APPENDIX 7-1

GEOTECHNICAL & PEAT STABILITY ASSESSMENT REPORT

FEHILY TIMONEY

DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

LEMANAGHAN WIND FARM, CO. OFFALY

Geotechnical & Peat Stability Assessment Report

Prepared for:
MKO Ltd

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Geotechnical & Peat Stability Assessment Report
Lemanaghan Wind Farm

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Abstract: Fehily Timoney and Company (FT) were engaged by McCarthy Keville O'Sullivan (MKO) to undertake a geotechnical assessment of the proposed Lemanaghan Wind Farm with respect to peat stability. As part of the geotechnical assessment of the Proposed Project, FT completed a walkover survey at the site as well as a ground investigation comprising peat probes, boreholes and trial pits. The findings of the geotechnical and peat stability assessment showed that the site has an acceptable margin of safety and is suitable for the proposed wind farm development.

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1. NON-TECHNICAL SUMMARY

Fehily Timoney and Company (FT) was engaged by McCarthy Keville O'Sullivan (MKO) on behalf of Lemanaghan Wind Farm DAC (the Applicant) to undertake a geotechnical and peat stability assessment of the proposed Lemanaghan Wind Farm. In accordance with planning guidelines compiled by the Department of the Housing, Planning and Local Government (Draft Guidelines, DoHPLG, 2019), where peat >0.5m in thickness is present on a proposed wind farm development, a peat stability assessment is required.

As detailed in Section 1.1.1 in Chapter 1, for the purposes of this EIAR, the various project components are described and assessed using the following references: 'Proposed Project', 'Proposed Wind Farm', 'Proposed Grid Connection', 'Proposed Project site' and the 'site'.

Site walkover surveys (including intrusive peat depth probing), desk study, stability analysis and risk assessment were 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, 2nd Edition, 2017).

The findings, which involved a stability analysis of 281 locations across the Proposed Project site, carried out by FT to record peat depth, slope inclination, vegetation type and ground water, show that the site has an acceptable margin of safety and is suitable for the Proposed 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. It is noted that there have been numerous wind farms successfully constructed on cutaway and cutover bog sites over the past 15 years without any issues relating to peat failure, such as Mount Lucas, Derrinlough and Cloncreen (Co. Offaly) and Bruckana (Co.'s, Kilkenny, Laois and Tipperary)

The site, which is typically flat, consists predominantly of bare locally re-vegetated cut-away peat and intact peat. The site was subject to historical peat extraction activities by Bord na Mona, with the cessation of peat extraction occurring in June 2020 and all stockpiled peat being removed the site by the end of 2023.

The Proposed Project comprises 15 no. wind turbines, a proposed onsite 220kv substation, and all associated infrastructure. A detailed description of the Proposed Project is included in Chapter 4 Description of the Proposed Project of the EIAR. The site is undulating with drainage channels running typically southwest-northeast. The land use within the Proposed Project site comprises predominately of vegetated peatlands (milled in some areas), along with forestry and agricultural lands. Several disused Bord na Mona rail lines also pass through the site.

Slope inclinations at the main infrastructure locations range from 2 to 4 degrees. The flat topography/nature of the terrain on site reflects the low risk of peat failure. Ground conditions comprised mainly of peat overlying till derived from limestone.

A combined total of 722 no. peat probes were carried by FT, MKO and Hydro-Environmental Services (HES), to determine peat depth across the site. Peat depth recorded from peat probing ranged from 0.1 to 6.2m with an average peat depth of 2.0m. Approximately 21% of the probes recorded peat depths of less than 1.0, approximately 36% of peat depth probes recorded peat depths of 1.0m to 2.0m, and approximately 23% of peat depth probes recorded peat depths of 2.0m to 3.0m. The remaining 20% of probes recorded peat depths of between 3.0 to 6.2m.

The purpose of the stability analysis was to determine the stability i.e. Factor of Safety (FoS), of the peat slopes. The FoS provides a direct measure of the degree of stability of a peat slope. A FoS of less than 1.0 indicates that a slope is unstable; a FoS of greater than 1.0 indicates a stable slope. An acceptable FoS for slopes is generally taken as a minimum of 1.3. The stability analysis for this project, which analysed the turbine locations, internal roads and substation, 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 Drawings P20-216-0600-0004 to 0006.

The findings of the peat assessment (which combines the FOS and the risk assessment), which involved analysis of 281 peat probing no. locations collected by FT, showed that the Proposed Project site has an acceptable margin of safety and that the site is suitable for the Proposed Project. Notwithstanding the above, the management of peat stability and appropriate construction practices will be inherent in the construction phase of the Proposed Project to ensure peat failures do not occur on site.

In summary, the Proposed Project site has an acceptable margin of safety and is considered to be at **low** risk of peat failure providing appropriate mitigation measures and construction controls are implemented 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 c.100 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 Doireann Tarrant, MSc. Doireann is a Senior Project Engineer with FT and has 2 years' experience in geotechnical engineering. This report was reviewed by Aaron Clarke, BSc, MSc, MCSM, PGeo, EurGeol. Aaron is a Chartered Principal Geologist with FT and has over 20 years' experience in engineering geology and geoscience projects.

Site visits were undertaken by Doireann Tarrant, MSc, and Julian Borlado, MSc. Julian is a Senior Project Engineer with FT and has over 10 years' experience in geotechnical engineering.

2.2 Project Description

FT was engaged in January 2021 by McCarthy Keville O'Sullivan (MKO) on behalf of Lemanaghan Wind Farm DAC (the Applicant) to undertake a geotechnical & peat stability assessment of the proposed Lemanaghan Wind Farm. As detailed in Section 1.1.1 in Chapter 1, for the purposes of this EIAR, the various project components are described and assessed using the following references: 'Proposed Project', 'Proposed Wind Farm', 'Proposed Grid Connection', 'Proposed Project site' and the 'site'.

The Proposed Project site is located approximately 3 kilometres (km) northeast of Ferbane and approximately 2.5 km southwest of the village of Ballycumber in Co. Offaly.

The site is relatively flat-lying with drainage channels running typically southwest-northeast. The site is bounded by the R436 regional round to the south with the Rosfaraghan road located partially within the site, and the L7001 local road to the north and east. The N62 national road runs in a north to south direction to the west of the site. Note that the L7002 runs through the site and splits the Proposed Project into a northernmost section and the main bog area. Land uses within the site are a mixture of bare cutover and cutaway peat and re-vegetation of bare peat. Several disused Bord na Mona rail lines also pass through the site.

The Proposed Project comprises 15 no. wind turbines, a proposed onsite 220kv substation, and all associated infrastructure. A detailed description of the Proposed Project is included in Chapter 4 Description of the Proposed Project 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 considering peat failures that have occurred on wind farm sites located on peatland (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 Proposed Project and the construction methodologies to be implemented. The Meenbog failure occurred during the construction of a section of floating road on sidelong ground in an area of weak peat. The slope angles on the Proposed Project site are lower than those at Meenbog, and no significant areas of sidelong ground are present. 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. The peat failures which took place at Shass Mountain and Meenbog occurred on upland blanket bog; the Proposed Project site is a mixture of bare cutaway peat, re-vegetated bare peat, degraded raised bog, and remnants of high bog which is a significantly different topography than that found at Shass Mountain and Meenbog. It is also noted that there have been numerous wind farms successfully constructed on bogland sites over the past 15 years with any issues relating to peat failure, such as Derrinlough (Co. Offaly), Galway Wind Park and Arderroo Wind Farm (both Co. Galway).

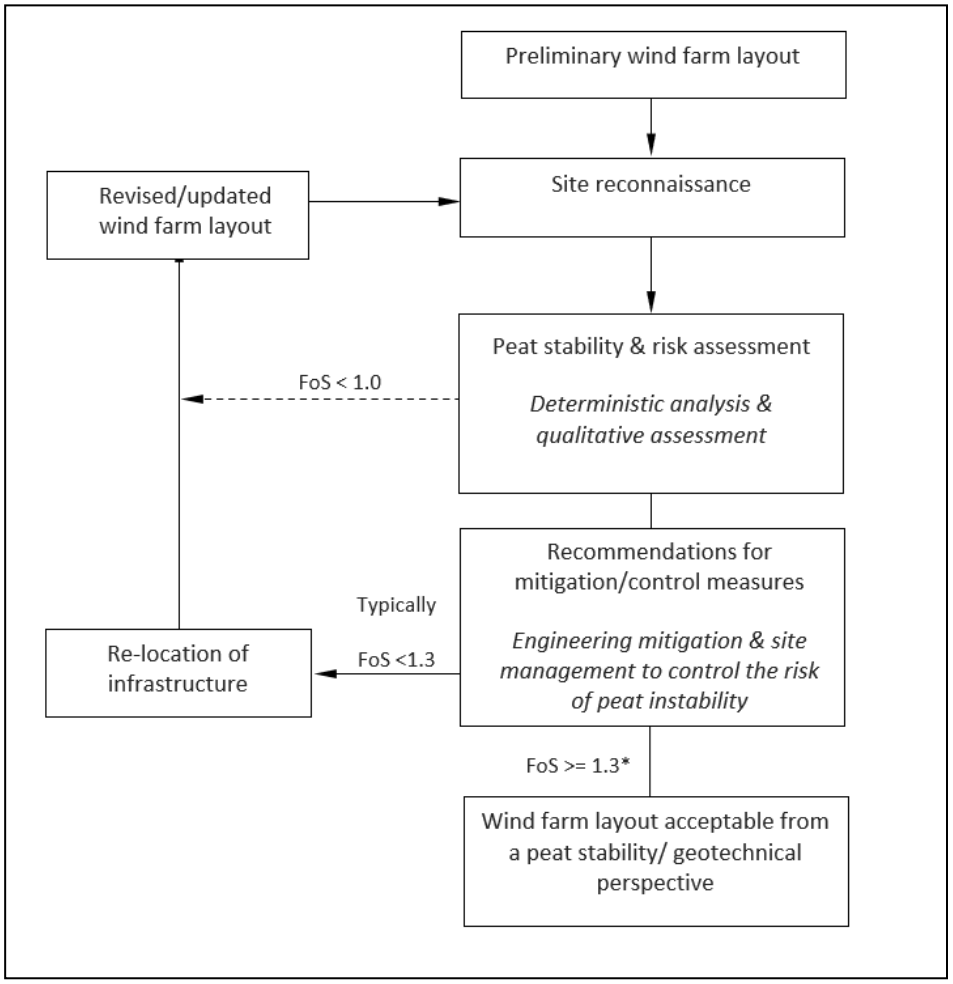
A constraints study was initially undertaken by the Environmental, Hydrogeological and Ecological members of the design team to determine the developable area on the site, prior to the site reconnaissance by engineering geologists/geotechnical engineers from FT. The extent and depth of ground investigation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

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, and aerial photography.
2. Site reconnaissance including shear strength and peat depth measurements undertaken following initial constraints study (by design team) to determine the proposed construction envelope within the site, 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 722 no. peat depth probes carried out across the site by FT (2022), MKO (2024 and 2025) and HES (2021 and 2024).
5. Factor of safety plan – compiled for the short-term critical condition (undrained) for 281 no. FoS points analysed along the proposed infrastructure envelope on site.

6. Construction buffer zone plan – identifies areas with an elevated or higher construction risk where mitigation/control measures will need to be implemented during construction to minimise the potential risks and ensure they are kept within an acceptable range.
7. A 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) and Fehily Timoney (FT) between 2021 and 2025.
9. Preliminary assessment of foundation type for turbines.
10. Commentary of founding details for other infrastructure elements such as internal roads, crane hardstands, onsite substation, temporary 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.



*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.

Figure 2-1: Methodology for Peat Stability Assessment

As for all construction projects, a detailed engineering construction design must be carried out by the appointed construction stage designer prior to any construction work commencing on site. This must take account of the consented project details and any conditions imposed by that consent. This must include a 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 and a peat and spoil management plan to allow for the most appropriate geotechnical and environmental led solutions to be developed for the management of peat and spoil.

2.4 Peat Failure Definition

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

The potential for peat failure at the Proposed Project 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 considers 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 (FoS)) 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, internal 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 FoS 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.

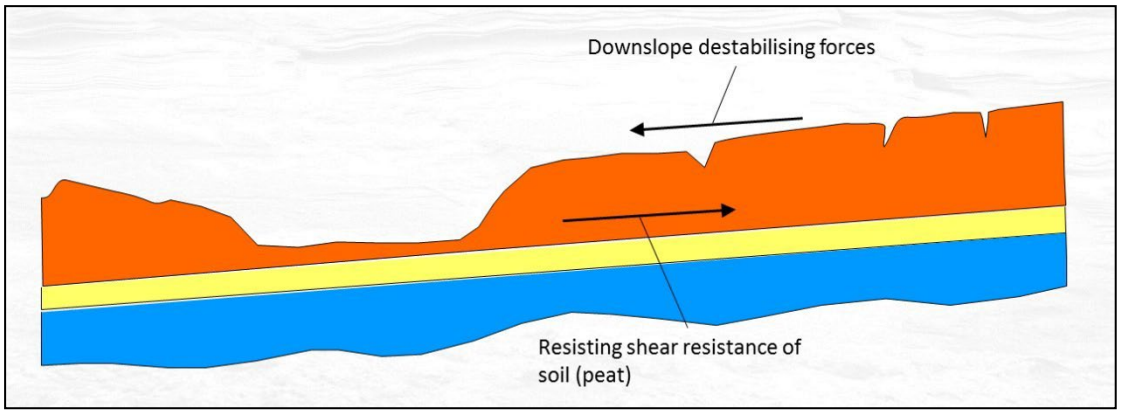


Figure 2-2: Peat Slope Showing Balance of Forces to Maintain Stability

The FoS 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 FoS will be greater than 1.0 and the slope will remain stable. If the FoS is less than 1.0 the slope is unstable and liable to fail. The acceptable factor of safety for assessment purposes is 1.3 (BS6031, 1981).

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 FoS 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 FoS approach '*has provided the most informative results'* with respect to analysing peat stability (Section 5.3.1 of the guide).

The FoS approach in this report includes undrained (short-term stability) and drained (long-term stability) analyses. The undrained condition is the critical condition for a development. The purpose of the drained analysis is to identify the relative susceptibility of rainfall-induced failures at the Proposed Project 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 FoS 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 FoS 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 Proposed Project 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, 2025) and geological plans (GSI, 1999) 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, 2025) 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 the GSI was carried out.

The GSI subsoils maps indicates that the Proposed Project site is underlain by a combination of predominantly cut over raised peat with small pockets of till derived from limestones, gravels derived from limestones, and an area of bedrock outcrop or subcrop.

In relation to bedrock, the Proposed Project site is underlain by 4 no. geological formations. The north and northwest of the site is predominantly underlain by the Waulsortian Limestone, described as massive un-bedded lime-mudstones. This is separated by northeast to southwest trending fault lines which separate the Waulsortian Limestone formation from the Ballysteen formation and Navan Beds, which comprises dark muddy limestone shale and dark limestone, mudstone and sandstone, respectively. There are 4 no. perpendicular fault lines across the east of the site which are orientated in a northwest to southeast direction. The geological formation in the south and southwestern portion of the site is Old Red Sandstone (undifferentiated) described as red conglomerate, sandstone & mudstone.

There is a quarry recorded approximately 5km southwest of the Proposed Project site.

No karst features were identified on the survey area. The nearest karst features were recorded 0.5km to the northeast of the site and consisted of 2 no. springs and 1 no. swallow hole. Additionally, there are 2 no. mushroom rocks (a surface karst related feature) located approx. 3-5km to the west of the site.

There are 2 no. dug wells located to the south of the site and 1 no. dug well located in the north of the site.

1 no. landslide event was recorded 2km south of the site which occurred in 1954. This failure is noted to have occurred in an area of glacial till.

There are no geological heritage sites noted in the study area. The nearest geological heritage site is the Clonmacnoise Esker which is present 0.5km to the north and approx. 2km to the east of the study area.

3.3 Previous Failures

There are no recorded peat failures within the Proposed Project site (GSI, 2022). The nearest recorded peat failure is located in Kilmaleady Bog near Clara, approximately 10km northwest of the study area. This failure was described as a flow slide failure. It occurred in 1821 and there have been no other recorded failures since.

The landslide susceptibility of the site was classified by the GSI (2022) as '**low**' susceptibility, which is expected given the flat terrain present.

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

4. FINDINGS PF SITE RECONNAISSANCE

4.1 Site Reconnaissance

As part of the assessment of potential peat failure at the Proposed Project 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 Proposed Project, which included peat depth and preliminary assessment of peat strength. The information gathered from these site visits provide sufficient information for a site-wide assessment of the extent, depth and strength of peat present at the Proposed Project site.

The following salient geomorphological features were considered:

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

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

The method adopted for carrying out the site reconnaissance relied on 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 comprised a walkover inspection of the site by engineers from FT on several different days from April 2021 to September 2024. Weather conditions for the site visits ranged from dry to wet. The dates of each site reconnaissance and the associated FT personal are listed below.

- 6th to 9th of April 2021 (Emily Archer)
- 5th to 8th of September 2022 (Alan Whelan and Karim Costa)
- 25th of October 2023 (Julian Borlado)
- 25th of September 2024 (Doireann Tarrant and Julian Borlado)

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 Proposed Project site are as follows:

1. The site is typically covered in a layer of peat and is relatively flat. Peat depths vary across the site depending on mainly topography. Bare cutover and cutaway peat, re-vegetation of bare peat and degraded raised bog from historical peat extraction activities are present across the site (see Appendix A).

2. A total of 722 no. peat depth probes were carried out by FT, MKO and HES on site. Peat depths recorded from peat probing across the site ranged from 0.1 to >6.0m with an average depth of 2.0m (Drawings P20-216-0600-0001 to 0003). Approximately 80% of peat depth probes recorded peat depths of less than 3.0m. A number of localised readings were recorded where peat depths were 3.5 to >6.0m.
3. The peat depths recorded at the turbine locations varied from 0.1 to 4.2m with an average depth of 1.6m. The ground investigation identified that at 8 no. turbine locations the peat was underlain by soft clay or silt deposits, ranging from 0.4m to 2.9m in thickness.
   (1) With respect to the new proposed internal roads, peat depths ranged from 0 to 5.5m.
   (2) Slope angles at the turbine locations ranged from 2 to 4 degrees. These slope angle readings were obtained using a combination of readings taken during the site reconnaissance by FT using handheld equipment, such as the Silva Clino Master which has an accuracy of +/- 0.25 degrees and from contour survey plans for the site.
   (3) 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.
   (4) Localised areas of ponded water were recorded. This is not unexpected given the ground conditions and the flat terrain present across the site.
   (5) No evidence of past failures or any significant signs of peat instability were noted on site.
   (6) A summary of the site walkover findings for the Proposed Project site are as follows:
      (a) The site is typically covered in a layer of peat with typically flat terrain and open peatland. Peat depths recorded across the site by means of peat probing ranged from 0.1 to 6.0m with an average depth of 2.0m.
      (b) A construction buffer zone plan has been produced for the site (Drawings P20-216-0600-0004 to 006). This shows areas on the site where no development is advised and areas with an elevated or higher construction risk. The above identified buffer areas are based on qualitative factors identified during the walkover survey e.g. relatively deep peat, quaking peat, mechanically cut peat, recent peat landslide, etc.
      (c) The results of the peat depth probing, shear strength testing of the peat and qualitative factors identified on site have been used in the stability and risk assessments, see Sections 6, 7 and 8 of this report for details.
      (d) Based on the findings from the walkover survey, the Proposed Project is considered to have a **low** risk of peat failure.

5. GROUND INVESTIGATION

Ground investigations (GI) in the form of trial pits and rotary boreholes were carried out at the Proposed Project site by Fehily Timoney in April 2021 and by Irish Drilling Limited (IDL) in March 2022 and November 2023. A total of 28 trial pits were excavated by FT in April 2021. The ground investigations by IDL comprised a total of 19 no. trial pits in 2022 and the additional GI in 2024 comprised 10 no. rotary boreholes and 16 no. trial pits with associated laboratory testing.

The laboratory testing included the following:

- Classification testing for overburden material
- Minimum and maximum density values for overburden material
- Determination of dry density/moisture content relationship

The trial pits logs, photographs and associated laboratory testing are included within Appendix E, F and G of this report.

The purpose of the ground investigation was to assess the ground conditions at the main infrastructure locations and potential borrow pit locations across the site. A ground investigation location plan is included as Drawings P20-216-0600-007 to 0009) in this report.

5.1 Summary of Ground Conditions

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

Peat – Typically described as Very soft or firm black dark brownish amorphous or pseudo fibrous or fibrous PEAT. Peat thicknesses ranged from 0.2m to 4.9m from trial pits and 4.1 to 7.1m in the boreholes.

Lacustrine Clay & Silt – soft blueish-grey or yellowish brown silty very sandy or slightly sandy or slightly gravelly sandy silt with fibres or shell fragments. The thickness of the layer is variable across the site.

Fluvioglacial Sand and Gravel – Typically described as grey slightly sandy Gravel or sandy very silty Gravel or silty Sand with boulders and cobbles. Sand is fine to coarse, and gravel is angular to subrounded. The thickness of the layer is variable across the site.

Limestone Bedrock – Strong locally very strong thinly bedded grey and dark grey sparry bioclastic fine- and coarse-grained LIMESTONE massive dark blackish grey fine grained calp limestone. Upper 1.0 to 4.0m possible weathered rock described as subrounded to subangular fine to coarse assorted light grey and dark grey limestone GRAVEL with rare cobble some grey slightly sandy slightly gravelly silt. This is consistent with the GSI bedrock mapping which indicates that the site is underlain by dark muddy Limestone or Dark Limestone, Mudstone, Sandstone.

Groundwater was recorded in 44 no. of the trial pits on site and varied between 0.6 and 3.9m bgl.

5.2 Summary of Laboratory Tests

Following completion of intrusive site investigations by FT and IDL laboratory testing was scheduled by FT and undertaken by Irish Drilling Ltd (IDL). Soil testing was carried out in accordance with BS1377 (1990) - *Methods of Test for Soils for Civil Engineering Purposes* in IDL's Materials Laboratory, accredited in accordance with the Irish National Accreditation Board (INAB).

The samples of the overburden material were analysed for a range of parameters which included Particle Size Distribution (PSD), Moisture Content and Atterberg Limits.

The results are summarised in Table 5-1. Atterberg limit tests carried out on the samples classify the material as Clay of low to high plasticity, or non-plastic (Silt). No elevated sulphate levels were detected in the samples tested. The results indicate that the fine-grained soils tested are predominantly low to intermediate plasticity Clays. The moisture content was typically lower for granular soils than cohesive soils.

Table 5-1: Laboratory Testing

Type	N	Min	Max	Remarks
Natural Moisture Content (%)	28	6.1	62	Typical % lower from gravel dominated soil and higher for silt dominated soil.
Atterberg Limits	28	0	35	Low plasticity Silt and low-to-high plasticity Clay.
Particle Size Distribution	12			% passing 63 µm ranged from 5 to 95%
Point Load	3			Rock strength ranged from weak to very strong.
Dry Density/Moisture Content	5	1.96	2.17	
Soil Organic Content (%)	4	0.552	5.26	
Sulphate Total (%)	5	0.0148	0.0976	
Water Soluble Sulphate as SO4 (g/L)	5	0.0202	0.401	-
pH	5	8.08	8.57	-

5.3 Summary of Geotechnical Parameters

Table 5-2 contains characteristic geotechnical parameters for the main material types likely to be encountered on the Proposed Project 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 5-2: Summary of Geotechnical Parameters

Material Type/Strata	Unit Weight	Geotechnical Parameters		
		Undrained Parameters	Drained Parameters	
	γ (kN/m³)	cu (kPa)	ϕ' (°)	c' (kPa)
Peat	11	6 (3)	25	4
Lacustrine Soil	18	20	26	0
Fluvioglacial – Sand & Gravel	20	-	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, cu for the peat of 6kPa was selected. The lowest recorded value on the Proposed Project site was 12kPa hence a value of 6kPa is a conservative value.

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 probes were carried out at/near to proposed turbine locations and internal roads and other main infrastructure elements to determine the peat depth on site. At all proposed turbine locations, up to 5 no. 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. Strength testing was carried out at selected locations across the site to provide representative coverage of indicative peat strengths. The results of the vane testing with depth are presented in Figure 6-1.

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 the Proposed Project site.

The slope angle quoted typically reflects the slope within the footprint of each proposed 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 the peat probes carried out by FT, MKO and HES and the trial pits and boreholes excavated by FT and IDL, the peat varied in depth from 0.1 to >7.1m with an average depth of 2.0m. All peat depth probes carried out on site have been utilised to produce a peat depth contour plan for the site (Drawing P20-216-0600-0001 to 0003).

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

Proposed Infrastructure	Easting	Northing	Peat Depth Range (m) (Note 1)	Average Peat Depth (m)	Slope Angle (°) (Note 2)
T01	614198	727373	3.1 – 3.6	3.5	3
T02	614481	726939	0.9 – 1.7	1.2	4
T03	614779	726516	1.5 – 2.2	1.8	4
T04	615314	727112	0.1 – 0.4	0.2	4
T05	615978	727580	0.7 – 1.3	1.0	3
T06	615647	727935	1.5 – 2.4	1.9	2
T07	614968	727549	1.8 – 2.7	2.2	3
T08	615375	728345	0.9 – 1.8	1.2	4
T09	616021	728746	1.0 – 1.7	1.3	3
T10	615717	729399	0.9 – 2.0	1.5	4
T11	616379	729349	0.9 – 1.7	1.2	3
T12	616415	728161	1.3 – 1.5	1.4	2
T13	616995	728608	0.7 – 2.0	1.3	4
T14	617357	728184	0.3 – 1.3	1.0	4
T15	617684	728906	3.6 – 4.1	3.8	3
Met Mast	614131	727021	1.8 – 3.2	2.5	4
Substation	614953	730887	5.0 – 7.1	5.5	3
Telecoms Tower	615004	730929	5.2 – 6.0	6.0	3
Steel Mast 1 (under OHL west)	614640	731161	1.00	1.0	2
Steel Mast 2 (under OHL east)	614687	731203	0.20	0.20	2
Steel Mast 3 (beside substation west)	614881	730908	5.30	5.30	2
Steel Mast 4 (beside substation east)	614915	730938	5.20	5.20	2
Crane Pad (under OHL)	614662	731177	0.4 – 0.7	0.6	2
Crane Pad (beside substation)	614881	730945	2.4 – 6.0	4.2	3
Tower Build Area (under OHL)	614634	731199	0.5 – 3.0	3.0	2
Tower Build Area (beside substation)	614921	730978	2.0 – 5.0	3.5	2

Proposed Infrastructure	Easting	Northing	Peat Depth Range (m) (Note 1)	Average Peat Depth (m)	Slope Angle (°) (Note 2)
Construction Compound 1	612542	727781	2.5 – 5.4	3.9	3
Construction Compound 2	617278	728493	1.9 - 2.3	2.1	4
Construction Compound 3	614686	727316	0.6 – 2.2	1.2	3
Construction Compound 4	615684	729778	3.0 - 3.8	3.4	4
Construction Compound 5	614958	730828	2.0 - 5.5	4.0	2
Borrow Pit 1	614589	726681	1.6 - 4.2	2.9	6
Borrow Pit 2	615081	727017	0.2	0.2	4
Borrow Pit 3	615695	728507	0.6	0.6	4
Borrow Pit 4	615982	728959	0.7 - 1.2	1.0	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 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 12 to 65kPa, with an average value of 43kPa. The strengths recorded would be typical of well drained peat present within the site.

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

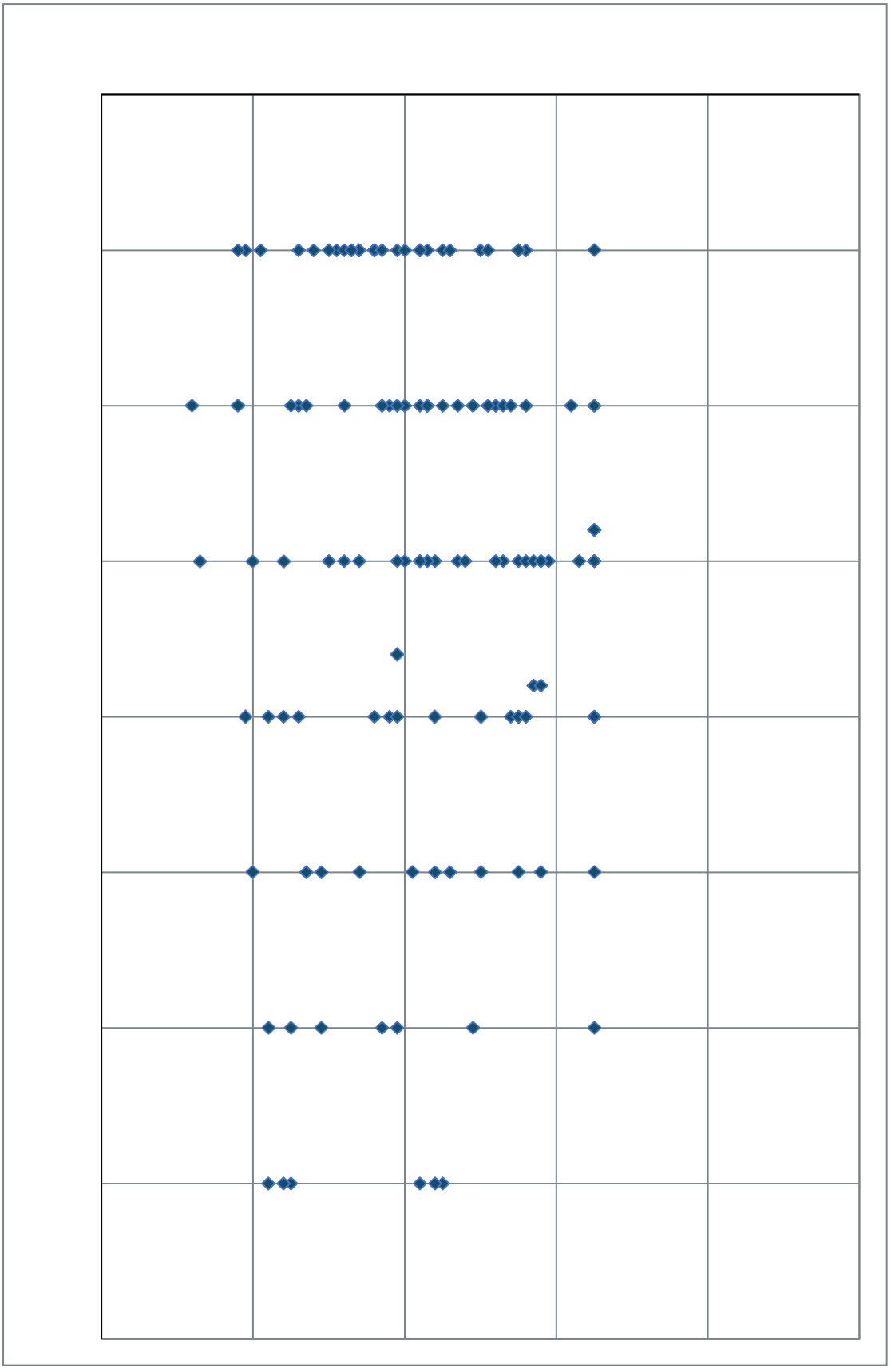


Figure 6-1: Undrained Shear Strength (cu) Profile for Peat with Dept

7. PEAT STABILITY ASSESSMENTS

The peat stability assessment includes an assessment of the stability of the natural peat slopes for individual parcels across the Proposed Project site including at the proposed turbine, substation and me mast locations and along the proposed internal 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 FoS 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 FoS 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 7.1 the values for c' ranged from 1.1 to 8.74kPa and ø' ranged from 21.6 to 43°. The average c' and ø' values are 4.5kPa and 30° respectively. Based on the above, it was considered to adopt a conservative approach and to use design values below the averages. For design the following general drained strength values have been used for the site:

c' = 4kPa
$ø'$ = 25°

Table 7-1: List of Effective Cohesion and Friction Angle Values for Peat

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

7.2 Analysis to Determine Factor of Safety (Deterministic Approach)

The purpose of the analysis was to determine the FoS of the peat slopes using infinite slope analysis. The analysis was carried out at the proposed turbine locations, along the proposed internal roads and at various locations across the Proposed Project site.

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

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

As a general guide the FoS limits for peat slopes in this report are summarised in Table 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 FoS 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 across the Proposed Project 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 Proposed Project site. In reality the peat generally has a higher undrained strength.

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

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

Where:

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

z = Depth to failure plane assumed as depth of peat
α = Slope angle

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

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

Where:

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

For the drained analysis the level of the water table above the failure surface is required to calculate the FoS for the slope. Since the water level in cutover/cutaway peatland 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 and ground investigation.
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 the Proposed Project 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 6kPa was selected for the assessment. The lowest recorded value on the Proposed Project site during the site walkover was 12kPa. 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 Proposed Project site. In reality, the peat has a significantly higher undrained strength as a result of the extensive drainage and extraction works which have been carried out on site.

For the stability analysis two load conditions were examined, namely

Condition (1): no surcharge loading

Condition (2): surcharge of 10 kPa, equivalent to 1m of stockpiled peat assuming a precautionary scenario

7.3 Results of Analysis

7.3.1 Undrained Analysis for the Peat

The results of the undrained analysis for the natural peat slopes are presented in Appendix C and the results of the undrained analysis for the most critical load case (load condition 2) are shown on Drawings P20-216-0600- 0010 to 0012. The undrained analysis for load condition 2 is considered the most critical load case as most peat failures occur in the short term upon loading of the peat surface. The results from the main infrastructure locations are summarised in Table 7.3.

The calculated FoS for load condition 1 is in excess of 1.3 for each of the infrastructure locations (281 no. locations) analysed with a range of FoS of 2.44 to 86.01, indicating a low risk of peat instability.

The calculated FoS for load condition 2 is in excess of 1.3 for each of the infrastructure locations (281 no. locations) analysed with a range of FoS of 2.01 to 14.34, 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	614198	727373	**3.19**	**2.50**
T02	614481	726939	**5.07**	**3.19**
T03	614779	726516	**3.92**	**2.69**
T04	615978	727580	**21.56**	**6.16**
T05	615647	727935	**8.83**	**4.99**
T06	615647	727935	**7.17**	**5.06**
T07	614968	727549	**4.25**	**3.10**
T08	615375	728345	**4.79**	**3.08**
T09	616021	728746	**6.75**	**4.25**
T10	615717	729399	**4.31**	**2.87**

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T11	616379	729349	**6.75**	**4.25**
T12	616415	728161	**11.47**	**6.88**
T13	616995	728608	**4.31**	**2.87**
T14	617357	728184	**6.63**	**3.75**
T15	617684	728906	**2.80**	**2.25**
Met Mast	614131	727021	**6.38**	**4.10**
Substation	614953	730887	**2.44**	**2.01**
Telecoms Tower	615004	730929	**2.87**	**2.46**
Steel Mast 1 (under OHL west)	614640	731161	**17.20**	**8.60**
Steel Mast 2 (under OHL east)	614687	731203	**86.01**	**14.34**
Steel Mast 3 (beside substation west)	614881	730908	**3.25**	**2.73**
Steel Mast 4 (beside substation east)	614915	730938	**3.31**	**2.77**
Crane Pad (under OHL)	614662	731177	**28.67**	**10.75**
Crane Pad (beside substation)	614881	730945	**4.10**	**3.31**
Tower Build Area (under OHL)	614634	731199	5.73	4.30
Tower Build Area (beside substation)	614921	730978	4.92	3.82
Borrow Pit 1	614589	726681	**34.55**	**5.76**
Borrow Pit 2	615081	727017	**34.55**	**5.76**
Borrow Pit 3	615695	728507	**45.92**	**9.18**
Borrow Pit 4	615982	728959	**57.40**	**9.57**
Construction Compound 1	612542	727781	**2.73**	**2.21**
Construction Compound 2	617278	728493	**4.54**	**2.97**
Construction Compound 3	614686	727316	**5.22**	**3.59**
Construction Compound 4	615684	729778	**3.13**	**2.65**
Construction Compound 5	614958	730827	**2.50**	**2.05**

7.3.2 Drained Analysis for the Peat

The results of the drained analysis for the peat are presented in Appendix C. The results from the main infrastructure locations are summarised in Table 7.4. As stated previously, the drained loading condition examines the effect of rainfall and water on the existing stability of the natural peat slopes.

The calculated FoS for load condition 1 is in excess of 1.3 for each of the locations (281 no. locations) analysed with a range of FoS of 2.13 to 21.04 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 (281 no. locations) analysed with a range of FoS of 3.6 to 17.94, indicating a low risk of peat instability.

Table 7-4: Factor of Safety Results (Drained Conditions)

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T01	614198	727373	**2.13**	**3.60**
T02	614481	726939	**10.05**	**8.80**
T03	614779	726516	**9.28**	**8.46**
T04	615314	727112	**21.04**	**10.77**
T05	615978	727580	**14.78**	**12.23**
T06	615647	727935	**18.13**	**16.73**
T07	614968	727549	**11.73**	**10.97**
T08	615375	728345	**9.86**	**8.72**
T09	616021	728746	**13.40**	**11.73**
T10	615717	729399	**9.54**	**8.56**
T11	616379	729349	**13.40**	**11.73**
T12	616415	728161	**21.00**	**17.94**
T13	616995	728608	**9.54**	**8.58**
T14	617357	728184	**11.09**	**9.17**
T15	617684	728906	**10.76**	**10.40**
Met Mast	614131	727021	**4.25**	**5.91**
Substation	614953	730887	**10.53**	**10.24**
Telecoms. Tower	615004	730929	15.26	14.99
Steel Mast 1 (under OHL west)	614640	731161	24.82	19.09
Steel Mast 2 (under OHL east)	614687	731203	70.70	22.91
Steel Mast 3 (beside substation west)	614881	730908	15.52	15.17

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
Steel Mast 4 (beside substation east)	614915	730938	15.56	15.20
Crane Pad (under OHL)	614662	731177	32.47	20.52
Crane Pad (beside substation)	614881	730945	16.08	15.56
Tower Build Area (under OHL)	614634	731199	17.18	16.22
Tower Build Area (beside substation)	614921	730978	16.63	15.90
Borrow Pit 1	614589	726681	28.37	9.17
Borrow Pit 2	615081	727017	28.37	9.17
Borrow Pit 3	615695	728507	39.51	15.02
Borrow Pit 4	615982	728959	47.16	15.28
Construction Compound 1	612542	727781	8.97	8.31
Construction Compound 2	617278	728493	9.69	8.65
Construction Compound 3	614686	727316	13.15	11.63
Construction Compound 4	615684	729778	6.93	6.62
Construction Compound 5	614958	730827	11.39	11.09

8. PEAT STABILITY RISK ASSESSMENT

A peat stability risk assessment was carried out for the main infrastructure elements at the Proposed Project site. This approach considers guidelines for geotechnical/peat stability risk assessments as given in PLHRAG (2017) and MacCulloch (2005).

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

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

Table 8-1: Risk Rating Legend

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

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

8.1 Summary of Risk Assessment Results

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

The risk rating for each proposed infrastructure element of the Proposed Project is designated Negligible following mitigation/control measures being implemented. Sections of internal roads to the nearest proposed infrastructure element will be subject to the same mitigation/control measures that apply to the nearest proposed infrastructure element.

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

Table 8-2: Summary of Peat Stability Risk Register

Proposed Infrastructure	Pre-Control Measure Implementation Risk Rating	Pre-Control Measure Implementation Risk Rating Category	Notable Control Measures Required	Post-Control Measure Implementation Risk Rating	Post-Control Measure Implementation Risk Rating Category
T1	Low	5 to 10	Yes	Negligible	1 to 4
T2	Negligible	1 to 4	No	Negligible	1 to 4
T3	Negligible	1 to 4	No	Negligible	1 to 4
T4	Negligible	1 to 4	No	Negligible	1 to 4
T5	Negligible	1 to 4	No	Negligible	1 to 4
T6	Negligible	1 to 4	No	Negligible	1 to 4
T7	Low	5 to 10	Yes	Negligible	1 to 4
T8	Negligible	1 to 4	No	Negligible	1 to 4
T9	Negligible	1 to 4	No	Negligible	1 to 4
T10	Negligible	1 to 4	No	Negligible	1 to 4
T11	Negligible	1 to 4	No	Negligible	1 to 4
T12	Negligible	1 to 4	No	Negligible	1 to 4
T13	Negligible	1 to 4	No	Negligible	1 to 4
T14	Negligible	1 to 4	No	Negligible	1 to 4
T15	Negligible	1 to 4	No	Negligible	1 to 4
Met Mast	Negligible	1 to 4	No	Negligible	1 to 4
Substation	Low	5 to 10	Yes	Negligible	1 to 4
Telecoms Tower	Low	5 to 10	Yes	Negligible	1 to 4
Steel Mast 1 (under OHL west)	Medium	11 to 16	Yes	Negligible	1 to 4
Steel Mast 2 (under OHL east)	Low	5 to 10	Yes	Negligible	1 to 4
Steel Mast 3 (beside substation west)	Low	5 to 10	Yes	Negligible	1 to 4
Steel Mast 4 (beside substation east)	Low	5 to 10	Yes	Negligible	1 to 4
Crane Pad (under OHL)	Low	5 to 10	Yes	Negligible	1 to 4
Crane Pad (beside substation)	Low	5 to 10	Yes	Negligible	1 to 4
Tower Build Area (under OHL)	Low	5 to 10	Yes	Negligible	1 to 4

Proposed Infrastructure	Pre-Control Measure Implementation Risk Rating	Pre-Control Measure Implementation Risk Rating Category	Notable Control Measures Required	Post-Control Measure Implementation Risk Rating	Post-Control Measure Implementation Risk Rating Category
Tower Build Area (beside substation)	Low	5 to 10	Yes	Negligible	1 to 4
Construction Compound 1	Low	5 to 10	Yes	Negligible	1 to 4
Construction Compound 2	Negligible	1 to 4	No	Negligible	1 to 4
Construction Compound 3	Negligible	1 to 4	No	Negligible	1 to 4
Construction Compound 4	Low	5 to 10	Yes	Negligible	1 to 4
Construction Compound 5	Negligible	1 to 4	No	Negligible	1 to 4
Borrow Pit 1	Low	5 to 10	Yes	Negligible	1 to 4
Borrow Pit 2	Negligible	1 to 4	No	Negligible	1 to 4
Borrow Pit 3	Negligible	1 to 4	No	Negligible	1 to 4
Borrow Pit 4	Negligible	1 to 4	No	Negligible	1 to 4
Internal Road - Main Entrance Road to T1 and T1/T2 Junction	Low	5 to 10	Yes	Negligible	1 to 4
Internal Road - T2 to T3	Negligible	1 to 4	No	Negligible	1 to 4
Internal Road - T3 to R436 Entrance	Negligible	1 to 4	No	Negligible	1 to 4
Internal Road - T2/T3 Junction to T5	Negligible	1 to 4	No	Negligible	1 to 4
Internal Road - T5 to T6 to T6/T7 junction	Negligible	1 to 4	No	Negligible	1 to 4
Internal Road - T5/T6 Junction to T12	Medium	11 to 16	Yes	Low	5 to 10
Internal Road - T12 to T14	Negligible	1 to 4	No	Negligible	1 to 4
Internal Road - Entrance R436 to CC	Negligible	1 to 4	No	Negligible	1 to 4
Internal Road - T12/T14 Junction to T13 and T15	Negligible	1 to 4	No	Negligible	1 to 4

Proposed Infrastructure	Pre-Control Measure Implementation Risk Rating	Pre-Control Measure Implementation Risk Rating Category	Notable Control Measures Required	Post-Control Measure Implementation Risk Rating	Post-Control Measure Implementation Risk Rating Category
Internal Road - T1/T2 Junction to T6/T7 Junction	Negligible	1 to 4	No	Negligible	1 to 4
Internal Road - T6/T7 Junction to T8	Medium	11 to 16	Yes	Low	5 to 10
Internal Road - T8 to T9	Negligible	1 to 4	No	Negligible	1 to 4
Internal Road - T8/T9 Junction to T11	Negligible	1 to 4	No	Negligible	1 to 4
Internal Road - T10 to Local Road Entrance	Negligible	1 to 4	No	Negligible	1 to 4
Internal Road - Local Road Entrance to Substation	Low	5 to 10	Yes	Negligible	1 to 4

9. INDICTATIVE FOUNDATION TYPE AND FOUNDATION DEPTH FOR TURBINES

9.1 Summary

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

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

Turbine No.	Foundation Type	Relevant GI	Indicative founding depth (m bgl)	Comment
T1	Gravity/Piled foundations	TP-T01	4.9	The site investigation works carried out indicate that gravity or piled foundation may be required.
T2	Gravity/Piled foundations	TP-T02	3.0	The site investigation works carried out indicate that gravity or piled foundation may be required.
T3	Gravity/Piled foundations	TP-T03	4.1	The site investigation works carried out indicate that gravity or piled foundation may be required.
T4	Gravity/Piled foundations	TP-T04	3.0	The site investigation works carried out indicate that gravity or piled foundation may be required.
T5	Gravity/Piled foundations	TP-T05	4.3	The site investigation works carried out indicate that gravity or piled foundation may be required.
T6	Gravity/Piled foundations	TP-T06	3.8	The site investigation works carried out indicate that gravity or piled foundation may be required.
T7	Gravity/Piled foundations	TP-T07	3.15	The site investigation works carried out indicate that gravity or piled foundation may be required.
T8	Gravity/Piled foundations	TP-T08	3.0	The site investigation works carried out indicate that gravity or piled foundation may be required.
T9	Gravity/Piled foundations	TP-T09	3.0	The site investigation works carried out indicate that gravity or piled foundation may be required.
T10	Gravity/Piled foundations	TP-T10	3.6	The site investigation works carried out indicate that gravity or piled foundation may be required.
T11	Gravity/Piled foundations	TP-T11	3.0	The site investigation works carried out indicate that gravity or piled foundation may be required.

