Appendix 2-9 – Peat Stability Risk Assessment

Cloghercor Wind Farm

Planning Stage Peat Stability Risk Assessment

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CR	As Construction Record documentation, PDF, Models etc	C01, C02, etc

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1. Executive Summary

Ciaran Reilly & Associates has been instructed by TOBIN Consulting Engineers (TOBIN) on behalf of Ørsted to carry out a planning stage peat stability risk assessment (PSRA) as part of the environmental impact assessment for the proposed Cloghercor Wind Farm site in the townlands of Clogherachullion, Cloghercor, and Derryloaghan (met mast only) in County Donegal. The proposed site is located in a peatland and forested landscape. It is proposed to erect 19 no. wind turbines with overall blade tip heights of 185 to 200m, new entrances, access roads, cable routes, compound areas, and borrow pits, etc.

The PSRA was carried out in accordance with Peat Landslide Hazard and Risk Assessments, Best Practice Guide for Proposed Electricity Generation Developments – Second edition (Scottish Government, 2017). The report sets out the methodology used to assess the peat stability risk, the activities undertaken, and the results of the peat stability assessment. The report should be read along with the Soils and Geology chapter of the overall Environmental Impact Assessment Report (EIAR).

The topography of the site is undulating, steeply in places, with elevation levels ranging from between 30mOD and 190mOD. Several streams cut through the site, draining typically to the north west. The site is underlain by bedrock of the Main Donegal Granite formation and superficial deposits, where present, are predominantly blanket peat with glacial till beneath the peat in places. The distribution of outcropping or subcropping rock across the site suggests that bedrock is, in general, shallow.

A comprehensive desk study was undertaken, site-specific LiDAR digital terrain model data were acquired and reviewed, and a comprehensive suite of ground investigations were undertaken to assist the assessment. Following application of mitigation measures, including consideration to the siting of infrastructure to minimise the risk, the findings of the planning stage PSRA indicate a “low” hazard ranking for instability related to the requirement for excavations on the site. Routine and common place mitigation measures can be put in place during the detailed design and construction of the scheme to reduce the likelihood of a failure. Possible mitigation measures include stepping or battering back of excavations to a safe angle (as determined through a detailed slope stability assessment by a competent temporary works designer) or construction of a temporary sheet pile wall or rock fill berm to support the peat during construction. Following mitigation, the hazard ranking of the development is considered to be “low” for all areas. Further the site terrain is rolling and undulating and topographically confined, limiting the potential and scale of peat slide and debris runout distances. It is concluded that the site is suitable for the proposed development.

Deterministic stability assessments indicate that the materials are considered to be stable in the short (undrained) and long (drained) term, including under the influence of extreme weather events, hence justifying the “low” hazard rankings assigned. Best practice guidance regarding the management of peat stability must be inherent in the construction phase of the project.

2. Introduction

In accordance with planning guidelines compiled by the Department of the Environment, Heritage and Local Government (DoEHLG) (2016), where peat is present on a proposed wind farm development, a peat stability assessment is required as part of the environmental impact assessment. Ciaran Reilly & Associates has been instructed by TOBIN Consulting Engineers (TOBIN) on behalf of Ørsted and FEI to carry out a planning stage peat stability risk assessment (PSRA) as part of the environmental impact assessment for the proposed Cloghercor Wind Farm site in the townlands of Clogherachullion, Cloghercor, and Derryloaghan (met mast only) in County Donegal.

This report sets out the methodology used to assess the peat stability risk, the activities undertaken and the results of the peat stability assessment. This report should be read along with Chapter 8 of the Cloghercor Wind Farm Environmental Impact Assessment Report (EIAR) and its appendices.

2.1. Description of the Development

The proposed wind farm site is located within a peatland and forested landscape, between Doochary, Lettermacaward and Glenties, in Co. Donegal. A summary of the overall proposed project is as follows:

- Erection of 19 no. wind turbines with an overall blade tip height range from 185m to 200m, a rotor diameter range from 149m to 164m, a hub height range from 112m to 125m, and all associated foundations and hard-standing areas in respect of each turbine;
- Construction of new site entrance with access onto the L6483 local road for the construction phase (operational phase maintenance traffic only), and utilisation of a permitted forest entrance (Pl. Ref. 1951040) to the L6483 as a second construction phase site access point. A third site entrance on the L6483 will form the operational phase public entrance to the wind farm;
- Improvements and temporary modifications to 5 no. locations adjacent to the public road to facilitate delivery of abnormal loads and turbine delivery on the R262 and N56 in the townlands of Tullycumber, Drumard, Darney, Cashelreagh Glebe and Aghayeevoge;
- Construction of an area of temporary hard standing to function as a blade transfer area to facilitate turbine delivery on the R262 in the townland of Drumnacross;
- Widening of sections of the L6363 and L6483 within the road corridor (up to 4.5m running width) to facilitate delivery of abnormal loads/turbines in the townlands of Cloghercor, Shallogan More, Derryloaghan and Straboy;
- Construction of 2 no. temporary construction compounds with associated temporary site offices, parking areas and security fencing;
- Installation of 1 no. permanent meteorological mast with a height of 100m;
- 4 no. borrow pits;
- Construction of new internal site access roads and upgrade of existing site roads, to include passing bays and all associated drainage;
- Construction of drainage and sediment control systems;

- Construction of 1 no. permanent 110kV electrical substation including:
    - 1 no. EirGrid control building containing worker welfare facilities and equipment store;
    - 1 no. Independent Power Producer (IPP) control building containing HV switch room, site offices, kitchen facilities, storeroom and toilet amenities.
    - All electrical plant and infrastructure and grid ancillary services equipment;
    - Parking;
    - Lighting;
    - Security Fencing;
    - Wastewater holding tank;
    - Rainwater harvesting equipment;
    - All associated infrastructure and services including site works and signage;
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed wind farm substation;
- All works associated with the connection of the proposed wind farm to the national electricity grid, which will be via a loop-in 110 kV underground cable connection (approximately 4.1km cable length within trenches on approximately 3.36km of internal access roads) to the existing 110kV overhead line in the townland of Cloghercor, Co. Donegal, with two new 16m and 21m high steel lattice end masts at each interface;
- Removal of 26 no. existing wooden polesets and 1no. Steel lattice angle mast between the two new interface end masts;
- 2 no. watercourse (stream) crossings on the grid connection route;
- All related site works and ancillary development including berms, landscaping, and soil excavation;
- Forestry felling to facilitate construction and operation of the proposed development and any onsite forestry replanting;
- Development of a permanent public car park with seating/picnic tables at the end of the construction phase of the development at the location where the proposed grid connection intersects the L6483;
- Permanent recreational facilities including marked walking trails along the site access roads and paths, and associated recreation and amenity signage; and
- Approximately 252 ha of biodiversity enhancement lands located over 3km from the proposed wind turbines.

