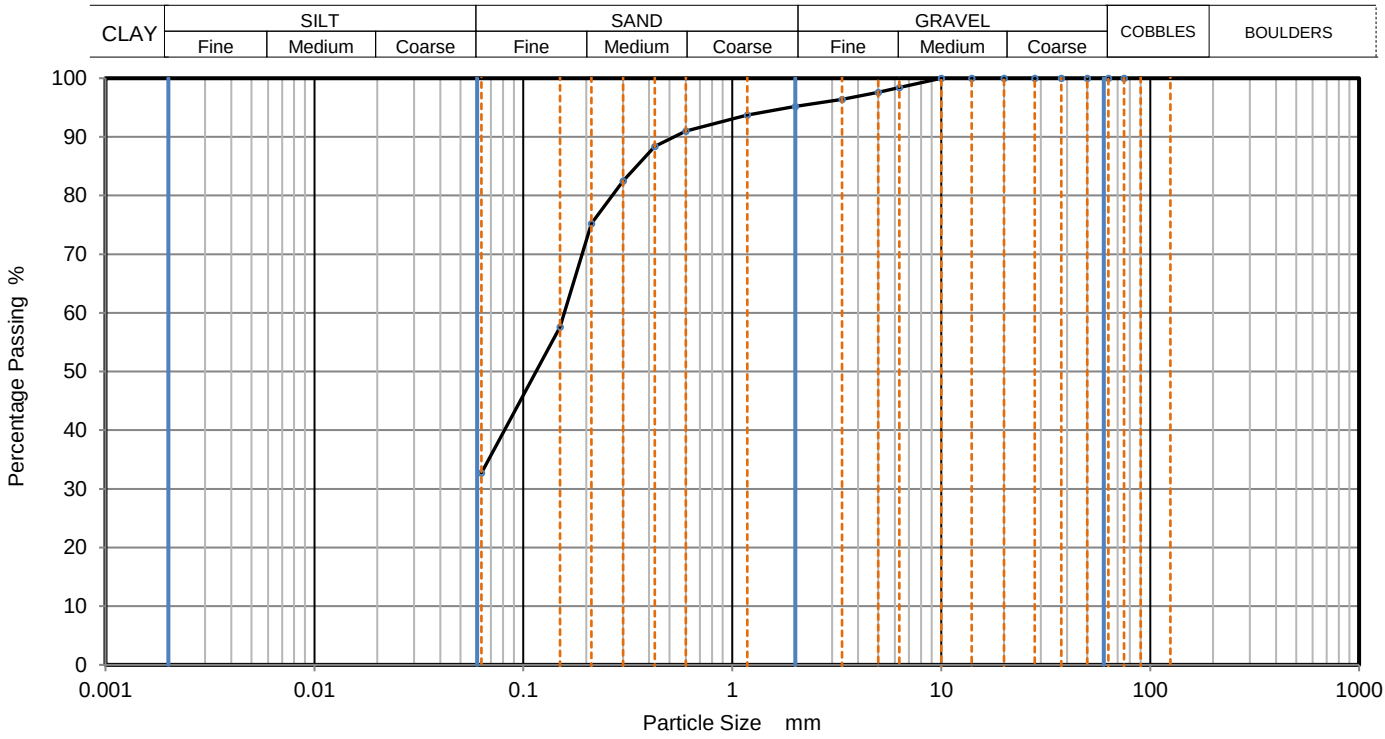
Plasticity abeviations: L = Low, I = Intermediate = H = High, V = Very High, E = Extremely High.

The letter O is added to the symbol of any material containing a significant proportion of organic material.

Chart taken from BS5930: 2010

QC Form: R1

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2021MO111**
				Borehole/Pit No.	TP-02
Site Name	SSE Sheskin Wind Farm			Sample No.	3
Soil Description	Grey gravelly very silty fine SAND.			Depth, m	3.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1202111096



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	98		
5	98		
3.35	96		
2	95		
1.18	94		
0.6	91		
0.425	88		
0.3	83		
0.212	75		
0.15	58		
0.063	33		

Dry Mass of sample, g	334

Sample Proportions	% dry mass
Very coarse	0
Gravel	5
Sand	63
Fines <0.063mm	33

Grading Analysis		
D100	mm	
D60	mm	0.157
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