Turbine No.	Foundation Type	Relevant GI	Indicative founding depth (m bgl)	Comment
T12	Gravity/Piled foundations	TP-T12	3.6	The site investigation works carried out indicate that gravity or piled foundation may be required.
T13	Gravity/Piled foundations	TP-T13	3.0	The site investigation works carried out indicate that gravity or piled foundation may be required.
T14	Gravity/Piled foundations	TP-T14	3.0	The site investigation works carried out indicate that gravity or piled foundation may be required.
T15	Gravity/Piled foundations	TP-T15	4.7	The site investigation works carried out indicate that gravity or piled foundation may be required.

It should be noted that confirmatory ground investigation will be carried out prior to construction at each proposed turbine location in the form of a borehole with in-situ SPT testing at 1.0m intervals in the overburden and follow- on rotary core through bedrock to confirm the foundation types and founding stratums assumed in Table 9-1. It is possible that following the completion of further ground investigation prior to construction that a number of the proposed turbine bases will be deemed suitable for gravity type foundations.

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

For the piled type turbine foundations, a typical piling type and configuration could be up to 16 no. 1200-1600mm diameter rotary bored piles.

10. FOUNDING DETAILS FOR OTHER INFRASTRUCTURE ELEMENTS

This section provides a summary of the founding details for various elements of the proposed infrastructure across the Proposed Project site. The detailed methodologies for the construction of these elements of the Proposed Project are included in Chapter 4 of the EIAR. A summary of this assessment is provided in 9.2.

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

Turbine No.	Foundation Type	Relevant GI	Indicative founding depth (m bgl)	Comment
Substation	Gravity/Piled foundations	BHSS1 to BHSS4	10.0	The site investigation works carried out indicate that either gravity or a piled foundation will be required.
Tower Build Area (under OHL)	Gravity/Piled foundations	Peat Probes	4.0	The site investigation works carried out indicate that gravity or piled foundation may be required.
Tower Build Area (beside substation)	Gravity/Piled foundations	BHSS2	10.0	The site investigation works carried out indicate that gravity or piled foundation may be required.
Met Mast	Gravity/Piled foundations	TP-T02	3.0	The site investigation works carried out indicate that gravity or piled foundation may be required.
Telecoms Tower	Gravity/Piled foundations	BHSS4	8.5	The site investigation works carried out indicate that gravity or piled foundation may be required.
Steel Mast 1 & 2 (under OHL)	Gravity/Piled foundations	Peat Probes	1.0	The site investigation works carried out indicate that gravity or piled foundation may be required.
Steel Mast 3 & 4 (beside substation)	Gravity/Piled foundations	BHSS1	2.0	The site investigation works carried out indicate that gravity or piled foundation may be required.
Crane Pad (under OHL)	Gravity/Piled foundations	Peat Probes	4.0	The site investigation works carried out indicate that gravity or piled foundation may be required.
Crane Pad (beside substation)	Gravity/Piled foundations	BHSS1	11.0	The site investigation works carried out indicate that gravity or piled foundation may be required.

10.1 Internal Roads

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

The total length of new proposed internal road to be constructed on site is 18.2km (see Drawings P20216-0600-0013 to 0015).

The typical make-up of the floated internal roads is a minimum stone thickness of 1000mm with at least one layer of reinforcing geogrid. The necessary stone thickness will be confirmed at detailed design stage.

Refer to the Peat and Spoil Management Plan (Appendix 4-4) for further details on the proposed internal roads on site.

10.2 Substation & Tower Build Areas Foundations

The substation and tower build areas will have a piled foundation due to the depth of peat exceeding 4.0m. A typical piling type and configuration could be up to 900mm diameter CFA piles. The platforms will be founded on competent material underlying the peat deposits.

Given the ground conditions present at the proposed substation and tower build areas, it is envisaged that the foundations will require to be founded on glacial till. The peat and lacustrine soils will not be a suitable founding stratum for the substation foundations.

Typical founding depth for substation and tower build areas platforms is likely to be 9.0-11.0mBGL.

10.3 Temporary Construction Compound Platforms

The construction compound platforms will be constructed using a floated technique.

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

The construction compound platforms will require to be founded on material underlying the peat deposits. Typical founding depth for construction compound platforms will require excavations from 0.8m to 1.4m bgl.

Alternatively, the compounds may be floated, with a stone thickness of 1000mm with at least one layer of reinforcing geogrid. The necessary stone thickness will be confirmed at detailed design stage.

10.4 Telecommunications Tower Platform

The telecommunications tower platforms will be constructed using a piled technique.

The telecommunications tower will have a piled foundation due to the depth of peat in this location exceeding 6.0m. A typical piling type and configuration could be up to 900mm diameter CFA piles. The telecommunications tower platform will be founded on competent material underlying the peat deposits.

Given the ground conditions present at the proposed telecom. tower, it is envisaged that the foundations will require to be founded on glacial till. The peat and lacustrine soils will not be a suitable founding stratum for the telecommunications tower.

Typical founding depth for telecommunications tower platform is likely to be 8.5mBGL.

10.5 Steel Mast Foundations

The steel mast platforms will be constructed using a gravity or piled type foundation.

For a gravity foundation the steel mast foundation will be founded on a competent stratum below the peat. Typical founding depth for the steel mast gravity foundation is envisaged to be 1.5mbgl. At the underside of the steel mast foundation, a layer of structural up-fill (class 6N) will be required.

Alternatively, for a piled steel mast foundation where the depth of peat is >5.0m, a typical piling type and configuration could be up to 5 no. 900mm diameter rotary bored piles.

10.6 Met Mast Foundations

The met mast foundation will comprise gravity or piled type foundation.

For a gravity foundation the met mast foundation will be founded on a competent stratum below the peat. Typical founding depth for the met mast gravity foundation is envisaged to be 3.2mbgl. At the underside of the met mast foundation, a layer of structural up-fill (class 6N) will be required.

Alternatively, for a piled met mast foundation, a typical piling type and configuration could be up to 5 no. 900mm diameter rotary bored piles.

10.7 Crane Hardstands/Pads

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

Crane hardstands/pads are constructed using compacted Class 1/6F material on a suitable sub-formation to achieve the required bearing resistance. The hardstands/pads will be designed for the most critical loading combinations from the crane.

The hardstands/pads will require to be founded on competent material underlying the peat deposits. The founding levels for the hardstands/pads will be variable across the site and will be determined at pre-construction stage.

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

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 Project site.

The findings of the peat assessment showed that the site has an acceptable margin of safety and is suitable for the Proposed 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 site which is typically flat consists predominantly of bare locally re-vegetated cut-away peat and intact shallow peat. The site was subject to historical peat extraction activities by BnM, with the cessation of peat extraction occurring in 2020 and all stockpiled peat being removed the site by the end of 2023.

Karst features were identified in a desk study <0.5km from the site. No karst features were identified during the site walkovers or within the intrusive ground investigation. Confirmatory ground investigation at construction is recommended at each turbine base to confirm the presence or absence of karst at these locations. Should karst be recorded, a piled foundation solution for the affected turbine bases would be required.

Peat thicknesses recorded during the site walkovers ranged from 0.1 to 6.2m with an average peat depth of 2.0m. Approximately 21% of the probes recorded peat depths of less than 1.0m, with 36% of peat depth probes recorded peat depths of 1.0m to 2.0m, and 23% of peat depth probes recorded peat depths of 2.0m to 3.0m. The remaining 20% of probes recorded peat depths of between 3.0 to 6.2m. The boreholes carried out identified localised area of peat up to 7.1m, in the north of the site at the proposed onsite 220kV substation.

Slope inclinations at the main infrastructure locations range from 2 to 4 degrees.

An analysis of peat sliding was carried out at the main infrastructure locations across the Proposed Project 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 would be 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 infrastructure locations have an acceptable FoS of greater than 1.3.

The peat stability risk assessment at each infrastructure location identified a number of mitigation/control measures to reduce the potential risk of peat failure. Sections of internal roads to the nearest infrastructure element should be subject to the same mitigation/control measures that apply to the nearest infrastructure element. See Appendix B for details of the required mitigation/control measures for each infrastructure element.

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

11.2 Recommendations

The following recommendations are given.

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

Recommendations and guidelines given in FT's report 'Peat & Spoil Management Plan - Lemanaghan Wind Farm (FT 2023), included as Appendix 4-4 of the EIAR, should be implemented during the design and construction stage of the wind farm development.

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

12. REFERENCES

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DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

DRAWINGS

Legend:

- EIAR Site Boundary
- Proposed Turbine & Hardstanding
- Proposed Internal Track
- Proposed Upgrade to Existing Internal Track
- Proposed New Amenity Track
- Existing Amenity Track
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Pump Station
- Proposed Borrow Pit
- Proposed Peat Deposition Area
- Proposed Peat / Spoil Side Casting Berms

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

Amenity Car Park

T10

T11

Contd. Line 1

Contd. Line 1

0m 50m 100m 150m 200m 250m 300m 350m 400m 450m 500m

Scale 1:5000

PLAN

Scale 1:5000

KEYPLAN

Scale 1:60000

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Rev.	Description	App By	Date
A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	22.07.25

PROJECT	LEMANAGHAN WIND FARM, CO. OFFALY
CLIENT	MKO
SHEET	PEAT DEPTH CONTOUR PLAN SHEET 1 OF 3
Date	22.07.25
Project number	P20-216
Scale (@ A1)	1:5000
Drawn by	POR
Checked by	AC
Drawing Number	P20-216-0600-0001 (Sheet set subset 0600)
Rev	B

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22 July 2025

Contd. Line 1

Contd. Line 1

Contd. Line 2

Contd. Line 2

T08

T09

T11

T06

T05

T12

T13

T14

T15

BP3

BP4

0m 50m 100m 150m 200m 250m 300m 350m 400m 450m 500m

Scale 1:5000

Legend:

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- ≥ 1 < 1.5
- ≥ 1.5 < 2
- ≥ 2 < 2.5
- ≥ 2.5 < 3
- ≥ 3 < 3.5
- ≥ 3.5 < 4
- ≥ 4 < 4.5
- ≥ 4.5 < 5

PLAN

Scale 1:5000

KEYPLAN

Scale 1:60000

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Rev.	Description	App By	Date
A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	22.07.25

PROJECT	LEMANAGHAN WIND FARM, CO. OFFALY
CLIENT	MKO
SHEET	PEAT DEPTH CONTOUR PLAN SHEET 2 OF 3
Date	22.07.25
Project number	P20-216
Scale (@ A1)	1:5000
Drawn by	POR
Checked by	AC
Drawing Number	P20-216-0600-0002 (Sheet set subset 0600)
Rev	B

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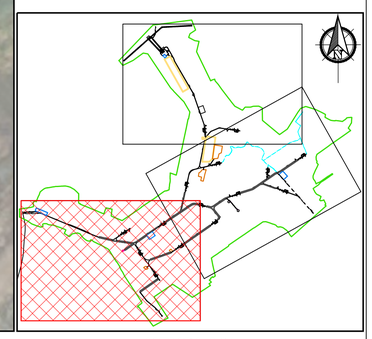
22 July 2025

Legend:

- EIAR Site Boundary
- Proposed Turbine & Hardstanding
- Proposed Internal Track
- Proposed Upgrade to Existing Internal Track
- Proposed New Amenity Track
- Existing Amenity Track
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Pump Station
- Proposed Borrow Pit
- Proposed Peat Deposition Area
- Proposed Peat / Spoil Side Casting Berms

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



KEYPLAN

Scale 1:60000

PLAN

Scale 1:5000

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Rev.	Description	App By	Date
A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	22.07.25

PROJECT	LEMANAGHAN WIND FARM, CO. OFFALY
CLIENT	MKO
SHEET	PEAT DEPTH CONTOUR PLAN SHEET 3 OF 3
Date	22.07.25
Project number	P20-216
Scale (@ A1)	1:5000
Drawn by	POR
Drawing Number	P20-216-0600-0003
Rev	B
Checked by	AC

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22 July 2025

EPA 20m Mapped Watercourse Buffer

Amenity Car Park

T10

T11

Contd. Line 1

Contd. Line 1

0m 50m 100m 150m 200m 250m 300m 350m 400m 450m 500m

Scale 1:5000

Legend:

- EIAR Site Boundary
- Proposed Turbine & Hardstanding
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- Proposed Borrow Pit
- Proposed Peat Deposition Area
- Proposed Peat / Spoil Side Casting Berms

Construction Buffer Zone Legend:

- Marginal buffer zones which may need supervision should construction works take place in these areas.
- Watercourses / Lakes with 50m buffer

PLAN

Scale 1:5000

KEYPLAN

Scale 1:60000

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Rev.	Description	App By	Date
A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	22.07.25

PROJECT: LEMANAGHAN WIND FARM, CO. OFFALY

CLIENT: MKO

SHEET: CONSTRUCTION BUFFER ZONE PLAN SHEET 1 OF 3

Date: 22.07.25

Drawn by: POR

Checked by: AC

Project number: P20-216

Scale (@ A1): 1:5000

Drawing Number: P20-216-0600-0004

(Sheet set subset 0600)

Rev: B

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22 July 2025

Contd. Line 1

Contd. Line 1

Contd. Line 2

Contd. Line 2

T08

BP4

T09

BP3

T06

T12

T13

T15

T11

T05

T14

0m 50m 100m 150m 200m 250m 300m 350m 400m 450m 500m

Scale 1:5000

Legend:

- EIAR Site Boundary
- Proposed Turbine & Hardstanding
- Proposed Internal Track
- Proposed Upgrade to Existing Internal Track
- Proposed New Amenity Track
- Existing Amenity Track
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Pump Station
- Proposed Borrow Pit
- Proposed Peat Deposition Area
- Proposed Peat / Spoil Side Casting Berms

Construction Buffer Zone Legend:

- Marginal buffer zones which may need supervision should construction works take place in these areas.
- Watercourses / Lakes with 50m buffer

PLAN

Scale 1:5000

KEYPLAN

Scale 1:60000

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A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	22.07.25

PROJECT	LEMANAGHAN WIND FARM, CO. OFFALY
CLIENT	MKO
SHEET	CONSTRUCTION BUFFER ZONE PLAN SHEET 2 OF 3
Date	22.07.25
Project number	P20-216
Scale (@ A1)	1:5000
Drawn by	POR
Drawing Number	P20-216-0600-0005
Rev	B
Checked by	AC

(Sheet set subset 0600)

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22 July 2025

Contd. Line 2

Contd. Line 2

T01

T02

T03

T04

T07

BP1

BP2

Met Mast

0m 50m 100m 150m 200m 250m 300m 350m 400m 450m 500m

Scale 1:5000

Legend:

- EIAR Site Boundary
- Proposed Turbine & Hardstanding
- Proposed Internal Track
- Proposed Upgrade to Existing Internal Track
- Proposed New Amenity Track
- Existing Amenity Track
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Pump Station
- Proposed Borrow Pit
- Proposed Peat Deposition Area
- Proposed Peat / Spoil Side Casting Berms

Construction Buffer Zone Legend:

- Marginal buffer zones which may need supervision should construction works take place in these areas.
- Watercourses / Lakes with 50m buffer

PLAN

Scale 1:5000

KEYPLAN

Scale 1:60000

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A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	22.07.25

PROJECT: LEMANAGHAN WIND FARM, CO. OFFALY

CLIENT: MKO

SHEET: CONSTRUCTION BUFFER ZONE PLAN SHEET 3 OF 3

Date: 22.07.25

Drawn by: POR

Checked by: AC

Project number: P20-216

Scale (@ A1): 1:5000

Drawing Number: P20-216-0600-0006

(Sheet set subset 0600)

Rev: B

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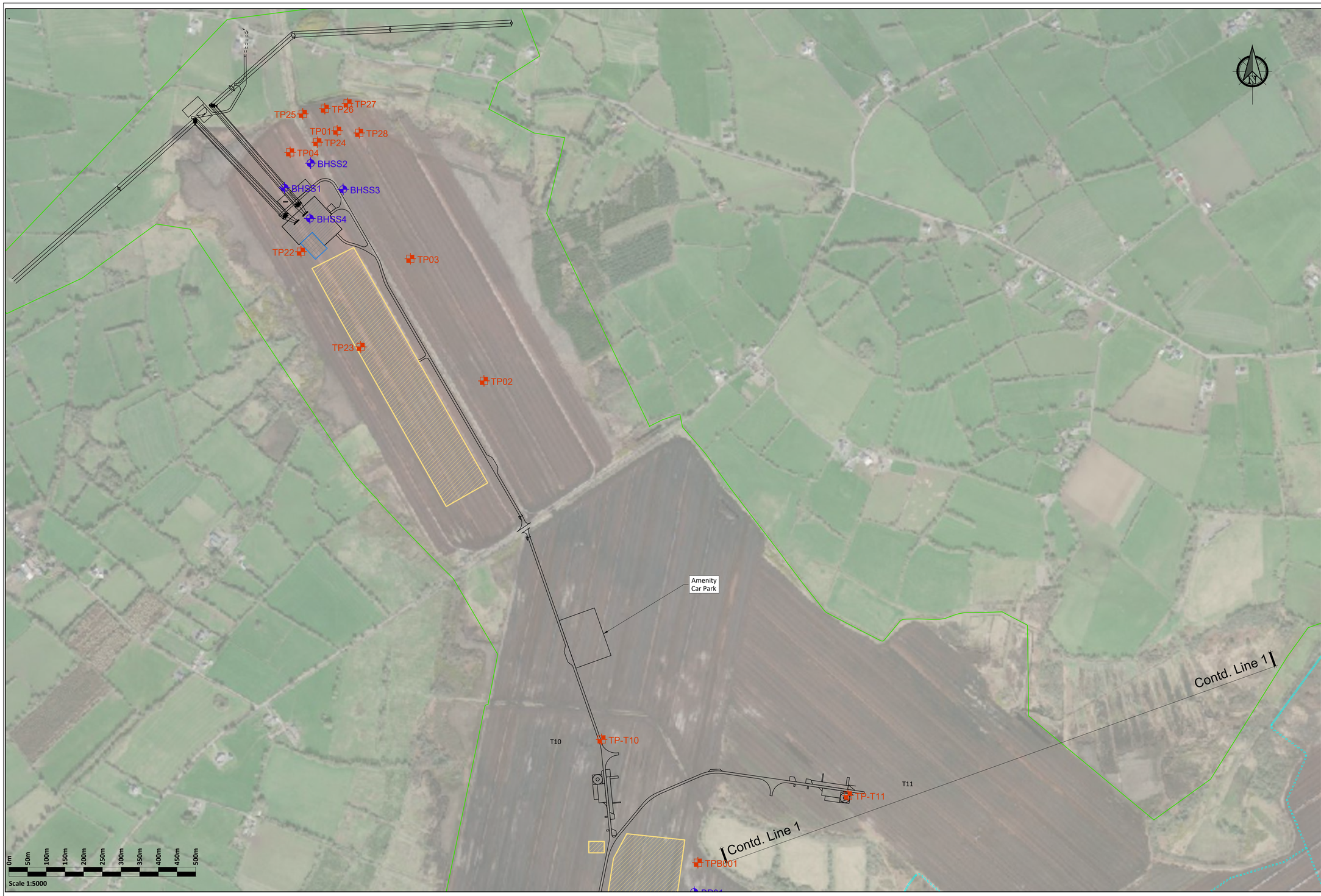
22 July 2025

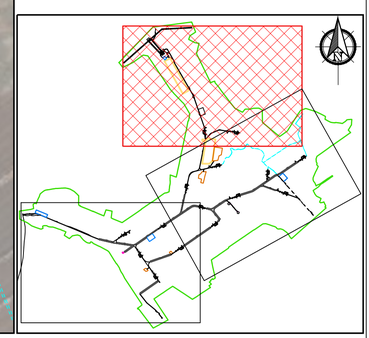


Legend:

- EIAR Site Boundary
- Proposed Turbine & Hardstanding
- Proposed Internal Track
- Proposed Upgrade to Existing Internal Track
- Proposed New Amenity Track
- Existing Amenity Track
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Pump Station
- Proposed Borrow Pit
- Proposed Peat Deposition Area
- Proposed Peat / Spoil Side Casting Berms

Ground Investigation Legend:

- TP... Trial Pit Location
- B... Borehole Location



PLAN
Scale 1:5000

KEYPLAN
Scale 1:60000

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A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	22.07.25

PROJECT	LEMANAGHAN WIND FARM, CO. OFFALY
CLIENT	MKO
SHEET	GROUND INVESTIGATION LOCATION PLAN SHEET 1 OF 3
Date	22.07.25
Project number	P20-216
Scale (@ A1)	1:5000
Drawn by	POR
Checked by	AC
Drawing Number	P20-216-0600-0007 (Sheet set subset 0600)
Rev	B

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22 July 2025

Legend:

- EIAR Site Boundary
- Proposed Turbine & Hardstanding
- Proposed Internal Track
- Proposed Upgrade to Existing Internal Track
- Proposed New Amenity Track
- Existing Amenity Track
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Pump Station
- Proposed Borrow Pit
- Proposed Peat Deposition Area
- Proposed Peat / Spoil Side Casting Berms

Ground Investigation Legend:

- TP... Trial Pit Location
- B... Borehole Location

0m 50m 100m 150m 200m 250m 300m 350m 400m 450m 500m

Scale 1:5000

PLAN

Scale 1:5000

KEYPLAN

Scale 1:60000

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A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	22.07.25

PROJECT: LEMANAGHAN WIND FARM, CO. OFFALY

CLIENT: MKO

SHEET: GROUND INVESTIGATION LOCATION PLAN SHEET 2 OF 3

Date 22.07.25	Project number P20-216	Scale (@ A1) 1:5000	
Drawn by POR	Drawing Number P20-216-0600-0008		Rev B
Checked by AC	(Sheet set subset 0600)		

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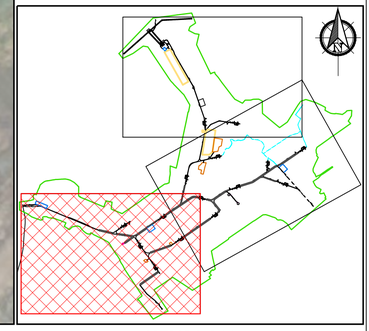
22 July 2025

Legend:

- EIAR Site Boundary
- Proposed Turbine & Hardstanding
- Proposed Internal Track
- Proposed Upgrade to Existing Internal Track
- Proposed New Amenity Track
- Existing Amenity Track
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Pump Station
- Proposed Borrow Pit
- Proposed Peat Deposition Area
- Proposed Peat / Spoil Side Casting Berms

Ground Investigation Legend:

- TP... Trial Pit Location
- B... Borehole Location



PLAN
Scale 1:5000

KEYPLAN
Scale 1:60000

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Rev.	Description	App By	Date
A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	22.07.25

PROJECT: LEMANAGHAN WIND FARM, CO. OFFALY

CLIENT: MKO

SHEET: GROUND INVESTIGATION LOCATION PLAN SHEET 3 OF 3

Date: 22.07.25
Drawn by: POR
Checked by: AC

Project number: P20-216
Scale (@ A1): 1:5000
Drawing Number: P20-216-0600-0009 (Sheet set subset 0600)
Rev: B

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22 July 2025

Legend:

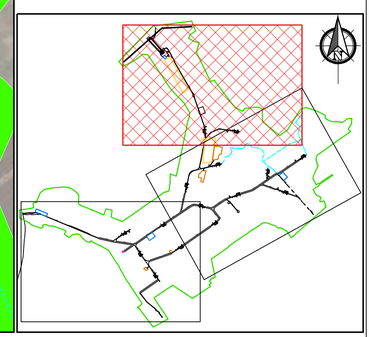
- EIAR Site Boundary
- Proposed Turbine & Hardstanding
- Proposed Internal Track
- Proposed Upgrade to Existing Internal Track
- Proposed New Amenity Track
- Existing Amenity Track
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Pump Station
- Proposed Borrow Pit
- Proposed Peat Deposition Area
- Proposed Peat / Spoil Side Casting Berms

Factor of Safety Legend:

- 0 < 1.0
- ≥ 1.0 < 1.3
- ≥ 1.3

Increasing Stability

No Peat Recorded
At This Location



PLAN
Scale 1:5000

KEYPLAN
Scale 1:60000

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A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	22.07.25

PROJECT: LEMANAGHAN WIND FARM, CO. OFFALY

CLIENT: MKO

SHEET: FACTOR OF SAFETY PLAN – SHORT TERM CRITICAL CONDITION 2 (UNDRAINED) SHEET 1 OF 3

Date: 22.07.25
Drawn by: POR
Checked by: AC
Project number: P20-216
Scale (@ A1): 1:5000
Drawing Number: P20-216-0600-0010 (Sheet set subset 0600)
Rev: B

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22 July 2025

Contd. Line 1

Contd. Line 1

Contd. Line 2

Contd. Line 2

T08

T09

T11

T06

T05

T12

T13

T14

T15

BP3

BP4

4

0m 50m 100m 150m 200m 250m 300m 350m 400m 450m 500m

Scale 1:5000

Legend:

- EIAR Site Boundary
- Proposed Turbine & Hardstanding
- Proposed Internal Track
- Proposed Upgrade to Existing Internal Track
- Proposed New Amenity Track
- Existing Amenity Track
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Pump Station
- Proposed Borrow Pit
- Proposed Peat Deposition Area
- Proposed Peat / Spoil Side Casting Berms

Factor of Safety Legend:

- 0 < 1.0
- ≥ 1.0 < 1.3
- ≥ 1.3

Increasing Stability

No Peat Recorded
At This Location

PLAN

Scale 1:5000

KEYPLAN

Scale 1:60000

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Rev.	Description	App By	Date
A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	22.07.25

PROJECT: LEMANAGHAN WIND FARM, CO. OFFALY

CLIENT: MKO

SHEET: FACTOR OF SAFETY PLAN – SHORT TERM CRITICAL CONDITION 2 (UNDRAINED) SHEET 2 OF 3

Date: 22.07.25

Drawn by: POR

Checked by: AC

Project number: P20-216

Scale (@ A1): 1:5000

Drawing Number: P20-216-0600-0011 *(Sheet set subset 0600)*

Rev: B

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22 July 2025

Contd. Line 2

Contd. Line 2

T01

T02

T03

T04

T07

BP1

BP2

Met Mast

0m 50m 100m 150m 200m 250m 300m 350m 400m 450m 500m

Scale 1:5000

Legend:

- EIAR Site Boundary
- Proposed Turbine & Hardstanding
- Proposed Internal Track
- Proposed Upgrade to Existing Internal Track
- Proposed New Amenity Track
- Existing Amenity Track
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Pump Station
- Proposed Borrow Pit
- Proposed Peat Deposition Area
- Proposed Peat / Spoil Side Casting Berms

Factor of Safety Legend:

- 0 < 1.0
- ≥ 1.0 < 1.3
- ≥ 1.3

Increasing Stability

No Peat Recorded
At This Location

PLAN
Scale 1:5000

KEYPLAN
Scale 1:60000

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Rev.	Description	App By	Date
A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	22.07.25

PROJECT: LEMANAGHAN WIND FARM, CO. OFFALY

CLIENT: MKO

SHEET: FACTOR OF SAFETY PLAN – SHORT TERM CRITICAL CONDITION 2 (UNDRAINED) SHEET 3 OF 3

Date: 22.07.25
Drawn by: POR
Checked by: AC
Project number: P20-216
Scale (@ A1): 1:5000
Drawing Number: P20-216-0600-0012 (Sheet set subset 0600)
Rev: B

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22 July 2025

Legend:

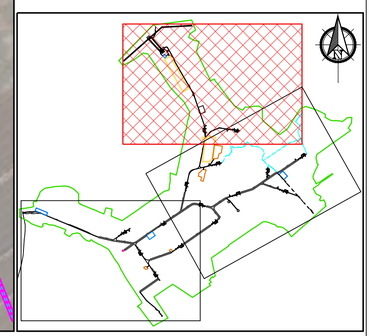
- EIAR Site Boundary
- Proposed Turbine & Hardstanding
- Proposed Internal Track
- Proposed Upgrade to Existing Internal Track
- Proposed New Amenity Track
- Existing Amenity Track
- Proposed Construction Compound
- Proposed Substation
- Proposed Met Mast
- Proposed Pump Station
- Proposed Borrow Pit
- Proposed Peat Deposition Area
- Proposed Peat / Spoil Side Casting Berms

Road Type Legend:

Type A -
New Excavate &
Replace Internal Track

Type B -
New Floated Internal Track

Type C -
Upgrade of Existing
Excavated Internal Track



PLAN
Scale 1:5000

KEYPLAN
Scale 1:60000

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Rev.	Description	App By	Date
A	FOR INFORMATION	BDH	30.05.25
B	FOR INFORMATION	BDH	27.06.25
C	FOR INFORMATION	BDH	22.07.25

PROJECT	LEMANAGHAN WIND FARM, CO. OFFALY
CLIENT	MKO
SHEET	ROAD CONSTRUCTION TYPES PLAN SHEET 1 OF 3
Date	22.07.25
Project number	P20-216
Scale (@ A1)	1:5000
Drawn by	POR
Checked by	AC
Drawing Number	P20-216-0600-0013 (Sheet set subset 0600)
Rev	C

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DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

APPENDIX A

Photos from Site Walkover

Figure A- 1 Open worked peat

Figure A- 2 Open peatland with ponded water in drains

Figure A- 3 Possible Rock outcrop at location of proposed borrow pit

Figure A- 4 Soil Profile of Peat overlying Glacial Till.

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DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

APPENDIX B

Peat Stability Risk Register

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

Location:	Turbine T1

Grid Reference (Eastings, Northings):	614198	727373
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	3.10 - 3.60	
Control Required:	Yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.50 (u), 2.13 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively Deep Peat	5	1	5	Low	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T1**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following may be required: - excavation side walls to be supported (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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	Turbine T2

Grid Reference (Eastings, Northings):	614481	726939
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.90 - 1.70	
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), 8.80 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
	2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
	3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
	4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
	6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
	7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T2**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties
vi	Inspection and approval of turbine base subformation by a competent person where a gravity type foundation base is constructed

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.

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

Location:	Turbine T3

Grid Reference (Eastings, Northings):	614779	726516
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.50 - 2.20	
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 = 2.69 (u), 8.46 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
	2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
	3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
	4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
	6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
	7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	11	Other	3	1	3	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **T3**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties
vi	Inspection and approval of turbine base subformation by a competent person where a gravity type foundation base is constructed

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.

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

Location:	Turbine T4

Grid Reference (Eastings, Northings):	615978	727580
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.10 - 0.40	
Control Required:	No	

			Pre-Control Measure Implementation						Post-Control Measure Implementation			
	Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
	1	FOS = 6.16 (u), 10.77 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
	2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
	3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
	4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
	6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
	7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T4**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties
vi	Inspection and approval of turbine base subformation by a competent person where a gravity type foundation base is constructed

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.

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

Location:	Turbine T5

Grid Reference (Eastings, Northings):	615647	727935
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.70 - 1.30	
Control Required:	No	

			Pre-Control Measure Implementation						Post-Control Measure Implementation			
	Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
	1	FOS = 4.99 (u), 12.23 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
	2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
	3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
	4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
	6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
	7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T5**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties
vi	Inspection and approval of turbine base subformation by a competent person where a gravity type foundation base is constructed

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.

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

Location:	Turbine T6

Grid Reference (Eastings, Northings):	615647	727935
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.50 - 2.40	
Control Required:	No	

			Pre-Control Measure Implementation						Post-Control Measure Implementation			
	Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
	1	FOS = 5.06 (u), 16.73 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
	2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
	3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
	4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
	6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
	7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T6**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties
vi	Inspection and approval of turbine base subformation by a competent person where a gravity type foundation base is constructed

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.

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

Location:	Turbine T7

Grid Reference (Eastings, Northings):	614968	727549
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.80 - 2.70	
Control Required:	Yes	

			Pre-Control Measure Implementation						Post-Control Measure Implementation			
	Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
	1	FOS = 3.10 (u),10.97 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
	2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
	3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
	4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
	6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
	7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	9	Evidence of quaking or buoyant peat	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	5	1	5	Low	No		3	1	3	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **T7**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following may be required: - excavation side walls to be supported (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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	Turbine T8

Grid Reference (Eastings, Northings):	615375	728345
Distance to Watercourse (m)	100 - 150	
Min & Max Measured Peat Depth (m):	0.90 - 1.80	
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 = 3.08 (u), 8.72 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
	2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
	3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
	4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
	6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
	7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T8**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties
vi	Inspection and approval of turbine base subformation by a competent person where a gravity type foundation base is constructed

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.

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

Location:	Turbine T9

Grid Reference (Eastings, Northings):	616021	728746
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.00 - 1.70	
Control Required:	No	

			Pre-Control Measure Implementation						Post-Control Measure Implementation			
	Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
	1	FOS = 4.25 (u), 11.73 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
	2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
	3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
	4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
	6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
	7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T9**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties
vi	Inspection and approval of turbine base subformation by a competent person where a gravity type foundation base is constructed

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.

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

Location:	Turbine T10

Grid Reference (Eastings, Northings):	615717	729399
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.90 - 2.00	
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 = 2.87 (u), 8.56 (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	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
	6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
	7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
	11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T10**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties
vi	Inspection and approval of turbine base subformation by a competent person where a gravity type foundation base is constructed

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.

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

Location:	Turbine T11

Grid Reference (Eastings, Northings):	616379	729349
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.90 - 1.70	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 4.25 (u), 11.73 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T11**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties
vi	Inspection and approval of turbine base subformation by a competent person where a gravity type foundation base is constructed

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.

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

Location:	Turbine T12

Grid Reference (Eastings, Northings):	616415	728161
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.30 - 1.50	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 6.88 (u), 17.94 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T12**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties
vi	Inspection and approval of turbine base subformation by a competent person where a gravity type foundation base is constructed

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.

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

Location:	Turbine T13

Grid Reference (Eastings, Northings):	616995	728608
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.70 - 2.00	
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 = 2.87 (u), 8.58 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	3	1	3	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **T13**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties
vi	Inspection and approval of turbine base subformation by a competent person where a gravity type foundation base is constructed

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.

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

Location:	Turbine T14

Grid Reference (Eastings, Northings):	617357	728184
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.30 - 1.30	
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 = 3.75 (u), 9.17 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T14**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainage measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties
vi	Inspection and approval of turbine base subformation by a competent person where a gravity type foundation base is constructed

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.

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

Location:	Turbine T15

Grid Reference (Eastings, Northings):	**617684**	**728906**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**3.60 - 4.10**	
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 = 2.25 (u), 10.40 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively Deep Peat	5	1	5	Low	No		3	1	3	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **T15**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following may be required: - excavation side walls to be supported (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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	**Met Mast**

Grid Reference (Eastings, Northings):	**614131**	**727021**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**1.00 - 1.80**	
Control Required:	**No**	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 4.10 (u), 11.63 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Met. Mast**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.

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.

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

Location:	Substation

Grid Reference (Eastings, Northings):	614936	730963
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	5.0 - 7.1	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 6.75 (u), 13.40 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	5	1	5	Low	No		3	1	3	Negligible

	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 may 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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	Telecom Tower

Grid Reference (Eastings, Northings):	615004	730929
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	5.2 - 6.0	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.46(u), 14.99 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively Deep Peat	5	1	5	Low	No		3	1	3	Negligible

	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 may 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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	Const. Comp. (1)

Grid Reference (Eastings, Northings):	612542	727781
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	2.50 - 4.5	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.21 (u), 8.31 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively Deep Peat	5	1	5	Low	No		3	1	3	Negligible

	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 may 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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	Const. Comp. (2)

Grid Reference (Eastings, Northings):	617278	728493
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.60 - 2.20	
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 = 3.59 (u), 11.29 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	1	1	1	Negligible	No		2	1	2	Negligible

	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 determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.

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.

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

Location:	**Const. Comp. (3)**

Grid Reference (Eastings, Northings):	**614686**	**727316**
Distance to Watercourse (m)	**> 150**	
Min & Max Measured Peat Depth (m):	**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 = 2.21 (u), 8.41 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	2	1	2	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound (3)**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following may be required: - excavation side walls to be supported (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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	Const. Comp. (4)

Grid Reference (Eastings, Northings):	615684	729778
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	5.0 to 5.5	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.65 (u), 15.12 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	5	1	5	Low	No		3	1	3	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound (4)**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following may be required: - excavation side walls to be supported (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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	Const. Comp. (5)

Grid Reference (Eastings, Northings):	614958	730827
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.9 - 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 = 2.97 (u), 8.65 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound (5)**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.

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.

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

Location:	Borrow Pit 1

Grid Reference (Eastings, Northings):	614493	726610
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.6 to 4.2	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 4.00 (u), 11.73 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	5	1	5	Low	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for Borrow Pit 3
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following may be required: - excavation side walls to be supported (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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	Borrow Pit 2

Grid Reference (Eastings, Northings):	616791	728233
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.2	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 4.00 (u), 11.73 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for Borrow Pit 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 determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.

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.

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

Location:	Borrow Pit 3

Grid Reference (Eastings, Northings):	615647	728507
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.6	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 7.18 (u), 13.68 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **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 determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.

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.

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

Location:	Borrow Pit 4

Grid Reference (Eastings, Northings):	615965	728933
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.7 to 1.2	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 3.92 (u), 9.28 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	1	1	1	Negligible	No		1	1	1	Negligible

	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 determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.

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.

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

Location:	Steel Mast 1 (under OHL)

Grid Reference (Eastings, Northings):	614640	731161
Distance to Watercourse (m)	< 50	
Min & Max Measured Peat Depth (m):	1.0	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 8.60(u), 19.09(d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	3	4	12	Medium	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		1	4	4	Negligible
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	1	4	4	Negligible	No		1	4	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		1	4	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively deep peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Met. Mast**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.

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.

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

Location:	Steel Mast 2 (under OHL)

Grid Reference (Eastings, Northings):	614687	731203
Distance to Watercourse (m)	< 50	
Min & Max Measured Peat Depth (m):	0.2	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 14.34(u), 22.91 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	2	4	8	Low	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		1	4	4	Negligible
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	1	4	4	Negligible	No		1	4	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		1	4	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively Deep Peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound (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 determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.

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.

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

Location:	Steel Mast 3 (Beside Substation)

Grid Reference (Eastings, Northings):	614881	730908
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	5.3	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.73(u), 15.17 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	5	1	5	Low	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound (2)**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following may be required: - excavation side walls to be supported (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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	Steel Mast 4 (Beside Substation)

Grid Reference (Eastings, Northings):	614915	730938
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	5.2	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.77 (u), 15.20 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	5	1	5	Low	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound (3)**
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following may be required: - excavation side walls to be supported (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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	Crane Pad (North)

Grid Reference (Eastings, Northings):	614662	731177
Distance to Watercourse (m)	< 50	
Min & Max Measured Peat Depth (m):	0.4 - 0.7	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.65 (u), 15.12 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	2	4	8	Low	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		1	4	4	Negligible
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	2	4	8	Low	No		1	4	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		1	4	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively deep peat	0	4	0	Not Applicable	No		0	4	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 determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.

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.

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

Location:	Crane Pad (substation)

Grid Reference (Eastings, Northings):	614881	730945
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	2.4 - 6.0	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.97 (u), 8.65 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	5	1	5	Low	No		3	1	3	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Construction Compound (5)**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.

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.

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

Location:	Tower Building (North)

Grid Reference (Eastings, Northings):	614634	731199
Distance to Watercourse (m)	< 50	
Min & Max Measured Peat Depth (m):	0.5 - 3.0	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 6.75 (u), 13.40 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	2	4	8	Low	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		1	4	4	Negligible
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	2	4	8	Low	No		1	4	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		1	4	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively deep peat	2	4	8	Low	No		1	4	4	Negligible

	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 may 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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	Tower Building (Substation)

Grid Reference (Eastings, Northings):	614921	730978
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	2.0 - 5.0	
Control Required:	yes	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 4.00 (u), 11.73 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	5	1	5	Low	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for Borrow Pit 3
i	Due to relatively deep peat at this turbine location, additional construction measures such as the following may be required: - excavation side walls to be supported (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.
vi	Inspection & approval of turbine base sub-formation by a competent person where a gravity type foundation base is constructed.
vii	Movement monitoring posts to be installed upslope of the turbine/harsdtand excavation and monitored on a regular basis
viii	No sidecasting of excavated peat or spoil on in-situ peat
ix	No machinery to track directly on the peat surface

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.

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

Location:	Main Entrance Road to T1 and T1/T2 Junction

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**1.5 to 5.4**
Control Required:	**yes**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 1.76 (u), 2.05 (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	3	1	3	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	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	5	1	5	Low	No		3	1	3	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Main Entrance Road to T1 and T1/T2 Junction**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainge measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

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

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

Location:	T2 to T3

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**0.3 to 2.2**
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 = 3.0 (u), 3.19 (d)	1	1	1	Negligible	No		1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		1	1	1	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No	See Below	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 **T2 to T3**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

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

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

Location:	T3 to R436 Entrance

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**0.2 to 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 = 1.87 (u), 1.71 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		1	1	1	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 **T3 to R436 Entrance**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

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

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

Location:	T2/T3 Junction to T5

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**0.2 to 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 = 2.38 (u), 2.42 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		1	1	1	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 **T2/T3 Junction to T5**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

Note

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

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

Location:	T5 to T6 to T6/T7 junction

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**1.8 to 3.4**
Control Required:	**yes**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 3.02 (u), 10.91 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		1	1	1	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	Relatively Deep Peat	4	1	4	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **T5 to T6 to T6/T7 junction**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

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

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

Location:	T5/T6 Junction to T12

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**0.3 to 2.7**
Control Required:	**yes**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 3.1 (u), 10.97(d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		1	4	4	Negligible
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	2	4	8	Low	No		1	4	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		1	4	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively Deep Peat	3	4	12	Medium	No		2	4	8	Low

	Control Measures to be Implemented Prior to/and During Construction for **T5/T6 Junction to T12**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

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

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

Location:	T12 to T14

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**1.1 to 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 = 2.87 (u), 9.17 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		1	1	1	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 **T12 to T14**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

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

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

Location:	Entrance R436 to CC

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**0.6 to 3.5**
Control Required:	**yes**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.9 (u), 8.65 (d)	1	1	1	Negligible	No		1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		1	1	1	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No	See Below	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	Relatively Deep Peat	3	1	3	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **R436 to CC**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

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

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

Location:	T12/T14 Junction to T13 and T15

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**1.7 to 3.8**
Control Required:	**yes**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.39 (u), 8.58 (d)	1	1	1	Negligible	No		1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		1	1	1	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No	See Below	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	Relatively Deep Peat	3	1	3	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **T12/T14 Junction to T13 and T15**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

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

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

Location:	T1/T2 Junction to T6/T7 Junction

Grid Reference (Eastings, Northings):	Varies
Distance to Watercourse (m)	> 150
Min & Max Measured Peat Depth (m):	1.2 to 3.7
Control Required:	yes

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 3.38 (u), 11.15 (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	3	1	3	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	1	2	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	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		1	1	1	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **T1/T2 Junction to T6/T7 Junction**
i	Maintain hydrology of area as far as possible;
ii	Installation of appropriate drainge measures to alleviate ingress of surface water into excavations
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

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

Location:	T6/T7 Junction to T8

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**< 50**
Min & Max Measured Peat Depth (m):	**0.9 to 3.7**
Control Required:	**yes**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 2.4(u), 8.27 (d)	1	4	4	Negligible	No	See Below	1	4	4	Negligible
2	Evidence of sub peat water flow	1	4	4	Negligible	No		1	4	4	Negligible
3	Evidence of surface water flow	2	4	8	Low	No		1	4	4	Negligible
4	Evidence of previous failures/slips	0	4	0	Not Applicable	No		0	4	0	Not Applicable
5	Type of vegetation	2	4	8	Low	No		1	4	4	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	2	4	8	Low	No		1	4	4	Negligible
7	Evidence of very soft/soft clay at base of peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
8	Evidence of mechanically cut peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	4	0	Not Applicable	No		0	4	0	Not Applicable
10	Evidence of bog pools	0	4	0	Not Applicable	No		0	4	0	Not Applicable
11	Relatively Deep Peat	3	4	12	Medium	No		2	4	8	Low

	Control Measures to be Implemented Prior to/and During Construction for **T6/T7 Junction to T8**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

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

Location:	T8 to T9

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**0.6 to 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 = 3.02 (u), 9.41 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		1	1	1	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	Relatively Deep Peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T8 to 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 determine peat, mineral soil and bedrock condition and properties.

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

Location:	**T8/T9 Junction to T11**

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**0.7 to 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 = 3.08 (u), 8.72 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		1	1	1	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 **T8/T9 Junction 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 determine peat, mineral soil and bedrock condition and properties.

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

Location:	T10 to Local Road Entrance

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**1.1 to 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 = 2.21 (u), 6.87 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		1	1	1	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	Relatively Deep Peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **T10 to Local Road Entrance**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.