2.2. Statement of authority

Ciaran Reilly & Associates is a specialist geotechnical engineering practice delivering a range of consultancy services to the private and public sectors across Ireland and the UK. Ciaran Reilly & Associates was established in 2016 and is based in Co. Kildare.

This report was prepared by Dr Ciaran Reilly. Dr Reilly (BE, PhD, PGDip, CEng, MIEI, Registered Ground Engineering Specialist (UK RoGEP)) is a geotechnical engineer with over 15 years' experience in civil and geotechnical engineering consultancy, contracting, and research. He worked for several years in industry before completing his PhD in Trinity College Dublin in 2014. Since then, he has undertaken a diverse range of environmental impact assessment and engineering design projects as senior engineer and more recently as director of Ciaran Reilly & Associates.

2.3. Peat Failures

Peat landslides represent one end of a spectrum of natural processes of peat degradation. They have potential to cause fatalities, injury and damage to infrastructure and farmland. They also have the potential to cause significant damage to peatland habitats.

Excavations works on electricity infrastructure construction sites can induce slope failures due to the low basal strength in peat, even in relatively flat sites. These peat failures induced by excavations can extend significantly beyond the excavations, likely due to seepage forces caused by intentional or accidental drainage of the peat.

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

2.4. Methodology

The evaluation of the peat stability at the site was carried out in accordance with the document "Peat Landslide Hazard and Risk Assessments, Best Practice Guide for Proposed Electricity Generation Developments – Second edition" (Scottish Government, 2017). The geotechnical and peat stability assessment at the site included the following activities:

- Desk Study,
- Site reconnaissance including peat depth measurement,
- Review of ground investigation carried out at the site by Ground investigations Ireland (GII),
- Review of digital surface model data,
- Peat stability assessment using a qualitative approach, and
- Peat stability assessment using a deterministic approach.

The risk assessment approach is discussed in detail in Section 5.

3. Ground Investigation

3.1. Desk study

A desk study was undertaken to collate and review background information in advance of the site survey. The desk study involved the following:

- Examination of the Geological Survey of Ireland (GSI) datasets pertaining to geology, landslide susceptibility, and the GSI borehole database,
- Examination of Environmental Protection Agency (EPA) data, and
- Preparation of site maps and suitable field sheets for the site survey.

The desk study information obtained is referenced below. Following the desk study and the site survey, geological maps were generated in GIS and are included in the Soils and Geology chapter of the main EIAR and reproduced in Appendix 1 to this report. The ground investigation information is included in the Soils and Geology chapter of the main EIAR.

Publicly available sources of mapping, aerial photography and satellite imagery were consulted to establish the expected ground conditions, topography, and condition of the site in the past. The following sources were referred to:

- Ordnance Survey historical mapping,
- Geological Survey of Ireland mapping,
- EPA mapping,
- Publicly available satellite photography (Google Maps & Bing Maps), and
- Site specific LiDAR digital terrain model data.

3.2. Field work

Site surveys relating to the soil and geological environment and ground investigations were undertaken between June and October 2022. These surveys included:

- Site walkovers by Ciaran Reilly & Associates staff in July 2021 and October 2022 to review the ground conditions and assess the topography, geomorphology, and requirements for site investigations,
- 39 nr peat probes and hand vane tests by Ciaran Reilly & Associates and TOBIN staff throughout the site,
- 110 nr peat probes by TLI along the route of the proposed underground cable,
- 141 nr peat probes, 23 nr Russian sampler borings, 21 nr trial pits, and 2 nr rotary core boreholes by Ground Investigations Ireland throughout the site.

The logs and records of the investigations can be found in Appendix 8-1 to the Soils and Geology chapter of the main EIAR. The locations of investigations and a resulting peat depth contour map are reproduced as Figure 8-4 and Figure 4 in Appendix 1 of this report. The observations made during the walkover survey are used to prepare the Peat Stability Risk Register included as Appendix 3 of this report.

4. Detailed Site Assessment

4.1. Site Topography and Geomorphology

The site topography and geomorphology are discussed in detail in the Soils & Geology Chapter of the EIAR and reference is made to the chapter herein. The topography of the site is undulating, steeply in places, with elevation levels ranging from between 30mOD and 190mOD. Several streams cut through the site, draining typically to the north west. For the purposes of the stability assessment, an overall view was taken on the topography of the site and individual drainage features were not assessed. LiDAR digital terrain model data were obtained and interrogated to provide a generalised ground profile for peat stability assessment. The site terrain is rolling and undulating and topographically confined, limiting the potential and scale of peat slide and debris runout distances.

4.2. Local Bedrock Geology

Geological Survey of Ireland bedrock mapping shows that the site is underlain by the Main Donegal Granite, described as coarse biotite granite and granodiorite. Bedrock geology mapping is provided as Figure 8-5 of Appendix 1.

4.3. Local soils and subsoils

Geological Survey Ireland mapping shows the site as underlain mainly by blanket peat, with significant areas of outcropping rock, as shown in Figure 1 and in Figure 8-2 and 8-3 in Appendix 1. The distribution of outcropping or subcropping rock across the site suggests that bedrock is shallow.