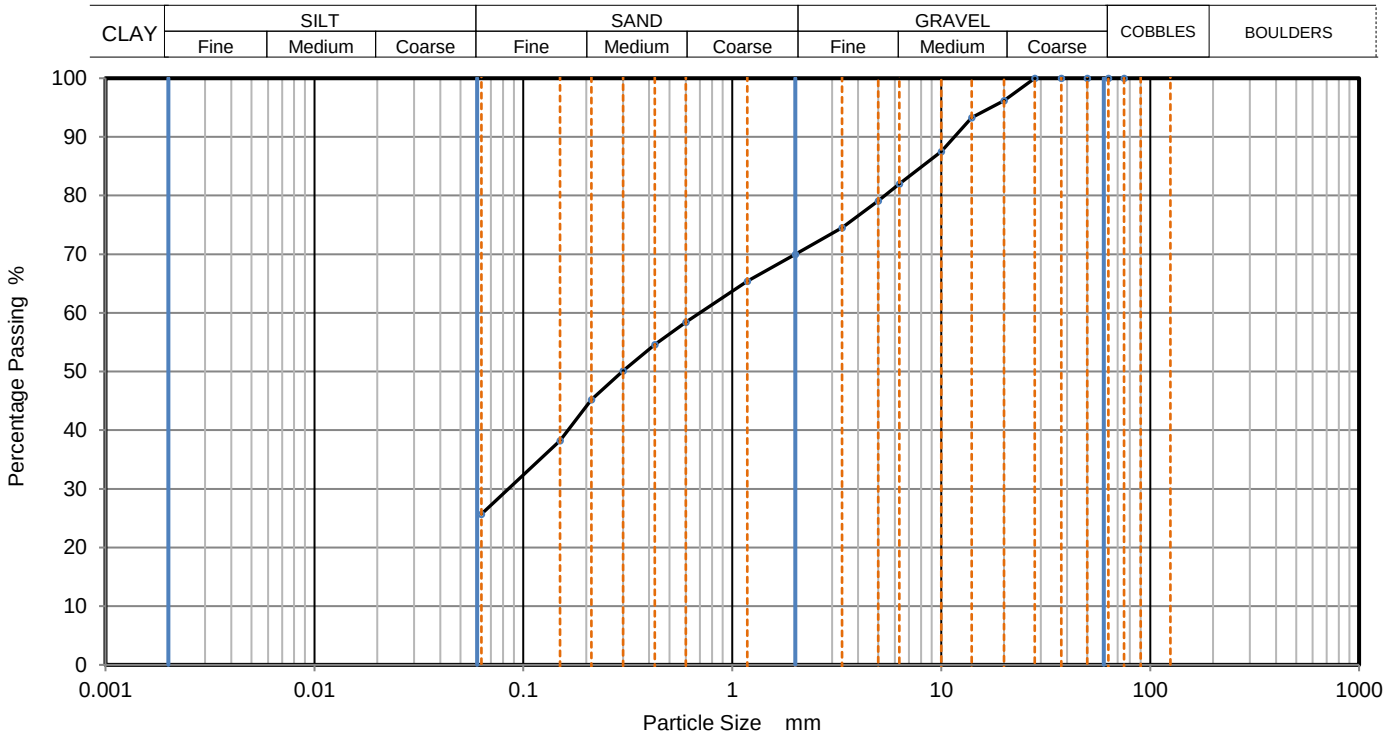
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	14/01/2022 12:18	**1** QC From No:R2

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39

Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2021MO111**
				Borehole/Pit No.	TP-03
Site Name	SSE Sheskin Wind Farm			Sample No.	3
Soil Description	Dark grey very silty very gravelly fine SAND.			Depth, m	2.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1202111099



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	96		
14	93		
10	88		
6.3	82		
5	79		
3.35	75		
2	70		
1.18	65		
0.6	58		
0.425	55		
0.3	50		
0.212	45		
0.15	38		
0.063	26		

Dry Mass of sample, g	511

Sample Proportions	% dry mass
Very coarse	0
Gravel	30
Sand	44
Fines <0.063mm	26

Grading Analysis		
D100	mm	
D60	mm	0.702
D30	mm	0.085
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