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

Location:	**Local Road Entrance to Substation**

Grid Reference (Eastings, Northings):	**Varies**
Distance to Watercourse (m)	**> 150**
Min & Max Measured Peat Depth (m):	**3.7 to 5.5**
Control Required:	**yes**

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 1.82 (u), 10.11 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	2	1	2	Negligible	No		1	1	1	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		1	1	1	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	Deep Peat	5	1	5	Low	No		3	1	3	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Local Road Entrance to Substation**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v.	Ground settlement monitoring points to be installed at 50m intervals at either side of the road

FEHILY TIMONEY

DESIGNING AND DELIVERING
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APPENDIX C

Calculated FOS for Peat Slopes on Site

Infinite Slope Analysis

Assumptions as follows:

(1) Undrained analysis assumed to give worst case, using infinite slope:

Infinite slope analysis (undrained)

$FoS = Cu/[\gamma.z.\sin \beta \cos \beta]$

where,
β = slope angle
Cu = undrained strength
z = depth of sliding layer
γ = bulk unit weight

Calculated FoS of Natural Peat Slopes for Lemanaghan 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
T1 - C	3	4	10.0	10.0	3.60	25	1.0	4.6	**2.13**	**3.60**
T1 - N	3	4	10.0	10.0	3.60	25	1.0	4.6	**11.02**	**10.56**
T1 - S	3	4	10.0	10.0	3.60	25	1.0	4.6	**11.02**	**10.56**
T1 - E	3	4	10.0	10.0	3.10	25	1.0	4.1	**11.37**	**10.76**
T1 - W	3	4	10.0	10.0	3.40	25	1.0	4.4	**11.15**	**10.64**
T2 - C	4	4	10.0	10.0	1.00	25	1.0	2.0	**12.42**	**9.54**
T2 - N	4	4	10.0	10.0	1.70	25	1.0	2.7	**10.05**	**8.80**
T2 - S	4	4	10.0	10.0	0.90	25	1.0	1.9	**13.06**	**9.69**
T2 - E	4	4	10.0	10.0	0.90	25	1.0	1.9	**13.06**	**9.69**
T2 - W	4	4	10.0	10.0	1.40	25	1.0	2.4	**10.77**	**9.06**
T3 - C	4	4	10.0	10.0	2.20	25	1.0	3.2	**9.28**	**8.46**
T3 - N	4	4	10.0	10.0	1.80	25	1.0	2.8	**9.86**	**8.72**
T3 - S	4	4	10.0	10.0	1.60	25	1.0	2.6	**10.26**	**8.88**
T3 - E	4	4	10.0	10.0	1.50	25	1.0	2.5	**10.50**	**8.97**
T3 - W	4	4	10.0	10.0	1.80	25	1.0	2.8	**9.86**	**8.72**
T4 - C	4	4	10.0	10.0	0.10	25	1.0	1.1	**64.15**	**11.89**
T4 - N	4	4	10.0	10.0	0.40	25	1.0	1.4	**21.04**	**10.77**
T4 - S	4	4	10.0	10.0	0.10	25	1.0	1.1	**64.15**	**11.89**
T4 - E	4	4	10.0	10.0	0.20	25	1.0	1.2	**35.41**	**11.46**
T4 - W	4	4	10.0	10.0	0.20	25	1.0	1.2	**35.41**	**11.46**
T5 - C	3	4	10.0	10.0	1.30	25	1.0	2.3	**14.78**	**12.23**
T5 - N	3	4	10.0	10.0	1.20	25	1.0	2.2	**15.28**	**12.38**
T5 - S	3	4	10.0	10.0	0.70	25	1.0	1.7	**19.83**	**13.40**
T5 - E	3	4	10.0	10.0	0.80	25	1.0	1.8	**18.46**	**13.15**
T5 - W	3	4	10.0	10.0	1.00	25	1.0	2.0	**16.55**	**12.72**
T6 - C	2	4	10.0	10.0	2.10	25	1.0	3.1	**18.81**	**17.05**
T6 - N	2	4	10.0	10.0	2.40	25	1.0	3.4	**18.13**	**16.73**
T6 - S	2	4	10.0	10.0	1.60	25	1.0	2.6	**20.52**	**17.76**
T6 - E	2	4	10.0	10.0	2.00	25	1.0	3.0	**19.09**	**17.18**
T6 - W	2	4	10.0	10.0	1.50	25	1.0	2.5	**21.00**	**17.94**
T7 - C	3	4	10.0	10.0	2.70	25	1.0	3.7	**11.73**	**10.97**
T7 - N	3	4	10.0	10.0	1.80	25	1.0	2.8	**13.15**	**11.63**
T7 - S	3	4	10.0	10.0	2.10	25	1.0	3.1	**12.54**	**11.37**
T7 - E	3	4	10.0	10.0	2.20	25	1.0	3.2	**12.38**	**11.29**
T7 -W	3	4	10.0	10.0	2.10	25	1.0	3.1	**12.54**	**11.37**
T8 - C	4	4	10.0	10.0	0.90	25	1.0	1.9	**13.06**	**9.69**
T8 - N	4	4	10.0	10.0	1.80	25	1.0	2.8	**9.86**	**8.72**
T8 - S	4	4	10.0	10.0	0.90	25	1.0	1.9	**13.06**	**9.69**
T8 - E	4	4	10.0	10.0	1.10	25	1.0	2.1	**11.89**	**9.41**
T8 -W	4	4	10.0	10.0	1.20	25	1.0	2.2	**11.46**	**9.28**
T9 - C	3	4	10.0	10.0	1.00	25	1.0	2.0	**16.55**	**12.72**
T9 - N	3	4	10.0	10.0	1.00	25	1.0	2.0	**16.55**	**12.72**
T9 - S	3	4	10.0	10.0	1.50	25	1.0	2.5	**14.00**	**11.96**
T9 - E	3	4	10.0	10.0	1.30	25	1.0	2.3	**14.78**	**12.23**
T9 - W	3	4	10.0	10.0	1.70	25	1.0	2.7	**13.40**	**11.73**
T10 - C	4	4	10.0	10.0	2.00	25	1.0	3.0	**9.54**	**8.58**
T10 - N	4	4	10.0	10.0	1.70	25	1.0	2.7	**10.05**	**8.80**
T10 - S	4	4	10.0	10.0	1.80	25	1.0	2.8	**9.86**	**8.72**
T10 - E	4	4	10.0	10.0	1.10	25	1.0	2.1	**11.89**	**9.41**
T10 - W	4	4	10.0	10.0	0.90	25	1.0	1.9	**13.06**	**9.69**
T11 - C	3	4	10.0	10.0	1.10	25	1.0	2.1	**15.86**	**12.54**
T11 - N	3	4	10.0	10.0	1.00	25	1.0	2.0	**16.55**	**12.72**
T11 - S	3	4	10.0	10.0	1.70	25	1.0	2.7	**13.40**	**11.73**
T11 - E	3	4	10.0	10.0	1.50	25	1.0	2.5	**14.00**	**11.96**
T11 - W	3	4	10.0	10.0	0.90	25	1.0	1.9	**17.40**	**12.93**
T12 - C	2	4	10.0	10.0	1.50	25	1.0	2.5	**21.00**	**17.94**
T12 - N	2	4	10.0	10.0	1.30	25	1.0	2.3	**22.18**	**18.34**
T12 - S	2	4	10.0	10.0	1.50	25	1.0	2.5	**21.00**	**17.94**
T12 - E	2	4	10.0	10.0	1.30	25	1.0	2.3	**22.18**	**18.34**
T12 - W	2	4	10.0	10.0	1.40	25	1.0	2.4	**21.55**	**18.13**
T13 - C	4	4	10.0	10.0	0.90	25	1.0	1.9	**13.06**	**9.69**
T13 - N	4	4	10.0	10.0	1.00	25	1.0	2.0	**12.42**	**9.54**
T13 - S	4	4	10.0	10.0	1.70	25	1.0	2.7	**10.05**	**8.80**
T13 - E	4	4	10.0	10.0	0.70	25	1.0	1.7	**14.88**	**10.05**
T13 - W	4	4	10.0	10.0	2.00	25	1.0	3.0	**9.54**	**8.58**
T14 - C	4	4	10.0	10.0	1.10	25	1.0	2.1	**11.89**	**9.41**
T14 - N	4	4	10.0	10.0	1.00	25	1.0	2.0	**12.42**	**9.54**
T14 - S	4	4	10.0	10.0	1.20	25	1.0	2.2	**11.46**	**9.28**
T14 - E	4	4	10.0	10.0	1.30	25	1.0	2.3	**11.09**	**9.17**
T14 - W	4	4	10.0	10.0	0.30	25	1.0	1.3	**25.83**	**11.09**
T15 - C	3	4	10.0	10.0	3.60	25	1.0	4.6	**11.02**	**10.56**
T15 - N	3	4	10.0	10.0	3.60	25	1.0	4.6	**11.02**	**10.56**
T15 - S	3	4	10.0	10.0	4.10	25	1.0	5.1	**10.76**	**10.40**
T15 - E	3	4	10.0	10.0	3.90	25	1.0	4.9	**10.86**	**10.46**
T15 - W	3	4	10.0	10.0	4.00	25	1.0	5.0	**10.81**	**10.43**
Met - C	3	4	10.0	10.0	1.80	25	1.0	2.8	**13.15**	**11.63**
Met - N	3	4	10.0	10.0	1.00	25	1.0	2.0	**16.55**	**12.72**
Met - S	3	4	10.0	10.0	1.20	25	1.0	2.2	**15.28**	**12.38**
Met - E	3	4	10.0	10.0	1.80	25	1.0	2.8	**13.15**	**11.63**
Met - W	3	4	10.0	10.0	1.40	25	1.0	2.4	**14.36**	**12.09**
TC1_1	3	4	10.0	10.0	2.90	25	1.0	3.9	**11.54**	**10.86**
TC1_2	2	4	10.0	10.0	5.40	25	1.0	6.4	**15.48**	**15.15**
TC1_3	2	4	10.0	10.0	4.50	25	1.0	5.5	**15.90**	**15.44**
TC1_4	4	4	10.0	10.0	2.50	25	1.0	3.5	**8.97**	**8.31**
TC1_5	3	4	10.0	10.0	4.20	25	1.0	5.2	**10.72**	**10.37**
TC2_1	3	4	10.0	10.0	1.80	25	1.0	2.8	**13.15**	**11.63**
TC2_2	3	4	10.0	10.0	2.20	25	1.0	3.2	**12.38**	**11.29**
TC2_3	3	4	10.0	10.0	0.60	25	1.0	1.6	**21.65**	**13.68**
TC2_4	3	4	10.0	10.0	0.60	25	1.0	1.6	**21.65**	**13.68**
TC2_5	3	4	10.0	10.0	0.80	25	1.0	1.8	**18.46**	**13.15**
TC3_1	3	4	10.0	10.0	1.20	25	1.0	2.2	**15.28**	**12.38**

Calculated FoS of Natural Peat Slopes for Lemanaghan 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
TC3_2	3	4	10.0	10.0	1.30	25	1.0	2.3	**14.78**	**12.23**
TC3_3	3	4	10.0	10.0	1.70	25	1.0	2.7	**13.40**	**11.73**
TC3_4	3	4	10.0	10.0	1.10	25	1.0	2.1	**15.86**	**12.54**
TC3_5	3	4	10.0	10.0	1.40	25	1.0	2.4	**14.36**	**12.09**
TC4_1	3	4	10.0	10.0	1.60	25	1.0	2.6	**13.68**	**11.84**
TC4_2	3	4	10.0	10.0	1.30	25	1.0	2.3	**14.78**	**12.23**
TC4_3	3	4	10.0	10.0	1.70	25	1.0	2.7	**13.40**	**11.73**
TC4_4	2	4	10.0	10.0	2.50	25	1.0	3.5	**17.94**	**16.63**
TC4_5	2	4	10.0	10.0	3.30	25	1.0	4.3	**16.83**	**16.02**
BP01	3	4	10.0	10.0	0.70	25	1.0	1.7	**19.83**	**13.40**
BP02	4	4	10.0	10.0	1.20	25	1.0	2.2	**11.46**	**9.28**
BP03	3	4	10.0	10.0	0.60	25	1.0	1.6	**21.65**	**13.68**
BP04	4	4	10.0	10.0	0.60	25	1.0	1.6	**16.25**	**10.26**
BP05	4	4	10.0	10.0	0.20	25	1.0	1.2	**35.41**	**11.46**
BP06	6	4	10.0	10.0	0.10	25	1.0	1.1	**42.91**	**7.93**
BP07	3	4	10.0	10.0	2.40	25	1.0	3.4	**12.09**	**11.15**
R1	NO PEAT ENCOUNTERED AT THIS LOCATION									
R2	5	4	10.0	10.0	0.20	25	1.0	1.2	**28.37**	**9.17**
R3	4	4	10.0	10.0	2.50	25	1.0	3.5	**8.97**	**8.31**
R4	3	4	10.0	10.0	3.60	25	1.0	4.6	**11.02**	**10.56**
R5	3	4	10.0	10.0	4.20	25	1.0	5.2	**10.72**	**10.37**
R6	2	4	10.0	10.0	4.50	25	1.0	5.5	**15.90**	**15.44**
R8	4	4	10.0	10.0	3.60	25	1.0	4.6	**8.27**	**7.92**
R10	3	4	10.0	10.0	2.80	25	1.0	3.8	**11.63**	**10.91**
R11	7	4	10.0	10.0	1.80	25	1.0	2.8	**5.63**	**4.98**
R12	6	4	10.0	10.0	1.50	25	1.0	2.5	**7.00**	**5.98**
R14	3	4	10.0	10.0	5.40	25	1.0	6.4	**10.31**	**10.09**
R16	4	4	10.0	10.0	3.70	25	1.0	4.7	**8.22**	**7.89**
R18	4	4	10.0	10.0	3.90	25	1.0	4.9	**8.14**	**7.84**
R20	3	4	10.0	10.0	4.80	25	1.0	5.8	**10.49**	**10.22**
R21	4	4	10.0	10.0	1.90	25	1.0	2.9	**9.69**	**8.65**
R22	4	4	10.0	10.0	1.70	25	1.0	2.7	**10.05**	**8.80**
R23	4	4	10.0	10.0	0.70	25	1.0	1.7	**14.88**	**10.05**
R24	3	4	10.0	10.0	1.80	25	1.0	2.8	**13.15**	**11.63**
R25	3	4	10.0	10.0	1.40	25	1.0	2.4	**14.36**	**12.09**
R26	3	4	10.0	10.0	1.20	25	1.0	2.2	**15.28**	**12.38**
R27	3	4	10.0	10.0	1.80	25	1.0	2.8	**13.15**	**11.63**
R28	3	4	10.0	10.0	2.20	25	1.0	3.2	**12.38**	**11.29**
R29	3	4	10.0	10.0	2.40	25	1.0	3.4	**12.09**	**11.15**
R31	3	4	10.0	10.0	1.90	25	1.0	2.9	**12.93**	**11.54**
R32	3	4	10.0	10.0	1.90	25	1.0	2.9	**12.93**	**11.54**
R33	3	4	10.0	10.0	2.10	25	1.0	3.1	**12.54**	**11.37**
R34	2	4	10.0	10.0	3.00	25	1.0	4.0	**17.18**	**16.22**
R35	2	4	10.0	10.0	3.70	25	1.0	4.7	**16.45**	**15.79**
R36	3	4	10.0	10.0	2.70	25	1.0	3.7	**11.73**	**10.97**
R37	3	4	10.0	10.0	1.80	25	1.0	2.8	**13.15**	**11.63**
R38	4	4	10.0	10.0	2.60	25	1.0	3.6	**8.88**	**8.27**
R39	3	4	10.0	10.0	0.90	25	1.0	1.9	**17.40**	**12.93**
R40	3	4	10.0	10.0	2.50	25	1.0	3.5	**11.96**	**11.08**
R41	3	4	10.0	10.0	1.40	25	1.0	2.4	**14.36**	**12.09**
R42	3	4	10.0	10.0	1.90	25	1.0	2.9	**12.93**	**11.54**
R43	2	4	10.0	10.0	2.00	25	1.0	3.0	**19.09**	**17.18**
R44	3	4	10.0	10.0	2.80	25	1.0	3.8	**11.63**	**10.91**
R45	3	4	10.0	10.0	1.30	25	1.0	2.3	**14.78**	**12.23**
R46	3	4	10.0	10.0	1.50	25	1.0	2.5	**14.00**	**11.96**
R47	3	4	10.0	10.0	1.70	25	1.0	2.7	**13.40**	**11.73**
R48	3	4	10.0	10.0	1.30	25	1.0	2.3	**14.78**	**12.23**
R49	3	4	10.0	10.0	1.40	25	1.0	2.4	**14.36**	**12.09**
R50	3	4	10.0	10.0	1.40	25	1.0	2.4	**14.36**	**12.09**
R51	3	4	10.0	10.0	1.30	25	1.0	2.3	**14.78**	**12.23**
R52	3	4	10.0	10.0	1.10	25	1.0	2.1	**15.86**	**12.54**
R53	3	4	10.0	10.0	2.50	25	1.0	3.5	**11.96**	**11.08**
R54	4	4	10.0	10.0	1.80	25	1.0	2.8	**9.86**	**8.72**
R55	5	4	10.0	10.0	2.00	25	1.0	3.0	**7.63**	**6.87**
R57	4	4	10.0	10.0	2.10	25	1.0	3.1	**9.41**	**8.52**
R59	4	4	10.0	10.0	2.90	25	1.0	3.9	**8.65**	**8.14**
R61	2	4	10.0	10.0	3.70	25	1.0	4.7	**16.45**	**15.79**
R63	3	4	10.0	10.0	4.10	25	1.0	5.1	**10.76**	**10.40**
R65	3	4	10.0	10.0	4.70	25	1.0	5.7	**10.53**	**10.24**
R67	3	4	10.0	10.0	5.30	25	1.0	6.3	**10.34**	**10.11**
R69	2	4	10.0	10.0	5.50	25	1.0	6.5	**15.44**	**15.12**
R71	3	4	10.0	10.0	4.70	25	1.0	5.7	**10.53**	**10.24**
R73	3	4	10.0	10.0	3.00	25	1.0	4.0	**11.45**	**10.81**
R75	3	4	10.0	10.0	0.70	25	1.0	1.7	**19.83**	**13.40**
R76	4	4	10.0	10.0	1.00	25	1.0	2.0	**12.42**	**9.54**
R77	4	4	10.0	10.0	1.80	25	1.0	2.8	**9.86**	**8.72**
R78	3	4	10.0	10.0	1.00	25	1.0	2.0	**16.55**	**12.72**
R79	3	4	10.0	10.0	2.50	25	1.0	3.5	**11.96**	**11.08**
R80	3	4	10.0	10.0	1.10	25	1.0	2.1	**15.86**	**12.54**
R81	3	4	10.0	10.0	1.40	25	1.0	2.4	**14.36**	**12.09**
R82	3	4	10.0	10.0	1.30	25	1.0	2.3	**14.78**	**12.23**
R83	3	4	10.0	10.0	1.70	25	1.0	2.7	**13.40**	**11.73**
R84	3	4	10.0	10.0	2.00	25	1.0	3.0	**12.72**	**11.45**
R85	4	4	10.0	10.0	1.10	25	1.0	2.1	**11.89**	**9.41**
R86	3	4	10.0	10.0	1.70	25	1.0	2.7	**13.40**	**11.73**
R87	4	4	10.0	10.0	0.90	25	1.0	1.9	**13.06**	**9.69**
R88	3	4	10.0	10.0	2.10	25	1.0	3.1	**12.54**	**11.37**
R89	3	4	10.0	10.0	1.50	25	1.0	2.5	**14.00**	**11.96**
R90	3	4	10.0	10.0	0.60	25	1.0	1.6	**21.65**	**13.68**
R91	2	4	10.0	10.0	3.80	25	1.0	4.8	**16.37**	**15.74**
R92	3	4	10.0	10.0	2.80	25	1.0	3.8	**11.63**	**10.91**
R93	3	4	10.0	10.0	2.80	25	1.0	3.8	**11.63**	**10.91**
R94	2	4	10.0	10.0	3.10	25	1.0	4.1	**17.05**	**16.15**

Calculated FoS of Natural Peat Slopes for Lemanaghan 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
R95	2	4	10.0	10.0	2.40	25	1.0	3.4	**18.13**	**16.73**
R96	2	4	10.0	10.0	1.80	25	1.0	2.8	**19.72**	**17.45**
R97	2	4	10.0	10.0	3.10	25	1.0	4.1	**17.05**	**16.15**
R98	2	4	10.0	10.0	3.40	25	1.0	4.4	**16.73**	**15.96**
R99	3	4	10.0	10.0	2.70	25	1.0	3.7	**11.73**	**10.97**
R100	3	4	10.0	10.0	2.30	25	1.0	3.3	**12.23**	**11.22**
R101	3	4	10.0	10.0	1.70	25	1.0	2.7	**13.40**	**11.73**
R102	4	4	10.0	10.0	0.30	25	1.0	1.3	**25.83**	**11.09**
R103	3	4	10.0	10.0	1.30	25	1.0	2.3	**14.78**	**12.23**
R104	3	4	10.0	10.0	1.60	25	1.0	2.6	**13.68**	**11.84**
R105	2	4	10.0	10.0	1.10	25	1.0	2.1	**23.78**	**18.81**
R106	2	4	10.0	10.0	1.90	25	1.0	2.9	**19.39**	**17.31**
R107	2	4	10.0	10.0	2.50	25	1.0	3.5	**17.94**	**16.63**
R108	3	4	10.0	10.0	1.60	25	1.0	2.6	**13.68**	**11.84**
R109	3	4	10.0	10.0	1.70	25	1.0	2.7	**13.40**	**11.73**
R110	3	4	10.0	10.0	2.10	25	1.0	3.1	**12.54**	**11.37**
R111	3	4	10.0	10.0	2.50	25	1.0	3.5	**11.96**	**11.08**
R112	4	4	10.0	10.0	2.00	25	1.0	3.0	**9.54**	**8.58**
R113	3	4	10.0	10.0	2.30	25	1.0	3.3	**12.23**	**11.22**
R114	3	4	10.0	10.0	2.40	25	1.0	3.4	**12.09**	**11.15**
R115	3	4	10.0	10.0	2.30	25	1.0	3.3	**12.23**	**11.22**
R116	3	4	10.0	10.0	2.70	25	1.0	3.7	**11.73**	**10.97**
R117	3	4	10.0	10.0	3.80	25	1.0	4.8	**10.91**	**10.49**
R118	3	4	10.0	10.0	2.90	25	1.0	3.9	**11.54**	**10.86**
R119	3	4	10.0	10.0	2.80	25	1.0	3.8	**11.63**	**10.91**
R120	3	4	10.0	10.0	3.60	25	1.0	4.6	**11.02**	**10.56**
R122	4	4	10.0	10.0	1.90	25	1.0	2.9	**9.69**	**8.65**
R124	3	4	10.0	10.0	2.10	25	1.0	3.1	**12.54**	**11.37**
R125	2	4	10.0	10.0	2.80	25	1.0	3.8	**17.45**	**16.37**
R126	2	4	10.0	10.0	3.10	25	1.0	4.1	**17.05**	**16.15**
R128	2	4	10.0	10.0	3.50	25	1.0	4.5	**16.63**	**15.90**
R130	3	4	10.0	10.0	2.80	25	1.0	3.8	**11.63**	**10.91**
R132	4	4	10.0	10.0	0.60	25	1.0	1.6	**16.25**	**10.26**
R133	3	4	10.0	10.0	2.00	25	1.0	3.0	**12.72**	**11.45**
R134	3	4	10.0	10.0	2.00	25	1.0	3.0	**12.72**	**11.45**
R135	3	4	10.0	10.0	2.10	25	1.0	3.1	**12.54**	**11.37**
R136	8	4	10.0	10.0	1.50	25	1.0	2.5	**5.25**	**4.48**
R137	5	4	10.0	10.0	0.90	25	1.0	1.9	**10.45**	**7.75**
R138	6	4	10.0	10.0	0.30	25	1.0	1.3	**17.26**	**7.40**
R139	NO PEAT ENCOUNTERED AT THIS LOCATION									
R140	3	4	10.0	10.0	1.60	25	1.0	2.6	**13.68**	**11.84**
R141	2	4	10.0	10.0	2.60	25	1.0	3.6	**17.76**	**16.54**
R142	3	4	10.0	10.0	1.80	25	1.0	2.8	**13.15**	**11.63**
R144	2	4	10.0	10.0	3.50	25	1.0	4.5	**16.63**	**15.90**
R145	4	4	10.0	10.0	1.30	25	1.0	2.3	**11.09**	**9.17**
R146	3	4	10.0	10.0	3.00	25	1.0	4.0	**11.45**	**10.81**
R147	4	4	10.0	10.0	1.80	25	1.0	2.8	**9.86**	**8.72**
R148	5	4	10.0	10.0	0.20	25	1.0	1.2	**28.37**	**9.17**
R149	4	4	10.0	10.0	0.20	25	1.0	1.2	**35.41**	**11.46**
R150	4	4	10.0	10.0	0.90	25	1.0	1.9	**13.06**	**9.69**
R151	4	4	10.0	10.0	0.20	25	1.0	1.2	**35.41**	**11.46**
R152	2	4	10.0	10.0	3.40	25	1.0	4.4	**16.73**	**15.96**
R153	3	4	10.0	10.0	2.20	25	1.0	3.2	**12.38**	**11.29**
R154	2	4	10.0	10.0	3.10	25	1.0	4.1	**17.05**	**16.15**
R155	3	4	10.0	10.0	2.40	25	1.0	3.4	**12.09**	**11.15**
R156	3	4	10.0	10.0	1.30	25	1.0	2.3	**14.78**	**12.23**
R157	3	4	10.0	10.0	1.30	25	1.0	2.3	**14.78**	**12.23**
R158	3	4	10.0	10.0	1.00	25	1.0	2.0	**16.55**	**12.72**
R159	3	4	10.0	10.0	1.30	25	1.0	2.3	**14.78**	**12.23**
R160	3	4	10.0	10.0	0.70	25	1.0	1.7	**10.93**	**9.74**
R161	3	4	10.0	10.0	0.90	25	1.0	1.9	**8.50**	**8.71**
R162	3	4	10.0	10.0	0.30	25	1.0	1.3	**25.51**	**12.73**
R163	3	4	10.0	10.0	1.00	25	1.0	2.0	**7.65**	**8.28**
R164	3	4	10.0	10.0	0.30	25	1.0	1.3	**25.51**	**12.73**
R165	3	4	10.0	10.0	0.20	25	1.0	1.2	**38.27**	**13.79**
R166	5	4	10.0	10.0	0.50	25	1.0	1.5	**9.21**	**6.62**
R167	5	4	10.0	10.0	1.90	25	1.0	2.9	**2.42**	**3.43**
R168	4	4	10.0	10.0	1.10	25	1.0	2.1	**5.23**	**5.91**
R169	3	4	10.0	10.0	2.40	25	1.0	3.4	**3.19**	**4.87**
R171	3	4	10.0	10.0	2.40	25	1.0	3.4	**3.19**	**4.87**
R172	3	4	10.0	10.0	1.40	25	1.0	2.4	**5.47**	**6.90**
R173	3	4	10.0	10.0	1.40	25	1.0	2.4	**5.47**	**6.90**
R174	3	4	10.0	10.0	1.30	25	1.0	2.3	**5.89**	**7.20**
R175	4	4	10.0	10.0	0.30	25	1.0	1.3	**19.16**	**9.55**
R176	3	4	10.0	10.0	1.80	25	1.0	2.8	**4.25**	**5.91**
R177	3	4	10.0	10.0	2.20	25	1.0	3.2	**3.48**	**5.17**
R178	5	4	10.0	10.0	1.30	25	1.0	2.3	**3.54**	**4.32**
R180	4	4	10.0	10.0	1.80	25	1.0	2.8	**3.19**	**4.43**
R181	4	4	10.0	10.0	1.60	25	1.0	2.6	**3.59**	**4.78**
R182	3	4	10.0	10.0	2.30	25	1.0	3.3	**3.33**	**5.02**
R183	3	4	10.0	10.0	1.90	25	1.0	2.9	**4.03**	**5.71**
R184	3	4	10.0	10.0	2.00	25	1.0	3.0	**3.83**	**5.52**
R185	4	4	10.0	10.0	2.20	25	1.0	3.2	**2.61**	**3.88**
R186	4	4	10.0	10.0	1.10	25	1.0	2.1	**5.23**	**5.91**
R187	4	4	10.0	10.0	2.80	25	1.0	3.8	**2.05**	**3.27**
R188	5	4	10.0	10.0	2.70	25	1.0	3.7	**1.71**	**2.69**
R189	5	4	10.0	10.0	0.50	25	1.0	1.5	**9.21**	**6.62**
R190	6	4	10.0	10.0	0.30	25	1.0	1.3	**12.83**	**6.37**
R191	5	4	10.0	10.0	0.20	25	1.0	1.2	**23.04**	**8.28**
R192	NO PEAT ENCOUNTERED AT THIS LOCATION									
R193	NO PEAT ENCOUNTERED AT THIS LOCATION									
R194	3	4	10.0	10.0	4.60	25	1.0	5.6	**1.66**	**2.96**
R195	3	4	10.0	10.0	3.00	25	1.0	4.0	**2.55**	**4.14**

Calculated FoS of Natural Peat Slopes for Lemanaghan 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
R196	3	4	10.0	10.0	3.40	25	1.0	4.4	**2.25**	**3.76**
R197	3	4	10.0	10.0	3.70	25	1.0	4.7	**2.07**	**3.52**
R198	3	4	10.0	10.0	3.00	25	1.0	4.0	**2.55**	**4.14**
R199	4	4	10.0	10.0	2.80	25	1.0	3.8	**2.05**	**3.27**
PSA 001	1	4	10.0	10.0	1.90	25	1.0	2.9	**38.78**	**34.62**
PSA 002	1	4	10.0	10.0	1.70	25	1.0	2.7	**40.20**	**35.20**
PSA 003	1	4	10.0	10.0	1.90	25	1.0	2.9	**38.78**	**34.62**
PSA 004	1	4	10.0	10.0	2.00	25	1.0	3.0	**38.18**	**34.36**
PSA 005	1	4	10.0	10.0	2.80	25	1.0	3.8	**34.90**	**32.75**
PSA 006	4	4	10.0	10.0	0.40	25	1.0	1.4	**21.04**	**10.77**
PSA 007	1	4	10.0	10.0	2.00	25	1.0	3.0	**38.18**	**34.36**
PSA 008	1	4	10.0	10.0	2.20	25	1.0	3.2	**37.13**	**33.88**
PSA 009	3	4	10.0	10.0	3.60	25	1.0	4.6	**11.02**	**10.56**
PSA 010	1	4	10.0	10.0	1.50	25	1.0	2.5	**42.00**	**35.88**
PSA 011	1	4	10.0	10.0	0.40	25	1.0	1.4	**84.02**	**43.09**
PSA 012	1	4	10.0	10.0	5.80	25	1.0	6.8	**30.67**	**30.09**
PSA 013	1	4	10.0	10.0	6.00	25	1.0	7.0	**30.54**	**29.99**
PSA 014	1	4	10.0	10.0	2.80	25	1.0	3.8	**34.90**	**32.75**
PSA 015	1	4	10.0	10.0	5.70	25	1.0	6.7	**30.74**	**30.14**
PSA 016	4	4	10.0	10.0	2.80	25	1.0	3.8	**8.72**	**8.18**
PSA 017	1	4	10.0	10.0	4.00	25	1.0	5.0	**32.45**	**31.30**
PSA 018	1	4	10.0	10.0	5.00	25	1.0	6.0	**31.30**	**30.54**
PSA 019	1	4	10.0	10.0	4.10	25	1.0	5.1	**32.31**	**31.21**
PSA 020	1	4	10.0	10.0	4.50	25	1.0	5.5	**31.81**	**30.88**
PSA 021	1	4	10.0	10.0	5.80	25	1.0	6.8	**30.67**	**30.09**
PSA 022	1	4	10.0	10.0	2.80	25	1.0	3.8	**34.90**	**32.75**
PSA 023	1	4	10.0	10.0	4.10	25	1.0	5.1	**32.31**	**31.21**
PSA 024	1	4	10.0	10.0	5.60	25	1.0	6.6	**30.81**	**30.19**
PSA 025	1	4	10.0	10.0	5.00	25	1.0	6.0	**31.30**	**30.54**
Substation	2	4	10.0	10.0	5.70	25	1.0	6.7	**15.37**	**15.07**
Telecomm. Tower	2	4	10.0	10.0	6.00	25	1.0	7.0	**15.26**	**14.99**
Steel Mast 1 (under OHL)	2	4	10.0	10.0	1.00	25	1.0	2.0	**24.82**	**19.09**
Steel Mast 2 (under OHL)	2	4	10.0	10.0	0.20	25	1.0	1.2	**70.70**	**22.91**
Steel Mast 3 (Beside substation)	2	4	10.0	10.0	5.30	25	1.0	6.3	**15.52**	**15.17**
Steel Mast 4 (beside substation)	2	4	10.0	10.0	5.20	25	1.0	6.2	**15.56**	**15.20**
Crane Pad (north)	2	4	10.0	10.0	0.6	25	1.0	1.6	**32.47**	**20.52**
Crane Pad (substation)	2	4	10.0	10.0	4.2	25	1.0	5.2	**16.08**	**15.56**
Tower Building (North)	2	4	10.0	10.0	3.0	25	1.0	4.0	**17.18**	**16.22**
Tower Building (substation)	2	4	10.0	10.0	3.5	25	1.0	4.5	**16.63**	**15.90**
Borrow Pit 1	5.0	4	10.0	10.0	0.2	25	1.0	1.2	**28.37**	**9.17**
Borrow Pit 2	5.0	4	10.0	10.0	0.2	25	1.0	1.2	**28.37**	**9.17**
Borrow Pit 3	3.0	4	10.0	10.0	0.3	25	1.0	1.3	**39.51**	**15.02**
Borrow Pit 4	3.0	4	10.0	10.0	0.2	25	1.0	1.2	**47.16**	**15.28**
Construction Compound 2	4	4	10.0	10.0	1.90	25	1.0	2.9	**9.69**	**8.65**
Construction Compound 3	3	4	10.0	10.0	1.80	25	1.0	2.8	**13.15**	**11.63**
Construction Compound 4	5.0	4	10.0	10.0	3.4	26	1.0	4.4	**6.93**	**6.62**
Construction Compound 5	3.0	4	10.0	10.0	4.6	27	1.0	5.6	**11.39**	**11.09**

Minimum =	**1.66**	**2.69**
Maximum =	**84.02**	**43.09**
Average =	**16.01**	**12.59**

(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.

Calculated FoS of Natural Peat Slopes for Lemanaghan Wind Farm - Undrained Analysis

Turbine No./Waypoint	Slope	Undrained shear strength	Bulk unit weight of Peat	Peat Depth	Surcharge Equivalent Placed Fill Depth (m)	Factor of Safety for Load Condition	
	β (deg)	c_u (kPa)	γ (kN/m^3)	(m)	Condition (2)	Condition (1)	Condition (2)
T1 - C	3	6	10	3.6	4.6	**3.19**	**2.50**
T1 - N	3	6	10	3.6	4.6	**3.19**	**2.50**
T1 - S	3	6	10	3.6	4.6	**3.19**	**2.50**
T1 - E	3	6	10	3.1	4.1	**3.70**	**2.80**
T1 - W	3	6	10	3.4	4.4	**3.38**	**2.61**
T2 - C	4	6	10	1	2.0	**8.62**	**4.31**
T2 - N	4	6	10	1.7	2.7	**5.07**	**3.19**
T2 - S	4	6	10	0.9	1.9	**9.58**	**4.54**
T2 - E	4	6	10	0.9	1.9	**9.58**	**4.54**
T2 - W	4	6	10	1.4	2.4	**6.16**	**3.59**
T3 - C	4	6	10	2.2	3.2	**3.92**	**2.69**
T3 - N	4	6	10	1.8	2.8	**4.79**	**3.08**
T3 - S	4	6	10	1.6	2.6	**5.39**	**3.32**
T3 - E	4	6	10	1.5	2.5	**5.75**	**3.45**
T3 - W	4	6	10	1.8	2.8	**4.79**	**3.08**
T4 - C	4	6	10	0.1	1.1	**86.22**	**7.84**
T4 - N	4	6	10	0.4	1.4	**21.56**	**6.16**
T4 - S	4	6	10	0.1	1.1	**86.22**	**7.84**
T4 - E	4	6	10	0.2	1.2	**43.11**	**7.19**
T4 - W	4	6	10	0.2	1.2	**43.11**	**7.19**
T5 - C	3	6	10	1.3	2.3	**8.83**	**4.99**
T5 - N	3	6	10	1.2	2.2	**9.57**	**5.22**
T5 - S	3	6	10	0.7	1.7	**16.40**	**6.75**
T5 - E	3	6	10	0.8	1.8	**14.35**	**6.38**
T5 - W	3	6	10	1	2.0	**11.48**	**5.74**
T6 - C	2	6	10	2.1	3.1	**8.19**	**5.55**
T6 - N	2	6	10	2.4	3.4	**7.17**	**5.06**
T6 - S	2	6	10	1.6	2.6	**10.75**	**6.62**
T6 - E	2	6	10	2	3.0	**8.60**	**5.73**
T6 - W	2	6	10	1.5	2.5	**11.47**	**6.88**
T7 - C	3	6	10	2.7	3.7	**4.25**	**3.10**
T7 - N	3	6	10	1.8	2.8	**6.38**	**4.10**
T7 - S	3	6	10	2.1	3.1	**5.47**	**3.70**
T7 - E	3	6	10	2.2	3.2	**5.22**	**3.59**
T7 -W	3	6	10	2.1	3.1	**5.47**	**3.70**
T8 - C	4	6	10	0.9	1.9	**9.58**	**4.54**
T8 - N	4	6	10	1.8	2.8	**4.79**	**3.08**
T8 - S	4	6	10	0.9	1.9	**9.58**	**4.54**
T8 - E	4	6	10	1.1	2.1	**7.84**	**4.11**
T8 -W	4	6	10	1.2	2.2	**7.19**	**3.92**
T9 - C	3	6	10	1	2.0	**11.48**	**5.74**
T9 - N	3	6	10	1	2.0	**11.48**	**5.74**
T9 - S	3	6	10	1.5	2.5	**7.65**	**4.59**
T9 - E	3	6	10	1.3	2.3	**8.83**	**4.99**
T9 - W	3	6	10	1.7	2.7	**6.75**	**4.25**
T10 - C	4	6	10	2	3.0	**4.31**	**2.87**
T10 - N	4	6	10	1.7	2.7	**5.07**	**3.19**
T10 - S	4	6	10	1.8	2.8	**4.79**	**3.08**
T10 - E	4	6	10	1.1	2.1	**7.84**	**4.11**
T10 - W	4	6	10	0.9	1.9	**9.58**	**4.54**
T11 - C	3	6	10	1.1	2.1	**10.44**	**5.47**
T11 - N	3	6	10	1	2.0	**11.48**	**5.74**
T11 - S	3	6	10	1.7	2.7	**6.75**	**4.25**
T11 - E	3	6	10	1.5	2.5	**7.65**	**4.59**
T11 - W	3	6	10	0.9	1.9	**12.76**	**6.04**
T12 - C	2	6	10	1.5	2.5	**11.47**	**6.88**
T12 - N	2	6	10	1.3	2.3	**13.23**	**7.48**
T12 - S	2	6	10	1.5	2.5	**11.47**	**6.88**
T12 - E	2	6	10	1.3	2.3	**13.23**	**7.48**
T12 - W	2	6	10	1.4	2.4	**12.29**	**7.17**
T13 - C	4	6	10	0.9	1.9	**9.58**	**4.54**
T13 - N	4	6	10	1	2.0	**8.62**	**4.31**
T13 - S	4	6	10	1.7	2.7	**5.07**	**3.19**
T13 - E	4	6	10	0.7	1.7	**12.32**	**5.07**
T13 - W	4	6	10	2	3.0	**4.31**	**2.87**
T14 - C	4	6	10	1.1	2.1	**7.84**	**4.11**
T14 - N	4	6	10	1	2.0	**8.62**	**4.31**
T14 - S	4	6	10	1.2	2.2	**7.19**	**3.92**
T14 - E	4	6	10	1.3	2.3	**6.63**	**3.75**
T14 - W	4	6	10	0.3	1.3	**28.74**	**6.63**
T15 - C	3	6	10	3.6	4.6	**3.19**	**2.50**
T15 - N	3	6	10	3.6	4.6	**3.19**	**2.50**
T15 - S	3	6	10	4.1	5.1	**2.80**	**2.25**
T15 - E	3	6	10	3.9	4.9	**2.94**	**2.34**
T15 - W	3	6	10	4	5.0	**2.87**	**2.30**
Met - C	3	6	10	1.8	2.8	**6.38**	**4.10**
Met - N	3	6	10	1	2.0	**11.48**	**5.74**
Met - S	3	6	10	1.2	2.2	**9.57**	**5.22**
Met - E	3	6	10	1.8	2.8	**6.38**	**4.10**
Met - W	3	6	10	1.4	2.4	**8.20**	**4.78**
TC1_1	3	6	10	2.9	3.9	**3.96**	**2.94**
TC1_2	2	6	10	5.4	6.4	**3.19**	**2.69**
TC1_3	2	6	10	4.5	5.5	**3.82**	**3.13**
TC1_4	4	6	10	2.5	3.5	**3.45**	**2.46**
TC1_5	3	6	10	4.2	5.2	**2.73**	**2.21**
TC2_1	3	6	10	1.8	2.8	**6.38**	**4.10**
TC2_2	3	6	10	2.2	3.2	**5.22**	**3.59**
TC2_3	3	6	10	0.6	1.6	**19.13**	**7.18**
TC2_4	3	6	10	0.6	1.6	**19.13**	**7.18**
TC2_5	3	6	10	0.8	1.8	**14.35**	**6.38**
TC3_1	3	6	10	1.2	2.2	**9.57**	**5.22**
TC3_2	3	6	10	1.3	2.3	**8.83**	**4.99**
TC3_3	3	6	10	1.7	2.7	**6.75**	**4.25**
TC3_4	3	6	10	1.1	2.1	**10.44**	**5.47**
TC3_5	3	6	10	1.4	2.4	**8.20**	**4.78**

Calculated FoS of Natural Peat Slopes for Lemanaghan Wind Farm - Undrained Analysis

Turbine No./Waypoint	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)
TC4_1	3	6	10	1.6	2.6	**7.18**	**4.42**
TC4_2	3	6	10	1.3	2.3	**8.83**	**4.99**
TC4_3	3	6	10	1.7	2.7	**6.75**	**4.25**
TC4_4	2	6	10	2.5	3.5	**6.88**	**4.92**
TC4_5	2	6	10	3.3	4.3	**5.21**	**4.00**
BP01	3	6	10	0.7	1.7	**16.40**	**6.75**
BP02	4	6	10	1.2	2.2	**7.19**	**3.92**
BP03	3	6	10	0.6	1.6	**19.13**	**7.18**
BP04	4	6	10	0.6	1.6	**14.37**	**5.39**
BP05	4	6	10	0.2	1.2	**43.11**	**7.19**
BP06	6	6	10	0.1	1.1	**57.72**	**5.25**
BP07	3	6	10	2.4	3.4	**4.78**	**3.38**
R1	NO PEAT ENCOUNTERED AT THIS LOCATION						
R2	5	6	10	0.2	1.2	**34.55**	**5.76**
R3	4	6	10	2.5	3.5	**3.45**	**2.46**
R4	3	6	10	3.6	4.6	**3.19**	**2.50**
R5	3	6	10	4.2	5.2	**2.73**	**2.21**
R6	2	6	10	4.5	5.5	**3.82**	**3.13**
R8	4	6	10	3.6	4.6	**2.40**	**1.87**
R10	3	6	10	2.8	3.8	**4.10**	**3.02**
R11	7	6	10	1.8	2.8	**2.76**	**1.77**
R12	6	6	10	1.5	2.5	**3.85**	**2.31**
R14	3	6	10	5.4	6.4	**2.13**	**1.79**
R16	4	6	10	3.7	4.7	**2.33**	**1.83**
R18	4	6	10	3.9	4.9	**2.21**	**1.76**
R20	3	6	10	4.8	5.8	**2.39**	**1.98**
R21	4	6	10	1.9	2.9	**4.54**	**2.97**
R22	4	6	10	1.7	2.7	**5.07**	**3.19**
R23	4	6	10	0.7	1.7	**12.32**	**5.07**
R24	3	6	10	1.8	2.8	**6.38**	**4.10**
R25	3	6	10	1.4	2.4	**8.20**	**4.78**
R26	3	6	10	1.2	2.2	**9.57**	**5.22**
R27	3	6	10	1.8	2.8	**6.38**	**4.10**
R28	3	6	10	2.2	3.2	**5.22**	**3.59**
R29	3	6	10	2.4	3.4	**4.78**	**3.38**
R31	3	6	10	1.9	2.9	**6.04**	**3.96**
R32	3	6	10	1.9	2.9	**6.04**	**3.96**
R33	3	6	10	2.1	3.1	**5.47**	**3.70**
R34	2	6	10	3	4.0	**5.73**	**4.30**
R35	2	6	10	3.7	4.7	**4.65**	**3.66**
R36	3	6	10	2.7	3.7	**4.25**	**3.10**
R37	3	6	10	1.8	2.8	**6.38**	**4.10**
R38	4	6	10	2.6	3.6	**3.32**	**2.40**
R39	3	6	10	0.9	1.9	**12.76**	**6.04**
R40	3	6	10	2.5	3.5	**4.59**	**3.28**
R41	3	6	10	1.4	2.4	**8.20**	**4.78**
R42	3	6	10	1.9	2.9	**6.04**	**3.96**
R43	2	6	10	2	3.0	**8.60**	**5.73**
R44	3	6	10	2.8	3.8	**4.10**	**3.02**
R45	3	6	10	1.3	2.3	**8.83**	**4.99**
R46	3	6	10	1.5	2.5	**7.65**	**4.59**
R47	3	6	10	1.7	2.7	**6.75**	**4.25**
R48	3	6	10	1.3	2.3	**8.83**	**4.99**
R49	3	6	10	1.4	2.4	**8.20**	**4.78**
R50	3	6	10	1.4	2.4	**8.20**	**4.78**
R51	3	6	10	1.3	2.3	**8.83**	**4.99**
R52	3	6	10	1.1	2.1	**10.44**	**5.47**
R53	3	6	10	2.5	3.5	**4.59**	**3.28**
R54	4	6	10	1.8	2.8	**4.79**	**3.08**
R55	5	6	10	2	3.0	**3.46**	**2.30**
R57	4	6	10	2.1	3.1	**4.11**	**2.78**
R59	4	6	10	2.9	3.9	**2.97**	**2.21**
R61	2	6	10	3.7	4.7	**4.65**	**3.66**
R63	3	6	10	4.1	5.1	**2.80**	**2.25**
R65	3	6	10	4.7	5.7	**2.44**	**2.01**
R67	3	6	10	5.3	6.3	**2.17**	**1.82**
R69	2	6	10	5.5	6.5	**3.13**	**2.65**
R71	3	6	10	4.7	5.7	**2.44**	**2.01**
R73	3	6	10	3	4.0	**3.83**	**2.87**
R75	3	6	10	0.7	1.7	**16.40**	**6.75**
R76	4	6	10	1	2.0	**8.62**	**4.31**
R77	4	6	10	1.8	2.8	**4.79**	**3.08**
R78	3	6	10	1	2.0	**11.48**	**5.74**
R79	3	6	10	2.5	3.5	**4.59**	**3.28**
R80	3	6	10	1.1	2.1	**10.44**	**5.47**
R81	3	6	10	1.4	2.4	**8.20**	**4.78**
R82	3	6	10	1.3	2.3	**8.83**	**4.99**
R83	3	6	10	1.7	2.7	**6.75**	**4.25**
R84	3	6	10	2	3.0	**5.74**	**3.83**
R85	4	6	10	1.1	2.1	**7.84**	**4.11**
R86	3	6	10	1.7	2.7	**6.75**	**4.25**
R87	4	6	10	0.9	1.9	**9.58**	**4.54**
R88	3	6	10	2.1	3.1	**5.47**	**3.70**
R89	3	6	10	1.5	2.5	**7.65**	**4.59**
R90	3	6	10	0.6	1.6	**19.13**	**7.18**
R91	2	6	10	3.8	4.8	**4.53**	**3.58**
R92	3	6	10	2.8	3.8	**4.10**	**3.02**
R93	3	6	10	2.8	3.8	**4.10**	**3.02**
R94	2	6	10	3.1	4.1	**5.55**	**4.20**
R95	2	6	10	2.4	3.4	**7.17**	**5.06**
R96	2	6	10	1.8	2.8	**9.56**	**6.14**
R97	2	6	10	3.1	4.1	**5.55**	**4.20**
R98	2	6	10	3.4	4.4	**5.06**	**3.91**
R99	3	6	10	2.7	3.7	**4.25**	**3.10**
R100	3	6	10	2.3	3.3	**4.99**	**3.48**
R101	3	6	10	1.7	2.7	**6.75**	**4.25**