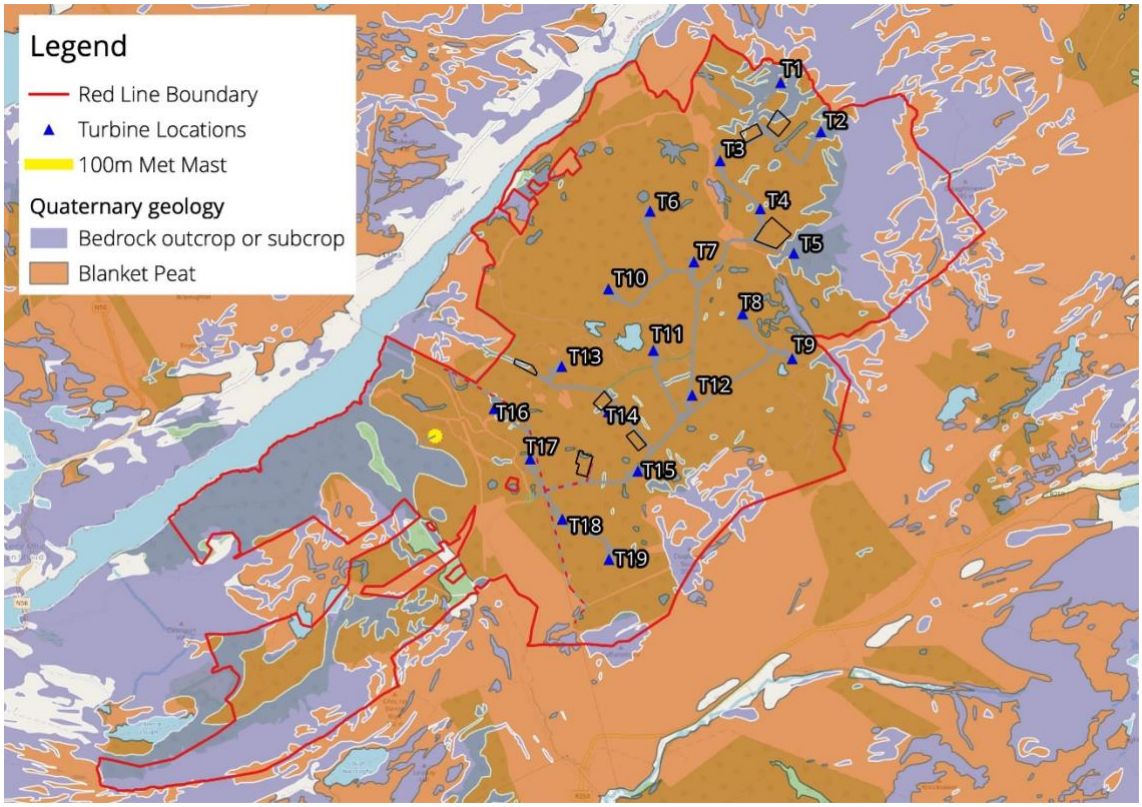

Figure 1 - Quaternary geology

Outcropping rock was observed regularly during the walkover survey, with an example shown in Figure 2.

Figure 2 - Outcropping rock near T4

4.4. Water courses

Ordnance Survey 6-inch first edition mapping (Geohive, 2022) shows the area as historically rough pasture with scattered dwelling houses. Information on the site is sparse, with only occasional spot levels, suggesting it has not been surveyed in detail. Drainage appears laid out as it does today, with the site draining to the north west. The two lakes at the centre of the site, Lough Aneane and Lough Errig West, are shown. Underground drainage of streams is noted in places. Ordnance Survey 6-inch last edition mapping (Geohive, 2022) shows more detail, including the majority of the site now characterised as having outcropping rock at the surface. Lough Aneane and Lough Errig West are now named Lough Aneane Beg and Lough Aneane More. Additional development is seen, with more roadways and enclosed parcels of land around the edges of the site. Ordnance Survey 25-inch mapping was not available for the majority of the site.

The site is in the Mulnamin Beg subbasin of the Gweebarra River catchment. Turbine 6 is the closest turbine to the Gweebarra River at a distance of 990m. Several streams cross the site, mainly flowing in a north westerly direction. Many are incised streams which have cut through peat and glacial till to sit on bedrock. The river network in the vicinity of the site is shown in Figure 3. Proximity to a water course is used to assess the risk of peat stability at individual infrastructure elements in Section 5 of this report.

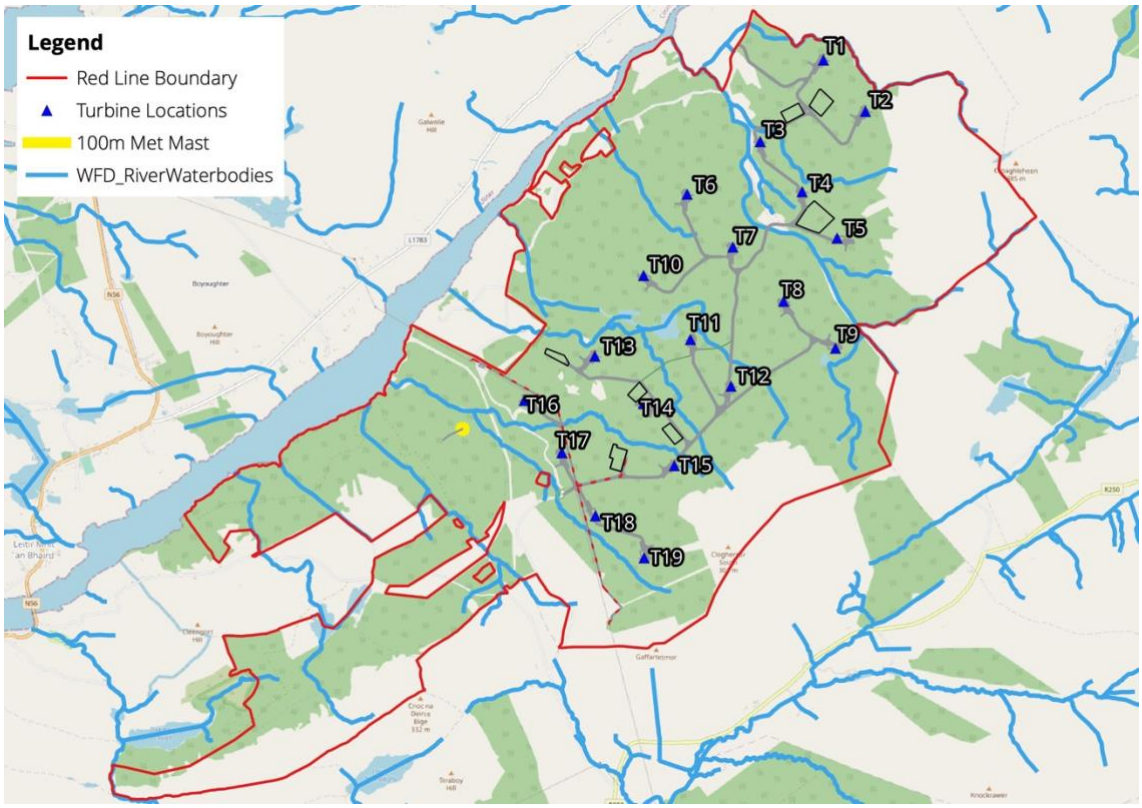

Figure 3 - River network (EPA)

4.5. Previous failures

A review of the landslide information on the GSI Irish Landslides Database indicated that the nearest recorded landslides occurred approximately 8.0km south east of the site (GSI_LS06-0296, a peat slide of "no apparent impact" at an elevation of over 200m). A number of similar slides of "no apparent impact" are recorded in this vicinity, over 8.0km from the site (GSI_LS14-0014 at 300mOD, and GSI_LS14-0019 and GSI_LS14-0022 at 320mOD being examples). A map of these events is provided in Figure 4.