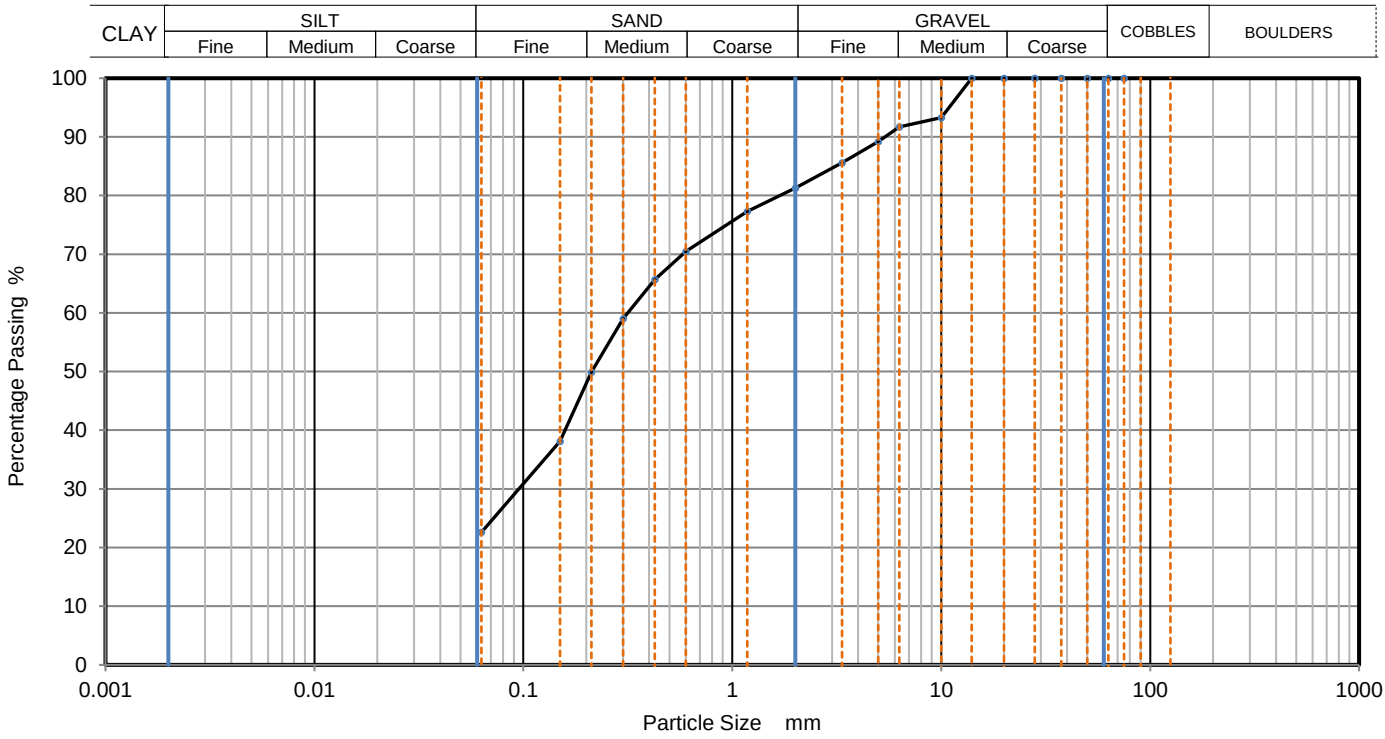
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	14/01/2022 12:18	**1**
				QC From No:R2

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39

Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2021MO111**
				Borehole/Pit No.	TP-04
Site Name	SSE Sheskin Wind Farm			Sample No.	2
Soil Description	Grey gravelly very silty fine and medium SAND.			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12021110911



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	93		
6.3	92		
5	89		
3.35	86		
2	81		
1.18	77		
0.6	71		
0.425	66		
0.3	59		
0.212	50		
0.15	38		
0.063	23		

Dry Mass of sample, g	391

Sample Proportions	% dry mass
Very coarse	0
Gravel	19
Sand	59
Fines <0.063mm	23

Grading Analysis		
D100	mm	
D60	mm	0.316
D30	mm	0.0952
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

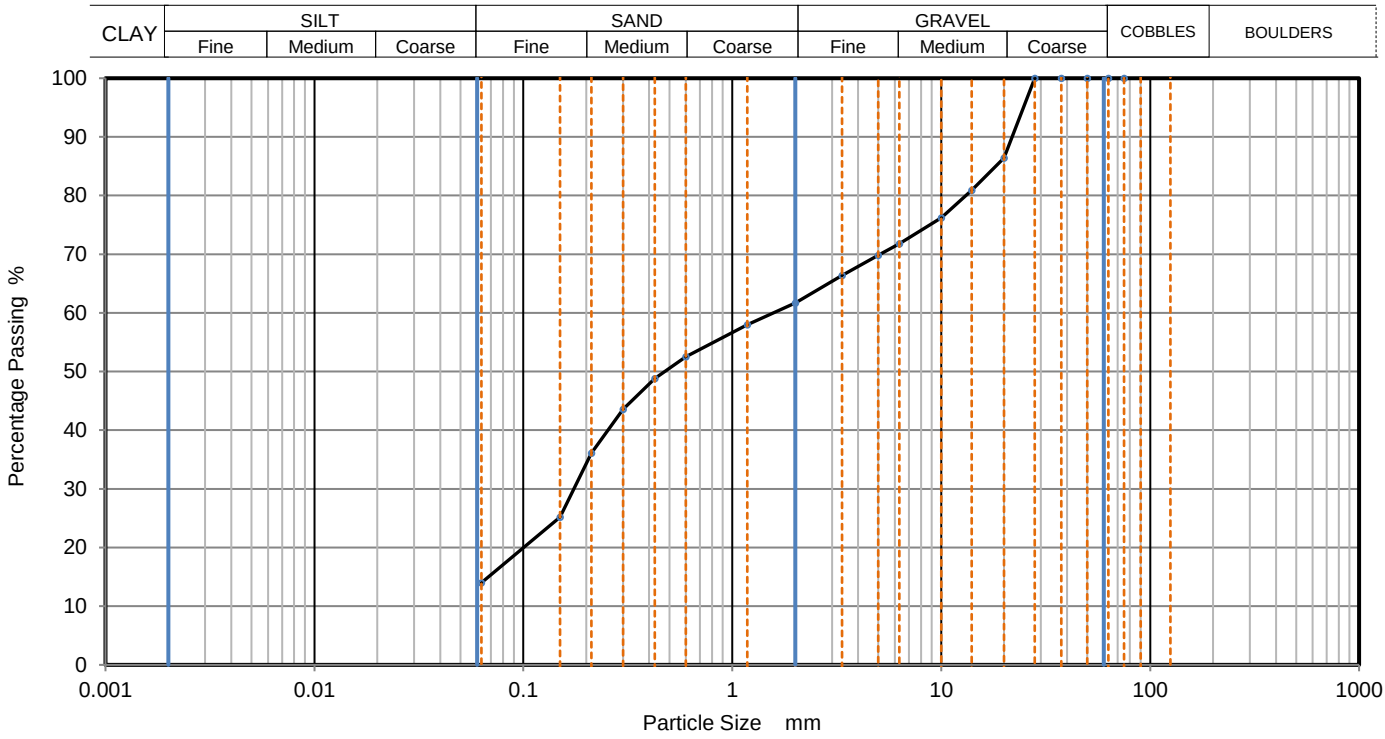
Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	14/01/2022 12:18	**1** QC From No:R2