Calculated FoS of Natural Peat Slopes for Lemanaghan Wind Farm - Undrained Analysis

Turbine No./Waypoint	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)
R102	4	6	10	0.3	1.3	**28.74**	**6.63**
R103	3	6	10	1.3	2.3	**8.83**	**4.99**
R104	3	6	10	1.6	2.6	**7.18**	**4.42**
R105	2	6	10	1.1	2.1	**15.64**	**8.19**
R106	2	6	10	1.9	2.9	**9.05**	**5.93**
R107	2	6	10	2.5	3.5	**6.88**	**4.92**
R108	3	6	10	1.6	2.6	**7.18**	**4.42**
R109	3	6	10	1.7	2.7	**6.75**	**4.25**
R110	3	6	10	2.1	3.1	**5.47**	**3.70**
R111	3	6	10	2.5	3.5	**4.59**	**3.28**
R112	4	6	10	2	3.0	**4.31**	**2.87**
R113	3	6	10	2.3	3.3	**4.99**	**3.48**
R114	3	6	10	2.4	3.4	**4.78**	**3.38**
R115	3	6	10	2.3	3.3	**4.99**	**3.48**
R116	3	6	10	2.7	3.7	**4.25**	**3.10**
R117	3	6	10	3.8	4.8	**3.02**	**2.39**
R118	3	6	10	2.9	3.9	**3.96**	**2.94**
R119	3	6	10	2.8	3.8	**4.10**	**3.02**
R120	3	6	10	3.6	4.6	**3.19**	**2.50**
R122	4	6	10	1.9	2.9	**4.54**	**2.97**
R124	3	6	10	2.1	3.1	**5.47**	**3.70**
R125	2	6	10	2.8	3.8	**6.14**	**4.53**
R126	2	6	10	3.1	4.1	**5.55**	**4.20**
R128	2	6	10	3.5	4.5	**4.92**	**3.82**
R130	3	6	10	2.8	3.8	**4.10**	**3.02**
R132	4	6	10	0.6	1.6	**14.37**	**5.39**
R133	3	6	10	2	3.0	**5.74**	**3.83**
R134	3	6	10	2	3.0	**5.74**	**3.83**
R135	3	6	10	2.1	3.1	**5.47**	**3.70**
R136	8	6	10	1.5	2.5	**2.90**	**1.74**
R137	5	6	10	0.9	1.9	**7.68**	**3.64**
R138	6	6	10	0.3	1.3	**19.24**	**4.44**
R139	NO PEAT ENCOUNTERED AT THIS LOCATION						
R140	3	6	10	1.6	2.6	**7.18**	**4.42**
R141	2	6	10	2.6	3.6	**6.62**	**4.78**
R142	3	6	10	1.8	2.8	**6.38**	**4.10**
R144	2	6	10	3.5	4.5	**4.92**	**3.82**
R145	4	6	10	1.3	2.3	**6.63**	**3.75**
R146	3	6	10	3	4.0	**3.83**	**2.87**
R147	4	6	10	1.8	2.8	**4.79**	**3.08**
R148	5	6	10	0.2	1.2	**34.55**	**5.76**
R149	4	6	10	0.2	1.2	**43.11**	**7.19**
R150	4	6	10	0.9	1.9	**9.58**	**4.54**
R151	4	6	10	0.2	1.2	**43.11**	**7.19**
R152	2	6	10	3.4	4.4	**5.06**	**3.91**
R153	3	6	10	2.2	3.2	**5.22**	**3.59**
R154	2	6	10	3.1	4.1	**5.55**	**4.20**
R155	3	6	10	2.4	3.4	**4.78**	**3.38**
R156	3	6	10	1.3	2.3	**8.83**	**4.99**
R157	3	6	10	1.3	2.3	**8.83**	**4.99**
R158	3	6	10	1	2.0	**11.48**	**5.74**
R159	3	6	10	1.3	2.3	**8.83**	**4.99**
R160	3	6	10	0.7	1.7	**16.40**	**6.75**
R161	3	6	10	0.9	1.9	**12.76**	**6.04**
R162	3	6	10	0.3	1.3	**38.27**	**8.83**
R163	3	6	10	1	2.0	**11.48**	**5.74**
R164	3	6	10	0.3	1.3	**38.27**	**8.83**
R165	3	6	10	0.2	1.2	**57.40**	**9.57**
R166	5	6	10	0.5	1.5	**13.82**	**4.61**
R167	5	6	10	1.9	2.9	**3.64**	**2.38**
R168	4	6	10	1.1	2.1	**7.84**	**4.11**
R169	3	6	10	2.4	3.4	**4.78**	**3.38**
R171	3	6	10	2.4	3.4	**4.78**	**3.38**
R172	3	6	10	1.4	2.4	**8.20**	**4.78**
R173	3	6	10	1.4	2.4	**8.20**	**4.78**
R174	3	6	10	1.3	2.3	**8.83**	**4.99**
R175	4	6	10	0.3	1.3	**28.74**	**6.63**
R176	3	6	10	1.8	2.8	**6.38**	**4.10**
R177	3	6	10	2.2	3.2	**5.22**	**3.59**
R178	5	6	10	1.3	2.3	**5.32**	**3.00**
R180	4	6	10	1.8	2.8	**4.79**	**3.08**
R181	4	6	10	1.6	2.6	**5.39**	**3.32**
R182	3	6	10	2.3	3.3	**4.99**	**3.48**
R183	3	6	10	1.9	2.9	**6.04**	**3.96**
R184	3	6	10	2	3.0	**5.74**	**3.83**
R185	4	6	10	2.2	3.2	**3.92**	**2.69**
R186	4	6	10	1.1	2.1	**7.84**	**4.11**
R187	4	6	10	2.8	3.8	**3.08**	**2.27**
R188	5	6	10	2.7	3.7	**2.56**	**1.87**
R189	5	6	10	0.5	1.5	**13.82**	**4.61**
R190	6	6	10	0.3	1.3	**19.24**	**4.44**
R191	5	6	10	0.2	1.2	**34.55**	**5.76**
R192	NO PEAT ENCOUNTERED AT THIS LOCATION						
R193	NO PEAT ENCOUNTERED AT THIS LOCATION						
R194	3	6	10	4.6	5.6	**2.50**	**2.05**
R195	3	6	10	3	4.0	**3.83**	**2.87**
R196	3	6	10	3.4	4.4	**3.38**	**2.61**
R197	3	6	10	3.7	4.7	**3.10**	**2.44**
R198	3	6	10	3	4.0	**3.83**	**2.87**
R199	4	6	10	2.8	3.8	**3.08**	**2.27**
PSA 001	1	6	10	1.90	2.9	**18.10**	**11.86**
PSA 002	1	6	10	1.70	2.7	**20.23**	**12.73**
PSA 003	1	6	10	1.90	2.9	**18.10**	**11.86**
PSA 004	1	6	10	2.00	3.0	**17.19**	**11.46**
PSA 005	1	6	10	2.80	3.8	**12.28**	**9.05**
PSA 006	4	6	10	0.40	1.4	**21.56**	**6.16**

Calculated FoS of Natural Peat Slopes for Lemanaghan Wind Farm - Undrained Analysis

Turbine No./Waypoint	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)
PSA 007	1	6	10	2.00	3.0	**17.19**	**11.46**
PSA 008	1	6	10	2.20	3.2	**15.63**	**10.75**
PSA 009	3	6	10	3.60	4.6	**3.19**	**2.50**
PSA 010	1	6	10	1.50	2.5	**22.92**	**13.75**
PSA 011	1	6	10	0.40	1.4	**85.96**	**24.56**
PSA 012	1	6	10	5.80	6.8	**5.93**	**5.06**
PSA 013	1	6	10	6.00	7.0	**5.73**	**4.91**
PSA 014	1	6	10	2.80	3.8	**12.28**	**9.05**
PSA 015	1	6	10	5.70	6.7	**6.03**	**5.13**
PSA 016	4	6	10	2.80	3.8	**3.08**	**2.27**
PSA 017	1	6	10	4.00	5.0	**8.60**	**6.88**
PSA 018	1	6	10	5.00	6.0	**6.88**	**5.73**
PSA 019	1	6	10	4.10	5.1	**8.39**	**6.74**
PSA 020	1	6	10	4.50	5.5	**7.64**	**6.25**
PSA 021	1	6	10	5.80	6.8	**5.93**	**5.06**
PSA 022	1	6	10	2.80	3.8	**12.28**	**9.05**
PSA 023	1	6	10	4.10	5.1	**8.39**	**6.74**
PSA 024	1	6	10	5.60	6.6	**6.14**	**5.21**
PSA 025	1	6	10	5.00	6.0	**6.88**	**5.73**
Substation	2	6	10	5.70	6.7	**3.02**	**2.57**
Telecomm. Tower	2	6	10	6.00	7.0	**2.87**	**2.46**
Steel Mast 1 (under OHL)	2	6	10	1.00	2.0	**17.20**	**8.60**
Steel Mast 2 (under OHL)	2	6	10	0.20	1.2	**86.01**	**14.34**
Steel Mast 3 (Beside substation)	2	6	10	5.30	6.3	**3.25**	**2.73**
Steel Mast 4 (beside substation)	2	6	10	5.20	6.2	**3.31**	**2.77**
Crane Pad (north)	2	6	10	0.6	1.6	**28.67**	**10.75**
Crane Pad (substation)	2	6	10	4.2	5.2	**4.10**	**3.31**
Tower Building (North)	2	6	10	3.0	4.0	**5.73**	**4.30**
Tower Building (substation)	2	6	10	3.5	4.5	**4.92**	**3.82**
Borrow Pit 1	5	6	10	0.2	1.2	**34.55**	**5.76**
Borrow Pit 2	5	6	10	0.2	1.2	**34.55**	**5.76**
Borrow Pit 3	3	6	10	0.3	1.3	**45.92**	**9.18**
Borrow Pit 4	3	6	10	0.2	1.2	**57.40**	**9.57**
Construction Compound 2	4	6	10	1.9	2.9	**4.54**	**2.97**
Construction Compound 3	3	6	10	2.2	3.2	**5.22**	**3.59**
Construction Compound 4	5	6	10	3.4	4.4	**2.03**	**1.57**
Construction Compound 5	3	6	10	4.6	5.6	**2.50**	**2.05**

Minimum =	**2.03**	**1.57**
Maximum =	**86.22**	**24.56**
Average =	**10.33**	**4.63**

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 6kPa was selected for the assessment. It should be noted that a cu of 6kPa for the peat is considered a conservative value for the analysis and is not representative of all peat present across the site. In reality the peat has a significantly higher undrained strength.

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

(6) For load conditions see report text.

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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 (2nd Edition, 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
	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.

Qualitative Factor	Type of Feature/Indicator for each Qualitative Factor [(1)]	Explanation/Description of Qualitative Factor
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 'Low' risk rating

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APPENDIX E

Preliminary Ground Investigation, FT 2021

Trial Pit Log

Trialpit No **TP1**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 615020.40 - 731136.49 Level:	Date 08/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6 Depth 4.00	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
▼	1.00	D					Soft light brown damp moss PEAT with branches and roots
				4.00			End of pit at 4.00 m

Remarks: Peat sample at 1m
Rate of water inflow: Medium
Terminated due to instability

Stability: Instability - collapse of walls

Trial Pit Log

Trialpit No **TP2**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 615413.73 - 730466.70 Level:	Date 08/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 x 1.6 Depth 4.30	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	2.00	D		4.30			Soft light brown spongy and damp moss PEAT with rootlets and branches. Higher concentration of vegetation from 3m End of pit at 4.30 m

1 2 3 4 5

Remarks: Peat sample at 2m
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP3**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 615215.96 - 730793.09 Level:	Date 08/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6, Depth 4.90	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Soft light brown damp moss PEAT with branches and roots
	2.00	D					
				4.70			
	4.80	B					Firm grey slightly gravelly CLAY. Gravel is coarse and sub-rounded
				4.90			End of pit at 4.90 m

Remarks:
Peat sample at 2m
Bulk bag sample at 4.8m
Rate of water inflow: Medium
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP4** Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 614894.38 - 731078.91 Level:	Date 09/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6, Depth 4.70	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	2.00	D					Soft light brown damp fibrous moss PEAT with rootlets and branches
				4.70			End of pit at 4.70 m

Remarks: Peat sample at 2m
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP5**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 612596.66 - 728119.21 Level:	Date 07/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6, Depth 4.60	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	1.00	D					Soft light brown damp moss PEAT with rootlets
				4.20			Soft grey gravelly CLAY. Gravel is coarse and sub-rounded
	4.40	B					
				4.60			End of pit at 4.60 m

1 2 3 4 5

Remarks: Peat sample at 1m
Bulk bag sample at 4.4m
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP6**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 612545.65 - 727943.21 Level:	Date 07/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6 Depth 4.50	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	1.50	D					Soft light brown damp, and spongy moss PEAT with rootlets and branches
▼				4.50			End of pit at 4.50 m

1 2 3 4 5

Remarks: Peat sample at 1.5m
Rate of water inflow: Slow
Terminated due to instability

Stability: Instability - collapse of walls

Trial Pit Log

Trialpit No **TP7**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 612496.01 - 727812.02 Level:	Date 07/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6 Depth 4.50	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	1.50	D					Soft light brown damp fibrous moss PEAT
▼				4.50			End of pit at 4.50 m

1 2 3 4 5

Remarks: Peat sample at 1.5m
Rate of water inflow: Slow
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP8**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 613882.98 - 727584.66 Level:	Date 07/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6 Depth 2.00	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
▼	1.00	D					Soft brown/ dark grey pseudo fibrous PEAT. Organic smell
				2.00			End of pit at 2.00 m

1 2 3 4 5

Remarks: Peat sample at 1m
Rate of water inflow: Rapid
Terminated due to instability

Stability: Instability - collapse of walls

Trial Pit Log

Trialpit No **TP9**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 613786.41 - 727425.20 Level:	Date 07/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6 Depth 4.00	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	1.00	D					Soft light brown damp moss PEAT
				4.00			End of pit at 4.00 m

Remarks: Peat sample at 1m
Rate of water inflow: Slow
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP10**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 613597.17 - 727357.58 Level:	Date 07/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6, Depth 3.60	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	1.50	D					Soft light brown damp moss PEAT with roots and branches
▼	3.50	B		3.40			Firm grey silty, gravelly CLAY with cobbles. Gravel is coarse and sub-rounded. Cobbles are sub-angular
				3.60			End of pit at 3.60 m

1
2
3
4
5

Remarks: Peat sample at 1.5m
Bulk bag sample at 3.5m
Rate of water inflow: Slow (trickle)
Terminated due to instability

Stability: Instability - collapse of walls

Trial Pit Log

Trialpit No **TP11** Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 615121.35 - 726494.87 Level:	Date 07/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6, Depth 4.00	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	1.50	D					Firm dark brown spongy pseudo fibrous PEAT
	3.50	B		3.20			Firm grey damp silty, gravelly CLAY. Gravel is coarse and sub-rounded
				4.00			End of pit at 4.00 m

Remarks: Peat sample at 1.5m
Bulk bag at 3.5m
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP12**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 615432.06 - 726691.52 Level:	Date 06/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6 Depth 4.30	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
							Firm dark brown damp spongy pseudo fibrous PEAT with roots and branches. Organic smell
▼	2.50	D					
				4.30			End of pit at 4.30 m

1 2 3 4 5

Remarks: Peat sample taken at 2.5m
Rate of water inflow: rapid
Terminated due to instability

Stability: Instability - collapse of walls

Trial Pit Log

Trialpit No **TP13** Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 615697.81 - 726868.57 Level:	Date 06/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 x 1.6 Depth 4.20	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	1.50	D					Firm dark brown damp, spongy pseudo fibrous PEAT with branches and roots. Organic smell
	4.00	B		3.70			Firm grey slightly silty, slightly gravelly CLAY. Gravel is sub-angular
				4.20			End of pit at 4.20 m

Remarks: Peat sample taken at 1.5m
Bulk bag sample taken at 4m
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP14**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 616866.35 - 728667.15 Level:	Date 06/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6 Depth 4.20	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	2.00	D					Firm dark brown spongy, damp pseudo fibrous PEAT
				4.20			End of pit at 4.20 m

1 2 3 4 5

Remarks: Peat sample taken at 2m
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP15** Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 616737.45 - 728576.44 Level:	Date 06/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 x 3.2, Depth 4.50	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	D		0.30			Firm dark brown damp pseudo fibrous PEAT
				0.50			Firm brown gravelly SILT. Gravel is sub-rounded
	3.00	B		4.50			Brown slightly gravelly, silty medium to coarse grained SAND with sub-rounded cobbles and sub-angular boulders. Large boulders from 1.5m End of pit at 4.50 m

Remarks: Peat sample taken at 0.2
Bulk bag sample taken at 3m
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP16**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 616691.21 - 728510.75 Level:	Date 06/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 x 1.6 Depth 2.50	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.20	D		0.20			Firm dark brown damp pseudo fibrous PEAT
				1.50			Grey slightly silty, gravelly medium grained SAND. Gravel is coarse and sub-rounded
	2.00	B		2.50			Grey silty, gravelly medium grained SAND with boulders. Gravel is coarse and sub-rounded. Boulders are sub-angular and approx. 1m in diameter
							End of pit at 2.50 m

1 2 3 4 5

Remarks: Peat sample taken at 0.2m
Bulk bag sample taken at 2m
Terminated due to obstruction (large boulders)

Stability: Stable

Trial Pit Log

Trialpit No **TP17**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 616171.95 - 728277.14 Level:	Date 06/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6, Depth 3.10	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	1.00	D					Firm dark brown spongy pseudo fibrous PEAT
				1.40			Firm grey slightly silty, slightly sandy CLAY. Sand is fine grained.
▼	2.50	B					
				2.90			Large sub-angular boulders
				3.10			End of pit at 3.10 m

Remarks:
Peat sample taken at 1m
Bulk bag sample taken at 2.5m
Rate of water inflow: Rapid
Terminated due to obstruction (large boulders)

Stability: Stable

Trial Pit Log

Trialpit No **TP18**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 616059.67 - 728247.39 Level:	Date 06/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6 Depth 3.20	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.50	D					Firm dark brown damp pseudo fibrous PEAT
▼				0.75			Grey slightly silty, gravelly fine to medium grained SAND. Gravels are sub-rounded.
	3.00	B		3.10			Large sub-angular boulders
				3.20			End of pit at 3.20 m

Remarks:
Peat sample taken at 0.5m
Bulk bag sample taken at 3m
Rate of water inflow: Rapid
Terminated due to obstruction (large boulders)

Stability: Stable

Trial Pit Log

Trialpit No **TP19**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 616012.43 - 728311.84 Level:	Date 06/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6 Depth 3.00	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	D		0.30			Firm dark brown, damp spongy pseudo fibrous PEAT.
				0.50			Firm grey slightly silty CLAY
▼	2.50	B					Grey silty, sandy fine to coarse GRAVEL with cobbles. Sand is medium to coarse grained. Gravel and cobbles are sub-rounded.
				3.00			End of pit at 3.00 m

1 2 3 4 5

Remarks: Peat sample taken at 0.2m.
Bulk bag sample taken at 2.5m.
Rate of water inflow: Medium
Terminated due to instability

Stability: Instability at 3m - Collapse of walls

Trial Pit Log

Trialpit No **TP20**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 616448.57 - 728382.87 Level:	Date 06/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 x 1.6 Depth 2.50	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.40	D		0.50			Firm, dark brown, damp, slightly gravelly PEAT
▼	2.50	B		2.50			Brown sandy, silty medium to coarse sub-rounded GRAVEL with cobbles. Sand is coarse grained and cobbles are sub-rounded. End of pit at 2.50 m

1 2 3 4 5

Remarks: Peat sample taken at 0.4m
Bulk bag sample taken at 2.5m
Rate of water inflow: Rapid
Terminated due to instability

Stability: Instability at 2.5 (Collapse of walls)

Trial Pit Log

Trialpit No **TP21**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 614735.10 - 726222.90 Level:	Date 07/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6 Depth 3.80	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
▼	1.50	D					Soft dark brown spongy, wet pseudo fibrous PEAT with branches
				3.80			End of pit at 3.80 m

Remarks: Peat sample at 1.5m
Rate of water inflow: Medium
Terminated due to instability

Stability: Instability - collapse of walls

Trial Pit Log

Trialpit No **TP22**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 614923.34 - 730812.56 Level:	Date 09/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6, Depth 4.80	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Soft light brown damp fibrous moss PEAT with branches
▼	2.00	D					
	4.70	B		4.60 4.80			Firm grey slightly sandy gravelly CLAY. Gravel is coarse and sub-rounded End of pit at 4.80 m

1 2 3 4 5

Remarks:
Peat sample at 2m
Bulk bag sample at 4.7m
Rate of water inflow: slow
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP23**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 615083.48 - 730557.75 Level:	Date 09/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6, Depth 4.00	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	1.50	D					Soft light brown damp fibrous moss PEAT with rootlets and branches
				3.80			
	4.00	B		4.00			Firm grey slightly silty sandy gravelly CLAY with cobbles. Gravel is coarse and sub-rounded. Cobbles are sub-rounded End of pit at 4.00 m

1 2 3 4 5

Remarks:
Peat sample at 1.5m
Bulk bag sample at 4m
Rate of water inflow: Slow
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP24**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 614967.02 - 731105.72 Level:	Date 08/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 x 1.6 Depth 4.20	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
							Soft light brown wet moss PEAT with roots and branches. Organic smell
▼	3.00	D					
				4.20			End of pit at 4.20 m

1 2 3 4 5

Remarks: Peat sample at 3m
Rate of water inflow: Slow
Terminated due to instability

Stability: Instability - collapse of walls

Trial Pit Log

Trialpit No **TP25** Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 614928.48 - 731181.63 Level:	Date 08/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 x 1.6 Depth 4.80	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	2.00	D					Soft light brown damp fibrous moss PEAT. Organic smell
▼				4.80			End of pit at 4.80 m

1 2 3 4 5

Remarks: Peat sample at 2m
Rate of water inflow: Medium
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP26**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 614987.27 - 731195.42 Level:	Date 08/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6, Depth 4.60	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
▼	4.00	D		4.60			Soft light brown damp fibrous moss PEAT with rootlets and branches End of pit at 4.60 m

1 2 3 4 5

Remarks: Peat sample at 4m
Rate of water inflow: Slow
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP27** Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 615048.66 - 731209.52 Level:	Date 08/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 x 1.6 Depth 4.00	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	1.00	D					Firm dark brown pseudo fibrous PEAT
	3.90	B		3.80 4.00			Soft grey silty slightly gravelly CLAY. Gravel is sub-rounded and coarse End of pit at 4.00 m

Remarks: Peat sample at 1m
Bulk bag at 3.9m
Terminated due to end of reach of bucket

Stability: Stable

Trial Pit Log

Trialpit No **TP28**

Sheet 1 of 1

Project Name: Lemanaghan WF	Project No. P20-216	Co-ords: 615079.44 - 731130.80 Level:	Date 08/04/2021
Location: Co. Offaly		Dimensions (m): 3.4 × 1.6, Depth 4.50	Scale 1:25
Client: Bord na Mona			Logged EA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
							Soft light brown damp fibrous moss PEAT
	2.00	D					
				4.20			Firm grey silty slightly sandy gravelly CLAY. Gravel is coarse and sub-angular
	4.40	B		4.50			End of pit at 4.50 m

Remarks: Peat sample at 2m
Bulk bag sample at 4.4m
Terminated due to end of reach of bucket

Stability: Stable

FEHILY TIMONEY

DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

APPENDIX F

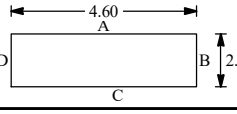
Infrastructure Ground Investigation, IDL (2022)

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T01**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**
ENGINEER: FTCO	**E N**
Rig: Hitachi 12T Tracked	
Rev: DRAFT	
Ground level: m O.D.	**DATE: 23.3.22**

GROUNDWATER

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

PIT DIRECTION: 090-270
PIT DIMENSION: 2.20 * 4.60m
LOGGED BY: MM



Shoring/Support: N/A
Stability: Pit becoming unstable with depth.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									Firm brown fibrous PEAT. H2 B3 R2 W1 TV2 TH2.
1			B 1	1.00-1.50					
2									1.90m: W3.
3									
4								4.20	
			B 2	4.20-4.60					Soft damp bluish grey CLAY.
								4.60	
						END			TP terminated at 4.60m bgl. Unable to progress TP - sidewall collapse.
5									

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:25

irish drilling

Ph.
Fax

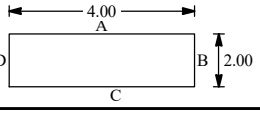
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm		**TRIALPIT: TP-T02**
LOCATION: Co Offaly		**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**	**Rig: Hitachi 12T Tracked**
ENGINEER: FTCO	**E N**	**Rev: DRAFT**
Ground level: m O.D.		**DATE: 23.3.22**

GROUNDWATER

Water strikes: Rose to after:
1st: 3.00m 10min 2.40m
2nd:
3rd:

PIT DIRECTION: 090-270
PIT DIMENSION: 2.00 * 4.00m
LOGGED BY: MM



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.09	Spongy black pseudo fibrous PEAT. H7 B2 F1 W0 TV2 TH2 A0.
									Firm brown fibrous PEAT. H2 B4 F1 W2 A2.
1			B 1	1.00-1.60					
								1.60	
			B 2	1.60-3.00					Soft damp greyish blue slightly gravelly SILT.
2		1							2.00m: firm. 2.20m: large boulder or rock at eastern side of TP.
3								3.00	3.00m: large boulder or rock at western side of TP.
						END			TP terminated at 3.00m bgl. Obstruction as large boulder or rock.
4									
5									

Remarks: Ingress of water at 3.00m bgl from northern corner of TP. TP backfilled with arisings.

Scale: 1:25

irish drilling

Ph.
Fax

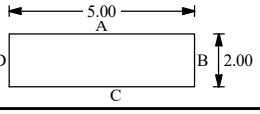
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T03**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**
ENGINEER: FTCO	**E N**
	Rig: Hitachi 12T Tracked
	Rev: DRAFT
Ground level: m O.D.	**DATE: 23.3.22**

GROUNDWATER

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

PIT DIRECTION: 090-270
PIT DIMENSION: 2.00 * 5.00m
LOGGED BY: MM



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.20	Firm black fibrous PEAT. H3.
									Firm brown fibrous PEAT. H2 B3 R2 TV2 TH2.
1			B 1	1.00-1.50					
2									2.50m: W3.
3								3.10	
			B 2	3.10-3.80					Soft damp bluish grey slightly sandy CLAY.
								3.80	
						END			TP terminated at 3.80m bgl. Maximum reach of excavator.
4									
5									

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:25

irish drilling

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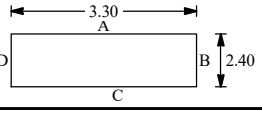
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T04**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**
ENGINEER: FTCO	**E 615,300.0 N 727,133.0**
Rig: Hitachi 12T Tracked	
Rev: DRAFT	
Ground level: m O.D.	**DATE: 28.3.22**

GROUNDWATER

Water strikes: **Rose to after:**
1st: 2.50m
2nd:
3rd:

PIT DIRECTION: 000-180
PIT DIMENSION: 2.40 * 3.30m
LOGGED BY: MM



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								0.40	Grass and moss over PEAT.
								2.00	Orangish grey sandy gravelly SILT with medium cobble content and medium boulder content.
		1						2.50	Wet bluish grey silty sandy rounded to subrounded fine to coarse GRAVEL with high cobble content and medium boulder content. Cobbles are rounded to subrounded. Boulders are rounded to subrounded
			B 1	2.50		END			TP terminated at 2.50m bgl. Unable to progress TP - sidewall collapse and ingress of water.
1									
2									
3									
4									
5									

Remarks: Basal ingress of water at 2.50m bgl. TP backfilled with arisings.

Scale: 1:25

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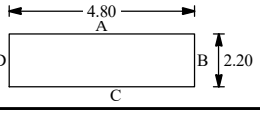
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T05**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**
ENGINEER: FTCO	**E N**
Rig: Hitachi 12T Tracked	
Rev: DRAFT	
Ground level: m O.D.	**DATE: 28.3.22**

GROUNDWATER

Water strikes: **Rose to after:**
1st: 3.00m
2nd:
3rd:

PIT DIRECTION: 045-225
PIT DIMENSION: 2.20 * 4.80m
LOGGED BY: MM



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									
			B 1	0.50-0.90				0.60	Firm black fibrous PEAT. H3.
1								1.10	Firm brown fibrous PEAT. H2 B3 F2 R2 W1 A1.
									Soft damp bluish grey CLAY interbedded with layer of sandy gravelly silt. Gravel is rounded to subrounded fine to medium.
2			B 2	2.00-2.30					
		▼1						3.00	
3						END			TP terminated at 3.00m bgl. Obstruction as possible large boulder or rock.
4									
5									

Remarks: Ingress of water at 2.90m bgl. TP backfilled with arisings.

Scale: 1:25

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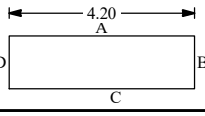
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T06**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**
ENGINEER: FTCO	**E N**
	Rig: Hitachi 12T Tracked
	Rev: DRAFT
Ground level: m O.D.	**DATE: 23.3.22**

GROUNDWATER

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

PIT DIRECTION: 090-270
PIT DIMENSION: 2.00 * 4.20m
LOGGED BY: MM



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									Heather and grass over spongy black pseudo fibrous PEAT. H7 B3 F0 R1 W0 A3.
								1.40	
			B 1	1.40-2.00					Firm brown fibrous PEAT. H3 B2 F2 R2 W2 TV2 TH2 A2.
3									2.90m: W3.
								3.30	
									Calcareous SILT/MARL.
			B 2	3.50-4.00				3.50	Soft bluish grey CLAY.
4								4.00	
									END TP terminated at 4.00m bgl. Unable to progress TP - sidewall collapse.
5									

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:25

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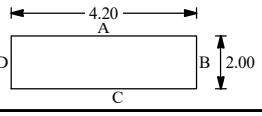
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T07**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**
ENGINEER: FTCO	**E N**
Rig: Hitachi 12T Tracked	
Rev: DRAFT	
Ground level: m O.D.	**DATE: 24.3.22**

GROUNDWATER

Water strikes: Rose to after:
1st: 3.60m
2nd:
3rd:

PIT DIRECTION: 090-270
PIT DIMENSION: 2.00 * 4.20m
LOGGED BY: MM



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.20	Firm black fibrous PEAT. H3 B2 F1 W0 TV2 TH2.
			B 1	0.20-1.00					Firm orangish brown fibrous PEAT. H2 B4 F1 W2 A2.
1									
2								3.00	
3			B 2	3.00-3.50				3.60	Soft bluish grey CLAY.
		▼						4.00	Subrounded to rounded siltstone BOULDERS. Boulders are up to 1500mm in length.
4						END			TP terminated at 4.00m bgl. Obstruction as probable rock or large boulders.
5									

Remarks: Ingress of water at 3.60m bgl. TP backfilled with arisings.

Scale: 1:25

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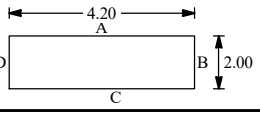
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T07A**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**
ENGINEER: FTCO	**E N**
	Rig: Hitachi 12T Tracked
	Rev: DRAFT
Ground level: m O.D.	**DATE: 24.3.22**

GROUNDWATER

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

PIT DIRECTION: 090-270
PIT DIMENSION: 2.00 * 4.20m
LOGGED BY: MM



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.50	Firm black fibrous PEAT. H3.
								1.90	Firm blackish brown fibrous PEAT. H3 B3 R2 W1 TV2 TH2. 1.50m: W3.
1			B 1	1.00-1.50					
2			B 2	2.00-2.60				2.20	Soft damp slightly sandy gravelly CLAY. Gravel is rounded to subrounded fine to coarse of siltstone.
								2.60	Stiff bluish grey sandy gravelly CLAY with medium cobble content. Gravel is rounded to subrounded fine to coarse of siltstone. Cobbles are rounded to subrounded of siltstone.
						END			TP terminated at 2.60m bgl. Unable to progress TP.
3									
4									
5									

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:25

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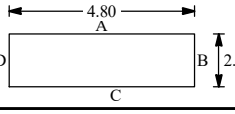
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T08**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**
ENGINEER: FTCO	**E N**
	Rig: Hitachi 12T Tracked
	Rev: DRAFT
Ground level: m O.D.	**DATE: 24.3.22**

GROUNDWATER

Water strikes: **Rose to after:**
1st: 2.80m
2nd:
3rd:

PIT DIRECTION: 270-090
PIT DIMENSION: 2.00 * 4.80m
LOGGED BY: MM



Shoring/Support: N/A
Stability: Pit unstable. Sidewall collapse from 1.70m to 3.70m bgl.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.20	Firm black fibrous PEAT. H2 B3 F1 R3 W0 A0.
									Firm brown fibrous PEAT. H3 B2 F1 R1 TV1 TH1 A2.
1			B 1	1.00-1.50					1.50m: H2.
								1.70	
			B 2	1.70-2.00					Soft damp bluish grey slightly sandy gravelly clayey SILT with medium cobble content. Gravel is rounded to subrounded fine to coarse of siltstone. Cobbles are rounded to subrounded.
2								2.70	
		▼							Wet greyish blue silty sandy rounded to subangular fine to coarse GRAVEL with high cobble content. Sand is coarse. Cobbles are rounded to subangular of siltstone.
3			B 3	3.00-3.40				3.70	
						END			TP terminated at 3.70m bgl. Unable to progress TP due to ingress of water.
4									
5									

Remarks: Ingress of water at 2.80m bgl. TP backfilled with arisings.

Scale: 1:25

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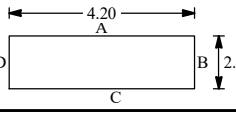
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T09**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates: E N**
ENGINEER: FTCO	**Rig: Hitachi 12T Tracked**
Ground level: m O.D.	**Rev: DRAFT**
	DATE: 24.3.22

GROUNDWATER

Water strikes: Rose to after:
1st: 1.70m
2nd:
3rd:

PIT DIRECTION: 000-180
PIT DIMENSION: 2.00 * 4.20m
LOGGED BY: MM



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								0.50	Firm black fibrous PEAT. H3.
								1.10	Soft damp bluish grey slightly sandy slightly gravelly silty CLAY with high cobble content and high boulder content. Cobbles are rounded to subrounded of siltstone. Boulders are rounded to subrounded of siltstone.
1			B 1	1.10-1.70				1.70	Wet bluish grey gravelly silty medium to coarse SAND. Gravel is rounded to subrounded fine to coarse of siltstone.
						END			TP terminated at 1.70m bgl. Unable to progress TP due to ingress of water.
2									
3									
4									
5									

Remarks: Basal ingress of water at 1.70m bgl. TP backfilled with arisings.

Scale: 1:25

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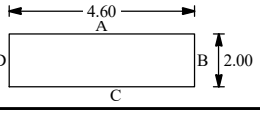
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm		**TRIALPIT: TP-T10**
LOCATION: Co Offaly		**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**	**Rig: Hitachi 12T Tracked**
ENGINEER: FTCO	**E N**	**Rev: DRAFT**
Ground level: m O.D.		**DATE: 24.3.22**

GROUNDWATER

Water strikes: **Rose to after:**
1st: 3.70m
2nd:
3rd:

PIT DIRECTION: 000-180
PIT DIMENSION: 2.00 * 4.60m
LOGGED BY: MM



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.30	Firm black fibrous PEAT. H3 B3 F1 R3 W0 A0.
									Firm brown fibrous PEAT. H3 B2 F1 R1 TV1 TH1 A2.
1			B 1	1.00-1.50					
									1.80m: blackish brown W3.
2								2.30	
			B 2	2.30-3.00					Soft greyish blue organic SILT.
3								3.30	
			B 3	3.30-3.70					Wet greyish blue gravelly silty coarse SAND with medium cobble content and medium boulder content. Gravel is fine to medium.
		▼1						3.70	
						END			TP terminated at 3.70m bgl. Unable to progress TP due to ingress of water.
4									
5									

Remarks: Basal ingress of water at 3.70m bgl. TP backfilled with arisings.

Scale: 1:25

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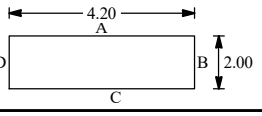
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm		**TRIALPIT: TP-T11**
LOCATION: Co Offaly		**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**	**Rig: Hitachi 12T Tracked**
ENGINEER: FTCO	**E N**	**Rev: DRAFT**
Ground level: m O.D.		**DATE: 24.3.22**

GROUNDWATER

Water strikes: **Rose to after:**
1st: 0.60m
2nd:
3rd:

PIT DIRECTION: 135-315
PIT DIMENSION: 2.00 * 4.20m
LOGGED BY: MM



Shoring/Support: N/A
Stability: Pit unstable. Sidewall collapse from 1.50m to 3.00m bgl.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.60	Spongy black pseudo fibrous PEAT. H4 B2 F0 R1 W2.
		1						1.50	Firm brown fibrous PEAT. H2 and H3.
1			B 1	1.00-1.30					
			B 2	1.50-2.00				3.00	Firm wet greyish blue gravelly sandy silty CLAY with low cobble content and low boulder content. Sand is medium. Gravel is rounded to subrounded fine to medium.
2									
3									**END** TP terminated at 3.00m bgl. Unable to progress TP - obstruction as large boulder and ingress of water.
4									
5									

Remarks: Ingress of water from peat at 0.60m bgl. TP backfilled with arisings.

Scale: 1:25

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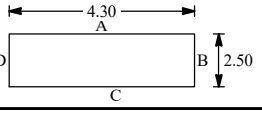
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T12**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**
ENGINEER: FTCO	**E N**
Ground level: m O.D.	**Rig: Hitachi 12T Tracked**
	Rev: DRAFT
	DATE: 28.3.22

GROUNDWATER

Water strikes: **Rose to after:**
1st: 1.05m
2nd:
3rd:

PIT DIRECTION: 225-045
PIT DIMENSION: 2.50 * 4.30m
LOGGED BY: MM



Shoring/Support: N/A
Stability: Pit unstable. Sidewall collapse from g/l to 0.60m bgl.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									Firm black fibrous PEAT. H3 B3 F1 R1.
									0.40m: brown.
								0.60	
									Soft creamish grey calcareous SILT/MARL.
1		▼							
			B 1	1.20-1.50				1.20	
									Soft greyish blue organic CLAY.
2									
									2.70m: firm.
3								3.70	
						END			TP terminated at 3.70m bgl. Unable to progress TP - sidewall collapse.
4									
5									

Remarks: Basal ingress of water at 3.70m bgl. TP backfilled with arisings.

Scale: 1:25

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TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

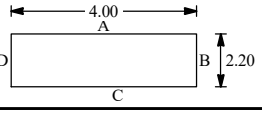
PROJECT: Lemanaghan Wind Farm
LOCATION: Co Offaly
TRIALPIT: TP-T12A
Sheet 1 of 1

CLIENT: Bord na Mona
ENGINEER: FTCO
Co-ordinates: E N
Rig: Hitachi 12T Tracked
Rev: DRAFT

Ground level: m O.D.
DATE: 28.3.22

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

PIT DIRECTION: 090-270
PIT DIMENSION: 2.20 * 4.00m
LOGGED BY: MM



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.20	Spongy black pseudo fibrous PEAT. H4.
								1.00	Firm blackish brown fibrous PEAT. H3.
1			B 1	1.00-1.30				1.70	Soft creamish grey calcareous SILT/MARL.
			B 2	1.70-2.00				3.50	Soft bluish grey CLAY.
						END			TP terminated at 3.50m bgl. Unable to progress TP - excavator sinking into peat.
2									
3									
4									
5									

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:25

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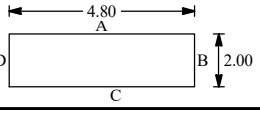
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T12B**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**
ENGINEER: FTCO	**E N**
Rig: Hitachi 12T Tracked	
Rev: DRAFT	
Ground level: m O.D.	**DATE: 28.3.22**

GROUNDWATER

Water strikes: Rose to after:
1st: 2.00m
2nd:
3rd:

PIT DIRECTION: 090-270
PIT DIMENSION: 2.00 * 4.80m
LOGGED BY: MM



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.06	Spongy black pseudo fibrous PEAT. H4.
									Spongy blackish brown pseudo fibrous PEAT. H4 B2 F1 R1 W1.
1			B 1	1.00					
								1.80	
		1							Siltstone BOULDERS. Boulders are up to 1500mm in length.
2								2.00	
						END			TP terminated at 2.00m bgl. Obstruction as large boulder or rock.
3									
4									
5									

Remarks: Ingress of water at 2.00m bgl. TP backfilled with arisings.

Scale: 1:25

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TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

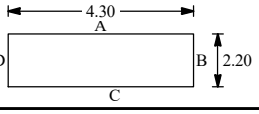
PROJECT: Lemanaghan Wind Farm
LOCATION: Co Offaly
TRIALPIT: TP-T13
Sheet 1 of 1

CLIENT: Bord na Mona
ENGINEER: FTCO
Co-ordinates: E N
Rig: Hitachi 12T Tracked
Rev: DRAFT

Ground level: m O.D.
DATE: 28.3.22

GROUNDWATER
Water strikes: Rose to after:
1st: 2.00m
2nd:
3rd:

PIT DIRECTION: 045-225
PIT DIMENSION: 2.20 * 4.30m
LOGGED BY: MM



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0								0.20	Firm black fibrous PEAT. H3.
			B 1	0.20-1.00				1.30	Spongy brown pseudo fibrous PEAT. H4 B3 F1 R1 W1.
			B 2	1.30-2.00				2.00	Damp bluish grey sandy silty rounded to subrounded fine to coarse GRAVEL with high cobble content and high boulder content. Sand is medium. Cobbles are rounded to subrounded of siltstone. Boulders are rounded to subrounded of siltstone.
2		1				END			TP terminated at 2.00m bgl. Obstruction as boulders.
3									
4									
5									

Remarks: Ingress of water at 2.00m bgl. TP backfilled with arisings.

Scale: 1:25

irish drilling
Ph.
Fax

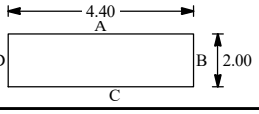
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T14**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**
ENGINEER: FTCO	**E N**
Rig: Hitachi 12T Tracked	
Rev: DRAFT	
Ground level: m O.D.	**DATE: 28.3.22**

GROUNDWATER

Water strikes: **Rose to after:**
1st: 2.70m
2nd:
3rd:

PIT DIRECTION: 045-225
PIT DIMENSION: 2.00 * 4.40m
LOGGED BY: MM



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			B 1	0.20-1.30					Spongy black pseudo fibrous PEAT. H4.
1									1.00m: W2.
								1.30	
			B 2	1.30-1.80					Boulder or possible rock on SW of TP.
								1.80	
2									Soft bluish grey silty CLAY.
		1						2.70	
						END			TP terminated at 2.70m bgl. Obstruction as boulders.
3									
4									
5									

Remarks: Ingress of water at 2.70m bgl. TP backfilled with arisings.