Figure 4 – Mapped landslide events (Source: GSI National Landslide Susceptibility Mapping, 2021)

4.6. Landslide susceptibility

Figure 56 shows the mapped landslide susceptibility for the site based on GSI mapping. The site is broken into 27 assessment areas. Of these, 2 are in areas of "high" landslide susceptibility, 15 are in areas of "moderately high" susceptibility, 6 in "moderately low", and 4 in "low" susceptibility. A summary is shown in Table 1.

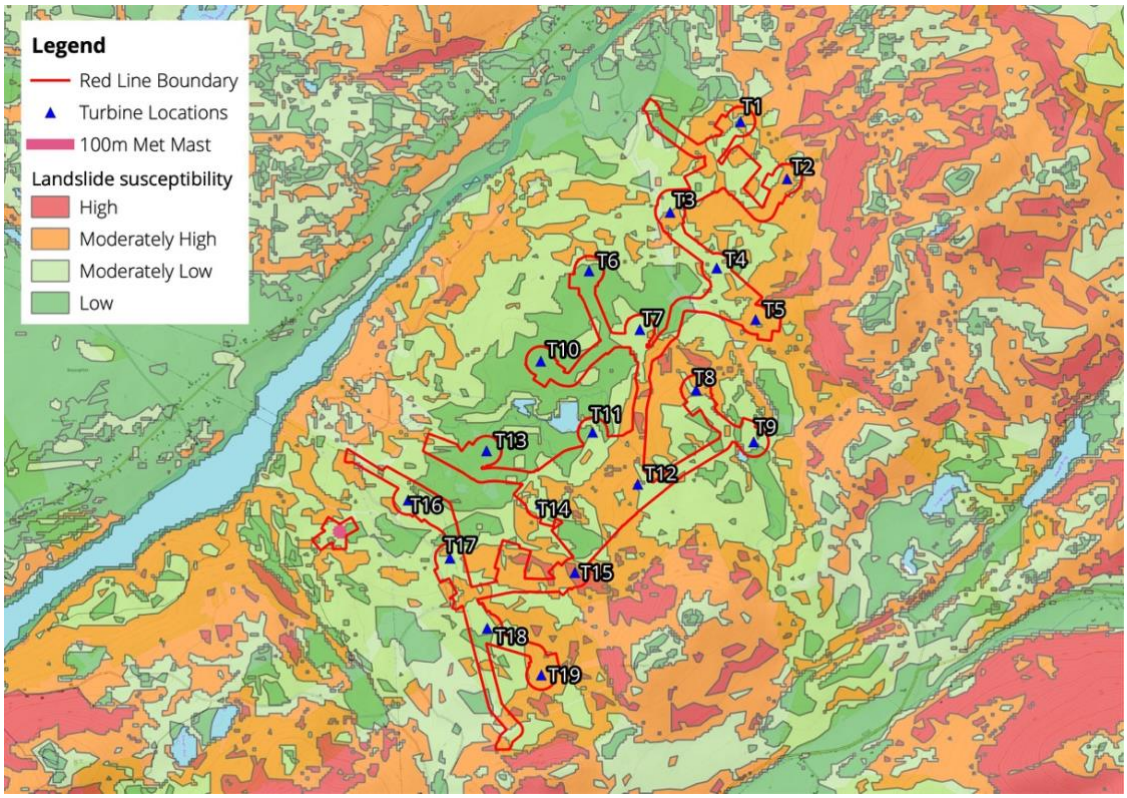

Figure 5 - Landslide susceptibility (Source: GSI National Landslide Susceptibility Mapping, 2021)

Table 1 – Landslide susceptibility (from GSI data)

Nr	Assessment area	Susceptibility
1	Access road to T1	Moderately high
2	T1	Moderately high
3	T2 & access road	Moderately high
4	Compound & borrow pit near T1	Moderately high
5	T3 & access road	Moderately high
6	T4 & access road	Moderately low
7	T5	Moderately high
8	T6 & access road	Low
9	T7	Moderately low
10	T8	Moderately high
11	T9 & access road	Moderately low
12	T10 & access road	Low
13	T11 & access road	Moderately low
14	Access road T12 to T7	Moderately high
15	T12	Moderately high
16	T13 & borrow pit	Low

17	T14 & borrow pit	Moderately high
18	T15	High
19	Substation compound	High
20	Public car park & grid connection	Moderately low
21	T16	Moderately low
22	T17	Moderately high
23	T18	Moderately high
24	T19	Moderately high
25	Grid connection route (near T19)	Moderately high
26	Access from main road	Moderately high
27	Met mast	Low

It should be noted that the GSI risk assessment is an initial indicative view which is useful to highlight areas for further assessment and is taken account of to assess the risk of peat stability at individual infrastructure elements in Section 5 of this report. Further, the GSI risk assessment only accounts for the current site topographic and hydrological conditions. The development of wind farm infrastructure can alter these parameters in the temporary and/or permanent case.

No evidence of historic peat failure was identified during the site walkover. During the geotechnical investigation by trial pits, the majority of the trial pits walls were stable, with a minority exhibiting spalling of the side walls. This spalling is not unexpected for steep-sided trial pits dug in peat deposits.

4.7. Ground Investigation

A number of phases of ground investigation (GI) of the development area were carried out as outlined in the previous section. These investigations confirmed the general geology indicated in the geological mapping. The GI indicated that the site is generally covered in shallow peat which overlies sand or gravel or presumed bedrock. Locations of the ground investigations and a peat depth contour plot generated from the data are shown in Appendix 1. The GI data is used in Section 5 and Section 6 of this report to carry out a location-specific geotechnical risk assessment. The relevant ground investigation reports and data are presented in Appendix 8-1 to the Soils and Geology chapter of the EIAR.

5. Peat Stability Assessment

5.1. Material properties

For the purposes of the peat stability assessment, material properties are assessed for Peat at the site. The results of the GII (2022) investigation are used along with comparable experience to derive the required properties.

The correlation of Amaryan et al (1973) as cited by Carlsten (2000) is used, along with comparable experience, to derive a conservative characteristic undrained shear strength value for the Peat. 55 moisture content tests were carried out on samples of Peat. The moisture content of the Peat ranges from 332% to 1441%. Taking the mean moisture content of 845% and assuming an R value of 4, a undrained shear strength of 18.0kPa is assessed. A conservative view is taken on this, and based on comparable experience, a characteristic undrained shear strength of 10kPa is assessed for the Peat at the site. Where relevant, local strengths are assessed based on local field vane measurements, with a vane correction of 0.5 used (Edil, 2001 and Mesri & Ajlouni, 2007).

Based on a range of published guidance including Long (2005) and O'Kelly and Zhang (2013), the Peat was assumed to have effective stress parameter values φ′ = 28° and c′ = 4kPa.