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39

Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

PARTICLE SIZE DISTRIBUTION

				Job Ref	**2021MO111**
				Borehole/Pit No.	TP-06
Site Name	SSE Sheskin Wind Farm			Sample No.	2
Soil Description	Grey silty very gravelly fine and medium SAND.			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12021110916



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	86		
14	81		
10	76		
6.3	72		
5	70		
3.35	66		
2	62		
1.18	58		
0.6	53		
0.425	49		
0.3	44		
0.212	36		
0.15	25		
0.063	14		

Dry Mass of sample, g: 660

Sample Proportions	% dry mass
Very coarse	0
Gravel	38
Sand	48
Fines <0.063mm	14

Grading Analysis		
D100	mm	
D60	mm	1.57
D30	mm	0.175
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

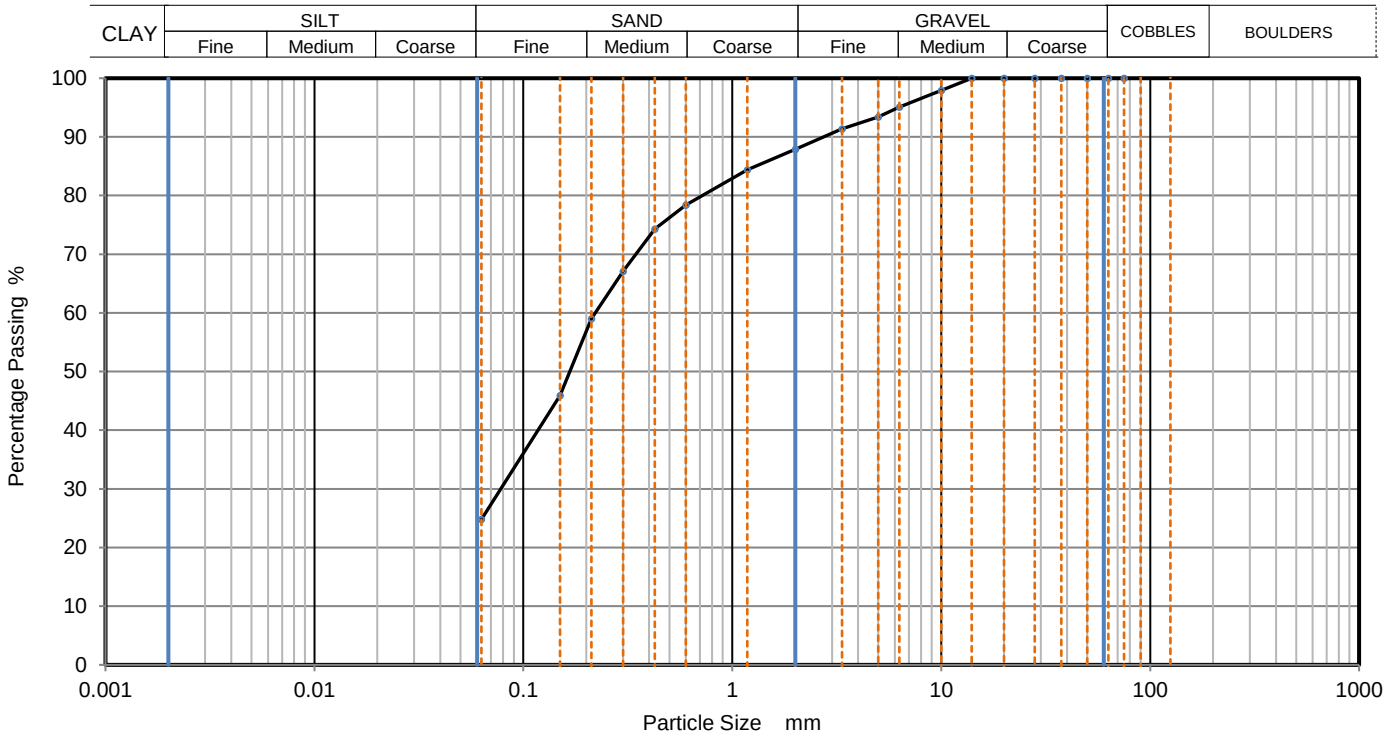
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	14/01/2022 12:18	**1**
				QC From No:R2