Scale: 1:25

irish drilling

Ph.
Fax

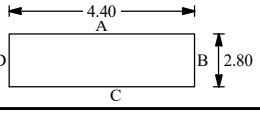
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T14A**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates:**
ENGINEER: FTCO	**E N**
	Rig: Hitachi 12T Tracked
	Rev: DRAFT
Ground level: m O.D.	**DATE: 28.3.22**

GROUNDWATER

Water strikes: **Rose to after:**
1st: 1.90m
2nd:
3rd:

PIT DIRECTION: 045-225
PIT DIMENSION: 2.80 * 4.40m
LOGGED BY: MM



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			B 1	0.20-0.60				0.80	Firm black fibrous PEAT. H3.
			B 2	0.80-1.20				1.70	Soft greyish blue silty CLAY with medium boulder content. Boulders are of siltstone.
		1						1.90	Stiff gravelly SILT.
2						**END**			TP terminated at 1.90m bgl. Obstruction as possible boulders.
3									
4									
5									

Remarks: Basal ingress of water at 1.90m bgl. TP backfilled with arisings.

Scale: 1:25

irish drilling

Ph.
Fax

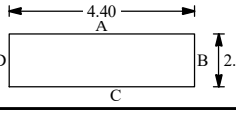
TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TP-T15**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: Bord na Mona	**Co-ordinates: E N**
ENGINEER: FTCO	**Rig: Hitachi 12T Tracked**
Ground level: m O.D.	**Rev: DRAFT**
	DATE: 23.3.22

GROUNDWATER

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

PIT DIRECTION: 225-045
PIT DIMENSION: 2.50 * 4.40m
LOGGED BY: MM



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								0.20	Firm black fibrous PEAT. H3.
									Firm brown fibrous PEAT. H3 B2 F1 R1 W3 TV1 TH1 A1.
1			B 1	1.00-1.80					
2									
3			B 2	3.10-3.80					3.10m: W2.
4								4.40	
						END			TP terminated at 4.40m bgl. Unable to progress TP - sidewall collapse.
5									

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:25

irish drilling

Ph.
Fax

TRIAL PIT VANE & WL RISES LEMANAGAHAN WF TPS FILE 1 APRIL 7 2022.GPJ IRISHDRL.GDT 7/4/22

FEHILY TIMONEY

DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

APPENDIX G

Infrastructure Ground Investigation, IDL (2024)

IRISH DRILLING LIMITED

LOUGHREA, CO. GALWAY, IRELAND

CONTRACT DRILLING
SITE INVESTIGATION

Phone: (091) 841 274
Fax: (091) 847 687

email: info@irishdrilling.ie

LEMANAGHAN WIND FARM PHASE 3

SITE INVESTIGATION CONTRACT FACTUAL REPORT

MKO,
Tuam Road,
Galway,
H91 VW84.

Fehily Timoney & Company,
Consulting Engineers,
Unit 6,
Bagenalstown Industrial Park,
Royal Oak Road,
Bagenalstown,
Co. Carlow,
R21 XW81.

	Prepared by	Approved by	Rev. Issue Date:	Revision No.
	Ronan Killeen	Declan Joyce	9th February 2024	23 _OY_108/02
Signature				

FOREWORD

The borehole and 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 borehole and 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 boreholes and trial pits.

The fieldwork was carried out in accordance with IS EN 1997-2 and BS5930:2015+A1:2020 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 Lemanaghan 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 October 24th 2023 and was completed on November 24th 2023.

2.0 Site & Geology

The site is located near Ferbane, County Offaly.

The site is agricultural in nature and the fieldwork was carried out predominantly on peatlands owned by Bord na Mona.

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. LD400 Tracked Rotary Core Drilling Rig.
1nr Hitachi 130 Wide-Tracked Excavator.

Fieldwork carried out to date has included the following:

Ten rotary core boreholes were carried out to establish overburden conditions and rockhead and to establish the nature and integrity of the underlying rock.

The rotary core boreholes were carried out as 'stand-alone' rotary core boreholes using wireline drilling techniques to recover soil and rock core samples.

HQ size drill strings ((64mm core diameter, 96mm hole diameter) were used to recover soil and/or rock core samples.

A water based flush system was used as the drilling medium while a biodegradable polymer gel was also used where necessary to aid the drilling and soil / rock recovery process.

The samples were stored in wooden boxes and returned to the laboratory where there were logged and photographed by a Geotechnical Engineer and presented for testing.

In-situ testing consisting of Standard Penetration Tests were carried out in the overburden in a number of boreholes at regular intervals.

A 50mm diameter standpipe was installed in the following boreholes and as instructed by the Client's Engineer, to allow for monitoring of groundwater levels over a prolonged period of time: BH BP01, BH SS01, BH SS03, BH T01, BH T03, BH T06, BH T12 and BH T15.

The rotary core boreholes were carried out to depths ranging from 8.50m to 19.20m below ground level.

Detailed engineering logs for the rotary core boreholes completed are included with this report in Appendix 1.

Groundwater readings were recorded on February 8th 2024 using a manual hand-held dip meter and the records of same are included as Appendix 2A.

Sixteen 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.

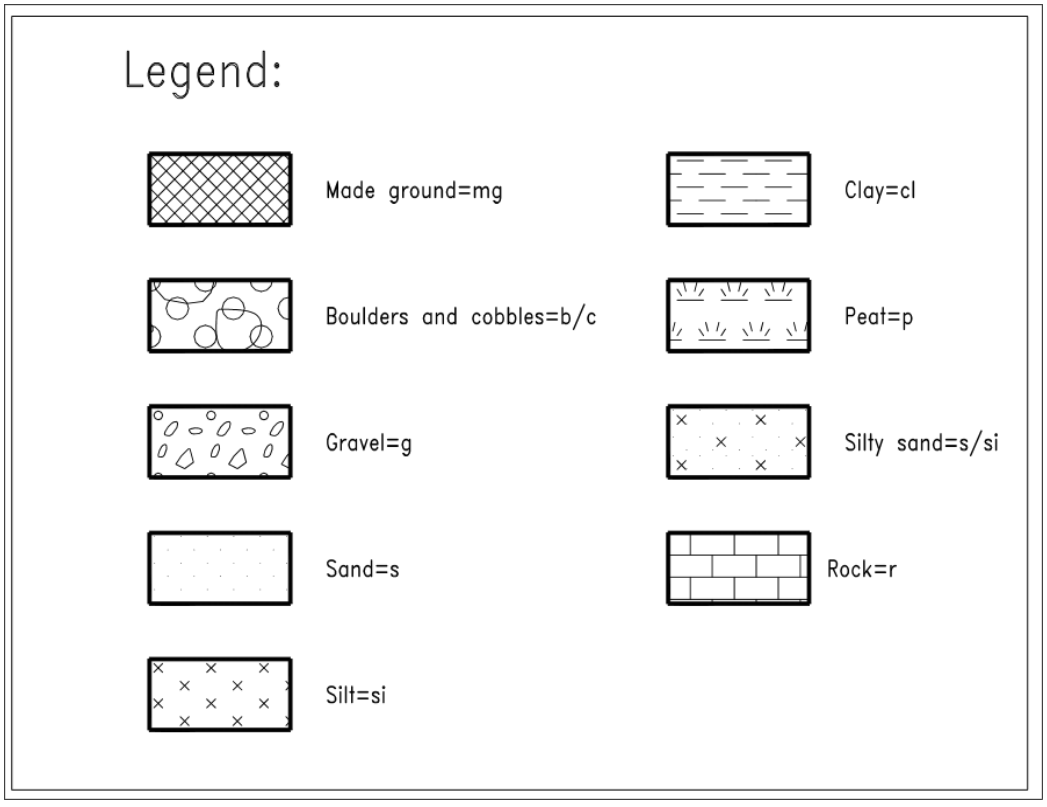
Small and bulk disturbed soil samples were recovered at each change in strata and returned to the laboratory and presented for testing.

In-Situ tests consisting of shear vane tests were also carried out where possible in cohesive soils and a summary of the shear vane test results are included on the trial pit logs.

The pits were excavated to depths ranging from 1.70m to 4.90m below ground level.

Detailed engineering logs for the trial pits completed are included with this report in Appendix 2.

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 bluish grey slightly sandy silt/clay and/or silty clayey sands and gravels and/or slightly gravelly sandy silt/clay with cobbles and boulders.

Soft brown peat was also encountered in many of the trial pits at depths ranging from 0.20m to 4.90m below ground level.

Intact bedrock was encountered in the rotary core boreholes at depths varying from 1.70m to 15.70m below ground level.

Weathered bedrock was also encountered in a number of the boreholes at shallower depths. Bedrock in general is described as strong locally very strong thinly bedded fine to coarse-grained limestone.

For detailed descriptions of the ground conditions encountered please refer to the engineering logs included as Appendix 1 and Appendix 2 of this report.

The fieldwork was carried out in accordance with IS EN 1997-2 and BS5930:2015+A1:2020 Code of Practice for Site Investigations with precedence given to IS EN 1997-2 where applicable.

The borehole and trial pit locations were set out on site using a Trimble CU Bluetooth GPS Surveying Unit and the co-ordinates are included on the logs presented in the appendices.

All fieldwork co-ordinates are reported to Irish Transverse Mercator (ITM) with Reduced Levels recorded relative to Malin Head Datum and with an accuracy level of + or – 0.10m.

4.0 Laboratory Testing

Representative samples recovered from the boreholes and trial pits 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.
* Sedimentation.
* Organic Content.
* Chemical (BRE SD1 Suite B).
* Chemical (Chloride Content).
* Compaction.

The test schedules included some or all of the following tests on rock core samples:

* Point Load.
* UCS.
* Natural Water Content.
* Slake Durability.
* Water Absorption.
* Magnesium Sulphate Soundness.
* LA Abrasion.

The test schedules were carried out predominantly at the IDL Laboratory located at Loughrea, County Galway.

A number of specialist tests not available at the IDL laboratory were carried out by designated laboratories on a subcontract basis as follows:

Laboratory chemical tests were carried out by Alcontrol Laboratories, UK.
Specialist rock tests (Magnesium Sulphate Soundness and LA Abrasion) Tests were carried out by Structural Soils Laboratories, UK.

Soil samples in general were recovered from the excavation of trial pits. Rock core samples were recovered from the completion of rotary core boreholes and the records of soil and rock core laboratory test results carried out on same are reported in Appendix 3.

The soil and rock descriptions as noted on the borehole and 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+A1:2020 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 BS5930:2015+A1:2020.

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
Chartered Engineer
Irish Drilling Limited
February 9th 2024

Appendix 01
Borehole Records
(Rotary Core)

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHBP1**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	14-11-23 14-11-23	54.16	E 615,975.0 N 728,983.4

Engineer	Sheet	Status
FTCO	1 of 1	FINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
0.00						0.00 - 1.70 : overburden.		Open hole drilling. No recovery.	
	- - -				(1.50)				
1.50			52.66		1.50				
			52.46		1.70			Subangular fine and medium assorted grey limestone GRAVEL with a little brown clay.	
	100 (71) 31	6				1.70 - 8.50 Discontinuities, medium spaced, locally very closely and closely spaced, dipping 8 to 10°, stepped, rough, with 0.5 to 1mm thick grey silt smear.		Strong locally very strong thinly bedded grey and dark grey sparry bioclastic fine and coarse grained LIMESTONE.	
2.50		6				2.10 - 2.25 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick grey silt smear, open.			
	100 (97) 95	5							
4.10									
	100 (97) 95	4			(6.80)			4.60-4.70m: weak. 4.70m: medium strong.	
5.50		3							
	100 (97) 95	3							
7.10									
	100 (97) 96	3							
14.11 8.50		1	45.66		8.50				

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
14/11/23	16.00	8.50	1.50	96			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	8.5	Water	100

GENERAL REMARKS

50mm standpipe installed. BH terminated at 8.50m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHSS1**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	08-11-23 08-11-23	56.61	E 614,879.4 N 730,982.5

Engineer	Sheet	Status
FTCO	1 of 2	FINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
0.00						0.00 - 11.20 : overburden.		Open hole drilling. No recovery. Drillers Comment: PEAT.	
	- - -				(3.00)				
3.00		3.00 (0)	53.61		3.00			Very soft black amorphous PEAT.	
	4 - -				(4.10)				
5.60		5.60 (0)							
	13 - -								
7.10		7.10 (5)	49.51		7.10			Loose grey slightly sandy peaty very clayey medium GRAVEL. Sand is fine.	
	33 - -				(1.40)				
8.60		8.60 (50/235mm)	48.11		8.50			Subrounded to subangular fine to coarse assorted light grey and dark grey limestone GRAVEL with some grey slightly sandy gravelly silt. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of assorted light grey and dark grey limestone.	
	40 - -				(2.70)				

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
			3.00	96				0	3.4	Water	100	50mm standpipe installed. BH terminated at 14.60m bgl on REs instruction.
								3.4	14.6	Water	0	

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHSS1**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	08-11-23 08-11-23	56.61	E 614,879.4 N 730,982.5

Engineer	Sheet	Status
FTCO	2 of 2	FINAL

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
10.10	93 (31) 25		45.41		11.20				
11.60	100 (98) 84	12 8			(3.40)	11.20 - 14.60 Discontinuities, medium spaced, locally closely spaced, dipping 10 to 12°, stepped, rough, with 0.5 to 1mm thick grey silt smear. 11.45 - 11.45 weak fissile. 11.86 - 11.86 weak fissile. 12.15 - 12.20 Joint, dipping 45°, stepped, rough, with 0.5 to 1mm thick grey silt smear, open.		Very strong locally strong thinly bedded grey and dark grey bioclastic fine and medium grained LIMESTONE with rounded fine and medium gravel sized fine grained chert nodules.	
13.10	100 (98) 91	6				12.60 - 12.60 medium strong silty dark grey.			
08.11 14.60		3	42.01		14.60	14.30 - 14.35 Joint, dipping 45°, stepped, rough, with 0.5 to 1mm thick grey silt smear, open.			

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
08/11/23	16.00	14.60					

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm standpipe installed. BH terminated at 14.60m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHSS2**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	24-11-23 24-11-23	55.89	E 614,948.7 N 731,048.7

Engineer	Sheet	Status
FTCO	1 of 2	FINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
0.00						0.00 - 9.80 : overburden.		Open hole drilling. No recovery. Drillers Comment: PEAT.	
	-				(4.00)				
4.00		4.00 (0)	51.89		4.00			Very soft black amorphous PEAT.	
	100				(1.00)				
	-		50.89		5.00			Firm dark blackish grey slightly sandy SILT. Sand is fine.	
5.60		5.60 (9)			(1.50)				
	53		49.39		6.50			Subrounded to subangular fine to coarse assorted light grey and dark grey limestone GRAVEL with cobbles. Cobbles are of assorted light grey and dark grey limestone.	
7.10		7.10 (23)				medium dense.			
	53				(3.30)				
8.60		8.60 (25/10mm)							
	47 (14)		46.09		9.80				
	-					9.80 - 11.60 Non-intact as possible			

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
			4.00	96				0	11.6	Water	100	BH backfilled. BH terminated at 11.60m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHSS2**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	24-11-23 24-11-23	55.89	E 614,948.7 N 731,048.7

Engineer	Sheet	Status
FTCO	2 of 2	FINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
10.10		NI	45.69		10.20	weathered rock.		Possible weathered rock. Strong dark grey fine grained limestone recovered as angular fine to coarse gravel sized clasts. *(continued)*	
		NI	45.49		10.40				
	100 (28) 23	2	45.04		10.85			Possible weathered rock. Strong dark grey fine grained limestone recovered as very stiff dark grey slightly gravelly silt. Gravel is angular fine to coarse of dark grey fine grained limestone.	
		NI			(0.75)			Very strong thinly bedded dark grey bioclastic fine and medium grained LIMESTONE.	
24.11 11.60			44.29		11.60			Possible weathered rock. Strong dark grey fine grained limestone recovered as stiff dark grey slightly sandy gravelly silt. Sand is fine to coarse. Gravel is angular fine to coarse of dark grey fine grained limestone.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
24/11/23	16.00	11.60					

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

BH backfilled. BH terminated at 11.60m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHSS3**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	13-11-23 13-11-23	56.40	E 615,036.4 N 730,978.5

Engineer	Sheet	Status
FTCO	1 of 2	FINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
0.00						0.00 - 10.90 : overburden.		Open hole drilling. No recovery. Drillers Comment: PEAT. 1 No coarse gravel sized piece of wood.	
	-				(5.00)				
5.00		5.00 (0)	51.40		5.00			Firm dark grey SILT.	
	5				(3.60)				
7.10		7.10 (0)							
	7								
8.60		8.60 (11)	47.80		8.60			Subrounded to subangular fine to coarse assorted light grey and dark grey limestone GRAVEL with some grey slightly sandy slightly gravelly silt. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of assorted light grey and dark grey limestone.	
	33				(2.30)				

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
			5.00	96			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	7.6	Water	100
7.6	14.6	Water	0

GENERAL REMARKS

50mm standpipe installed.
BH terminated at 14.60m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHSS3**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	13-11-23 13-11-23	56.40	E 615,036.4 N 730,978.5

Engineer	Sheet	Status
FTCO	2 of 2	FINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
10.10		10.10 (50/160mm)						
	100 (47) 45		45.50		10.90			
11.60		5				10.90 - 14.60 Discontinuities, medium spaced, locally closely spaced, dipping 10 to 12°, stepped, rough, with 0.5 to 2mm thick dark grey silt smear.	Strong locally very strong thinly bedded grey and dark grey silty bioclastic fine and medium grained LIMESTONE.	
	100 (98) 96	2			(3.70)		12.20m: medium strong.	
13.10						12.90 - 13.15 Joint, subvertical dip, undulating, tight, open as drilling induced from 13.10m to 13.15m bgl.		
	100 (96) 92	2					13.80-13.80m: medium strong.	
13.11 14.60		4	41.80		14.60	14.10 - 14.10 firm dark grey silt.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
13/11/23	16.00	14.60					

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm standpipe installed. BH terminated at 14.60m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHSS4**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	23-11-23 23-11-23	56.16	E 614,947.3 N 730,901.4

Engineer	Sheet	Status
FTCO	1 of 1	FINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
0.00						0.00 - 8.40 : overburden.		Open hole drilling. No recovery. Drillers Comment: PEAT.	
	- - -				(4.00)				
4.00		4.00 (0)	52.16		4.00			Very soft dark brownish black amorphous PEAT.	
	100 - -				(1.00)				
			51.16		5.00			Firm greyish brown SILT.	
5.60		5.60 (7)							
	37 - -				(2.10)				
7.10		7.10 (17)	49.06		7.10			Subrounded to subangular fine to coarse assorted light grey and dark grey limestone GRAVEL with cobbles and a little grey silt. Cobbles are of light grey limestone.	
	38 - -				(1.30)				
8.40			47.76		8.40				
	100 (69) 38	6 NI 14			(1.60)	8.40 - 10.00 Discontinuities, closely spaced, locally medium spaced, dipping 10 to 12°, stepped, rough, with 0.5 to 10mm thick dark grey silt smear. 9.00 - 9.00 firm dark grey silt.		Very strong locally strong thinly bedded grey and dark grey slightly bioclastic silty fine grained LIMESTONE.	
23.11 10.00			46.16		10.00				

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
23/11/23	16.00	10.00	4.00	96			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10	Water	100

GENERAL REMARKS

BH backfilled. BH terminated at 10.00m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHT01**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	22-11-23 22-11-23	50.52	E 614,198.9 N 727,375.1

Engineer	Sheet	Status
FTCO	1 of 2	FINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main
0.00						0.00 - 6.60 : overburden.		Open hole drilling. No recovery. Drillers Comment: PEAT.
	- - -				(3.00)			
3.00			47.52		3.00			
	27 - -	3.00 (0)			(1.10)			Very soft black amorphous PEAT.
4.10			46.42		4.10			
	33 - -	4.10 (8)			(1.50)			Firm bluish grey slightly sandy peaty gravelly CLAY. Sand is fine.
5.60			44.92		5.60			
	40 - -	5.60 (14)			(1.00)			Medium dense subrounded to subangular fine to coarse assorted light grey and dark grey limestone GRAVEL.
6.60			43.92		6.60			
7.00	100 (92) 48	4			(3.60)	6.60 - 10.20 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 1mm thick dark grey silt smear. 6.80 - 7.20 Joint, vertical dip, stepped, rough, with 0.5 to 2mm thick grey silt smear, open. 7.80 - 8.10 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick grey silt smear, open, over 10 to 15mm thick white calcitic vein. 8.20 - 8.60 Joint, vertical dip, stepped, rough, with 0.5 to 1mm thick grey silt smear, open, between 30mm thick white calcitic vein.		Very strong thinly bedded grey sparry bioclastic fine and medium grained LIMESTONE.
	100 (93) 54	5						
8.60		3						
	100 (98) 97	6						

Instrument/Backfill

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
			3.00	96			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	3	Water	100
3	10.2	Water	0

GENERAL REMARKS

50mm standpipe installed. BH terminated at 10.20m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHT01**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	22-11-23 22-11-23	50.52	E 614,198.9 N 727,375.1

Engineer	Sheet	Status
FTCO	2 of 2	FINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
22.11 10.20			40.32		10.20				

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
22/11/23	16.00	10.20					

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm standpipe installed. BH terminated at 10.20m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHT03**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	20-11-23 20-11-23	49.64	E 614,779.9 N 726,517.4

Engineer	Sheet	Status
FTCO	1 of 2	FINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument / Backfill
0.00	- - -				(3.00)	0.00 - 12.90 : overburden.	Open hole drilling. No recovery. Drillers Comment: PEAT.	
3.00		3.00 (6)	46.64		3.00		Firm bluish grey SILT.	
	7 - -				(4.10)			
5.60		5.60 (9)						
	33 - -							
7.10		7.10 (10)	42.54		7.10		Firm grey slightly gravelly sandy CLAY.	
	50 - -				(1.50)			
8.60		8.60 (50/75mm)	41.04		8.60	10.10 - 10.10 Core Run: 1 No grey limestone boulder 320mm in length. 1 No grey sparry bioclastic limestone boulder 300mm in length.	Subrounded to subangular fine to medium assorted light grey and dark grey limestone GRAVEL with cobbles and boulders. Cobbles are of grey bioclastic limestone.	
	50 - -							

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
			3.00	96			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	3.9	Water	100
3.9	19.2	Water	0

GENERAL REMARKS

50mm standpipe installed. BH terminated at 19.20m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used: CS-14		Driller: DC	Logged By: EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHT03**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	20-11-23 20-11-23	49.64	E 614,779.9 N 726,517.4

Engineer	Sheet	Status
FTCO	2 of 2	FINAL

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
10.10	50 -				(4.30)	11.60 - 11.60 Core Run: 1 No grey slightly bioclastic sparry limestone boulder 290mm in length.		Subrounded to subangular fine to medium assorted light grey and dark grey limestone GRAVEL with cobbles and boulders. Cobbles are of grey bioclastic limestone. *(continued)*	
11.60	33 (6) -	11.60 (24)	36.74		12.90	medium dense.			
13.10	80 (45) -				(2.80)	12.90 - 15.70 Non-intact as weathered rock.		Weathered rock. Medium strong thinly bedded light greyish green crystalline fine and medium grained probable dolomitised limestone recovered as angular fine to coarse gravel and cobble sized clasts with a little green silt and a little fine and sand.	
14.60	100 (31) 9	NI	33.94		15.70				
16.10	100 (74) 33	5 12			(3.50)	15.70 - 19.20 Discontinuities, very closely and closely spaced, locally medium spaced, dipping 10 to 12°, stepped, rough, with 0.5 to 3mm thick green silty fine and medium sand smear and minor orangish brown iron stain and powder. 16.60 - 16.75 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick green silty fine and medium sand smear, open. 17.40 - 17.60 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick green silty fine and medium sand smear and minor orangish brown iron stain and powder, open.		Medium strong thinly bedded light greyish green crystalline fine and medium grained probable DOLOMITISED LIMESTONE.	
17.60	100 (84) 58	10 11							
20.11 19.20		2	30.44		19.20	18.30 - 18.30 medium strong locally weak fissile with a little orangish brown fine and medium sand. 18.90 - 18.90 with 10 to 20mm x 5mm x 5 to 15mm deep vugs.			

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
20/11/23	16.00	19.20										50mm standpipe installed. BH terminated at 19.20m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHT06**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	17-11-23 17-11-23	48.57	E 615,652.4 N 727,929.7

Engineer	Sheet	Status
FTCO	1 of 2	FINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main
0.00						0.00 - 14.60 : overburden.		Open hole drilling. No recovery. Drillers Comment: PEAT.
	- - -				(3.00)			
3.00		3.00 (2)	45.57		3.00			Firm dark brownish grey slightly gravelly sandy CLAY.
	36 - -							
4.10		4.10 (6)						
	73 - -							
5.60		5.60 (9)						
	100 - -							
7.10		7.10 (10)			(8.60)			
	93 - -							
8.60		8.60 (10)						
	13 - -							

Instrument / Backfill

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
			3.00	96			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	3.2	Water	100
3.2	19.1	Water	0

GENERAL REMARKS

50mm standpipe installed.
BH terminated at 19.10m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHT06**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	17-11-23 17-11-23	48.57	E 615,652.4 N 727,929.7

Engineer	Sheet	Status
FTCO	2 of 2	FINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main
10.10		10.10 (7)						Firm dark brownish grey slightly gravelly sandy CLAY. *(continued)*
	100 -							
11.60		11.60 (34)	36.97		11.60			Dense subrounded to subangular fine to coarse assorted light grey and dark grey limestone GRAVEL with a little grey silt.
	73 -							
13.10					(3.00)			
	54 -							
14.20			33.97		14.60			Weathered rock. Medium strong locally very strong thickly bedded grey bioclastic fine and medium grained limestone recovered as angular fine to coarse gravel cobble and boulder sized clasts with a little orangish brown silt and orangish brown iron stain and powder.
	80 (10) -							
15.20								
	100 (14) -							
16.10						17.60 - 17.60 Core Run: 1 No grey bioclastic limestone boulder 290mm in length. 16.40 - 19.10 Non-intact as weathered rock. 16.60 - 16.60 subvertical 35mm thick white calcitic vein.		
	100 (57) 21	NI			(4.50)			
17.60								
	100 (21) -							
17.11 19.10			29.47		19.10			

Instrument/Backfill

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
17/11/23	16.00	19.10					

Rotary Flush			
From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm standpipe installed. BH terminated at 19.10m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used: CS-14		Driller: DC	Logged By: EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHT12**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	16-11-23 16-11-23	48.04	E 616,435.5 N 728,146.8

Engineer	Sheet	Status
FTCO	1 of 2	FINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument / Backfill
0.00						0.00 - 8.10 : overburden.	Open hole drilling. No recovery. Drillers Comment: PEAT.	
	- - -				(3.00)			
3.00			45.04		3.00			
	36 - -	3.00 (7)					Firm dark brownish grey SILT.	
4.10		4.10 (7)						
	20 - -				(3.70)			
5.60		5.60 (13)						
	53 - -		41.34		6.70			
7.10		7.10 (39)					Medium dense subrounded to subangular fine to coarse assorted light grey and dark grey limestone GRAVEL with a little grey silt.	
	75 - -				(1.40)	becoming dense.		
8.10			39.94		8.10			
	100 (97) 82	7				8.10 - 12.90 Discontinuities, medium spaced, locally very closely and closely spaced, dipping 10 to 12°, planar, smooth, with 0.5 to 5mm thick dark grey silt smear. 8.60 - 8.75 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick grey silt smear, open.	Very strong locally strong thinly bedded grey and dark grey silty bioclastic fine grained LIMESTONE.	
9.70		5					9.70m: medium strong.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
			3.00	96			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	3.4	Water	100
3.4	14.6	Water	0

GENERAL REMARKS

50mm standpipe installed.
BH terminated at 12.90m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used: CS-14		Driller: DC	Logged By: EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHT12**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	16-11-23 16-11-23	48.04	E 616,435.5 N 728,146.8

Engineer	Sheet	Status
FTCO	2 of 2	FINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	DESCRIPTION Main	Instrument/ Backfill
	100 (95) 82	12			(4.80)	10.15 - 10.15 stiff dark grey silt.	Very strong locally strong thinly bedded grey and dark grey silty bioclastic fine grained LIMESTONE. *(continued)* 10.50-10.60m: weak.	
11.30		5						
	100 (97) 91						12.10-12.30m: weak.	
16.11 12.90		4	35.14		12.90			

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
16/11/23	16.00	12.90					

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm standpipe installed. BH terminated at 12.90m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHT15**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	15-11-23 15-11-23	51.72	E 617,686.7 N 728,902.7

Engineer	Sheet	Status
FTCO	1 of 2	FINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main
0.00	- - -				(4.50)	0.00 - 9.00 : overburden.		Open hole drilling. No recovery. Drillers Comment: PEAT.
4.50		4.50 (0)	47.22		4.50			
	18 - -							Firm dark grey slightly sandy CLAY.
5.60		5.60 (9)			(3.60)			
	47 - -							
7.10		7.10 (24)	43.62		8.10			
	60 - -							Subrounded to subangular fine to coarse assorted light grey and dark grey limestone GRAVEL with rare cobble some grey slightly sandy slightly gravelly silt. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of assorted light grey and dark grey limestone. Cobble is of light grey limestone.
8.60		8.60 (50/75mm)	42.72		(0.90) 9.00			
	100 (13) -					9.00 - 13.60 Discontinuities, apparently closely and very closely spaced, dipping 10 to 12°, stepped, rough, with 0.5 to 1mm thick light brownish grey silt smear, non-intact as weathered rock.		
9.80								

Instrument / Backfill

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
			4.50	96				0	14.6	Water	100	50mm standpipe installed. BH terminated at 14.60m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Lemanaghan Wind Farm	Co Offaly	**BHT15**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2023OY108	15-11-23 15-11-23	51.72	E 617,686.7 N 728,902.7

Engineer	Sheet	Status
FTCO	2 of 2	FINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
	100 (23) -						Weathered rock. Strong locally very strong thinly bedded greyish brown crystalline fine and medium grained dolomitised limestone recovered as angular fine to coarse gravel and cobble sized clasts. *(continued)*	
11.40		NI			(4.60)	10.50 - 11.50 Probable joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick light brownish grey silt smear, open, non-intact as weathered rock. 11.50 - 13.60 Non-intact as angular fine to coarse gravel sized clasts.		
12.40	100 (17) -							
13.60	100 (24) 12		38.12		13.60			
	100 (95) 79	6			(1.00)	13.60 - 14.60 Discontinuities, medium spaced, locally closely spaced, dipping 10 to 12°, stepped, smooth, with 0.5 to 1mm thick grey silt smear.	Strong locally very strong thinly bedded grey silty bioclastic fine and medium grained LIMESTONE.	
15.11 14.60			37.12		14.60			

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
15/11/23	16.00	14.60					

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm standpipe installed. BH terminated at 14.60m bgl on REs instruction.

All dimensions in metres Scale 1:62.5	Client: MKO	Method/ Plant Used CS-14		Driller DC	Logged By EAT

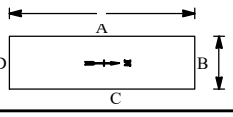
IDL AGS4 UK DH (SPTS) LEMANAGHAN RC ALL FILE DEC 1 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Appendix 02
Trial Pit Records

PROJECT: Lemanaghan Wind Farm		**TRIALPIT: TPB001**
LOCATION: Co Offaly		**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:**	**Rig: Hyundai**
ENGINEER: FTCO	**E 615,986.0 N 729,176.4**	**Rev:**
Ground level: 55.32m O.D.		**DATE: 25.10.23**

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

PIT DIRECTION: 0°
PIT DIMENSION: 5.00m * 1.80
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							54.82	0.50	Spongy brown pseudo fibrous PEAT. H6 B3 F2 R2 W2 TV2 TH2 A0.	
							54.42	0.90	Firm orangish brown fibrous PEAT. H2 B3 F3 R2 W2 TV0 TH0 A1.	
1			VANE	1.00	19mm vane 81 kN/m² 90 kN/m² 107 kN/m				Firm to stiff light grey slightly sandy SILT with fibres.	
			B 1	1.00-1.20						
			D 2	1.00-1.20			53.82	1.50		
2			B 3	2.00-2.20					Soft light grey sandy gravelly SILT with occasional cobbles. Gravel is subangular to rounded fine to coarse. Cobbles are subrounded.	
			D 4	2.00-2.20			53.02	2.30		
3			B 5	3.20-3.40					Wet light grey slightly silty SAND and subangular to rounded fine to coarse GRAVEL with frequent cobbles and occasional boulders. Cobbles are subrounded of limestone. Boulders are subrounded of limestone. Boulders are up to 700mm in length. Sand is medium.	
4							51.12	4.20		
						END				
5										
6										
7										
8										
9										
10										

Remarks: Slight inflow of water at 1.50m bgl. TP backfilled with arisings.

Scale: 1:50

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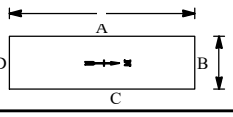
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TPB002**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:**
ENGINEER: FTCO	**E 615,976.7 N 729,008.5**
Ground level: 53.30m O.D.	**Rig: Hyundai**
	Rev:
	DATE: 25.10.23

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

PIT DIRECTION: 0°
PIT DIMENSION: 4.50m * 2.00
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							53.00	0.30	Spongy brown pseudo fibrous PEAT. H5.	
		1					52.50	0.80	Soft light greyish brown SILT with frequent cobbles and frequent boulders and fibres. Cobbles are subangular. Boulders are subangular. Boulders are up to 650mm in length.	
1			B 1	0.80-1.00			51.60	1.70	Wet light grey very silty very sandy subangular to rounded fine to coarse GRAVEL with frequent cobbles and frequent boulders. Cobbles are subrounded of limestone. Boulders are subrounded of limestone. Boulders are up to 600mm in length.	
									END	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: Heavy inflow of water at 0.65m bgl. TP backfilled with arisings.

Scale: 1:50

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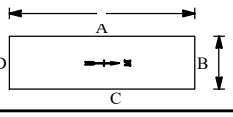
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TPB003**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:** E 615,946.7 N 728,838.9 — **Rig: Hyundai**
ENGINEER: FTCO	**Rev:**
Ground level: 52.19m O.D.	**DATE: 25.10.23**

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

PIT DIRECTION: 0°
PIT DIMENSION: 4.70m * 3.20
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							51.99	0.20	Plastic black amorphous PEAT.	
			VANE	0.40	19mm vane 62 kN/m² 73 kN/m² 7.3 kN/m²				Soft greenish grey slightly sandy CLAY with fibres.	
			B 1	0.40-0.60			51.49	0.70		
			D 2	0.40-0.60					Grey silty very sandy sandy angular to rounded fine to coarse GRAVEL with frequent cobbles and occasional boulders. Cobbles are subrounded. Boulders are subrounded.	
1		▼	B 3	1.20-1.40					1.50-2.10: saturated.	
			B 4	1.20-1.40						
2							50.09	2.10		
									END	
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: Heavy inflow of water at 1.20m bgl. TP backfilled with arisings.

Scale: 1:50

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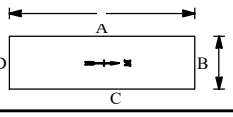
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TPB004**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:** E 615,693.6 N 728,560.3 — **Rig: Hyundai**
ENGINEER: FTCO	**Rev:**
Ground level: 51.82m O.D.	**DATE: 25.10.23**

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

PIT DIRECTION: 0°
PIT DIMENSION: 5.00m * 2.00
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							51.62	0.20	Spongy black pseudo fibrous PEAT. H8.	
			B 1 D 2 VANE	0.40-0.60 0.40-0.60 0.50	19mm vane 73 kN/m² 75 kN/m² 77 kN/m²				Firm yellowish brown slightly gravelly sandy SILT. Gravel is subrounded to rounded fine to coarse.	
1							50.72	1.10		
		▼1							Light grey coarse SAND and angular to subangular fine to coarse GRAVEL with frequent cobbles and occasional boulders. Cobbles are angular to subangular of limestone. Boulders are subangular to subrounded of limestone.	
2										
3							48.82	3.00		
							END			
4										
5										
6										
7										
8										
9										
10										

Remarks: Ingress of water at 1.70m bgl. TP backfilled with arisings.

Scale: 1:50

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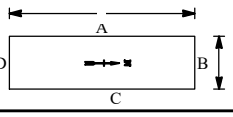
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TPB005**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:** E 615,703.9 N 728,441.5 — **Rig: Hyundai**
ENGINEER: FTCO	**Rev:**
Ground level: 49.91m O.D.	**DATE: 25.10.23**

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

PIT DIRECTION: 0°
PIT DIMENSION: 6.00m * 2.50
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							49.71	0.20	Reeds over plastic black amorphous PEAT.	
			VANE	0.40	19mm vane 62 kN/m²				Firm grey slightly sandy clayey SILT with occasional boulders and decaying organic matter. Boulders are angular of limestone. Boulders are up to 600mm in length.	
		1	B 1	0.60-0.80	69 kN/m²					
			D 2	0.60-0.80	65 kN/m²		49.11	0.80		
1		2							Soft light grey sandy gravelly SILT with frequent cobbles and frequent boulders. Gravel is angular to subrounded fine to coarse. Cobbles are subrounded. Boulders are subrounded. Boulders are up to 800mm in length. 1.20: Large boulder - extended pit to progress.	
							48.41	1.50		
			B 3	1.80-2.00					Wet light grey silty very sandy coarse GRAVEL and angular to subrounded COBBLES and angular to subrounded BOULDERS. Gravel is angular to subrounded fine to coarse. Boulders are up to 800mm in length.	
2										
3							46.81	3.10		
							END			
4										
5										
6										
7										
8										
9										
10										

Remarks: Seepage of water at 0.80m bgl. Heavy inflow of water at 1.50m bgl. TP backfilled with arisings.

Scale: 1:50

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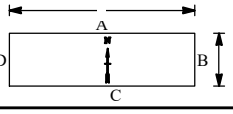
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TPB006**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:** E 615,079.8 N 727,014.4 — **Rig: Hyundai**
ENGINEER: FTCO	**Rev:**
Ground level: 53.33m O.D.	**DATE: 24.10.23**

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

PIT DIRECTION: 90°
PIT DIMENSION: 5.00m * 1.80
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							53.13	0.20	Reeds over plastic black amorphous PEAT.	
							52.78	0.55	Firm grey SILT with fibres.	
1			B 1	0.70-0.90					Light grey gravelly silty medium to coarse SAND and GRAVEL with frequent cobbles. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded to rounded. Cobble content increasing with depth.	
2		▼	B 2	2.00-2.20			51.33	2.00		
									Wet grey silty coarse SAND and subrounded fine to coarse GRAVEL with frequent cobbles. Cobbles are subrounded of limestone.	
3										
4							48.93	4.40		
									END	
5										
6										
7										
8										
9										
10										

Remarks: Moderate inflow of water at 2.10m bgl. TP backfilled with arisings.

Scale: 1:50

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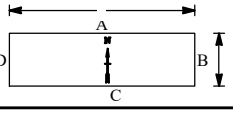
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TPB007**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:** E 614,588.9 N 726,680.1 — **Rig: Hyundai**
ENGINEER: FTCO	**Rev:**
Ground level: 52.21m O.D.	**DATE: 24.10.23**

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

PIT DIRECTION: 90°
PIT DIMENSION: 4.80m * 1.80
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							52.01	0.20	Plastic black amorphous PEAT. H9.	
							51.76	0.45	Stiff brown gravelly SILT with rootlets. Gravel is angular fine to coarse.	
1			B 1	0.70-0.90					Grey silty coarse SAND and angular to subangular fine to coarse GRAVEL with frequent cobbles. Cobbles are subrounded. 1.30-1.80: becoming slightly silty.	
							50.31	1.90		
2		▼	B 2	2.10-2.30			49.81	2.40	Orangish brown slightly silty very sandy angular to subangular fine to coarse GRAVEL with frequent cobbles. Cobbles are subangular.	
3			B 3	3.10-3.30					Bluish grey coarse SAND and angular to subrounded fine to coarse GRAVEL with frequent cobbles and occasional large boulders. Cobbles are subrounded of limestone. Boulders are of limestone. Boulders are up to 1600mm in length.	
4							48.21	4.00	**END**	
5										
6										
7										
8										
9										
10										

Remarks: Seepage of water at 2.40m bgl. TP backfilled with arisings.

Scale: 1:50

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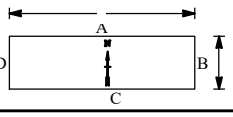
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TPB008**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:** **Rig: Hyundai**
ENGINEER: FTCO	**E 616,802.9 N 728,630.8** **Rev:**
Ground level: 53.24m O.D.	**DATE: 26.10.23**

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

PIT DIRECTION: 90°
PIT DIMENSION: 5.00m * 3.00
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							53.04	0.20	MADE GROUND: Grass over black sandy gravelly PEAT.	
									MADE GROUND: Black peaty SAND and subrounded fine to coarse GRAVEL.	
			B 1	0.60-0.80			52.14	1.10		
1									Grey SAND and subrounded to rounded fine to coarse GRAVEL.	
			B 2	1.60-1.80			51.64	1.60		
									Grey silty medium to coarse SAND and coarse GRAVEL with occasional large boulders. Boulders are angular.	
2							50.84	2.40		
							50.54	2.70	Brown slightly sandy SILT. Sand is fine.	
									Dark grey coarse SAND and subangular to rounded fine to coarse GRAVEL with occasional large boulders. Boulders are up to 1200mm in length.	
3			B 3	3.40-3.60						
		▼1					49.34	3.90		
4						END				
5										
6										
7										
8										
9										
10										

Remarks: Heavy inflow of water at 3.90m bgl. TP backfilled with arisings.

Scale: 1:50

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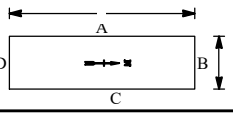
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm		**TRIALPIT: TPCC001**
LOCATION: Co Offaly		**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:**	**Rig: Hyundai**
ENGINEER: FTCO	**E 615,601.6 N 728,946.0**	**Rev:**
Ground level: 52.31m O.D.		**DATE: 25.10.23**

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

PIT DIRECTION: 0°
PIT DIMENSION: 5.00m * 1.80
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0										
							51.21	1.10	Firm orangish brown fibrous PEAT. H2 B2 F3 R1 W1 TV0 TH0 A1.	
1			B 1 D 2	1.10-1.30 1.10-1.30			50.66	1.65	Soft light grey slightly sandy gravelly organic SILT. Gravel is subangular fine to coarse.	
		▼					50.11	2.20	Wet light grey slightly silty sandy subangular to rounded fine to coarse GRAVEL with frequent cobbles and occasional boulders. Cobbles are subrounded to rounded. Boulders are subrounded to rounded.	
2			B 3	2.20-2.40						
3									Bluish grey sandy subrounded to rounded fine to coarse GRAVEL with frequent cobbles. Cobbles are subrounded to rounded.	
4			B 4	3.80-4.00			47.91	4.40		
									END	
5										
6										
7										
8										
9										
10										

Remarks: Moderate inflow of water at 1.65m bgl. TP backfilled with arisings.

Scale: 1:50

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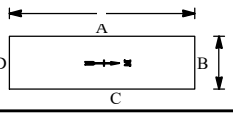
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TPCC002**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates: E 615,651.5 N 728,830.7** / **Rig: Hyundai**
ENGINEER: FTCO	**Rev:**
Ground level: 50.50m O.D.	**DATE: 25.10.23**

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

PIT DIRECTION: 0°
PIT DIMENSION: 5.00m * 3.00
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							50.25	0.25	Firm orangish brown fibrous PEAT. H2 B3 F3 R1 W1 TV0 TH0 A1.	
			B 1	0.50-0.70					Spongy brown pseudo fibrous PEAT. H5 B1 F2 R3 W2 TV0 TH0 A0.	
1		1								
		2								
		3					48.45	2.05		
2			B 2	2.10-2.25					Soft grey slightly gravelly sandy SILT with fibres.	
			D 3	2.10-2.25						
									2.80-3.40: becoming slightly gravelly.	
3			B 4	3.00-3.20			47.10	3.40		
									END	
4										
5										
6										
7										
8										
9										
10										

Remarks: Seepage of water at 1.00m bgl. Seepage of water at 1.80m bgl. Moderate inflow of water at 2.05m bgl. TP backfilled with arisings.

Scale: 1:50

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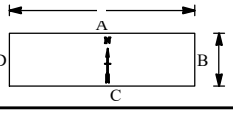
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm		**TRIALPIT: TPCC003**
LOCATION: Co Offaly		**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:**	**Rig: Hyundai**
ENGINEER: FTCO	**E 616,854.1 N 728,234.2**	**Rev:**
Ground level: 48.20m O.D.		**DATE: 26.10.23**

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

PIT DIRECTION: 90°
PIT DIMENSION: 4.80m * 1.80
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0										
			VANE	0.50	33mm vane 16 kN/m² 18 kN/m² 17 kN/m²		47.60	0.60	Firm orangish brown fibrous PEAT. H3 B3 F3 R0 W0 TV0 TH0 A0.	
1			B 1	1.00-1.20					Spongy dark brown pseudo fibrous PEAT. H6 B2 F2 R2 W1 TV0 TH0 A0.	
2							46.00	2.20		
							45.65	2.55	Flat angular BOULDERS.	
			B 2 D 3 VANE	2.60-2.80 2.60-2.80 2.70	33mm vane 37 kN/m² 40 kN/m² 46 kN/m²				Soft light grey slightly gravelly sandy SILT with shell fragments.	
3		▼					44.80	3.40		
									Wet grey gravelly angular COBBLES and angular BOULDERS. Boulders are up to 700mm in length.	
4			B 4	3.80-4.00			43.70	4.50		
									END	
5										
6										
7										
8										
9										
10										

Remarks: Heavy inflow of water at 3.40m bgl. TP backfilled with arisings.