A bulk weight of 10kN/m^3 is assumed for the Peat based on comparable experience and published data (e.g. Osorio-Salas (2012), O'Kelly (2017), and Trafford and Long, 2019).

The derived and assumed characteristic parameter values for the Peat are summarised in Table 2.

Table 2 – Characteristic parameter values

Material / Parameter	Peat
Bulk Weight (γ_k) [kN/m^3]	10
Undrained shear strength ($c_{u,k}$) [kPa]	10
Effective cohesion (c'_k)	4
Effective angle of shearing resistance (Φ'_k) [degrees]	28

5.2. Qualitative risk assessment procedure

The guidelines set out four categories of risk and recommends various mitigation / avoidance actions for each category. The categories of risk are:

1. Insignificant;
2. Significant;
3. Substantial; and
4. Serious.

The concept of risk analysis for a particular hazard presented in the guidelines referred to the publication entitled "Scottish Road Network Landslides Study" by Winter et al. (2005) and is presented as follows:

Hazard Ranking = Hazard x Exposure

Where:

- Hazard = The likelihood of the landslide event occurring
- Exposure = The effect and consequences that the event may have

Table 3 presents the scale of the likelihood and Table 4 presents the classification of exposure ratings based on a percentage of total project cost/time. These classifications are taken from the report entitled Peat Landslide Hazard and Risk Assessments, Best Practice Guide for Proposed Electricity Generation Developments – Second edition (Scottish Government, 2017).

Table 3 – Qualitative assessment of peat landslide Hazard over the lifetime of the development (Scottish Government, 2017)

Scale	Likelihood	Probability of occurrence
5	Almost certain	> 1 in 3
4	Probable	1 in 10 – 1 in 3
3	Likely	1 in 10^2 – 1 in 10
2	Unlikely	1 in 10^7 – 1 in 10^2
1	Negligible	< 1 in 10^7

Table 4 – Qualitative assessment of peat landslide Exposure over the lifetime of the development (Scottish Government, 2017)

Scale	Exposure	Impact as % damage to (or loss of) receptor
5	Extremely high effect	> 100% of asset
4	Very high effect	10% - 100%
3	High effect	4% - 10%
2	Low effect	1% - 4%
1	Very low effect	< 1% of asset

Using Table 3 and Table 4 it is possible to assign a hazard ranking for each zone by multiplying the hazard by the exposure. This will result in a hazard ranking between 1 to 25 (Table 5). Following the result, mitigation measures can be targeted and a revised assessment, post-control measures, is carried out. Through the various design iterations initial control measures implemented a mitigation by design approach where turbines were moved to lower risk areas. Further control measures are listed in Section 8 and the Peat Stability Risk Register in Appendix 3. This report is therefore an assessment of the final turbine locations.

Table 5 – Hazard ranking and suggested actions (Scottish Government, 2017)

Hazard Ranking	Designation	Action suggested
17-25	High	Avoid project development.
10-16	Medium	Project should not proceed unless the hazard can be avoided or mitigated without significant environmental effect, in order to reduce hazard ranking to low or negligible.
5-9	Low	Project may proceed pending further investigation to refine assessment and mitigate hazard through relocation or re-design.
1-4	Negligible	Project should proceed with monitoring and mitigation of peat landslide hazards as appropriate.

The proposed wind farm and associated infrastructure is located in an elevated and undulating landscape with steep terrain. GSI landslide susceptibility mapping (Geological Survey of Ireland, 2021) indicates that 17 of 27 assessment areas are in areas of "moderately high" or "high" landslide susceptibility, as shown in Figure 5 and Table 1.

It should be noted that the GSI assessment only accounts for the current site topographic and hydrological conditions and is not intended to be used in isolation to determine actual onsite risk. The development of a wind farm can alter these parameters in the temporary and/or permanent case. Excavations for turbine foundations are often several metres deep and represent a significant alteration to the local topography in the short term. This can have a significant effect on the stability of the material local to the turbine.

During the geotechnical investigation by trial pits, some of the walls of the trial pits spalled to a certain extent. The material encountered was generally described as "very soft" to "soft" and low values of undrained shear strength were measured in hand vane tests. Given this, the likelihood of an excavation collapsing during construction is generally in the range "likely" to "probable" in the absence of mitigation. A non-exhaustive listing of possible proposed mitigation measures is provided in Section 8 of this report.

The significance of a collapse in terms of cost and programme is likely to be in the range "very low effect" to "extremely high effect" as the affected area due to a collapse could range from a very localised area up to a major peat slide event feeding into a watercourse.

Mitigation measures can be put in place during the construction of the scheme to reduce the likelihood of an excavation collapsing. Possible mitigation measures include stepping or battering back of excavations to a safe angle (as determined through a

slope stability assessment by a competent temporary works designer) or construction of a temporary sheet pile wall or rock fill berm to support the peat during construction.

The assessment process described above was applied to discrete areas of the site, with common topography and ground conditions, and is summarised in Table 6. This assessment is based on information from geological maps from GSI, the available aerial and satellite mapping, walkovers, and the site-specific ground investigation undertaken. The Peat Stability Risk Register that this summary table is derived from is presented in Appendix 3, where detailed risk registers for each assessment area are provided.

Table 6 – Peat Stability Risk Register Summary

Assessment area	Pre-control measure risk rating	Post-control measure risk rating
Access road to T1	Low	Low
T1	Low	Low
T2 & access road	Low	Low
Compound & borrow pit near T1	Low	Low
T3 & access road	Medium	Low
T4 & access road	Medium	Low
T5	Medium	Low
T6 & access road	Medium	Low
T7	Medium	Low
T8	Medium	Low
T9 & access road	Medium	Low
T10 & access road	Medium	Low
T11 & access road	Medium	Low
Access road T12 to T7	Medium	Low
T12	Medium	Low
T13 & borrow pit	Medium	Low
T14 & borrow pit	Medium	Low
T15	Medium	Low
Substation compound	Medium	Low
Public car park & grid connection	Low	Low
T16	Low	Low
T17	Medium	Low
T18	Low	Low
T19	Low	Low
Grid connection route (near T19)	Medium	Low
Access from main road	Low	Low
Met mast	Low	Negligible

Notes: Assessment based on mitigation measures suggested in Section 8 and the Peat Stability Risk Register in Appendix 3.

While in the absence of mitigation, several areas are rated as *"medium"* risk, it is noted that in all cases a *"low"* risk rating is achieved by the implementation of suitable and common-place mitigation measures. Following mitigation, the risk ranking of the development is considered to be *"low"*. It is concluded that the site is suitable for the proposed electricity generation development.

6. Deterministic peat stability assessment

In addition to the qualitative assessment carried out in Section 5, a deterministic peat stability assessment was carried out based on the results of the ground investigation carried out on the site.