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39

Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2021MO111**
				Borehole/Pit No.	TP-07
Site Name	SSE Sheskin Wind Farm			Sample No.	1
Soil Description	Grey gravelly very silty fine SAND.			Depth, m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12021110917



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	98		
6.3	95		
5	93		
3.35	91		
2	88		
1.18	84		
0.6	78		
0.425	74		
0.3	67		
0.212	59		
0.15	46		
0.063	25		

Dry Mass of sample, g	376

Sample Proportions	% dry mass
Very coarse	0
Gravel	12
Sand	63
Fines <0.063mm	25

Grading Analysis		
D100	mm	
D60	mm	0.221
D30	mm	0.0779
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

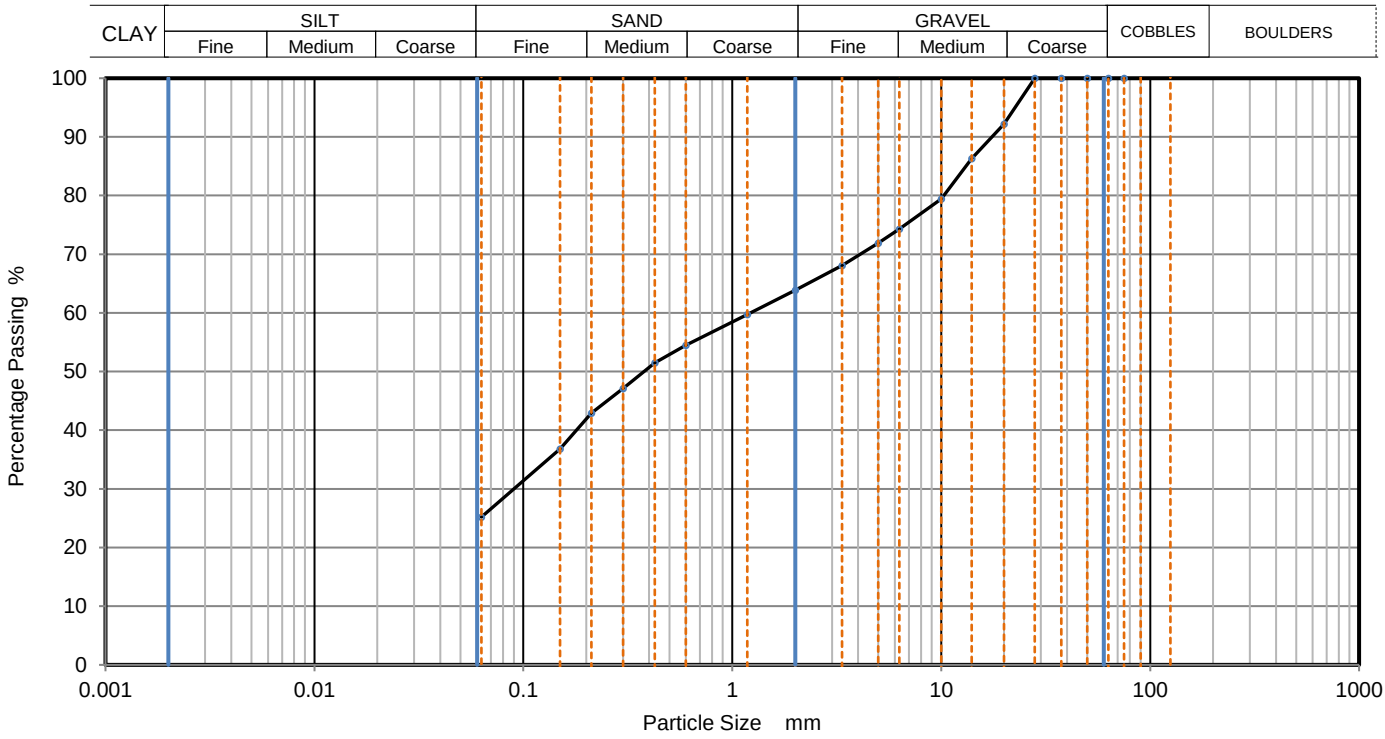
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	14/01/2022 12:18	**1** QC From No:R2