Scale: 1:50

Irish drilling LTD

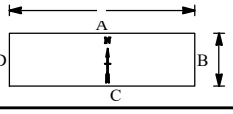
Ph.
Fax

TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TPCC004**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:** E 616,715.1 N 728,247.0 — **Rig: Hyundai**
ENGINEER: FTCO	**Rev:**
Ground level: 48.28m O.D.	**DATE: 26.10.23**

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

PIT DIRECTION: 90°
PIT DIMENSION: 4.80m * 1.80
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0										
			B 1	0.40-0.60	33mm vane				Spongy orangish brown pseudo fibrous PEAT. H4 B2 F3 R1 W1 TV0 TH0 A1.	
			VANE	0.50	16 kN/m² 17 kN/m²					
1							47.08	1.20		
									Spongy dark brown pseudo fibrous PEAT. H7 B1 F2 R3 W2 TV0 TH0 A0.	
2										
			B 2	2.40-2.60						
							45.43	2.85		
			B 3	2.90-3.00			45.28	3.00	Very soft yellowish brown SILT with fibres and shell fragments.	
3			D 4	2.90-3.00					Soft bluish grey slightly sandy SILT with decaying organic material.	
			VANE	3.20	33mm vane 30 kN/m²					
			B 5	3.40-3.60	35 kN/m²				3.40-4.50: becoming firm with no organic material.	
			D 6	3.40-3.60	37 kN/m²					
4							43.78	4.50		
						END				
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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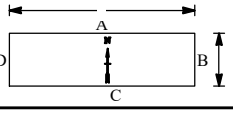
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm		**TRIALPIT: TPCC005**
LOCATION: Co Offaly		**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:**	**Rig: Hyundai**
ENGINEER: FTCO	**E 614,619.1 N 727,316.2**	**Rev:**
Ground level: 51.46m O.D.		**DATE: 24.10.23**

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

PIT DIRECTION: 90°
PIT DIMENSION: 4.50m * 1.80
LOGGED BY: DF



Shoring/Support: N/A
Stability: Pit unstable. Sidewall collapse from 2.90m bgl.

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0										
			VANE	0.60	33mm vane 14 kN/m² 16 kN/m²				Firm orangish brown fibrous PEAT. H2 B3 F3 R1 W1 TV0 TH0 A0.	
1							50.16	1.30		
			B 1	1.30-1.50					Spongy dark brown pseudo fibrous PEAT. H4 B2 F2 R2 W2 TV0 TH0 A0.	
2							49.36	2.10	1.90: with tree trunks.	
			B 2 D 3	2.20-2.40 2.20-2.40					Light grey fibrous sandy very silty GRAVEL with frequent cobbles. Gravel is angular medium to coarse. Cobbles are angular to subangular.	
3							48.56	2.90		
			B 4	3.10-3.30					Damp light grey slightly sandy angular to subangular medium to coarse GRAVEL with frequent cobbles and occasional boulders. Cobbles are subangular to subrounded. Boulders are angular of limestone. Boulders are up to 1000mm in length.	
4									3.90-4.50: becoming dark grey.	
							46.96	4.50		
						END				
5										
6										
7										
8										
9										
10										

Remarks: Slight inflow of water at 3.50m bgl. TP backfilled with arisings.

Scale: 1:50

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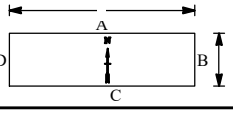
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm		**TRIALPIT: TPCC006**
LOCATION: Co Offaly		**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:**	**Rig: Hyundai**
ENGINEER: FTCO	**E 614,733.2 N 727,354.5**	**Rev:**
Ground level: 50.17m O.D.		**DATE: 24.10.23**

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

PIT DIRECTION: 90°
PIT DIMENSION: 4.40m * 1.80
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							49.77	0.40	Reed over plastic black amorphous PEAT. H8 B2 F1 R0 W TV0 TH0 A1.	
							49.52	0.65	Spongy brown pseudo fibrous PEAT. H5 B2 F2 R1 W1 TV0 TH0 A0.	
1			VANE B 1 D 2	0.70 0.70-0.90 0.70-0.90	33mm vane 30 kN/m² 32 kN/m² 29 kN/m²		48.77	1.40	Soft light grey slightly gravelly sandy SILT with occasional cobbles and decaying organic material. Gravel is angular fine to coarse. Cobbles are angular.	
2		▼	B 3 D 4	1.60-1.80 1.60-1.80			47.67	2.50	Soft light grey slightly sandy gravelly SILT with occasional large boulders. Boulders are of limestone. Boulders are up to 1200mm in length.	
3			B 5	2.80-3.00			47.07	3.10	Wet grey slightly sandy angular to subangular fine to coarse GRAVEL with frequent large boulders. Cobbles are angular to subangular. Boulders are of limestone. Boulders are up to 1000mm in length.	
									END	
4										
5										
6										
7										
8										
9										
10										

Remarks: Ingress of water at 2.00m bgl. TP backfilled with arisings.

Scale: 1:50

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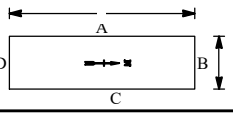
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm	**TRIALPIT: TPCC007**
LOCATION: Co Offaly	**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:** E 612,626.2 N 727,726.4 — **Rig: Hyundai**
ENGINEER: FTCO	**Rev:**
Ground level: 54.55m O.D.	**DATE: 24.10.23**

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

PIT DIRECTION: 0°
PIT DIMENSION: 4.50m * 1.80
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0			VANE	0.50	33mm vane 12 kN/m² 14 kN/m²				Firm orangish brown fibrous PEAT. H3 B3 F3 R0 W0 TV0 TH0 A0.	
1			B 1	0.80-1.00						
2							52.55	2.00		
									Spongy brown pseudo fibrous PEAT. H6 B3 F2 R3 W2 TV0 TH0 A0.	
3			B 2	3.00-3.20						
4										
							49.65	4.90		
5						END				
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

Irish drilling LTD

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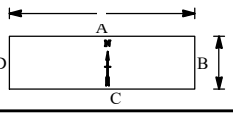
TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

PROJECT: Lemanaghan Wind Farm		**TRIALPIT: TPMM001**
LOCATION: Co Offaly		**Sheet 1 of 1**
CLIENT: MKO	**Co-ordinates:**	**Rig: Hyundai**
ENGINEER: FTCO	**E 614,379.8 N 726,554.8**	**Rev:**
Ground level: 50.94m O.D.		**DATE: 24.10.23**

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

PIT DIRECTION: 90°
PIT DIMENSION: 4.60m * 1.80
LOGGED BY: DF



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0										
			VANE	0.50	33mm vane 15 kN/m² 12 kN/m²				Spongy orangish brown pseudo fibrous PEAT. H4 B2 F3 R2 W1 TV0 TH0 A0.	
1			B 1	1.00-1.20						
							48.94	2.00		
2			B 2	2.10-2.30	33mm vane 70 kN/m² 72 kN/m² 73 kN/m²				Firm light grey slightly gravelly sandy SILT with rare cobbles. Sand is fine. Cobbles are rounded.	
			D 3	2.10-2.30						
			VANE	2.20						
3										
							47.24	3.70		
4			B 4	3.80-4.00					Stiff brown and grey slightly sandy laminated CLAY.	
			D 5	3.80-4.00						
		▼1					46.44	4.50		
						END				
5										
6										
7										
8										
9										
10										

Remarks: Slight inflow of water at 5.50m bgl. TP backfilled with arisings.

Scale: 1:50

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TRIALPIT LEMANAGHAN TPS FILE 1 NOV 3 2023.GPJ ID GINT AGS 4_0_4.GDT 9/2/24

Appendix 02A
Groundwater Readings

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 Fax: (091) 847687	Contract: **Lemanaghan Wind Farm Phase 3** Date: 09/02/2024 Sheet No. Tested by: DF Checked: RK

Water Levels in Standpipes

	Date							
Boreholes	**08/02/2024**							**Remarks**
BP 1	1.48m							50mm standpipe
SS 1	1.52m							50mm standpipe
SS 3	1.10m							50mm standpipe
T 01	0.15m							50mm standpipe
T 03	1.25m							50mm standpipe
T 06	0.43m							50mm standpipe
T 12	1.30m							50mm standpipe
T 15	0.92m							50mm standpipe

Remarks:
All readings record depth from ground level to top of water level.

Appendix 03
Laboratory Test Results

Project ID	2023OY108	Client	MKO	Remarks	hydrometer to be undertaken ONLY if the PSD shows >15%
Project Name	Lemanaghan Wind Farm	Due Date	06/11/2023 15:11	Turnaround	
Schedule ID	2023OY108_1,2,3	Scheduled Date	06/11/2023 15:11		

Sample Details							Classification						Chemical / Concrete								Compaction						Compressibilit				Strength (Total)								Strength (Effective Stress)			Rock		Other						
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 Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	BRE SD1 (Suite B)	Sulphate Water Gravimetric	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hammer	Moisture Condition Value	Dry density/moisture content relationsh	CBR	Consolidation	Pressure	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 Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Natural water content of rock sample	Slake durability	Water absorption	Magnesium sulphate soundness	Los Angeles abrasion	Sub'd code
BHBP1	0.00	1.50	C		14/11/23																																										
BHBP1	1.50	2.50	C		14/11/23																																										
BHBP1	2.50	4.10	C		14/11/23																																					1						
BHBP1	4.10	5.50	C		14/11/23																																					1	1					
BHBP1	5.50	7.10	C		14/11/23																																						1					
BHBP1	7.10	8.50	C		14/11/23																																										
BHSS1	7.10	8.60	C	7.1-8.6	08/11/23	als sent 25.01.24									1				1																													ALS 240126-71
BHSS1	0.00	3.00	C		08/11/23																																										
BHSS1	3.00	5.60	C		08/11/23																																										
BHSS1	5.60	7.10	C		08/11/23																																										
BHSS1	7.10	8.60	C		08/11/23		1	1																																							
BHSS1	8.60	10.10	C		08/11/23																																										
BHSS1	10.10	11.60	C		08/11/23																																										
BHSS1	11.60	13.10	C		08/11/23																																										
BHSS1	13.10	14.60	C		08/11/23																																										
BHSS2	0.00	4.00	C		24/11/23																																										
BHSS2	4.00	5.60	C		24/11/23																																										
BHSS2	5.60	7.10	C		24/11/23																																										
BHSS2	7.10	8.60	C		24/11/23																																										
BHSS2	8.60	10.10	C		24/11/23																																										
BHSS2	10.10	11.60	C		24/11/23																																										
BHSS3	0.00	5.00	C		13/11/23																																										
BHSS3	5.00	7.10	C		13/11/23																																										
BHSS3	7.10	8.60	C		13/11/23																																										
BHSS3	8.60	10.10	C		13/11/23																																										
BHSS3	10.10	11.60	C		13/11/23																																								1				
BHSS3	11.60	13.10	C		13/11/23																																					1	1					
BHSS3	13.10	14.60	C		13/11/23																																						1					
BHSS4	0.00	5.00	C		13/11/23																																										
BHSS4	5.00	7.10	C		13/11/23																																										
BHSS4	7.10	8.60	C		13/11/23																																										

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

Project ID	2023OY108	Client	MKO	Remarks	hydrometer to be undertaken ONLY if the PSD shows >15%
Project Name	Lemanaghan Wind Farm	Due Date	06/11/2023 15:11	Turnaround	
Schedule ID	2023OY108_1,2,3	Scheduled Date	06/11/2023 15:11		

Sample Details							Classification						Chemical / Concrete								Compaction						Compressibility				Strength (Total)								Strength (Effective Stress)			Rock		Other						
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 Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	BRE SD1 (Suite B)	Sulphate Water Gravimetric	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hammer	Moisture Condition Value	Dry density/moisture content relationsh	CBR	Consolidation	Pressure	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 Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Natural water content of rock sample	Slake durability	Water absorption	Magnesium sulphate soundness	Los Angeles abrasion	Sub'd code
BHSS4	8.60	10.10	C		13/11/23																																										
BHSS4	10.10	11.60	C		13/11/23																																										
BHSS4	11.60	13.10	C		13/11/23																																										
BHSS4	13.10	14.60	C		13/11/23																																										
BHT01	4.10	5.60	C	4.1-5.6	22/11/23	als sent 25.01.24							1		1				1																													ALS 240126-71
BHT01	0.00	3.00	C		22/11/23																																										
BHT01	3.00	4.10	C		22/11/23																																										
BHT01	4.10	5.60	C		22/11/23		1	1																																							
BHT01	5.60	6.60	C		22/11/23																																										
BHT01	6.60	7.00	C		22/11/23																																										
BHT01	7.00	8.60	C		22/11/23																																										
BHT01	8.60	10.20	C		22/11/23																																										
BHT03	7.10	8.60	C	7.1-8.6	20/11/23	als sent 25.01.24							1		1				1																													ALS 240126-71
BHT03	0.00	3.00	C		20/11/23																																										
BHT03	3.00	5.60	C		20/11/23																																										
BHT03	5.60	7.10	C		20/11/23																																										
BHT03	7.10	8.60	C		20/11/23		1	1																																							
BHT03	8.60	10.10	C		20/11/23																																										
BHT03	10.10	11.60	C		20/11/23																																										
BHT03	11.60	13.10	C		20/11/23																																										
BHT03	13.10	14.60	C		20/11/23																																										
BHT03	14.60	16.10	C		20/11/23																																										
BHT03	16.10	17.60	C		20/11/23																																										
BHT03	17.60	19.20	C		20/11/23																																										
BHT06	5.60	7.10	C	5.6-7.1	17/11/23	als sent 25.01.24							1		1				1																													ALS 240126-71
BHT06	0.00	3.00	C		17/11/23																																										
BHT06	3.00	4.10	C		17/11/23																																										
BHT06	4.10	5.60	C		17/11/23																																										
BHT06	5.60	7.10	C		17/11/23		1	1																																							

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

Project ID	2023OY108	Client	MKO
Project Name	Lemanaghan Wind Farm	Due Date	06/11/2023 15:11
Schedule ID	2023OY108_1,2,3	Scheduled Date	06/11/2023 15:11

Remarks: hydrometer to be undertaken ONLY if the PSD shows >15%

Turnaround:

Sample Details							Classification						Chemical / Concrete								Compaction					Compressibilit				Strength (Total)						Stregth (Effective Stress)			Rock		Other					
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 Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	BRE SD1 (Suite B)	Sulphate Water Gravimetric	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hammer	Moisture Condition Value	Dry density/moisture content relationsh	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 Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Natural water content of rock sample	Slake durability	Water absorption	Magnesium sulphate soundness	Los Angeles abrasion	Sub'd code
BHT06	7.10	8.60	C		17/11/23																																									
BHT06	8.60	10.10	C		17/11/23																																									
BHT06	10.10	11.60	C		17/11/23																																									
BHT06	11.60	13.10	C		17/11/23																																									
BHT06	13.10	14.20	C		17/11/23																																									
BHT06	14.20	15.20	C		17/11/23																																									
BHT06	15.20	16.10	C		17/11/23																																									
BHT06	16.10	17.60	C		17/11/23																																									
BHT06	17.60	19.10	C		17/11/23																																									
BHT12	0.00	3.00	C		16/11/23																																									
BHT12	3.00	4.10	C		16/11/23																																									
BHT12	4.10	5.60	C		16/11/23																																									
BHT12	5.60	7.10	C		16/11/23																																									
BHT12	7.10	8.10	C		16/11/23																																									
BHT12	8.10	9.70	C		16/11/23																																		1						
BHT12	9.70	11.30	C		16/11/23																																	1	1						
BHT12	11.30	12.90	C		16/11/23																																		1						
BHT15	5.60	7.10	C	5.6-7.1	15/11/23	als sent 25.01.24							1		1				1																											ALS 240126-71
BHT15	0.00	4.50	C		15/11/23																																									
BHT15	4.50	5.60	C		15/11/23																																									
BHT15	5.60	7.10	C		15/11/23		1	1			1	1																																		
BHT15	7.10	8.60	C		15/11/23																																									
BHT15	8.60	9.80	C		15/11/23																																									
BHT15	9.80	11.40	C		15/11/23																																									

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

Project ID	2023OY108	Client	MKO	Remarks	hydrometer to be undertaken ONLY if the PSD shows >15%	Turnaround	
Project Name	Lemanaghan Wind Farm	Due Date	06/11/2023 15:11				
Schedule ID	2023OY108_1,2,3	Scheduled Date	06/11/2023 15:11				

Sample Details							Classification						Chemical / Concrete									Compaction						Compressibility				Strength (Total)								Strength (Effective Stress)			Rock		Other						
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 Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	BRE SD1 (Suite B)	Sulphate Water Gravimetric	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hammer	Moisture Condition Value	Dry density/moisture content relationship	CBR	Consolidation	Permeability	Swelling Pressure Test	Laboratory Vane test	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	Triaxial Quick Undrained (Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Natural water content of rock sample	Slake durability	Water absorption	Magnesium sulphate soundness	Los Angeles abrasion	Sub'd code
BHT15	11.40	12.40	C		15/11/23																																										
BHT15	12.40	13.60	C		15/11/23																																										
BHT15	13.60	14.60	C		15/11/23																																										
Combined Rock Sample 1																																											0	0	0	0	0	
Combined Rock Sample 2																																											0	0	0	0	0	
TPB001	1.00	1.20	B	1	25/10/23		1	1			1	1	1																																		
TPB001	1.00	1.20	D	2	25/10/23																																										
TPB001	2.00	2.20	B	3	25/10/23																																										
TPB001	2.00	2.20	D	4	25/10/23																																										
TPB001	3.20	3.40	B	5	25/10/23		1				1	1														1																						
TPB002	0.80	1.00	B	1	25/10/23		1				1	1															0*																						
TPB003	0.40	0.60	B	1	25/10/23		1	1			1	1	1																																		
TPB003	0.40	0.60	D	2	25/10/23																																										
TPB003	1.20	1.40	B	3	25/10/23		1				1	1														1																						
TPB003	1.20	1.40	B	4	25/10/23																																										
TPB004	0.40	0.60	B	1	25/10/23		1	1																																							
TPB004	0.40	0.60	D	2	25/10/23																																										
TPB005	0.60	0.80	B	1	25/10/23		1	1			1	1	1																																		
TPB005	0.60	0.80	D	2	25/10/23																																										
TPB005	1.80	2.00	B	3	25/10/23		1				1	1															1																						
TPB006	0.70	0.90	B	1	24/10/23		1				1	1													1	1																						
TPB006	2.00	2.20	B	2	24/10/23		1				1	1																																				
TPB007	0.70	0.90	B	1	24/10/23																				1	1	1																						
TPB007	2.10	2.30	B	2	24/10/23		1				1	1																																				
TPB007	3.10	3.30	B	3	24/10/23																																										
TPB008	0.60	0.80	B	1	26/10/23																																										
TPB008	1.60	1.80	B	2	26/10/23		1				1	0*													1	1	1																						
TPB008	3.40	3.60	B	3	26/10/23																																										
TPCC001	1.10	1.30	B	1	25/10/23		1	1																																							

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

Project ID	2023OY108		Client	MKO	Remarks	hydrometer to be undertaken ONLY if the PSD shows >15%
Project Name	Lemanaghan Wind Farm		Due Date	06/11/2023 15:11	Turnaround	
Schedule ID	2023OY108_1,2,3		Scheduled Date	06/11/2023 15:11		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibilit				Strength (Total)								Strength (Effective Stress)			Rock		Other						
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 Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	BRE SD1 (Suite B)	Sulphate Water Gravimetric	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hammer	Moisture Condition Value	Dry density/moisture content relationsh	CBR	Consolidation	Pressure	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 Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Natural water content of rock sample	Slake durability	Water absorption	Magnesium sulphate soundness	Los Angeles abrasion	Sub'd code
TPCC001	1.10	1.30	D	2	25/10/23																																										
TPCC001	2.20	2.40	B	3	25/10/23																																										
TPCC001	3.80	4.00	B	4	25/10/23																																										
TPCC002	0.50	0.70	B	1	25/10/23																																										
TPCC002	2.10	2.25	B	2	25/10/23		1	1																																								
TPCC002	2.10	2.25	D	3	25/10/23																																										
TPCC002	3.00	3.20	B	4	25/10/23		1	1																																								
TPCC003	1.00	1.20	B	1	26/10/23																																										
TPCC003	2.60	2.80	B	2	26/10/23		1	1																																								
TPCC003	2.60	2.80	D	3	26/10/23																																										
TPCC003	3.80	4.00	B	4	26/10/23																																										
TPCC004	0.40	0.60	B	1	26/10/23																																										
TPCC004	2.40	2.60	B	2	26/10/23																																										
TPCC004	2.90	3.00	B	3	26/10/23																																										
TPCC004	2.90	3.00	D	4	26/10/23																																										
TPCC004	3.40	3.60	B	5	26/10/23		1	1																																								
TPCC004	3.40	3.60	D	6	26/10/23																																										
TPCC005	1.30	1.50	B	1	24/10/23																																										
TPCC005	2.20	2.40	B	2	24/10/23		1	1																																								
TPCC005	2.20	2.40	D	3	24/10/23																																										
TPCC005	3.10	3.30	B	4	24/10/23																																										
TPCC006	0.70	0.90	B	1	24/10/23		1	1																																								
TPCC006	0.70	0.90	D	2	24/10/23																																										
TPCC006	1.60	1.80	B	3	24/10/23		1	1																																								
TPCC006	1.60	1.80	D	4	24/10/23																																										
TPCC006	2.80	3.00	B	5	24/10/23																																										
TPCC007	0.80	1.00	B	1	24/10/23																																										
TPCC007	3.00	3.20	B	2	24/10/23																																										

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

Project ID	2023OY108	Client	MKO	Remarks	hydrometer to be undertaken ONLY if the PSD shows >15%
Project Name	Lemanaghan Wind Farm	Due Date	06/11/2023 15:11	Turnaround	
Schedule ID	2023OY108_1,2,3	Scheduled Date	06/11/2023 15:11		

Sample Details							Classification						Chemical / Concrete								Compaction					Compressibilit				Strength (Total)							Stregth (Effective Stress)			Rock		Other					
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 Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	BRE SD1 (Suite B)	Sulphate Water Gravimetric	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hammer	Moisture Condition Value	Dry density/moisture content relationsh	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 Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Natural water content of rock sample	Slake durability	Water absorption	Magnesium sulphate soundness	Los Angeles abrasion	Sub'd code
TPMM001	1.00	1.20	B	1	24/10/23																																										
TPMM001	2.10	2.30	B	2	24/10/23		1	1																																							
TPMM001	2.10	2.30	D	3	24/10/23																																										
TPMM001	3.80	4.00	B	4	24/10/23		1	1																																							
TPMM001	3.80	4.00	D	5	24/10/23																																										
	Tests scheduled:						27	19	0	0	12	11	7	0	5	0	0	0	5	0	0	0	0	3	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	9	2	2	2	2	2	0
	Tests completed to date:				08/02/24		27	19	0	0	12	11	7	0	5	0	0	0	5	0	0	0	0	3	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	9	0	0	0	0	0	0
	In progress						0	0			0	0	0		0				0																							2	2	2	2	2	

Combined Sample 1: BP BH1: 1.7-4.1m, BP SS1: 11.0-14.6m,

Combined Sample 2: BH SS3: 10.9-14.6, BHT15: 9.0-14.6m, BH T12 : 8.1-12.9m

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

Summary of Classification Test Results

Project No.	Project Name
2023OY108	Lemanaghan 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
BHSS1		7.10	8.60	C		Core: Dark grey peaty very clayey medium GRAVEL.			52.0	56	41	24	17		CI
BHT01		4.10	5.60	C		Core: Dark grey peaty gravelly CLAY.			41.0	83	36	20	16		CI
BHT03		7.10	8.60	C		Core: Grey slightly gravelly sandy CLAY.			12.0	99	28	17	11		CL
BHT06		5.60	7.10	C		Core: Dark grey slightly gravelly sandy CLAY.			17.0	99	34	18	16		CL
BHT15		5.60	7.10	C		Core: Grey slightly sandy CLAY.			16.0	98	29	20	9		CL
TPB001	1	1.00	1.20	B		Greenish-grey slightly sandy SILT.			29.0	99	42	22	20		CI
TPB001	5	3.20	3.40	B		Light grey very gravelly very silty medium SAND.			9.6	57					
TPB002	1	0.80	1.00	B		Brownish-grey very silty very sandy coarse GRAVEL.			18.0	34					
TPB003	1	0.40	0.60	B		Grenish-grey slightly sandy CLAY.			40.0	98	48	25	23		CI
TPB003	3	1.20	1.40	B		Grey Grey silty very sandy coarse GRAVEL.			8.8	32					
TPB004	1	0.40	0.60	B		Light greyish-brown slightly sandy gravelly SILT.			23.0	60	33	21	12		CL
TPB005	1	0.60	0.80	B		Grey slightly sandy clayey SILT.			35.0	98	49	22	27		CI
TPB005	3	1.80	2.00	B		Light grey silty very sandy coarse GRAVEL.			9.0	28					
TPB006	1	0.70	0.90	B		Brownish-grey silty SAND and GRAVEL.			10.0	40					
TPB006	2	2.00	2.20	B		Grey silty SAND and GRAVEL.			6.8	37					
TPB007	1	0.70	0.90	B		Light greyish-brown silty SAND and GRAVEL.			11.0						
TPB007	2	2.10	2.30	B		Light greyish-brown silty very sandy coarse GRAVEL.			10.0	31					
TPB008	2	1.60	1.80	B		Dark grey silty medium SAND and coarse GRAVEL.			6.1	24					
TPCC001	1	1.10	1.30	B		Greenish-grey slighlty sandy gravelly SILT.			19.0	54	31	21	10		CL
TPCC002	2	2.10	2.25	B		Dark grey slightly gravelly sandy SILT.			62.0	99	65	30	35		CH
TPCC002	4	3.00	3.20	B		Light grey slightly gravelly sandy SILT.			23.0	96	21	15	6		ML
TPCC003	2	2.60	2.80	B		Dark grey slightly gravelly sandy SILT.			16.0	90	25	17	8		CL
TPCC004	5	3.40	3.60	B		Dark grey sandy SILT.			20.0	100	32	17	15		CL
TPCC005	2	2.20	2.40	B		Grey very silty coarse GRAVEL.			18.0	72	28	18	10		CL
TPCC006	1	0.70	0.90	B		Grey slightly gravelly sandy SILT.			45.0	100	45	22	23		CI
TPCC006	3	1.60	1.80	B		Grey slightly sandy gravelly SILT.			16.0	93	20	15	5		ML

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: Linear measurement unless : wd - water displacement; wi - immersion in water

Liquid Limit: 4pt cone unless : 1pt - single point test; NP - Non Plastic

Particle density: sp - small pyknometer; gj - gas jar

Date Printed: 08/02/2024 08:59

QC From No: R1

Approved By: DCD

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.

Summary of Classification Test Results

Project No.	Project Name
2023OY108	Lemanaghan 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
TPMM001	2	2.10	2.30	B		Grey slightly gravelly sandy SILT.			21.0	99	31	17	14		CL
TPMM001	4	3.80	4.00	B		Dark brownish-grey sandy CLAY.			31.0	100	44 -1pt	24	20		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: Linear measurement unless : wd - water displacement; wi - immersion in water

Liquid Limit: 4pt cone unless : 1pt - single point test; NP - Non Plastic

Particle density: sp - small pyknometer; gj - gas jar

Date Printed: 08/02/2024 08:59

QC From No: R1

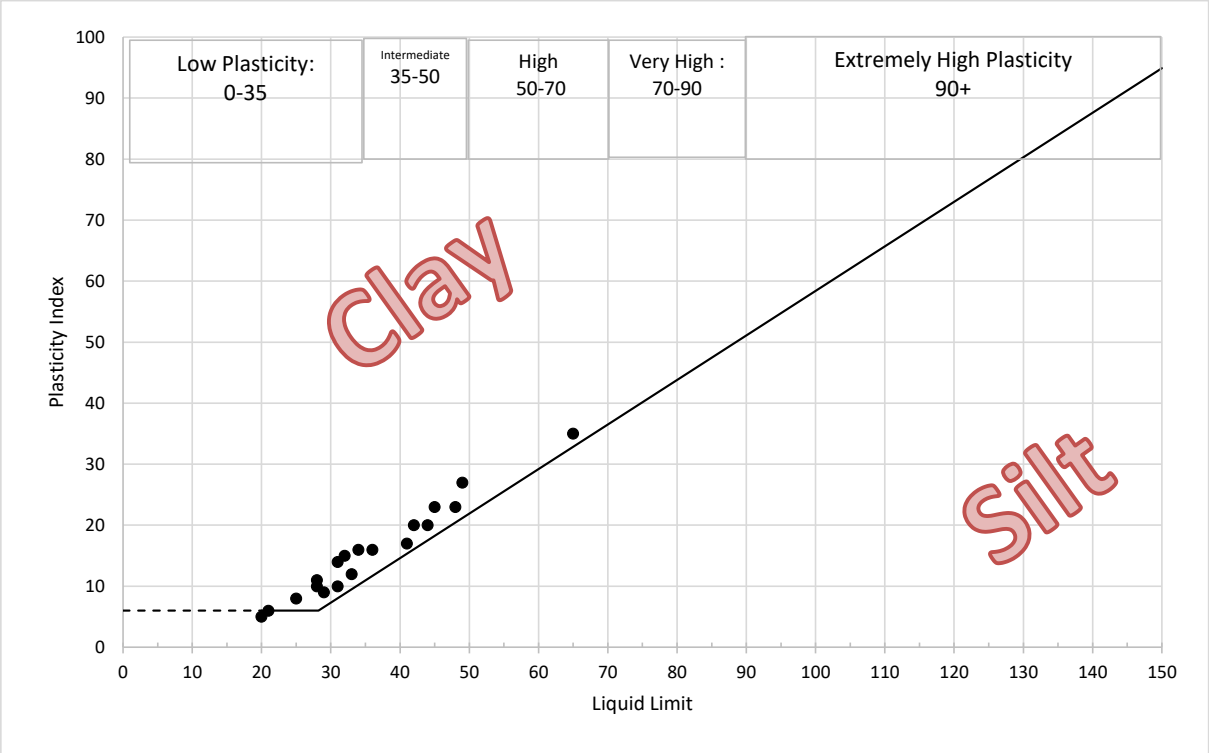
Approved By: DCD

Table 1 sheet 2

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:	**Lemanaghan Wind Farm**	
Location:		2023OY108



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

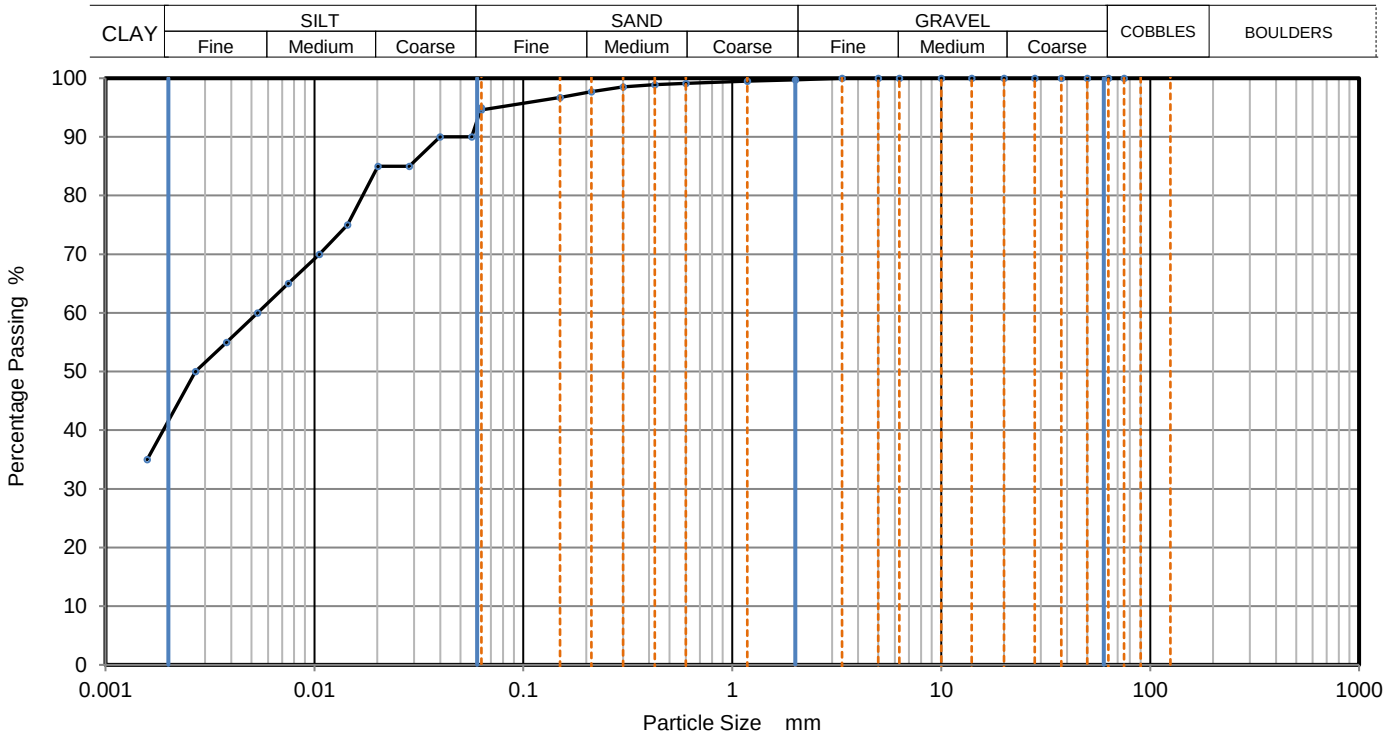
Plasticity abeviations: L = Low, I = Intermediate = H = High, V = Very High, E = Extremely High.

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	**2023OY108**
				Borehole/Pit No.	TPB001
Site Name	Lemanaghan Wind Farm			Sample No.	1
Soil Description	Greenish-grey slightly sandy SILT.			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL1202311061



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	95
		0.0565	90
75	100	0.0400	90
63	100	0.0284	85
50	100	0.0201	85
37.5	100	0.0144	75
28	100	0.0106	70
20	100	0.0075	65
14	100	0.0053	60
10	100	0.0038	55
6.3	100	0.0027	50
5	100	0.0016	35
3.35	100		
2	100		
1.18	100		
0.6	99	Particle density (assumed)	
0.425	99	2.65 Mg/m3	
0.3	99		
0.212	98		
0.15	97		
0.063	95		

Dry Mass of sample, g	620

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	5
Silt	53
Clay	41

Grading Analysis		
D100	mm	
D60	mm	0.00543
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

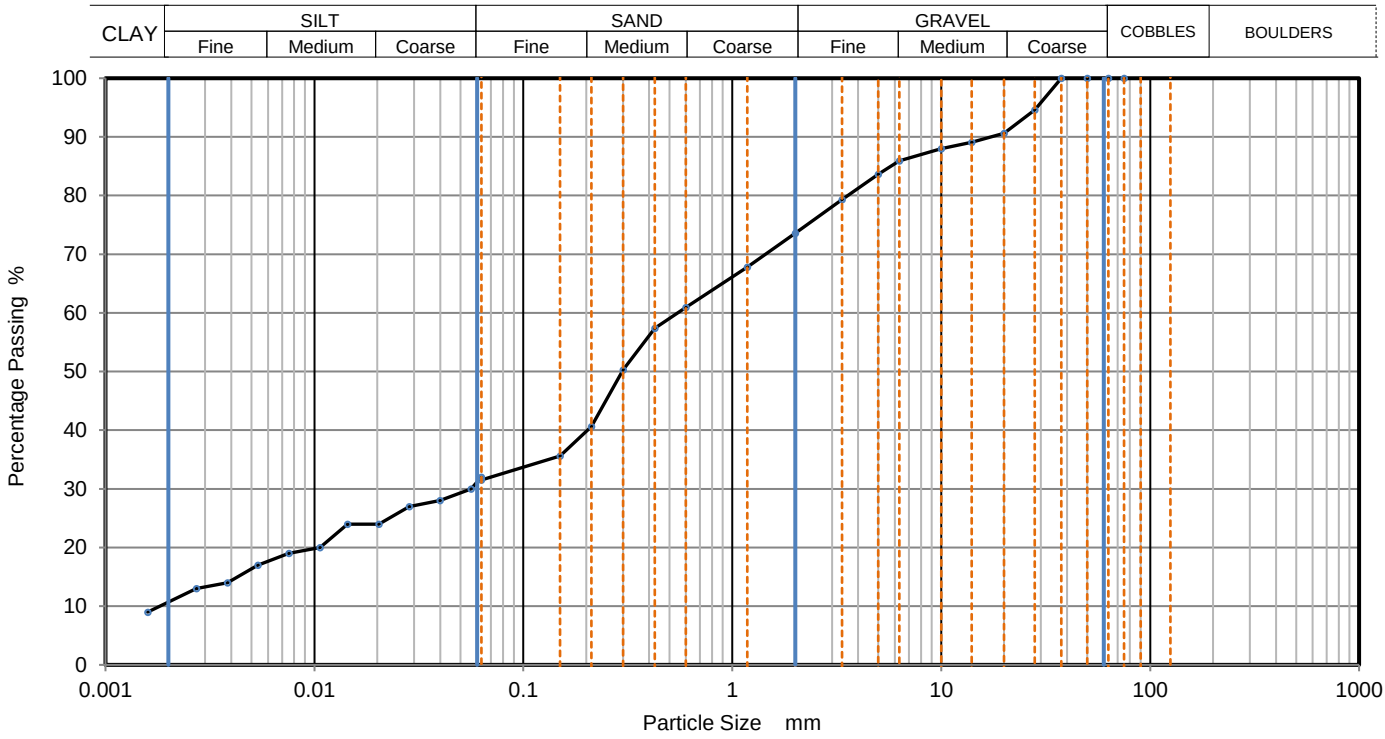
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	18/01/2024 09:25	**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	**2023OY108**
				Borehole/Pit No.	TPB001
Site Name	Lemanaghan Wind Farm			Sample No.	5
Soil Description	Light grey very gravelly very silty medium SAND.			Depth, m	3.20
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL1202311065



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	32
		0.0562	30
75	100	0.0400	28
63	100	0.0284	27
50	100	0.0203	24
37.5	100	0.0144	24
28	95	0.0106	20
20	91	0.0076	19
14	89	0.0054	17
10	88	0.0038	14
6.3	86	0.0027	13
5	84	0.0016	9
3.35	79		
2	74		
1.18	68		
0.6	61	Particle density (assumed)	
0.425	57	2.65 Mg/m3	
0.3	50		
0.212	41		
0.15	36		
0.063	32		

Dry Mass of sample, g	1132

Sample Proportions	% dry mass
Very coarse	0
Gravel	26
Sand	42
Silt	21
Clay	11

Grading Analysis		
D100	mm	
D60	mm	0.549
D30	mm	0.0565
D10	mm	0.00175
Uniformity Coefficient		310
Curvature Coefficient		3.3

Remarks

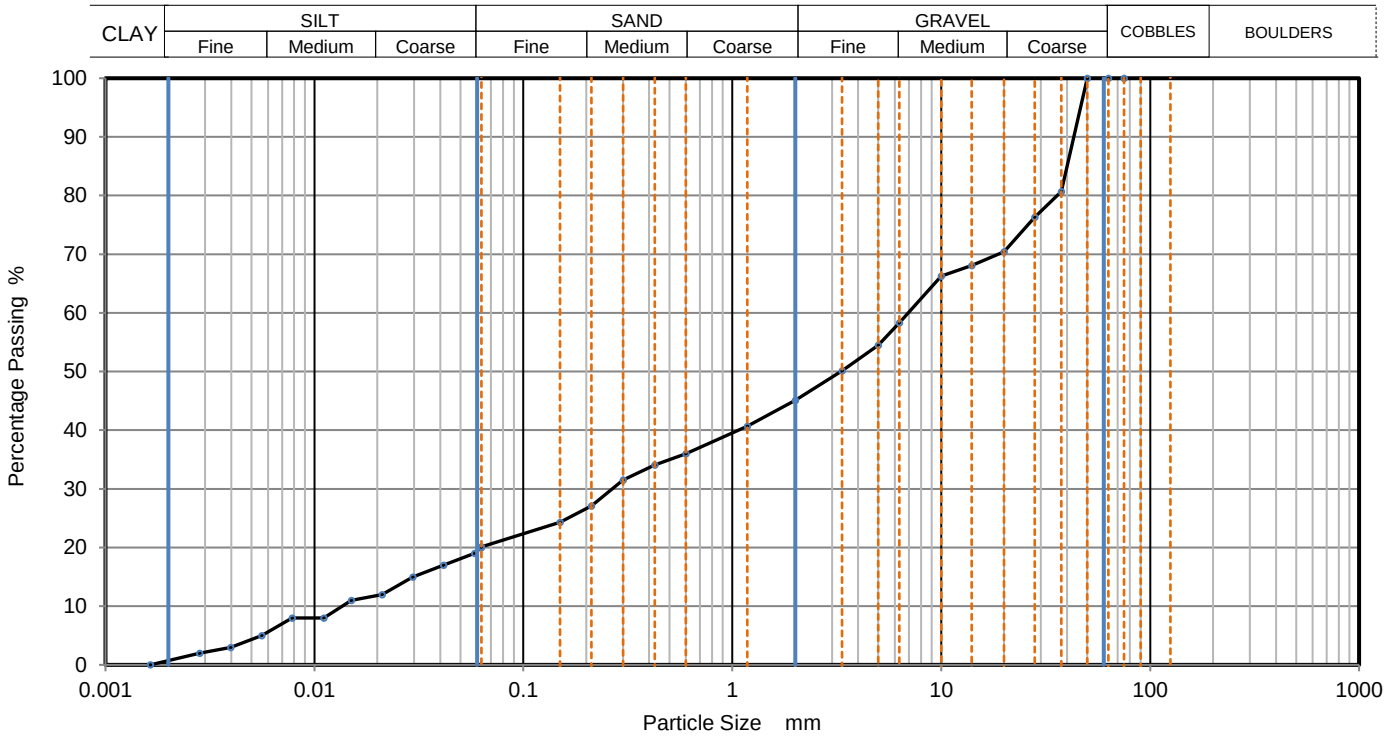
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	18/01/2024 09:25	**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	**2023OY108**
				Borehole/Pit No.	TPB002
Site Name	Lemanaghan Wind Farm			Sample No.	1
Soil Description	Brownish-grey very silty very sandy coarse GRAVEL.			Depth, m	0.80
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL1202311066



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	20
		0.0584	19
75	100	0.0415	17
63	100	0.0295	15
50	100	0.0211	12
37.5	81	0.0150	11
28	76	0.0111	8
20	70	0.0078	8
14	68	0.0056	5
10	66	0.0040	3
6.3	58	0.0028	2
5	55	0.0016	0
3.35	50		
2	45		
1.18	41		
0.6	36	Particle density (assumed)	
0.425	34	2.65	Mg/m3
0.3	32		
0.212	27		
0.15	24		
0.063	20		

Dry Mass of sample, g	1106

Sample Proportions	% dry mass
Very coarse	0
Gravel	55
Sand	25
Silt	19
Clay	1

Grading Analysis		
D100	mm	
D60	mm	6.96
D30	mm	0.266
D10	mm	0.0138
Uniformity Coefficient		500
Curvature Coefficient		0.74

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	18/01/2024 09:25	**1** QC From No:R2

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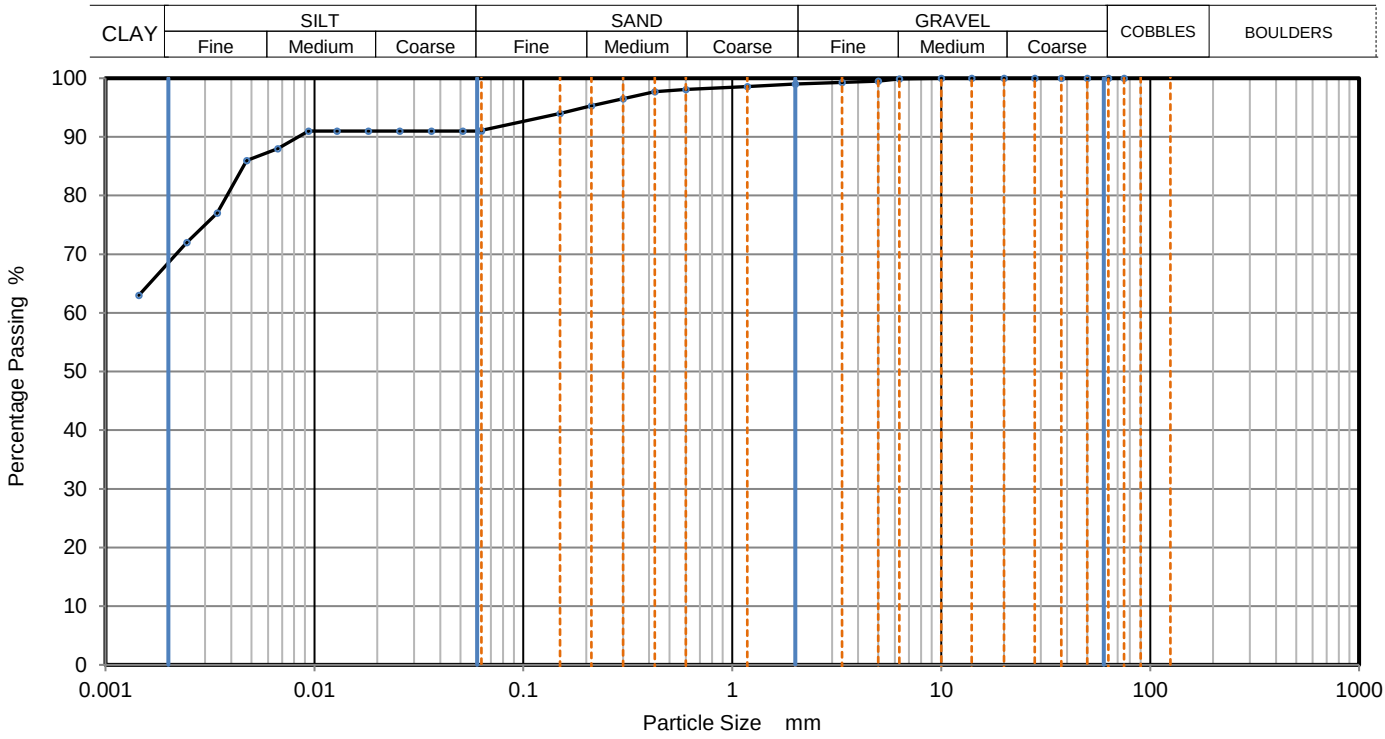
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2023OY108**
				Borehole/Pit No.	TPB003
Site Name	Lemanaghan Wind Farm			Sample No.	1
Soil Description	Grenish-grey slightly sandy CLAY.			Depth, m	0.40
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL1202311068