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 a peat slide. An adverse condition of one of the above-mentioned factors alone is unlikely to result in peat failure.

6.1. Methodology

To assess the factor of safety for a peat slide, an undrained and drained analysis has been undertaken to determine the stability of the peat slopes on site. The undrained case examines the stability in the short term, while the drained case examines the long term, including the effects of extreme weather events.

The infinite slope model (Skempton and DeLory, 1957) is used to combine these factors to determine a factor of safety for peat sliding. This model is based on a translational slide, which is a reasonable representation of the dominant mode of movement for peat failures.

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

$$ODF = \frac{c_{u,d}}{\gamma z \sin\beta \cos\beta}$$

Where:

- ODF = Overdesign Factor (analogous to Factor of Safety, however ODF > 1.0 indicates satisfactory stability.
- $c_{u,d}$ = Design value of undrained shear strength
- γ = Bulk unit weight of material
- z = Depth to failure plane assumed as depth of peat or soft soil
- β = Slope angle

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

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

Where:

- ODF = Overdesign Factor (analogous to Factor of Safety, however ODF > 1.0 indicates satisfactory stability.
- c'_d = Effective cohesion, assumed as

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
β = Slope angle
φ' = Effective stress friction angle

6.2. Effects of weather events

The drained loading condition applies in the long term. This condition examines the effect of the change in groundwater level because of rainfall on the stability of the peat slopes. For the drained analysis the level of the water table above the failure surface is required to calculate the factor of safety for the peat slope. In order to represent varying water levels within the peat slopes, a sensitivity analysis is carried out which assesses varying water level in the peat slopes i.e. water levels ranging between 0 and 100% of the peat depth is conducted, where 0% equates to the peat being completely dry and 100% equates to the peat being fully saturated. By carrying out such a sensitivity analysis with varying water level in the peat slopes, the effects of intense rainfall and extreme dry events were analysed.

6.3. Results and discussion

The results of the analysis are shown in Appendix 2. The assessment takes account of:

1. Slope angle, as derived from LiDAR digital terrain model data,
2. Material strength, as derived from site-specific ground investigation and comparable experience,
3. Likely loadings during the construction period, and
4. Extreme weather events.

The calculations are formulated in accordance with Eurocode 7, where partial factors are applied to soil strength parameters and loadings to achieve a satisfactory level of reliability in the design.

All overdesign factors (ODF) were greater than 1.0, indicating that the stability is satisfactory in both short term (undrained) and long term (drained) condition. Hence, a general “low” risk rating for peat instability is appropriate for the proposed development.

For the case of T15 and the Substation compound, highlighted as “high” landslide susceptibility risk in Section 4, local deterministic risk assessments have downgraded the risk to what would be considered “low”. This is due to the relatively shallow depths of peat encountered during ground investigations.

7. Summary and Conclusions

Ciaran Reilly & Associates has been instructed by TOBIN Consulting Engineers (TOBIN) on behalf of Ørsted and FEI to carry out a planning stage peat stability risk assessment (PSRA) as part of the environmental impact assessment for the proposed Cloghercor Wind Farm site in the townlands of Clogherachullion, Cloghercor, and Derryloaghan (met mast only) in County Donegal.

The PSRA was carried out in accordance with Peat Landslide Hazard and Risk Assessments, Best Practice Guide for Proposed Electricity Generation Developments – Second edition (Scottish Government, 2017). The report sets out the methodology used to assess the peat stability risk, the activities undertaken, and the results of the peat stability assessment. The report should be read along with the Soils and Geology chapter of the overall Environmental Impact Assessment Report (EIAR) and its appendices.

Following application of mitigation measures, including consideration to the siting of infrastructure to minimise the risk, the findings of the planning stage PSRA indicate a "low" hazard ranking for instability related to the requirement for excavations on the site, subject to appropriate mitigation measures. Routine and common place mitigation measures will be put in place during the detailed design and construction of the scheme to reduce the likelihood of a failure. Required mitigation measures include stepping or battering back of excavations to a safe angle (as determined through a detailed slope stability assessment by a competent temporary works designer) or construction of a temporary sheet pile wall or rock fill berm to support the peat during construction. Following mitigation, the hazard ranking of the development is considered to be "low" for all areas. Further the site terrain is rolling and undulating and topographically confined, limiting the potential and scale of peat slide and debris runout distances. It is concluded that the site is suitable for the proposed development.

Deterministic stability assessments indicate that the materials are considered to be stable in the short (undrained) and long (drained) term, including under the influence of extreme weather events, hence justifying the "low" hazard rankings assigned.

Best practice guidance regarding the management of peat stability must be inherent in the construction phase of the project and further recommendations are provided in the following section.

8. Recommendations

8.1. Detailed Design

The following outlines an overview of the tasks for the detailed design phase:

- Develop a design stage PRSA to include detailed descriptions of mitigations at specific locations.
- Mitigations to be confirmed at detailed design may include but are not limited to:
    - Confirmation of design of drainage system.
    - Hydrological assessment of stream flows to inform culvert sizing.
    - Detailing of monitoring regime for peat movement.
    - Identification of areas requiring site-specific temporary works design.
    - If required, specify additional site investigations inclusive of in situ testing and laboratory testing in specific risk areas on the site.
- Update the Peat Stability Risk Register.

8.2. Construction Phase:

The following outlines an overview of the tasks for the construction phase:

- Client's Geotechnical Engineer to provide a Geotechnical Induction to all contractor supervisory staff.
- Client to appoint a Site Geotechnical Supervisor to carry out supervision of site works as required. The Site Geotechnical Supervisor will be required to inspect that works are carried in accordance with the requirements of the PSRA, identifying new risks and ensuring all method statements for works are in place and certified.
- Retain a Site Geotechnical Folder which contains all the information relevant to the geotechnical aspects of the site including but not limited to Geotechnical Risk Register, Peat Stability Risk Register, site investigation information, method statements etc.
- Contractor to develop a Method Statement for the works to be carried out in each of the PSRA areas cognisant of the required mitigating measures.
- Mitigations to be implemented at construction stage may include but are not limited to:
    - Measures to maintain hydrology of area as far as possible.
    - Limiting stockpiling of materials in any specific areas.
    - Excavated material to be removed to designated deposition areas.
    - Stepping or battering back of excavations to a safe angle (as determined through a detailed slope stability assessment by a competent temporary works designer) or construction of a temporary sheet pile wall or rock fill berm to support the peat during construction.
    - Implement of monitoring regime for peat movement.
    - Frequent monitoring and inspection during construction and operation of floating roads.
    - Provision and management of a robust drainage system.