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39

Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2021MO111**
				Borehole/Pit No.	TP-08
Site Name	SSE Sheskin Wind Farm			Sample No.	1
Soil Description	Grey very silty SAND and GRAVEL.			Depth, m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12021110918



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	92		
14	86		
10	79		
6.3	74		
5	72		
3.35	68		
2	64		
1.18	60		
0.6	55		
0.425	52		
0.3	47		
0.212	43		
0.15	37		
0.063	25		

Dry Mass of sample, g	549

Sample Proportions	% dry mass
Very coarse	0
Gravel	36
Sand	39
Fines <0.063mm	25

Grading Analysis		
D100	mm	
D60	mm	1.23
D30	mm	0.0904
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

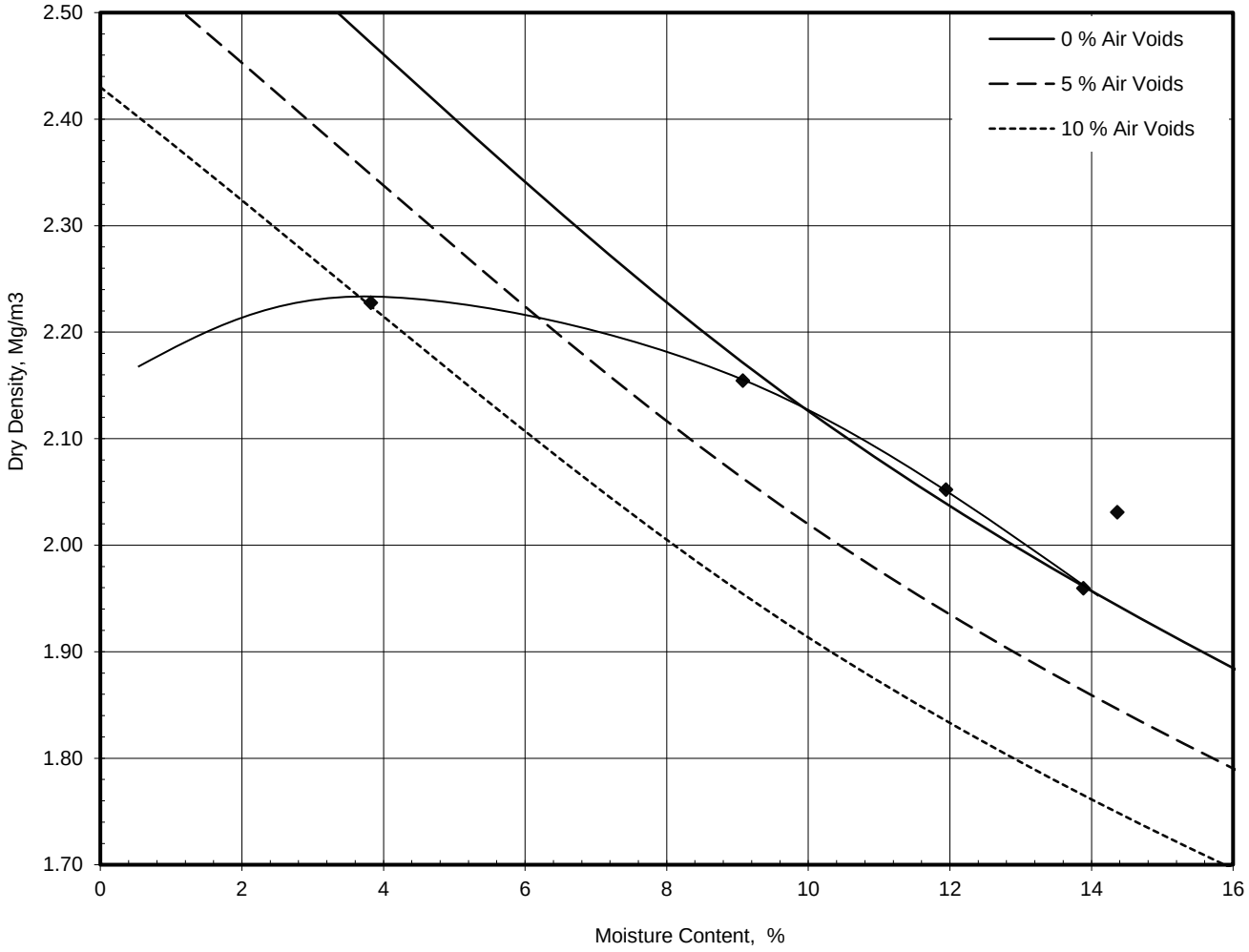
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	14/01/2022 12:18	**1** QC From No:R2

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39

Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

	Dry Density / Moisture Content Relationship Heavy Compaction			Job Ref	2021MO111
				Borehole / Pit No	TP-08
Site Name	**SSE Sheskin Wind Farm**			Sample No	1
Soil Description	Grey very silty SAND and GRAVEL.			Depth	0.50 m
Specimen Ref.	1	Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.6, 4.5kg rammer			Keylab ID	IDL12021110918
				Compaction Test Reference/No.	