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	91
		0.0512	91
75	100	0.0362	91
63	100	0.0256	91
50	100	0.0181	91
37.5	100	0.0128	91
28	100	0.0094	91
20	100	0.0067	88
14	100	0.0047	86
10	100	0.0034	77
6.3	100	0.0025	72
5	100	0.0014	63
3.35	99		
2	99		
1.18	99		
0.6	98	Particle density	(assumed)
0.425	98	2.65	Mg/m3
0.3	97		
0.212	95		
0.15	94		
0.063	91		

Dry Mass of sample, g	683

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	8
Silt	23
Clay	69

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

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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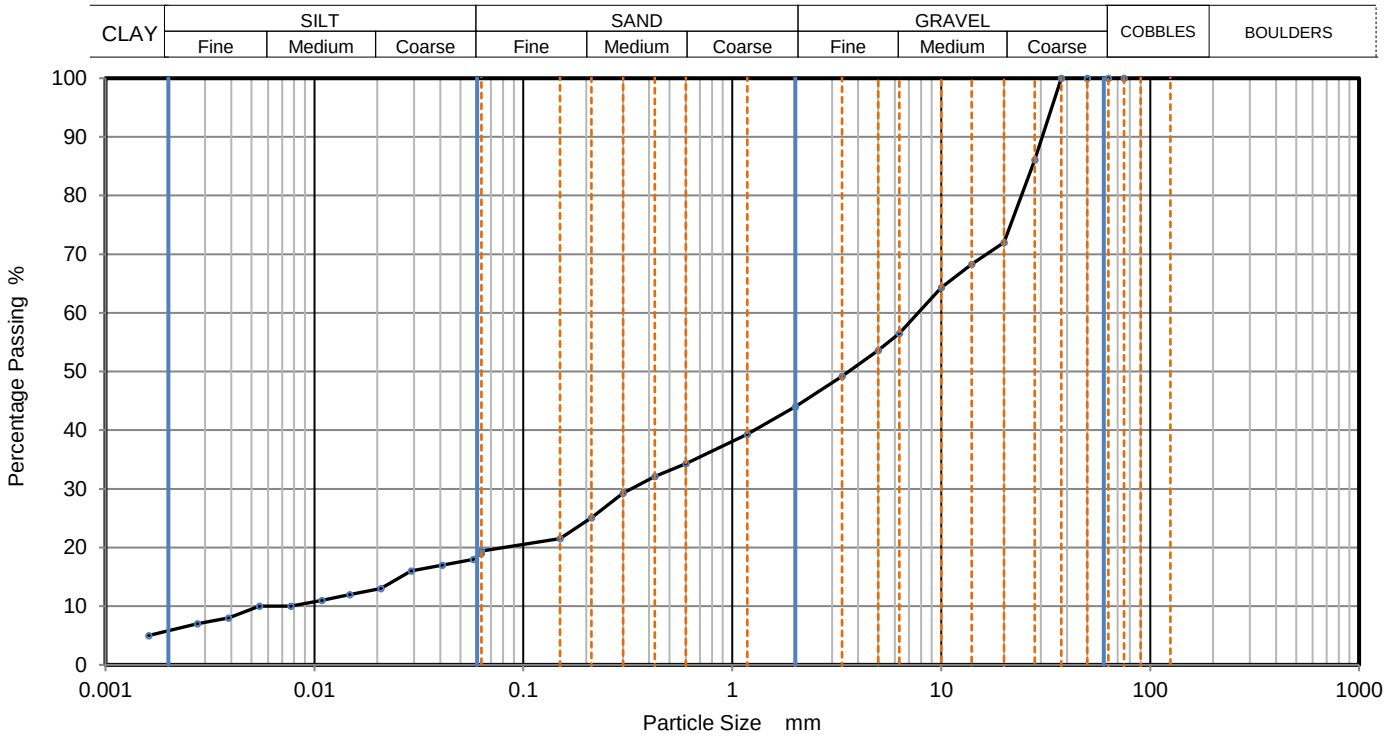
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2023OY108**
				Borehole/Pit No.	TPB003
Site Name	Lemanaghan Wind Farm			Sample No.	3
Soil Description	Grey Grey silty very sandy coarse GRAVEL.			Depth, m	1.20
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12023110610



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	19
		0.0575	18
75	100	0.0409	17
63	100	0.0291	16
50	100	0.0208	13
37.5	100	0.0148	12
28	86	0.0109	11
20	72	0.0077	10
14	68	0.0055	10
10	64	0.0039	8
6.3	57	0.0028	7
5	54	0.0016	5
3.35	49		
2	44		
1.18	39		
0.6	34	Particle density (assumed)	
0.425	32	2.65	Mg/m3
0.3	29		
0.212	25		
0.15	22		
0.063	19		

Dry Mass of sample, g	1096

Sample Proportions	% dry mass
Very coarse	0
Gravel	56
Sand	25
Silt	14
Clay	6

Grading Analysis		
D100	mm	
D60	mm	7.74
D30	mm	0.326
D10	mm	0.0084
Uniformity Coefficient		920
Curvature Coefficient		1.6

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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		Dympna Darcy B.Sc.	18/01/2024 09:25	**1** QC From No:R2

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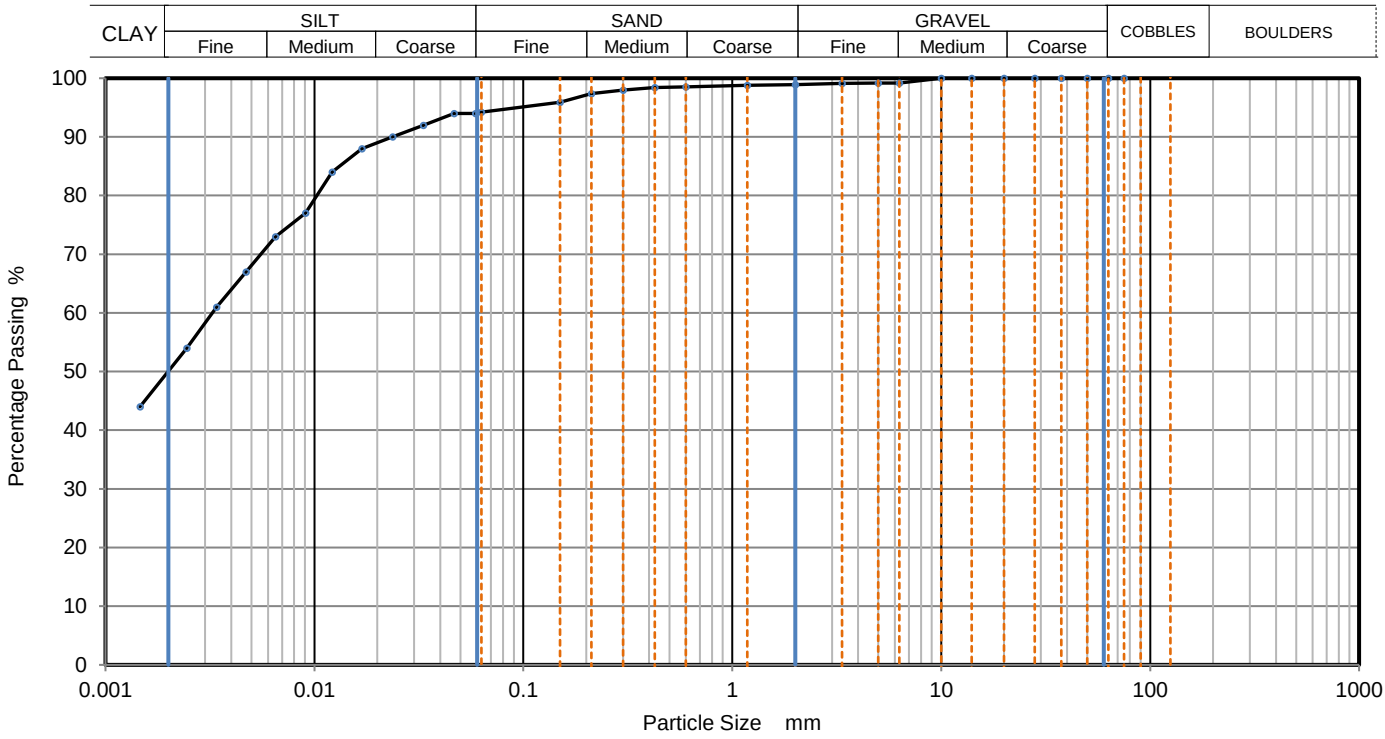
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2023OY108**
				Borehole/Pit No.	TPB005
Site Name	Lemanaghan Wind Farm			Sample No.	1
Soil Description	Grey slightly sandy clayey SILT.			Depth, m	0.60
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12023110616



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0591	94
		0.0466	94
75	100	0.0332	92
63	100	0.0237	90
50	100	0.0169	88
37.5	100	0.0121	84
28	100	0.0091	77
20	100	0.0065	73
14	100	0.0047	67
10	100	0.0034	61
6.3	99	0.0025	54
5	99	0.0015	44
3.35	99		
2	99		
1.18	99		
0.6	99	Particle density	(assumed)
0.425	98	2.65	Mg/m3
0.3	98		
0.212	97		
0.15	96		
0.063	94		

Dry Mass of sample, g	647

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	5
Silt	44
Clay	50

Grading Analysis		
D100	mm	
D60	mm	0.00328
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.	18/01/2024 09:25	**1** QC From No:R2

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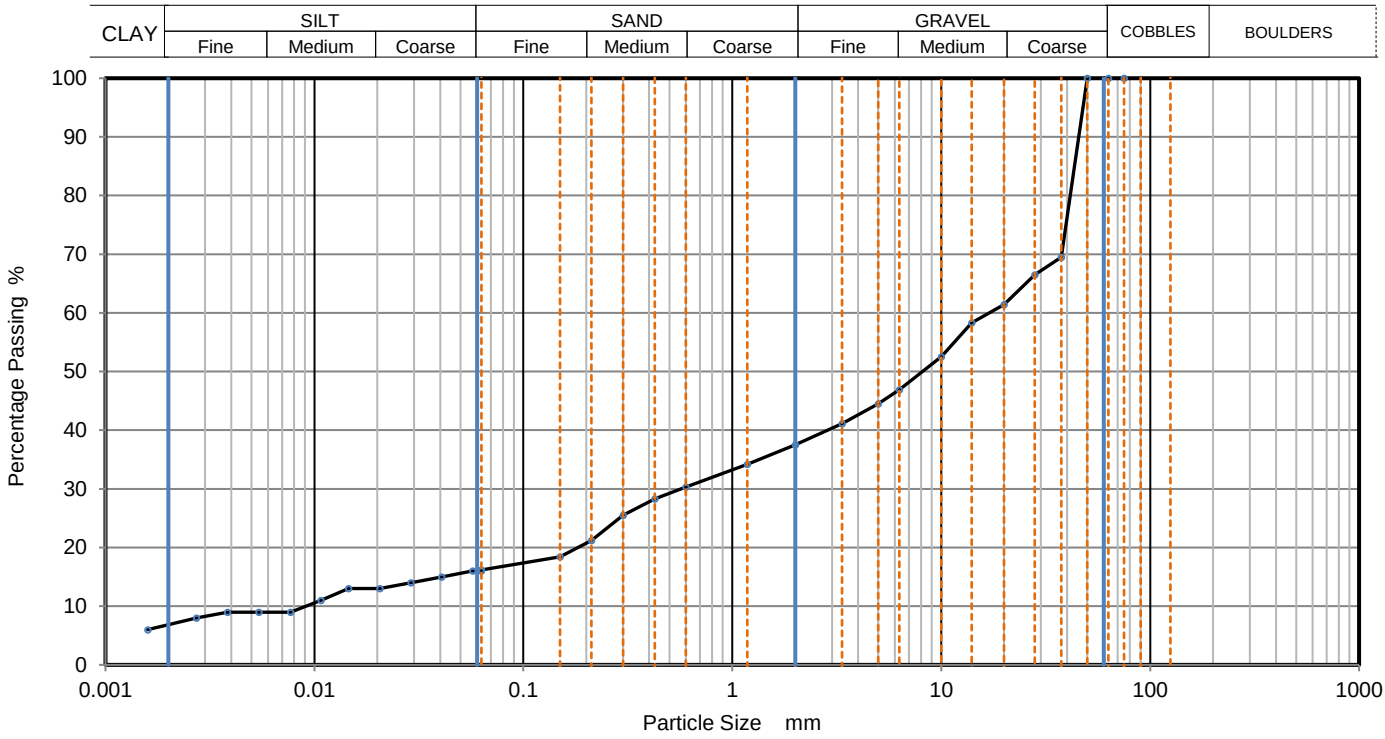
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2023OY108**
				Borehole/Pit No.	TPB005
Site Name	Lemanaghan Wind Farm			Sample No.	3
Soil Description	Light grey silty very sandy coarse GRAVEL.			Depth, m	1.80
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12023110618



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	16
		0.0572	16
75	100	0.0407	15
63	100	0.0289	14
50	100	0.0206	13
37.5	70	0.0145	13
28	67	0.0107	11
20	61	0.0077	9
14	58	0.0054	9
10	53	0.0038	9
6.3	47	0.0027	8
5	45	0.0016	6
3.35	41		
2	38		
1.18	34		
0.6	30	Particle density (assumed)	
0.425	28	2.65 Mg/m3	
0.3	26		
0.212	21		
0.15	18		
0.063	16		

Dry Mass of sample, g	1320

Sample Proportions	% dry mass
Very coarse	0
Gravel	63
Sand	21
Silt	9
Clay	7

Grading Analysis		
D100	mm	
D60	mm	17
D30	mm	0.571
D10	mm	0.00889
Uniformity Coefficient		1900
Curvature Coefficient		2.2

Remarks

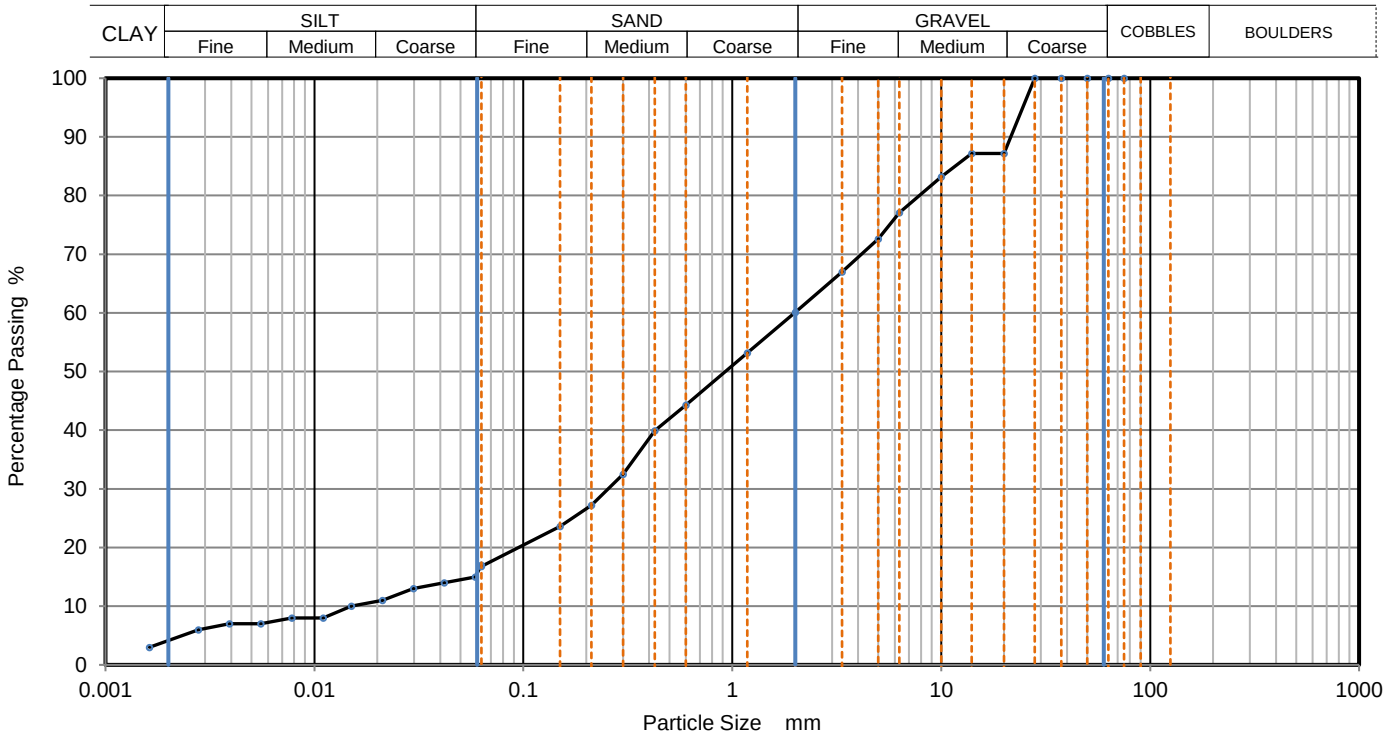
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	18/01/2024 09:25	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	**2023OY108**
				Borehole/Pit No.	TPB006
Site Name	Lemanaghan Wind Farm			Sample No.	1
Soil Description	Brownish-grey silty SAND and GRAVEL.			Depth, m	0.70
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12023110619



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	17
		0.0588	15
75	100	0.0418	14
63	100	0.0297	13
50	100	0.0211	11
37.5	100	0.0150	10
28	100	0.0110	8
20	87	0.0078	8
14	87	0.0055	7
10	83	0.0039	7
6.3	77	0.0028	6
5	73	0.0016	3
3.35	67		
2	60		
1.18	53		
0.6	44	Particle density (assumed)	
0.425	40	2.65 Mg/m3	
0.3	33		
0.212	27		
0.15	24		
0.063	17		

Dry Mass of sample, g	727

Sample Proportions	% dry mass
Very coarse	0
Gravel	40
Sand	43
Silt	13
Clay	4

Grading Analysis		
D100	mm	
D60	mm	1.98
D30	mm	0.255
D10	mm	0.0158
Uniformity Coefficient		130
Curvature Coefficient		2.1

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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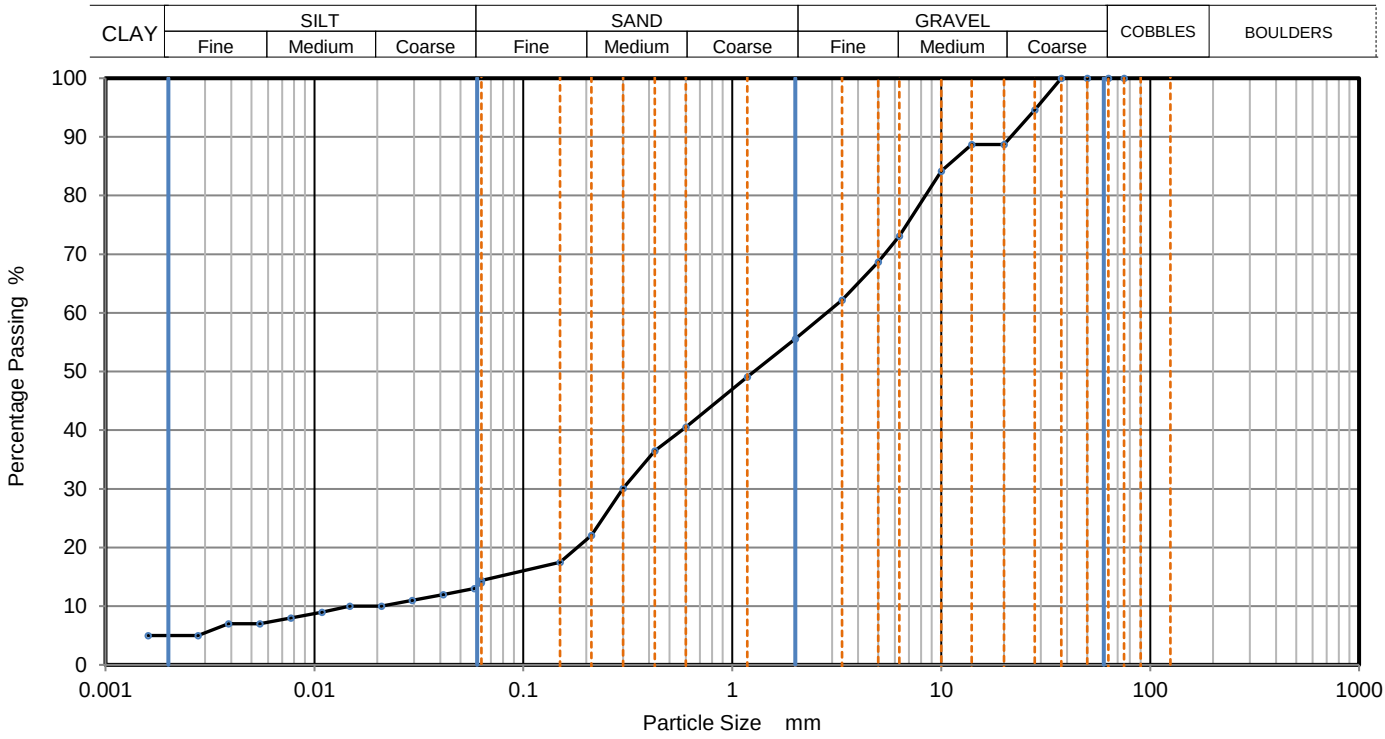
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2023OY108**
				Borehole/Pit No.	TPB006
Site Name	Lemanaghan Wind Farm			Sample No.	2
Soil Description	Grey silty SAND and GRAVEL.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12023110620



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	14
		0.0582	13
75	100	0.0414	12
63	100	0.0294	11
50	100	0.0209	10
37.5	100	0.0148	10
28	95	0.0109	9
20	89	0.0077	8
14	89	0.0055	7
10	84	0.0039	7
6.3	73	0.0028	5
5	69	0.0016	5
3.35	62		
2	56		
1.18	49		
0.6	41	Particle density (assumed)	
0.425	37	2.65 Mg/m3	
0.3	30		
0.212	22		
0.15	18		
0.063	14		

Dry Mass of sample, g	1002

Sample Proportions	% dry mass
Very coarse	0
Gravel	44
Sand	41
Silt	9
Clay	5

Grading Analysis		
D100	mm	
D60	mm	2.82
D30	mm	0.298
D10	mm	0.0136
Uniformity Coefficient		210
Curvature Coefficient		2.3

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	18/01/2024 09:25	**1** QC From No:R2

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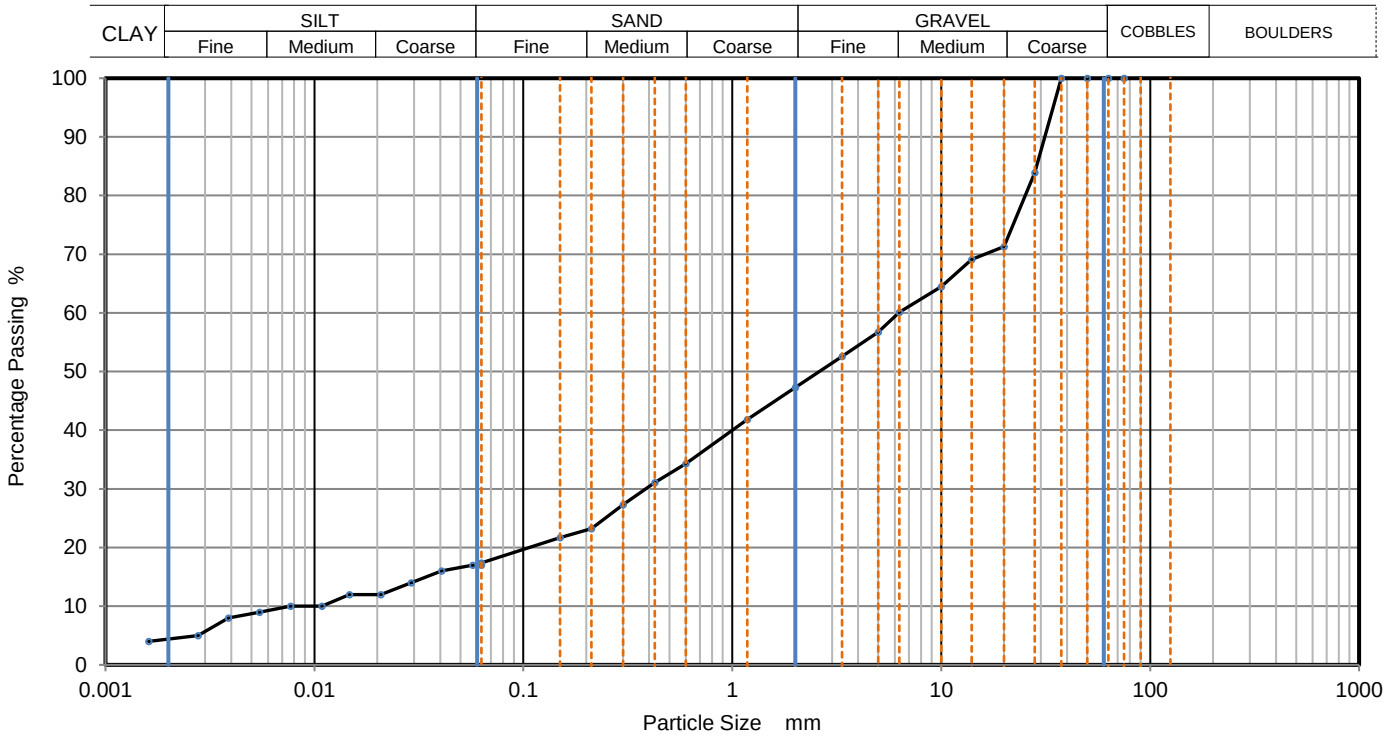
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2023OY108**
				Borehole/Pit No.	TPB007
Site Name	Lemanaghan Wind Farm			Sample No.	2
Soil Description	Light greyish-brown silty very sandy coarse GRAVEL.			Depth, m	2.10
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12023110622



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	17
		0.0572	17
75	100	0.0407	16
63	100	0.0291	14
50	100	0.0208	12
37.5	100	0.0147	12
28	84	0.0109	10
20	71	0.0077	10
14	69	0.0055	9
10	65	0.0039	8
6.3	60	0.0028	5
5	57	0.0016	4
3.35	53		
2	47		
1.18	42		
0.6	34	Particle density (assumed)	
0.425	31	2.65	Mg/m3
0.3	27		
0.212	23		
0.15	22		
0.063	17		

Dry Mass of sample, g	952

Sample Proportions	% dry mass
Very coarse	0
Gravel	53
Sand	30
Silt	13
Clay	5

Grading Analysis		
D100	mm	
D60	mm	6.25
D30	mm	0.384
D10	mm	0.0112
Uniformity Coefficient		560
Curvature Coefficient		2.1

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	18/01/2024 09:25	**1** QC From No:R2

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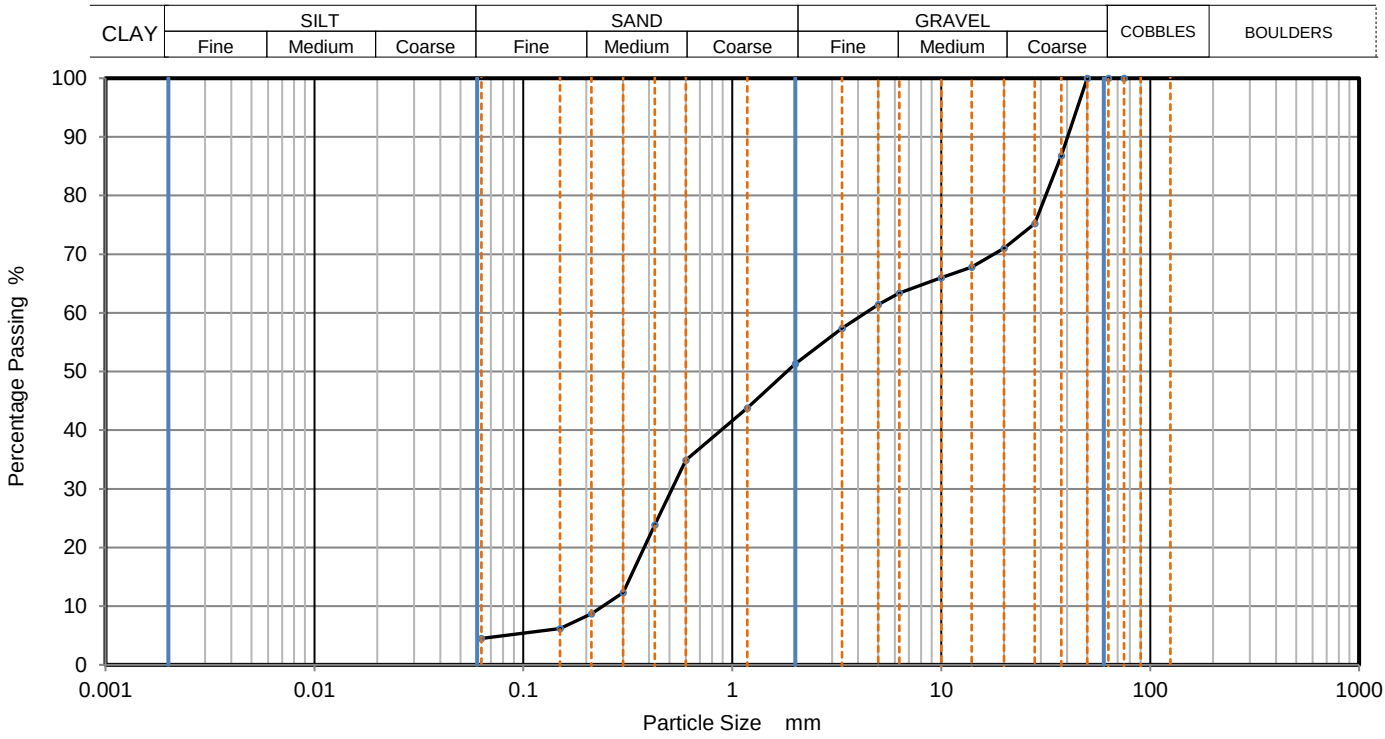
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2023OY108**
				Borehole/Pit No.	TPB008
Site Name	Lemanaghan Wind Farm			Sample No.	2
Soil Description	Dark grey silty medium SAND and coarse GRAVEL.			Depth, m	1.60
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12023110625



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	87		
28	75		
20	71		
14	68		
10	66		
6.3	63		
5	61		
3.35	57		
2	51		
1.18	44		
0.6	35		
0.425	24		
0.3	12		
0.212	9		
0.15	6		
0.063	5		

Dry Mass of sample, g	860

Sample Proportions	% dry mass
Very coarse	0
Gravel	49
Sand	47
Fines <0.063mm	5

Grading Analysis		
D100	mm	
D60	mm	4.35
D30	mm	0.514
D10	mm	0.24
Uniformity Coefficient		18
Curvature Coefficient		0.25

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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

Moisture Condition Value at Natural Moisture Content
Summary of Results

Project No.	Project Name
2023OY108	

Hole No.	Sample				Soil Description	Retained on 20mm sieve %	Moisture Content <20mm %	Moisture Condition Value	Method of Interpretation	Remarks
	Ref	Top	Base	Type						
TPB006	1	0.70	0.90	B		19	12.9	4.2	Best fit line	
TPB007	1	0.70	0.90	B		18	11.2	3.8	Best fit line	
TPB008	2	1.60	1.80	B		9	7.3	17.7	Steepest straight line	

Key	Date Printed	Approved By	Table
Test performed in accordance with BS1377:Part4:1990, clause 5.4 unless annotated otherwise	18/01/2024	SCS	sheet

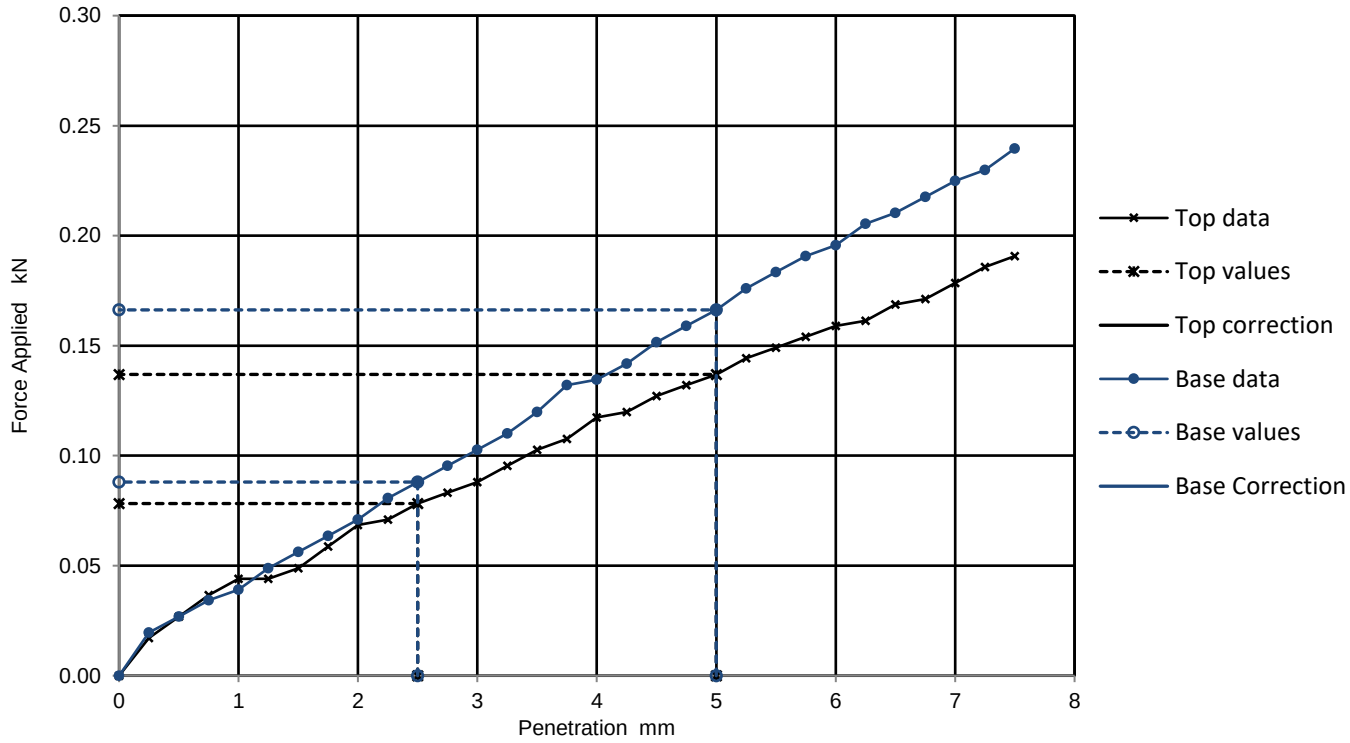
California Bearing Ratio (CBR)

				Job Ref	2023OY108
				Borehole/Pit No.	TPB005
Site Name	Lemanaghan Wind Farm			Sample No.	3
Soil Description	Light grey silty very sandy coarse GRAVEL.			Depth m	1.80
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	IDL12023110618
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed		56	%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.31	Mg/m3	Surcharge applied	2	kg
	Dry density	2.10	Mg/m3		1	kPa
	Moisture content	10.0	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Average	Moisture Content %
TOP		0.6	0.7	0.7	0.8	10.0
BASE		0.7	0.8	0.8		10.5

General remarks	Test specific remarks	Approved
		DCD

Fig No. 1
QC From R9
Sheet No 1

Lab Sheet Reference :

18/01/2024

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.

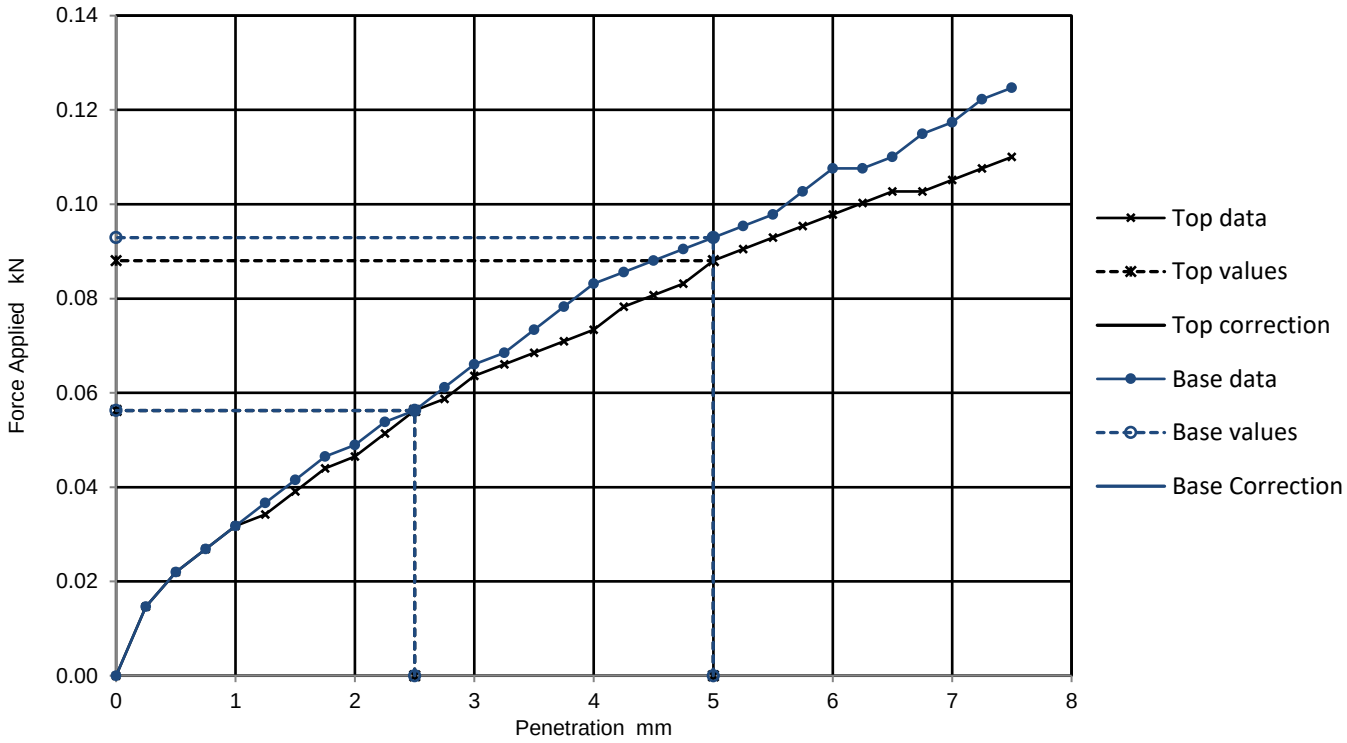
California Bearing Ratio (CBR)

				Job Ref	2023OY108
				Borehole/Pit No.	TPB007
Site Name	Lemanaghan Wind Farm			Sample No.	1
Soil Description	Light greyish-brown silty SAND and GRAVEL.			Depth m	0.70
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	IDL12023110621
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking	days
				Time to surface	days
				Amount of swell recorded	mm
Material retained on 20mm sieve removed			%	Dry density after soaking	Mg/m3
Initial Specimen details	Bulk density	2.25	Mg/m3	Surcharge applied	2 kg
	Dry density	1.99	Mg/m3		1 kPa
	Moisture content	13.0	%		

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Average	Moisture Content %
TOP		0.4	0.4	0.4	0.5	13.0
BASE		0.4	0.5	0.5		12.5

General remarks	Test specific remarks	Approved
		DCD

Fig No. 1
QC From R9
Sheet No 2

Lab Sheet Reference :

18/01/2024

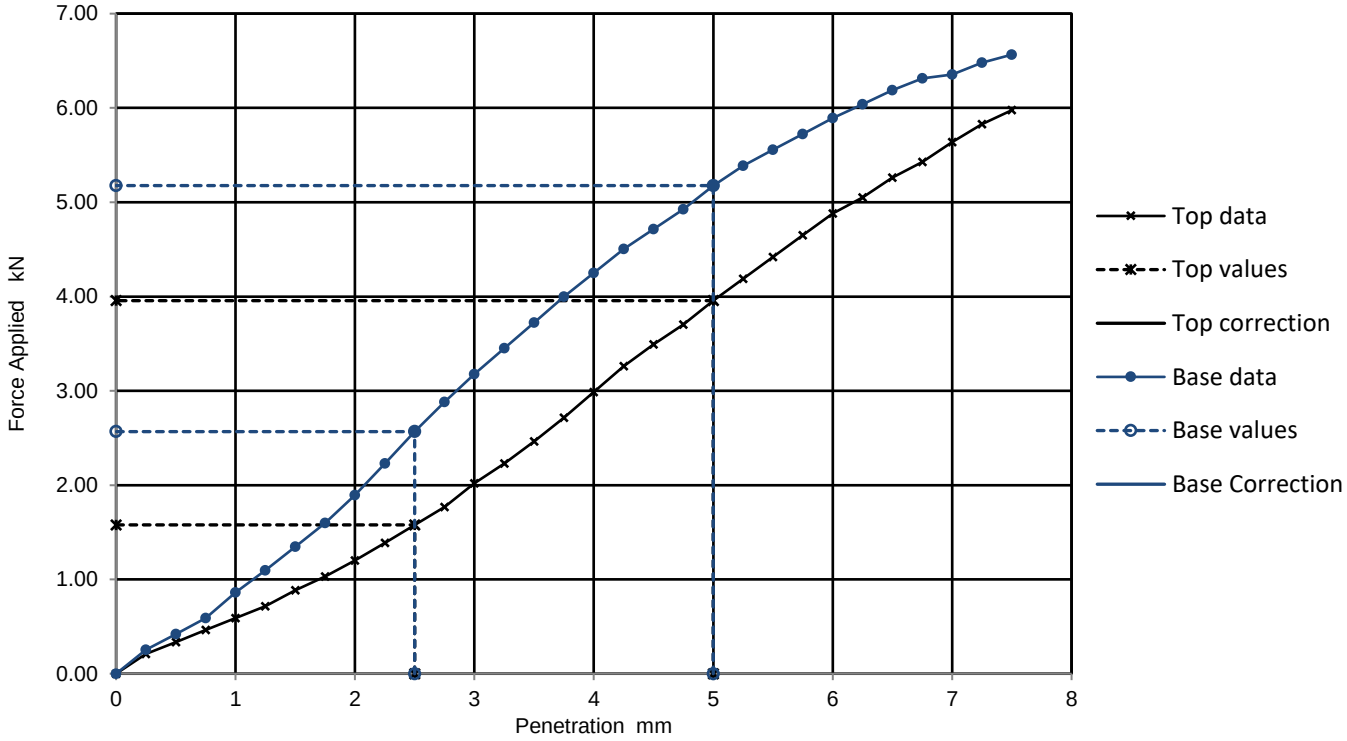
Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**California Bearing Ratio (CBR)**			Job Ref	2023OY108
				Borehole/Pit No.	TPB008
Site Name	Lemanaghan Wind Farm			Sample No.	2
Soil Description	Dark grey silty medium SAND and coarse GRAVEL.			Depth m	1.60
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	IDL12023110625
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking	days
				Time to surface	days
				Amount of swell recorded	mm
Material retained on 20mm sieve removed		9	%	Dry density after soaking	Mg/m3
Initial Specimen details	Bulk density	2.05	Mg/m3	Surcharge applied	kg
	Dry density	1.92	Mg/m3		kPa
	Moisture content	6.7	%		

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Average	Moisture Content %
TOP		12.0	20.0	20.0		7.9
BASE		19.0	26.0	26.0		6.7

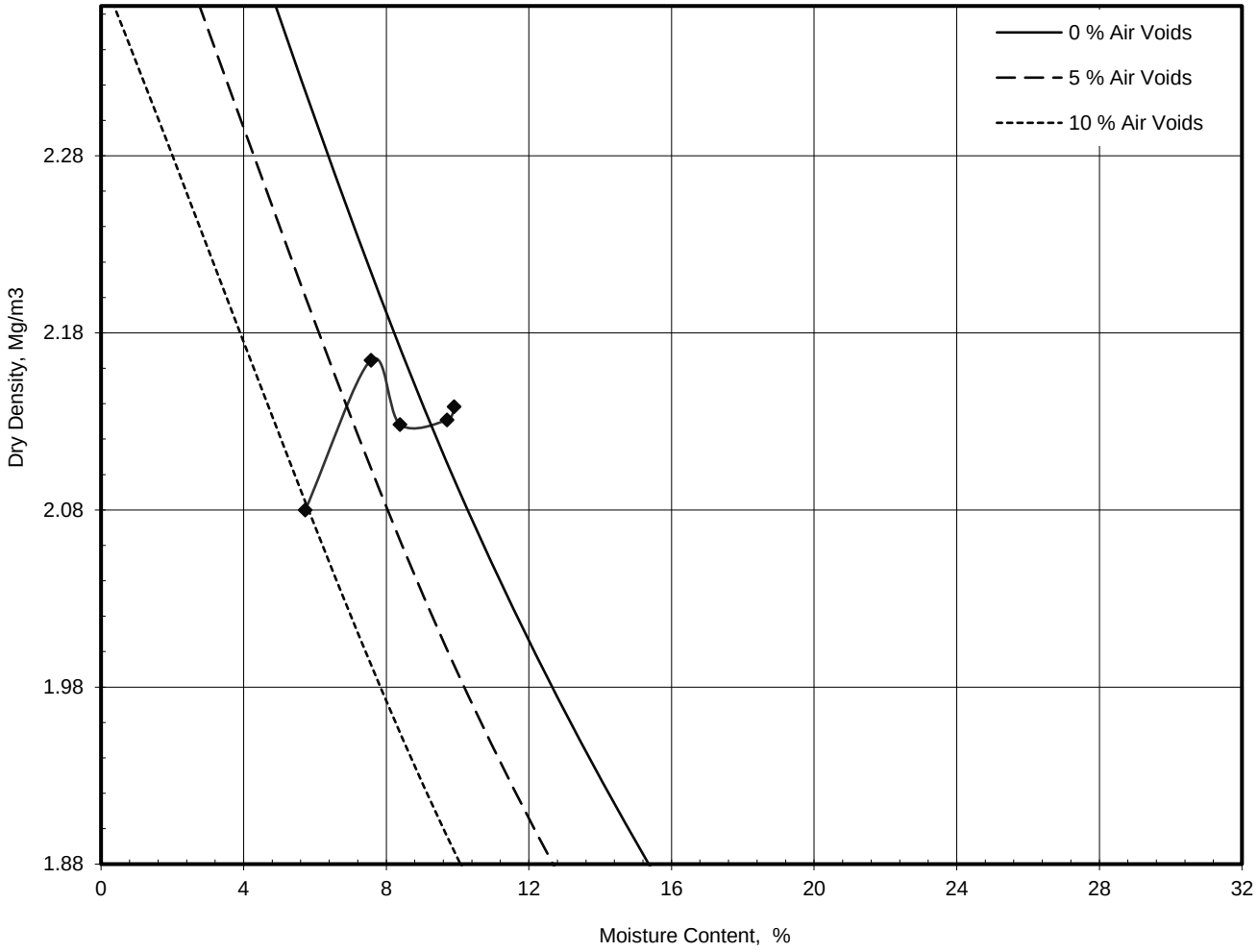
General remarks	Test specific remarks	Approved
		DCD

Fig No. 1
QC From R9
Sheet No 3

Lab Sheet Reference :

18/01/2024

IDL	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	2023OY108
				Borehole / Pit No	TPB001
Site Name	**Lemanaghan Wind Farm**			Sample No	5
Soil Description	Light grey very gravelly very silty medium SAND.			Depth	3.20 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	IDL1202311065
				Compaction Test Reference/No.	