    - Site-specific temporary works design by competent temporary works designer.
    - If required, carry out additional site investigations inclusive of in situ testing and laboratory testing in specific risk areas on the site.
- Client's Geotechnical Engineer/Site Geotechnical Supervisor to approve the method statement.
- Contractor to provide tool box talks and on-site supervision prior to and during the works.
- Daily sign off by supervising staff on completed works.
- Implementation of emergency plan and unforeseen event plan by the contractor.

8.3. Operation and Maintenance Phase:

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

- Communication of residual peat risk to appropriate site operatives.
- Ongoing monitoring of residual risks and maintenance if required. Such items would consist of regular inspection of drains and culverts to prevent blockages and inspections of specific areas such as settlement ponds and floated access roads after a significant rainfall event.

9. References

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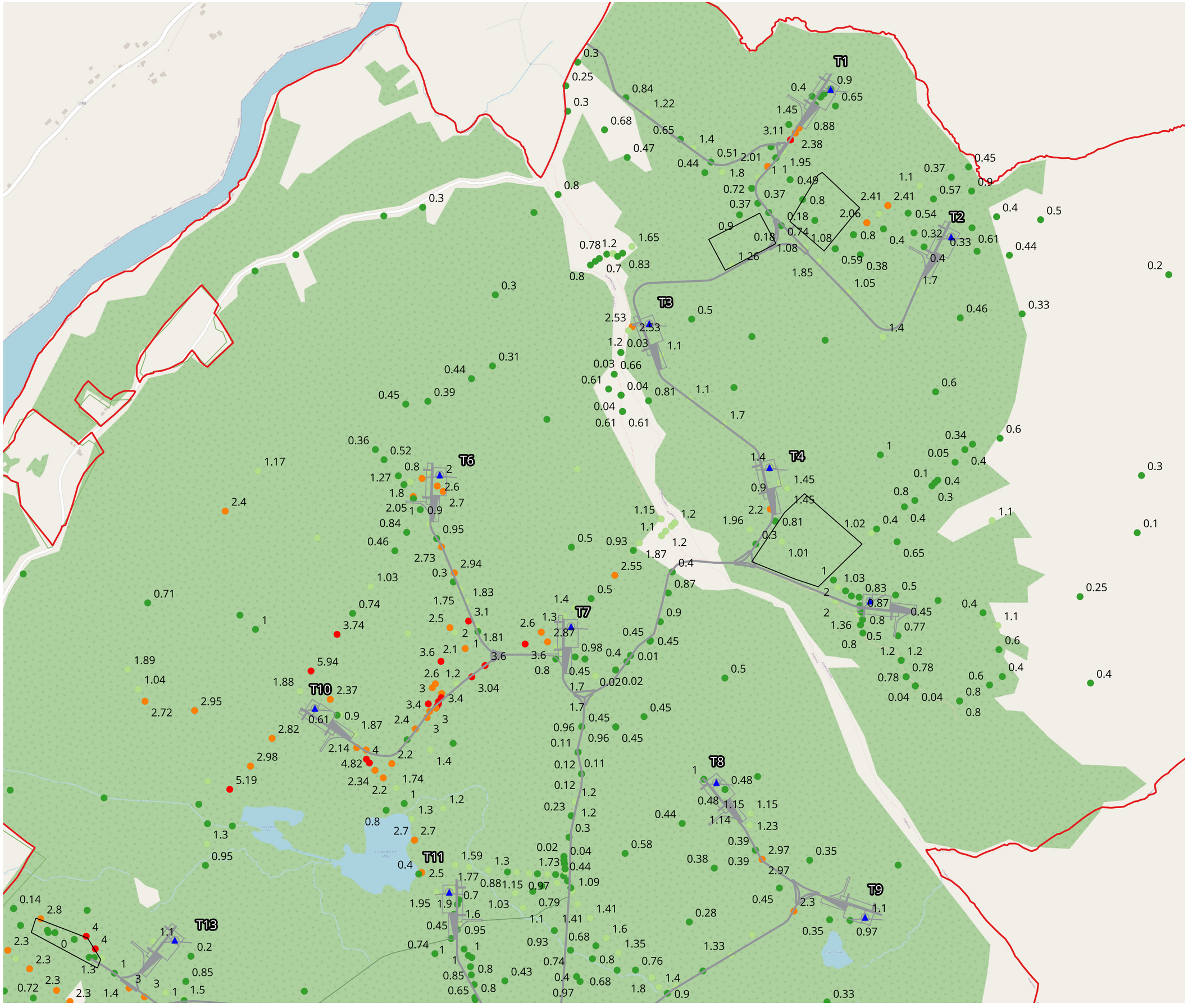
APPENDIX 1: GEOLOGICAL MAPS, GROUND INVESTIGATION LOCATIONS, AND PEAT DEPTH CONTOURS



N

Ground investigation

Peat depth (m)

- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 10

Ground investigation layout - Sheet 1

Cloghercor Wind Farm
Preliminary Peat Stability Risk Assessment

Doc Nr: P20_042_DR001_01
Rev: P02
Scale: 1:10,000 @ A3
Date: 10.02.2023
Drawn: CR
Background: OpenTopoMap