Preparation		Material used was natural
Mould Type		CBR
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	8
Particle Density - Assumed	Mg/m³	2.70

Maximum Dry Density	Mg/m³	**2.23**
Optimum Moisture Content	%	**3.9**

Operator	Checked	Approved	Remarks	QC Form R4
Administrator	DCD	Administrator		Sheet 1 of 1

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

Irish Drilling Limited
Old Galway Road
Loughrea
Co. Galway

Attention: Dympna Darcy

CERTIFICATE OF ANALYSIS

Date of report Generation:	07 December 2021
Customer:	Irish Drilling Limited
Sample Delivery Group (SDG):	211130-85
Your Reference:	2021MO111
Location:	SSE Sheskin Wind Farm
Report No:	624806
Order Number:	10555

We received 2 samples on Tuesday November 30, 2021 and 2 of these samples were scheduled for analysis which was completed on Tuesday December 07, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.

Approved By:

Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG: 211130-85 **Report Number:** 624806 **Superseded Report:**
Client Ref.: 2021MO111 **Location:** SSE Sheskin Wind Farm

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
25431064	TP-04	B3	2.00 - 2.50	01/11/2021
25431071	TP-05	B2	1.50 - 1.90	02/11/2021

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG: 211130-85 **Report Number:** 624806 **Superseded Report:**
Client Ref.: 2021MO111 **Location:** SSE Sheskin Wind Farm

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type
			25431064	TP-04	B3	2.00 - 2.50	250g Amber Jar (ALE210)	S
			25431071	TP-05	B2	1.50 - 1.90	250g Amber Jar (ALE210)	S
Anions by Kone (soil)	All	NDPs: 0 Tests: 2	X	X				
pH	All	NDPs: 0 Tests: 2	X	X				
Sample description	All	NDPs: 0 Tests: 2	X	X				
Total Sulphate	All	NDPs: 0 Tests: 2	X	X				

CERTIFICATE OF ANALYSIS

SDG: 211130-85 **Report Number:** 624806 **Superseded Report:**
Client Ref.: 2021MO111 **Location:** SSE Sheskin Wind Farm

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
25431064	TP-04	2.00 - 2.50	Light Brown	Loamy Sand	Stones	Vegetation
25431071	TP-05	1.50 - 1.90	Dark Brown	Sandy Loam	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Validated

CERTIFICATE OF ANALYSIS

SDG: 211130-85 **Report Number:** 624806 **Superseded Report:**
Client Ref.: 2021MO111 **Location:** SSE Sheskin Wind Farm

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	TP-04	TP-05				
			Depth (m)	2.00 - 2.50	1.50 - 1.90				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	01/11/2021	02/11/2021				
			Sample Time	.	.				
			Date Received	30/11/2021	30/11/2021				
			SDG Ref	211130-85	211130-85				
			Lab Sample No.(s)	25431064	25431071				
			AGS Reference	B3	B2				
Moisture Content Ratio (% of as received sample)	%	PM024		11	13				
pH	1 pH Units	TM133		8.58 @ M	6.32 @ M				
Sulphate, Total	<48 mg/kg	TM221		131 M	71.8 M				
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243		0.0199 @ M	0.014 @ M				
Chloride (soluble)	<5 mg/kg	TM243		11.8 @ M	7.77 @ M				

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid Extractable Sulphate in Soils by ICP OES
TM243		Mixed Anions In Soils By Kone

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

CERTIFICATE OF ANALYSIS

SDG: 211130-85 **Report Number:** 624806 **Superseded Report:**
Client Ref.: 2021MO111 **Location:** SSE Sheskin Wind Farm

Test Completion Dates

Lab Sample No(s)	25431064	25431071
Customer Sample Ref.	TP-04	TP-05
AGS Ref.	B3	B2
Depth	2.00 - 2.50	1.50 - 1.90
Type	Soil/Solid (S)	Soil/Solid (S)
Anions by Kone (soil)	07-Dec-2021	07-Dec-2021
pH	02-Dec-2021	02-Dec-2021
Sample description	01-Dec-2021	01-Dec-2021
Total Sulphate	07-Dec-2021	07-Dec-2021

Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Matrix interference**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**
§	**Sampled on date not provided**

20. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix 03
Trial Pit Photographs