Preparation		Material used was natural and air dried
Mould Type		CBR
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	30
Particle Density - Assumed	Mg/m³	2.65

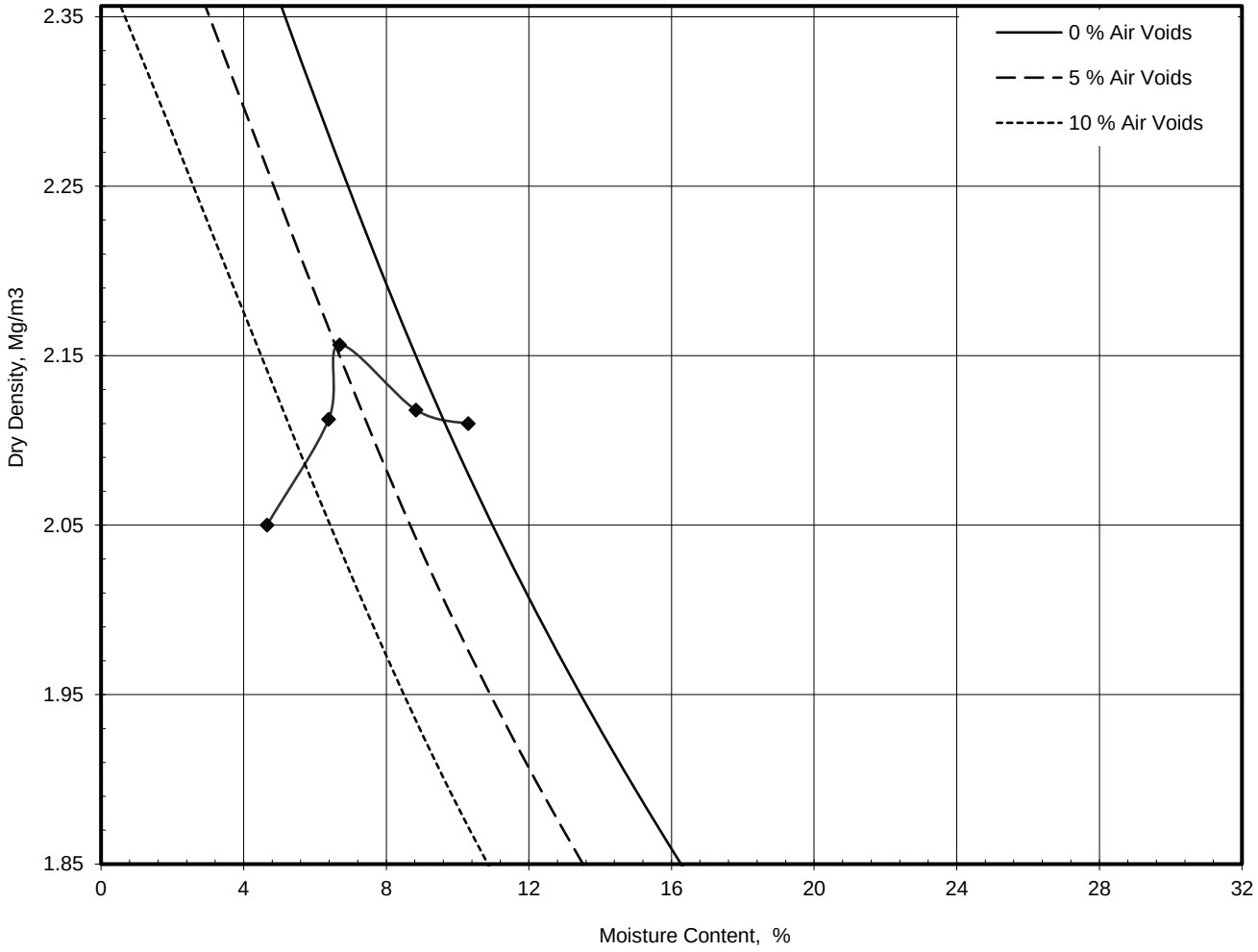
Maximum Dry Density	Mg/m³	**2.17**

Optimum Moisture Content	%	**7.4**

Operator	Checked	Approved	Remarks / Report Date:	**QC Form R4**
		SCS		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.

IDL	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	2023OY108
				Borehole / Pit No	TPB003
Site Name	**Lemanaghan Wind Farm**			Sample No	3
Soil Description	Grey Grey silty very sandy coarse GRAVEL.			Depth	1.20 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	IDL12023110610
				Compaction Test Reference/No.	



Preparation		Material used was natural and air dried
Mould Type		CBR
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	52
Particle Density - Assumed	Mg/m³	2.65

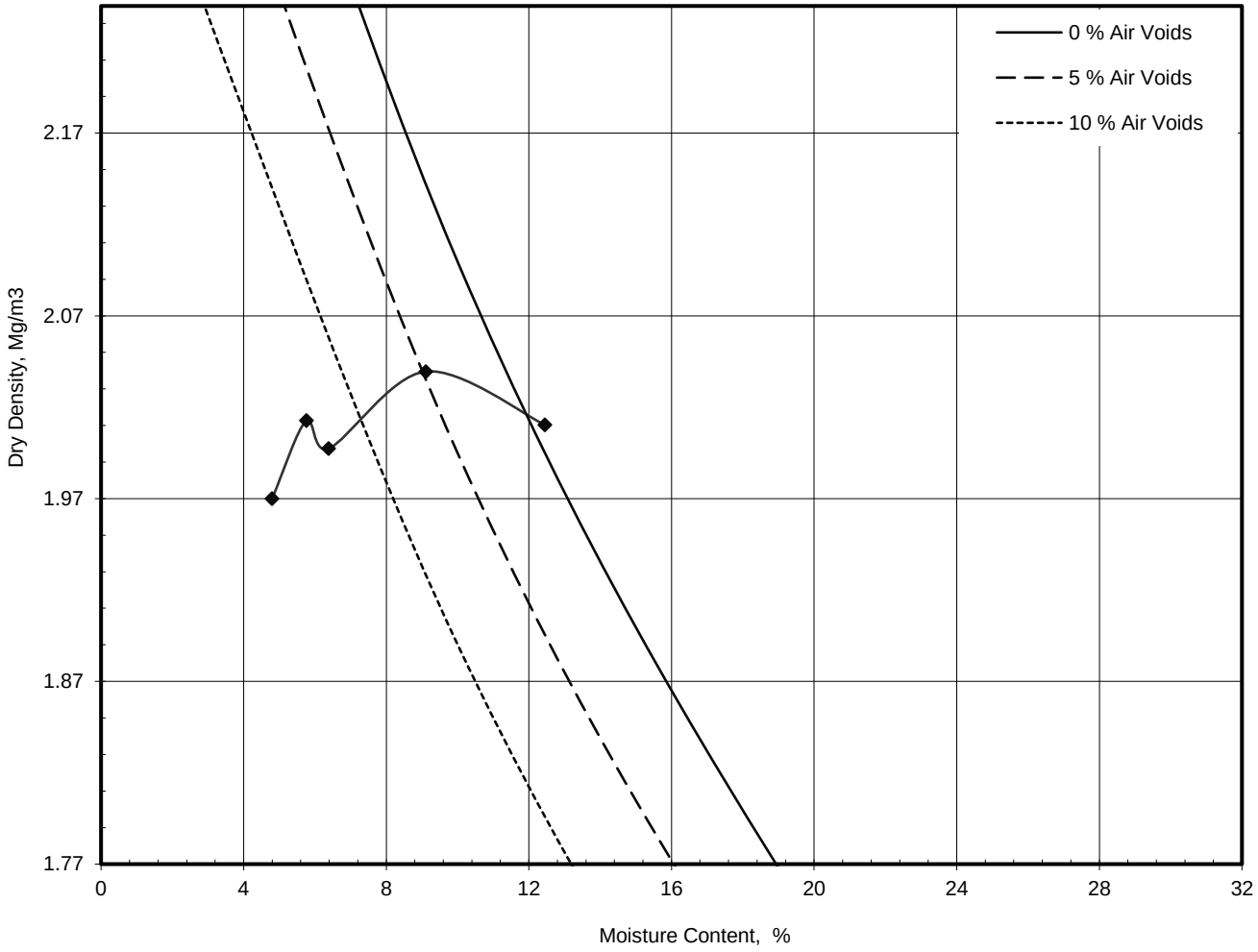
Maximum Dry Density	Mg/m³	**2.16**

Optimum Moisture Content	%	**6.7**

Operator	Checked	Approved	Remarks / Report Date:	**QC Form R4**
		DCD		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.

IDL	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	2023OY108
				Borehole / Pit No	TPB006
Site Name	**Lemanaghan Wind Farm**			Sample No	1
Soil Description	Brownish-grey silty SAND and GRAVEL.			Depth	0.70 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	IDL12023110619
				Compaction Test Reference/No.	



Preparation		Material used was natural and air dried
Mould Type		CBR
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	19
Particle Density - Assumed	Mg/m³	2.65

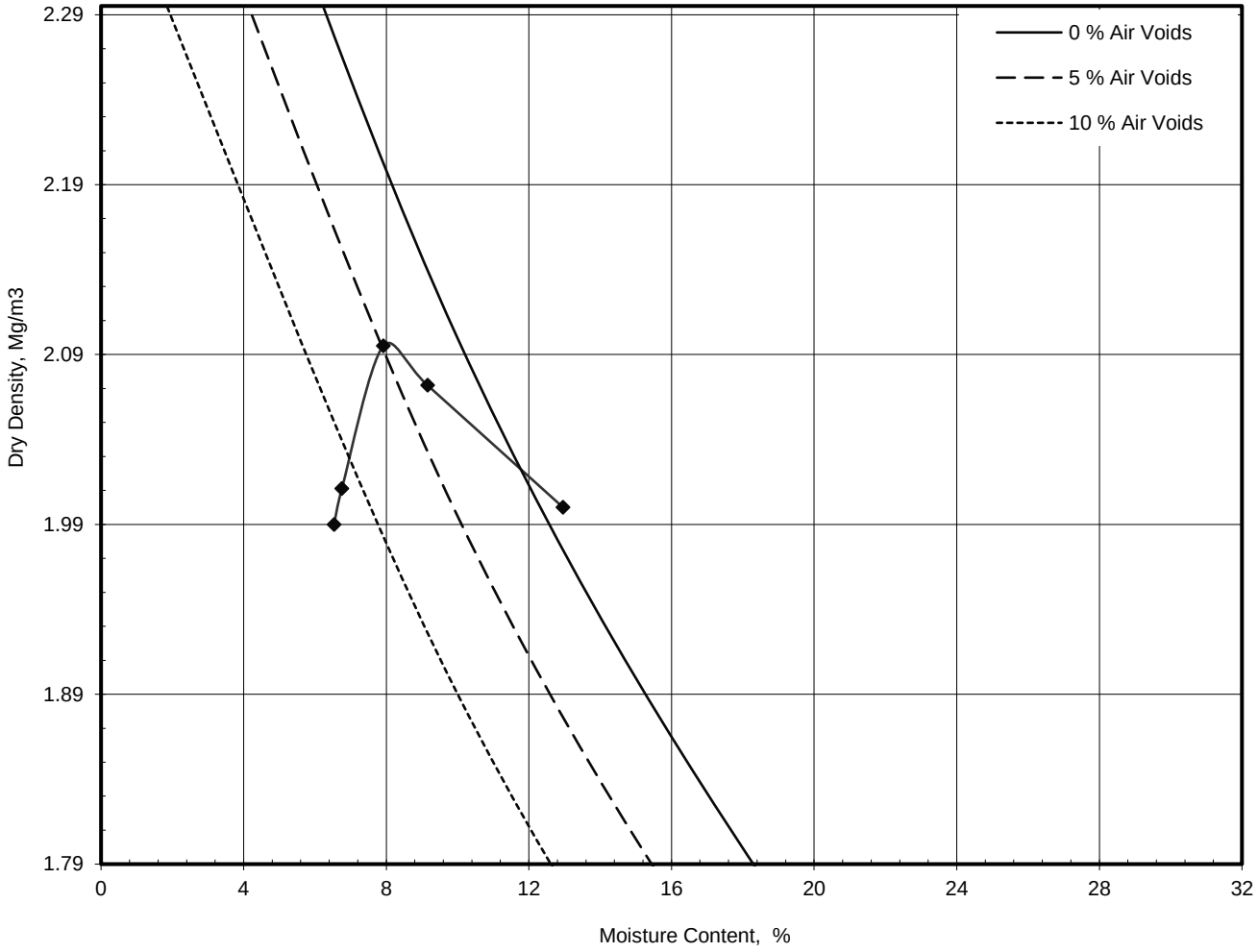
Maximum Dry Density	Mg/m³	**2.03**

Optimum Moisture Content	%	**9.4**

Operator	Checked	Approved	Remarks / Report Date:	**QC Form R4**
		DCD		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.

IDL	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	2023OY108
				Borehole / Pit No	TPB007
Site Name	**Lemanaghan Wind Farm**			Sample No	1
Soil Description	Light greyish-brown silty SAND and GRAVEL.			Depth	0.70 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	IDL12023110621
				Compaction Test Reference/No.	



Preparation		Material used was natural and air dried
Mould Type		CBR
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	18
Particle Density - Assumed	Mg/m³	2.65

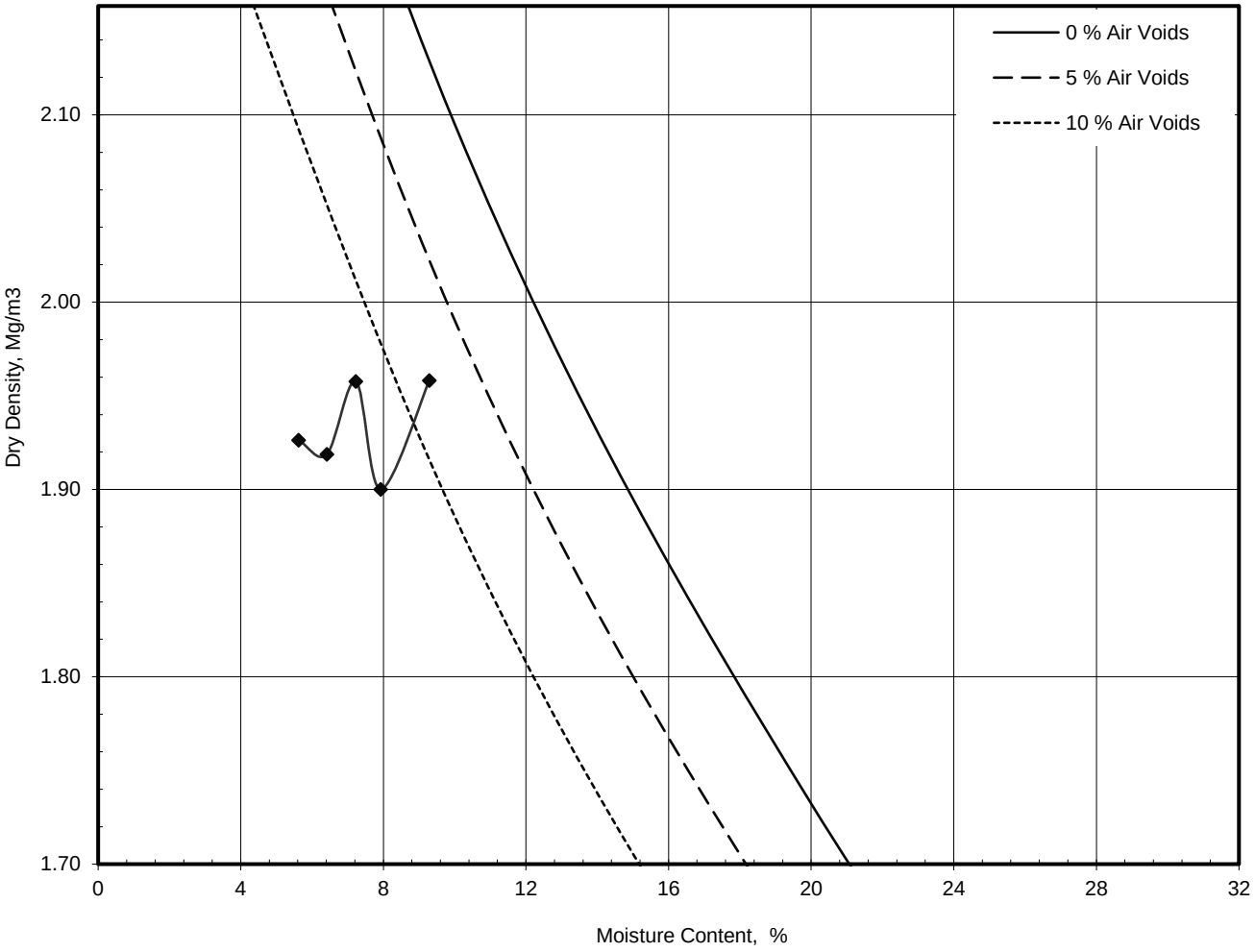
Maximum Dry Density	Mg/m³	**2.09**

Optimum Moisture Content	%	**7.9**

Operator	Checked	Approved	Remarks / Report Date:	**QC Form R4**
		DCD		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.

IDL	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	2023OY108
				Borehole / Pit No	TPB008
Site Name	**Lemanaghan Wind Farm**			Sample No	2
Soil Description	Dark grey silty medium SAND and coarse GRAVEL.			Depth	1.60 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	IDL12023110625
				Compaction Test Reference/No.	



Preparation		Material used was natural and air dried
Mould Type		CBR
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	9
Particle Density - Assumed	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**1.96**

Optimum Moisture Content	%	**7.2**

Operator	Checked	Approved	Remarks / Report Date:	**QC Form R4**
		DCD		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.

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Website: www.alsenvironmental.co.uk

Irish Drilling Limited
Old Galway Road
Loughrea
Co. Galway

Attention: Dympna Darcy

CERTIFICATE OF ANALYSIS

Date of report Generation:	19 December 2023
Customer:	Irish Drilling Limited
Sample Delivery Group (SDG):	231212-91
Your Reference:	2023OY108
Location:	Lemanaghan Wind Farm
Report No:	714839
Order Number:	13229

We received 3 samples on Tuesday December 12, 2023 and 3 of these samples were scheduled for analysis which was completed on Tuesday December 19, 2023. 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 Laboratories (UK) Limited 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

1291

ALS Laboratories (UK) Limited. Registered Office: Torrington Avenue, Coventry CV4 9GU. Registered in England and Wales No. 02391955.
Version: 3.6 Version Issued: 19/12/2023

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
29091413	TPB001	B1	1.00 - 1.20	25/10/2023
29091418	TPB003	B1	0.40 - 0.60	25/10/2023
29091420	TPB005	B1	0.60 - 0.80	25/10/2023

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

Validated

CERTIFICATE OF ANALYSIS

SDG: 231212-91 **Report Number:** 714839 **Superseded Report:**
Client Ref.: 2023OY108 **Location:** Lemanaghan 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)			29091413	29091418	29091420
Customer Sample Reference			TPB001	TPB003	TPB005
AGS Reference			B1	B1	B1
Depth (m)			1.00 - 1.20	0.40 - 0.60	0.60 - 0.80
Container			250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)
Sample Type			S	S	S
Sample description	All	NDPs: 0 Tests: 3	X	X	X
Total Organic Carbon	All	NDPs: 0 Tests: 3	X	X	X

CERTIFICATE OF ANALYSIS

SDG: 231212-91 **Report Number:** 714839 **Superseded Report:**
Client Ref.: 2023OY108 **Location:** Lemanaghan 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
29091413	TPB001	1.00 - 1.20	Light Brown	Silty Clay	None	None
29091418	TPB003	0.40 - 0.60	Light Brown	Silty Clay	None	None
29091420	TPB005	0.60 - 0.80	Grey	Silty Clay	Stones	None

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: 231212-91 **Report Number:** 714839 **Superseded Report:**
Client Ref.: 2023OY108 **Location:** Lemanaghan 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)

Customer Sample Ref.	TPB001	TPB003	TPB005			
Depth (m)	1.00 - 1.20	0.40 - 0.60	0.60 - 0.80			
Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)			
Date Sampled	25/10/2023	25/10/2023	25/10/2023			
Sample Time	.	.	.			
Date Received	12/12/2023	12/12/2023	12/12/2023			
SDG Ref	231212-91	231212-91	231212-91			
Lab Sample No.(s)	29091413	29091418	29091420			
AGS Reference	B1	B1	B1			

Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	22	26	22			
Soil Organic Matter (SOM)	<0.35 %	TM132	1.11 @ #	1.18 @ #	0.965 @ #			

Table of Results - Appendix

Method No	Description
PM024	Soil preparation including homogenisation, moisture, screens of soils for Asbestos Containing Material
TM132	ELTRA CS800 Operators Guide

NA = not applicable.
Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).

Test Completion Dates

Lab Sample No(s)	29091413	29091418	29091420
Customer Sample Ref.	TPB001	TPB003	TPB005
AGS Ref.	B1	B1	B1
Depth	1.00 - 1.20	0.40 - 0.60	0.60 - 0.80
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Sample description	13-Dec-2023	13-Dec-2023	13-Dec-2023
Total Organic Carbon	19-Dec-2023	19-Dec-2023	19-Dec-2023

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 15 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 15 days 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 (2021), 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 and soils are obtained from supplied bulk materials andd soils 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 (2021).

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.

Unit 7-8 Hawarden Business Park
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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:	01 February 2024
Customer:	Irish Drilling Limited
Sample Delivery Group (SDG):	240126-71
Your Reference:	2023OY108
Location:	Lemanaghan Wind Farm
Report No:	718867
Order Number:	13364

We received 5 samples on Friday January 26, 2024 and 5 of these samples were scheduled for analysis which was completed on Thursday February 01, 2024. 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 Laboratories (UK) Limited 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: 240126-71 **Report Number:** 718867 **Superseded Report:**
Client Ref.: 2023OY108 **Location:** Lemanaghan Wind Farm

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
29270163	BHSS1	C1	7.10 - 8.60	08/11/2023
29270167	BHT01	C1	4.10 - 5.60	22/11/2023
29270170	BHT03	C1	7.10 - 8.60	20/11/2023
29270172	BHT06	C1	5.60 - 7.10	17/11/2023
29270174	BHT15	C1	5.60 - 7.10	15/11/2023

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

CERTIFICATE OF ANALYSIS

SDG: 240126-71 **Report Number:** 718867 **Superseded Report:**
Client Ref.: 2023OY108 **Location:** Lemanaghan 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)	29270163	29270167	29270170	29270172	29270174
			Customer Sample Reference	BHSS1	BHT01	BHT03	BHT06	BHT15
			AGS Reference	C1	C1	C1	C1	C1
			Depth (m)	7.10 - 8.60	4.10 - 5.60	7.10 - 8.60	5.60 - 7.10	5.60 - 7.10
			Container	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB
			Sample Type	S	S	S	S	S
Ammoniacal N as NH4 in 2:1 extract	All	NDPs: 0 Tests: 5		X	X	X	X	X
Anions by Kone (soil)	All	NDPs: 0 Tests: 5		X	X	X	X	X
Magnesium (BRE)	All	NDPs: 0 Tests: 5		X	X	X	X	X
NO3, NO2 and TON by KONE (s)	All	NDPs: 0 Tests: 5		X	X	X	X	X
pH	All	NDPs: 0 Tests: 5		X	X	X	X	X
Sample description	All	NDPs: 0 Tests: 5		X	X	X	X	X
Total Organic Carbon	All	NDPs: 0 Tests: 4			X	X	X	X
Total Sulphate	All	NDPs: 0 Tests: 5		X	X	X	X	X
Total Sulphur	All	NDPs: 0 Tests: 5		X	X	X	X	X

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
29270163	BHSS1	7.10 - 8.60	Grey	Silty Clay	None	None
29270167	BHT01	4.10 - 5.60	Black	Silty Clay	None	None
29270170	BHT03	7.10 - 8.60	Grey	Clay	None	None
29270172	BHT06	5.60 - 7.10	Grey	Clay	None	None
29270174	BHT15	5.60 - 7.10	Grey	Clay	None	None

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: 240126-71 **Report Number:** 718867 **Superseded Report:**
Client Ref.: 2023OY108 **Location:** Lemanaghan 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.	BHSS1	BHT01	BHT03	BHT06	BHT15
			Depth (m)	7.10 - 8.60	4.10 - 5.60	7.10 - 8.60	5.60 - 7.10	5.60 - 7.10
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	08/11/2023	22/11/2023	20/11/2023	17/11/2023	15/11/2023
			Sample Time	.	.	.	.	.
			Date Received	26/01/2024	26/01/2024	26/01/2024	26/01/2024	26/01/2024
			SDG Ref	240126-71	240126-71	240126-71	240126-71	240126-71
			Lab Sample No.(s)	29270163	29270167	29270170	29270172	29270174
			AGS Reference	C1	C1	C1	C1	C1
Moisture Content Ratio (% of as received sample)	%	PM024		12	14	12	13	11
Sulphur, Total	<0.02 %	TM132		0.0761 @ #	<0.02 @ #	0.0506 @ #	<0.02 @ #	0.0567 @ #
Soil Organic Matter (SOM)	<0.35 %	TM132			1.1 @ #	0.657 @ #	5.26 @ #	0.552 @ #
pH	1 pH Units	TM133		8.08 @ M	8.23 @ M	8.57 @ M	8.44 @ M	8.31 @ M
Sulphate, acid soluble (total)	<0.0048 %	TM221		0.0976 M	0.026 M	0.0348 M	0.0148 M	0.044 M
Soluble Sulphate 2:1 extract as SO4 BRE	<0.004 g/l	TM243		0.401 @ M	0.0382 @ M	0.0733 @ M	0.0202 @ M	0.138 @ M
Chloride 2:1 water/soil extract BRE	<0.0025 g/l	TM243		0.0111 @ M	0.0086 @ M	0.011 @ M	0.0069 @ M	0.0132 @ M
Nitrate as NO3, 2:1 water soluble (BRE)	<0.0003 g/l	TM243		<0.0003	0.00177	<0.0003	0.000499	<0.0003
Ammoniacal N as NH4 in 2:1 extract BRE	<0.0003 g/l	TM248		0.00538	0.00414	0.0075	0.00594	0.0073
Magnesium (BRE)	<0.008 g/l	TM282		<0.008	<0.008	<0.008	<0.008	<0.008

Table of Results - Appendix

Method No	Description
TM248	Determination of Ammonium BRE (2:1 Extract) on solids
TM282	Extraction of Magnesium by BRE Method
PM024	Soil preparation including homogenisation, moisture, screens of soils for Asbestos Containing Material
TM132	ELTRA CS800 Operators Guide
TM133	Determination of pH in Soil and Water using the GLpH pH Meter
TM221	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 Laboratories (UK) Limited Hawarden (Method codes TM).

CERTIFICATE OF ANALYSIS

SDG: 240126-71 **Report Number:** 718867 **Superseded Report:**
Client Ref.: 2023OY108 **Location:** Lemanaghan Wind Farm

Test Completion Dates

Lab Sample No(s)	29270163	29270167	29270170	29270172	29270174
Customer Sample Ref.	BHSS1	BHT01	BHT03	BHT06	BHT15
AGS Ref.	C1	C1	C1	C1	C1
Depth	7.10 - 8.60	4.10 - 5.60	7.10 - 8.60	5.60 - 7.10	5.60 - 7.10
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Ammoniacal N as NH4 in 2:1 extract	01-Feb-2024	01-Feb-2024	01-Feb-2024	01-Feb-2024	01-Feb-2024
Anions by Kone (soil)	01-Feb-2024	01-Feb-2024	01-Feb-2024	01-Feb-2024	01-Feb-2024
Magnesium (BRE)	31-Jan-2024	31-Jan-2024	31-Jan-2024	31-Jan-2024	31-Jan-2024
NO3, NO2 and TON by KONE (s)	01-Feb-2024	01-Feb-2024	01-Feb-2024	01-Feb-2024	01-Feb-2024
pH	01-Feb-2024	01-Feb-2024	01-Feb-2024	01-Feb-2024	01-Feb-2024
Sample description	26-Jan-2024	26-Jan-2024	26-Jan-2024	26-Jan-2024	26-Jan-2024
Total Organic Carbon		31-Jan-2024	31-Jan-2024	31-Jan-2024	31-Jan-2024
Total Sulphate	31-Jan-2024	31-Jan-2024	31-Jan-2024	31-Jan-2024	31-Jan-2024
Total Sulphur	31-Jan-2024	31-Jan-2024	31-Jan-2024	31-Jan-2024	31-Jan-2024

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 15 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 15 days 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 (2021), 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 and soils are obtained from supplied bulk materials andd soils 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 (2021).

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.

IDL

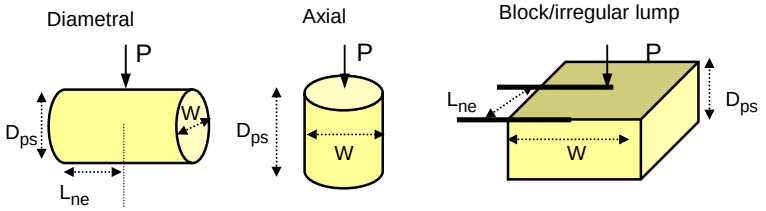
Point Load Strength Index Tests
Summary of Results

Project No.: 2023OY108

Project Name: Lemanaghan Wind Farm

Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Ref	Top		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m			m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BHBP1	2.50	4.1	C	3.4-3.53	3.40		D	U	YES		63.4		63.4	21.6	63.4	5.4	6.0	Very Strong
BHBP1	4.10	5.5	C	4.6-4.7	4.60		D	U	YES		63.4		63.4	1.2	63.4	0.3	0.3	Weak
BHBP1	5.50	7.1	C	6.8-7.0	6.80		D	U	YES		63.4		63.4	18.6	63.4	4.6	5.1	Very Strong
BHSS3	10.10	11.6	C	11.0-11.14	11.00		D	U	YES		63.4		63.4	13.9	63.4	3.4	3.8	Strong
BHSS3	11.60	13.1	C	12.5-12.64	12.50		D	U	YES		63.4		63.4	8.6	63.4	2.1	2.4	Strong
BHSS3	13.10	14.6	C	13.7-13.8	13.70		D	U	YES		63.4		63.4	6.5	63.4	1.6	1.8	Medium Strong
BHT12	8.10	9.7	C	8.8-9.0	8.80		D	U	YES		63.4		63.4	19.5	63.4	4.9	5.4	Very Strong
BHT12	9.70	11.3	C	10.5-10.6	10.50		D	U	YES		63.4		63.4	2.8	63.4	0.7	0.8	Weak
BHT12	11.30	12.9	C	12.1-12.3	12.10		D	U	YES		63.4		63.4	2.3	63.4	0.6	0.6	Weak

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise
Detailed legend for test and dimensions, based on ISRM, is shown above.
Size factor, F = (De/50)0.45 for all tests.

Date Printed	Approved By	Table
18/01/2024	DCD	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.

IDL

UNIAXIAL COMPRESSION TEST ON ROCK - SUMMARY OF RESULTS

Project No.: 2023OY108

Project Name: Lemanaghan Wind Farm

Hole No.	Sample				Specimen Depth (m)	Specimen Dimensions2			Bulk Density2	Water Content 1	Uniaxial Compression3				Remarks
	Ref	Top	Base	Type		Dia. mm	Length mm	H/D	Mg/m3	%	Condition	Stress Rate MPa/s	Mode of failure	UCS MPa	
BHBP1		4.10	5.50	C	4.7	63.4	160.4	2.5	2.67		as received	0.1670	AC	38.6	Medium Strong
BHSS3		11.60	13.10	C	12.2	63.4	158.5	2.5	2.70		as received	0.1354	AC	42.0	Medium Strong
BHT12		9.70	11.30	C	9.7	63.4	160.0	2.5	2.73		as received	0.1854	AC	37.6	Medium Strong

Notes

1 ISRM p87 test 1, water content at 105 ± 3 oC, specimen as tested for UCS

2 ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density

3 ISRM p153 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials

above notes apply unless annotated otherwise in the remarks

Mode of failure :

S - Single shear MS - multiple shear

AC - Axial cleavage F - Fragmented

Test Specification	Date Printed	Approved By	Table
International Society for Rock Mechanics, The complete ISRM suggested methods for Rock Characterization Testing and Monitoring, 2007	18/01/2024	DCD	sheet 1 of 1

Appendix 04
Photographs (Rotary Core)


Lemanaghan
Wind Farm,
Co. Offaly
2023 OY 108
BH B P 1
Box
1. 2. 3.
2·5
4·1
5·5
7·1
8·5m
EOH
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
Lemanaghan
Wind Farm,
Co. Offaly
2023 OY 108
BHS S 1
Box
1. 2. 3.
5·6
7·1
8·6
10·1
11·6
13·1
14·6
EOH
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150


Lemanaghan
Wind Farm,
Co. Offaly
2023 OY 108
BH SS 2
Box
1.2.
5.6
7.1
8.6
10.1
11.6
Lemanaghan
Wind Farm,
Co. Offaly
2023 OY 108
BH SS 3
Box
1.2.3.
7.1
8.6
10.1
11.6
13.1
14.6
Lemanaghan
Wind Farm,
Co. Offaly
2023 OY 108
BH SS 4
Box
1.2.
5.6
7.1
8.4
10m


Lemanaghan
Wind Farm,
Co. Offaly
2023 OY 108
BH- T 0 1
Box
1. 2.
4·1
5·6
6·6
7m
8·6
E.O.H
10·2


Lemanaghan
Wind Farm,
Co. Offaly
2023 OY 108
BH- T 0 3
Box
1. 2. 3.
5·6
7·1
10·1
11·6
13·1
14·6
16·1
17·6


Lemanaghan
Wind Farm,
Co. Offaly
2023 OY 108
BH- T 0 3
Box
4.
19.2
Lemanaghan
Wind Farm,
Co. Offaly
2023 OY 108
BH- T 0 6
Box
1. 2. 3.
4.1
5.6
7.1
10.1
11.6
13.1
14.2
15.2
Lemanaghan
Wind Farm,
Co. Offaly
2023 OY 108
BH- T 0 6
Box
4. 5.
16.1
17.6
19.1
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150


Lemanaghan
Wind Farm,
Co. Offaly
2023 OY 108
BH T 12
Box
1. 2. 3.
4·1
5·6
7·1
8·1
9·7
11·3
12·9
E.O.H


Lemanaghan
Wind Farm,
Co. Offaly
2023 OY 108
BH T 15
Box
1. 2. 3.
4·5
5·6
7·1
8·6
9·8
11·4
12·4
13·6
14·6
E.O.H

Appendix 05
Trial Pit Photographs

Figure 1 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb001,.jpg

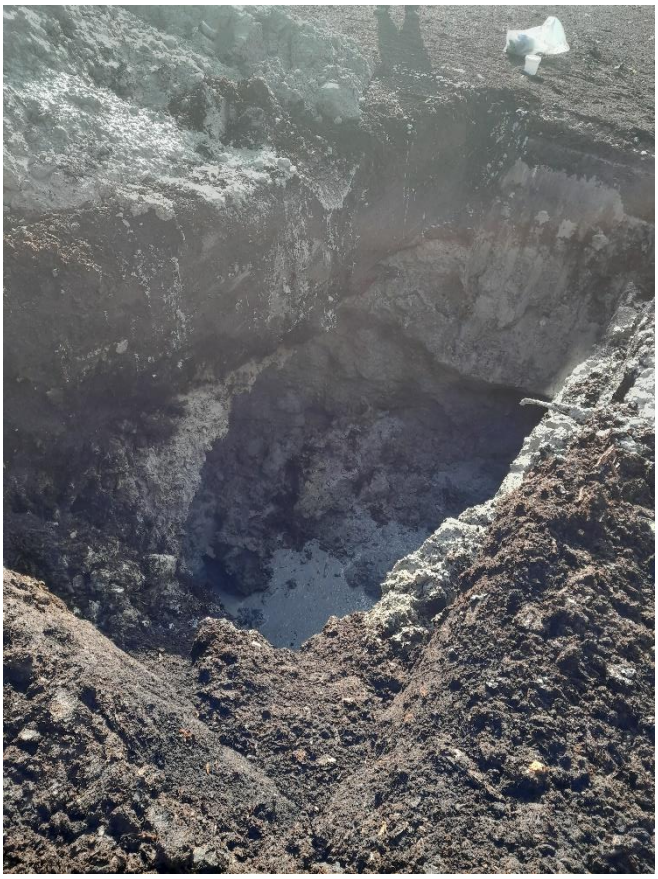


Figure 3 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb001.jpg

Figure 2 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb001..jpg

Figure 4 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb002,.jpg

Figure 5 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb002..jpg

Figure 7 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb003,.jpg

Figure 6 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb002.jpg

Figure 8 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb003..jpg

Figure 9 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb003.jpg

Figure 11 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb004..jpg

Figure 10 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb004,.jpg

Figure 12 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb004.jpg

Figure 13 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb005,.jpg

Figure 15 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb005.jpg

Figure 14 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb005..jpg

Figure 16 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb006,.jpg

Figure 17 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb006..jpg

Figure 19 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb008,.jpg

Figure 18 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb006.jpg

Figure 20 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb008..jpg

Figure 21 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpb008.jpg

Figure 23 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc001..jpg

Figure 22 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc001,.jpg

Figure 24 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc001.jpg

Figure 25 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc002,.jpg

Figure 27 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc002.jpg

Figure 26 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc002..jpg

Figure 28 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc003,.jpg

Figure 29 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc003..jpg

Figure 31 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc004,.jpg

Figure 30 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc003.jpg

Figure 32 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc004..jpg

Figure 33 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc004.jpg

Figure 35 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc005..jpg

Figure 34 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc005,.jpg

Figure 36 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc005.jpg

Figure 37 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc006,.jpg

Figure 39 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc006.jpg

Figure 38 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc006..jpg

Figure 40 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc007,.jpg

Figure 41 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc007..jpg

Figure 43 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpmm001,.jpg

Figure 42 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpcc007.jpg

Figure 44 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpmm001..jpg

Figure 45 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpmm001.jpg

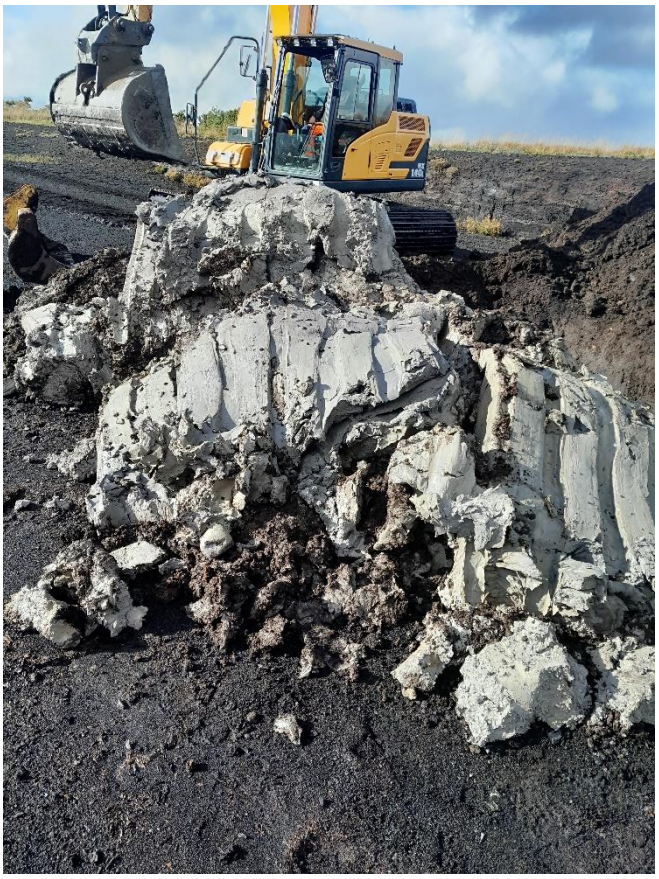


Figure 47 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpmm01..jpg

Figure 46 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpmm01,.jpg

Figure 48 H:\23OY108_Lemanaghan\lemanaghan tp photos\Tpmm01.jpg

Appendix 06
Site Plans

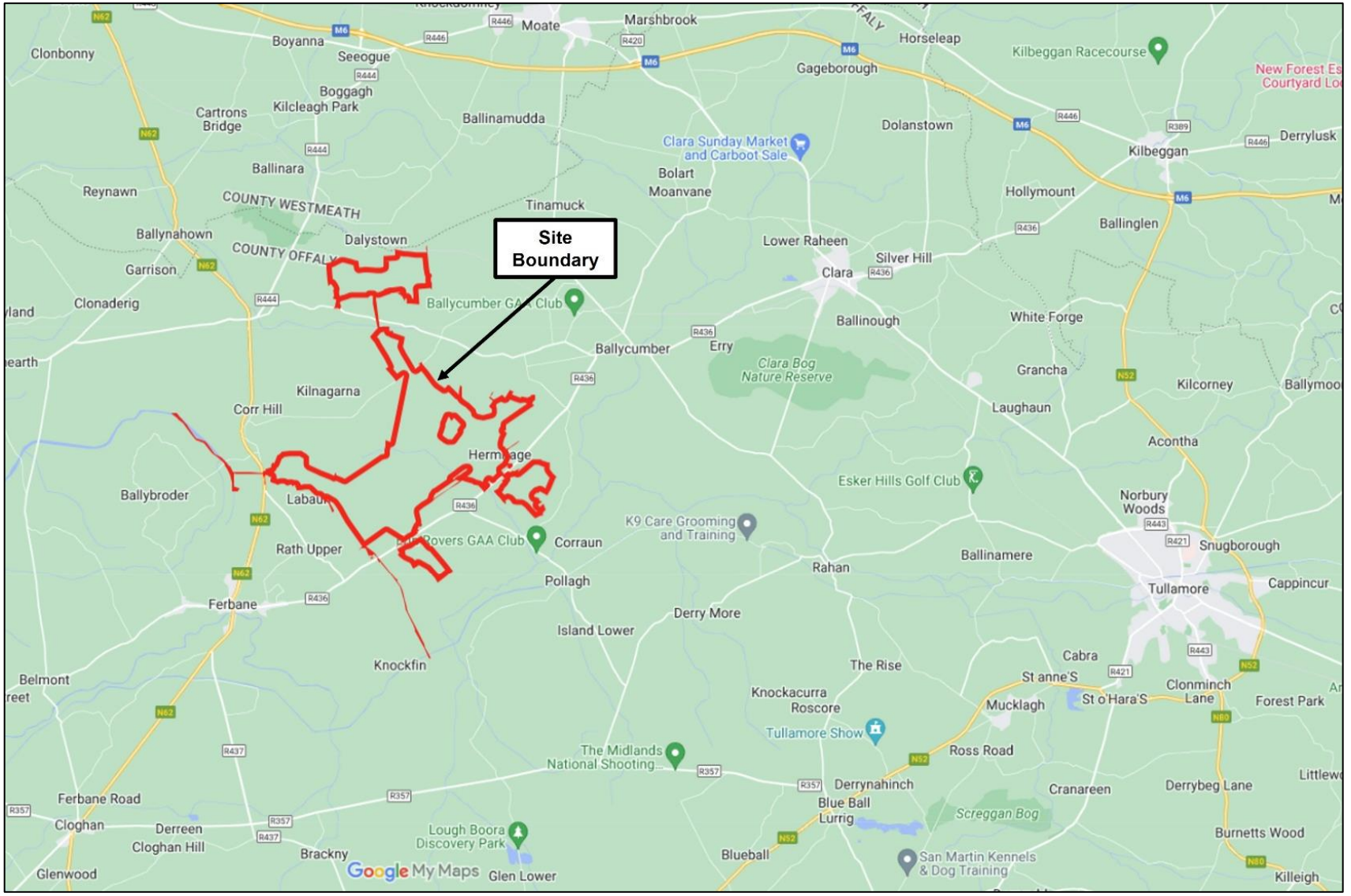


Figure 1 Site Location

Figure 2 Exploratory Hole Location Map

Appendix 07
AGS Data

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