Figure 1 H:\21MO102_Sheskin WF TP Photos\TP01 (1).JPG

Figure 2 H:\21MO102_Sheskin WF TP Photos\TP01 (2).JPG

Figure 3 H:\21MO102_Sheskin WF TP Photos\TP01 (3).JPG

Figure 4 H:\21MO102_Sheskin WF TP Photos\TP02 (1).JPG

Figure 5 H:\21MO102_Sheskin WF TP Photos\TP02 (2).JPG

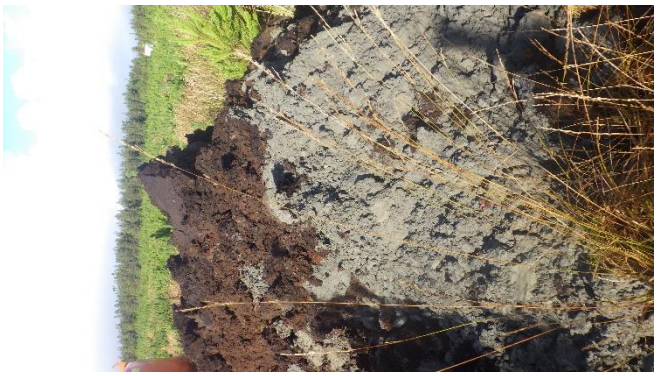


Figure 6 H:\21MO102_Sheskin WF TP Photos\TP02 (3).JPG

Figure 7 H:\21MO102_Sheskin WF TP Photos\TP03 (1).JPG

Figure 8 H:\21MO102_Sheskin WF TP Photos\TP03 (2).JPG

Figure 9 H:\21MO102_Sheskin WF TP Photos\TP03 (3).JPG

Figure 10 H:\21MO102_Sheskin WF TP Photos\TP04 (1).JPG

Figure 11 H:\21MO102_Sheskin WF TP Photos\TP04 (2).JPG

Figure 12 H:\21MO102_Sheskin WF TP Photos\TP04 (3).JPG

Figure 13 H:\21MO102_Sheskin WF TP Photos\TP05 (1).JPG

Figure 14 H:\21MO102_Sheskin WF TP Photos\TP05 (2).JPG

Figure 15 H:\21MO102_Sheskin WF TP Photos\TP05 (3).JPG

Figure 16 H:\21MO102_Sheskin WF TP Photos\TP06 (1).JPG

Figure 17 H:\21MO102_Sheskin WF TP Photos\TP06 (2).JPG

Figure 18 H:\21MO102_Sheskin WF TP Photos\TP06 (3).JPG

Figure 19 H:\21MO102_Sheskin WF TP Photos\TP07 (1).JPG

Figure 20 H:\21MO102_Sheskin WF TP Photos\TP07 (2).JPG

Figure 21 H:\21MO102_Sheskin WF TP Photos\TP07 (3).JPG

Figure 22 H:\21MO102_Sheskin WF TP Photos\TP08 (1).JPG

Figure 23 H:\21MO102_Sheskin WF TP Photos\TP08 (2).JPG

Figure 24 H:\21MO102_Sheskin WF TP Photos\TP08 (3).JPG

Figure 25 H:\21MO102_Sheskin WF TP Photos\TP10 (1).JPG

Figure 26 H:\21MO102_Sheskin WF TP Photos\TP10 (2).JPG

Figure 27 H:\21MO102_Sheskin WF TP Photos\TP10 (3).JPG

Figure 28 H:\21MO102_Sheskin WF TP Photos\TP11 (1).JPG

Figure 29 H:\21MO102_Sheskin WF TP Photos\TP11 (2).JPG

Figure 30 H:\21MO102_Sheskin WF TP Photos\TP11 (3).JPG

Figure 31 H:\21MO102_Sheskin WF TP Photos\TP12 (1).JPG

Figure 32 H:\21MO102_Sheskin WF TP Photos\TP12 (2).JPG

Figure 33 H:\21MO102_Sheskin WF TP Photos\TP12 (3).JPG

Figure 34 H:\21MO102_Sheskin WF TP Photos\TP9 (1).JPG

Figure 35 H:\21MO102_Sheskin WF TP Photos\TP9 (2).JPG

Figure 36 H:\21MO102_Sheskin WF TP Photos\TP9 (3).JPG

Appendix 04
Site Plan

Map Legend

- Sheskin Site Boundary
- Proposed Turbine Layout
- Proposed Met Mast Location
- Proposed Substation Locations
- Proposed Construction Compound Locations
- Potential Borrow Pit Locations
- Proposed New Roads
- Potential Alternative Roads
- Existing Roads - Upgrade Proposed
- Existing Roads

Drawing Title: Site Layout V2

Project Title: 201119 - SSE Sheskin Wind Farm

Drawn By	Checked By
DOS	EM
Project No.	Drawing No.
201119	Fig 1
Scale	Date
1:20000	10.08.21

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Appendix 05
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