0 250 500 m

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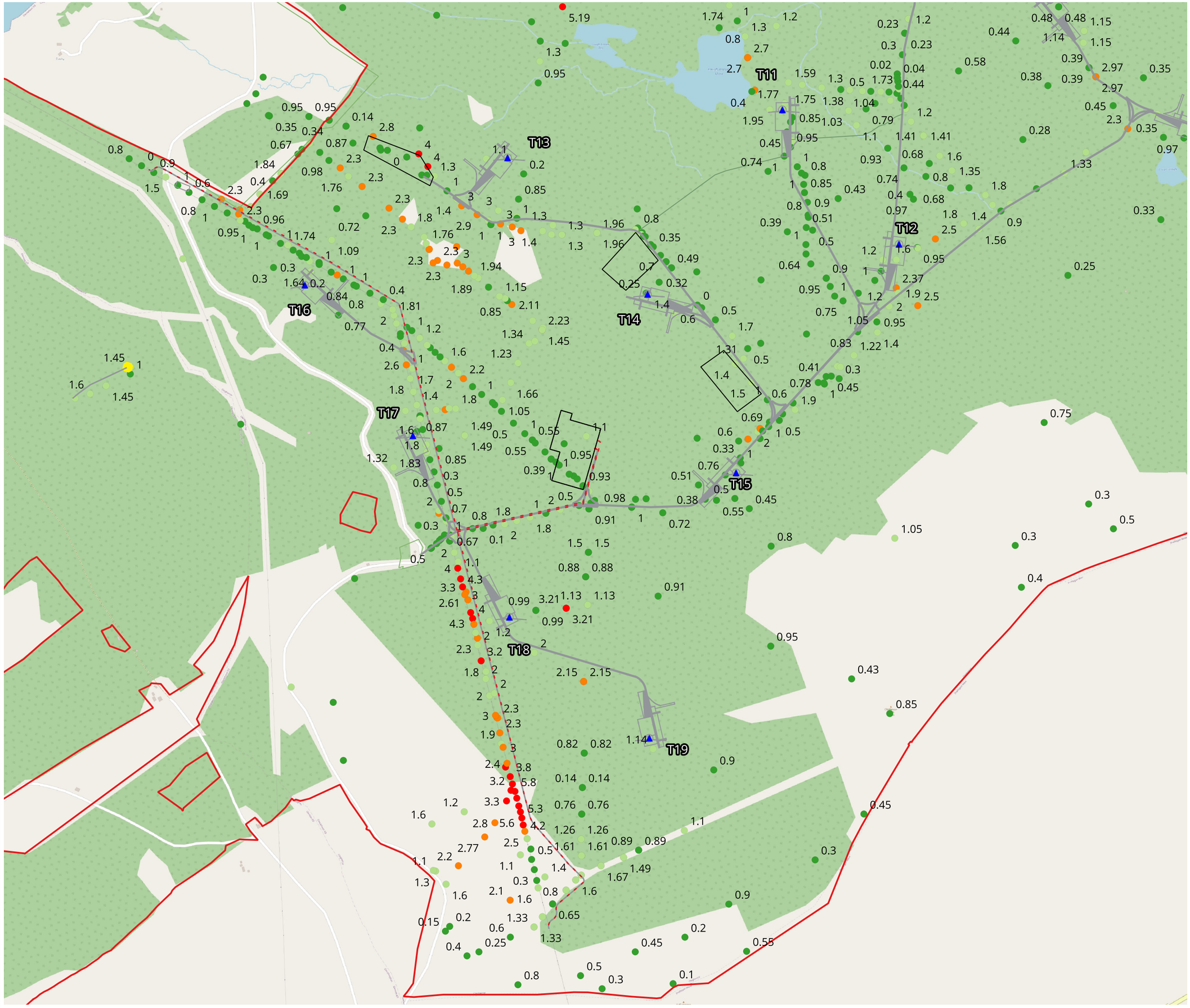

N

Ground investigation

Peat depth (m)

- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 10

Ground investigation layout - Sheet 2

Cloghercor Wind Farm
Preliminary Peat Stability Risk Assessment

Doc Nr: P20_042_DR001_02
Rev: P02
Scale: 1:10,000 @ A3
Date: 10.02.2022
Drawn: CR
Background: OpenTopoMap

0 250 500 m

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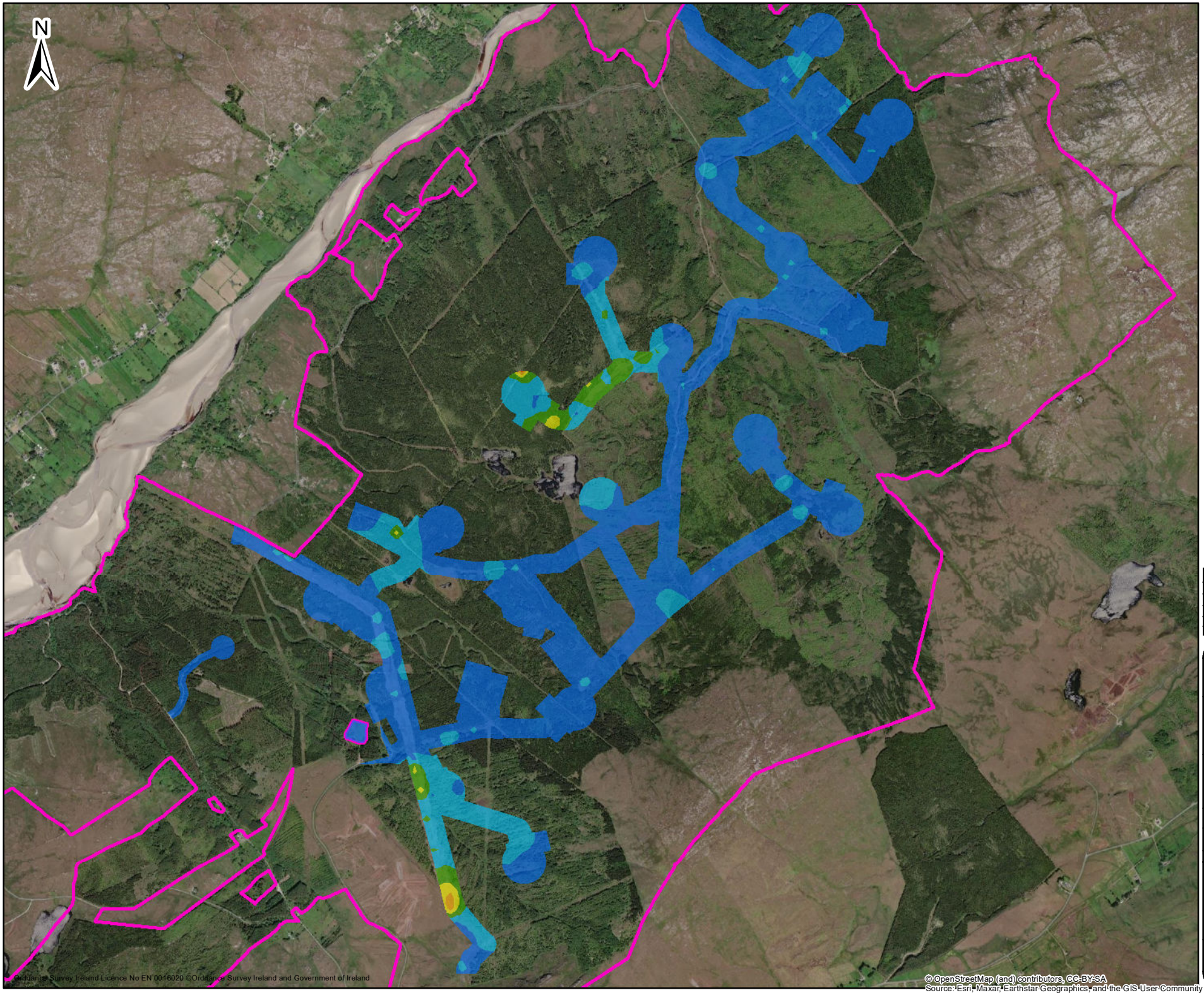

Legend

Proposed Wind Farm Site Boundary

Interpolated Peath Depths (m)

- 0.0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.00
- 5.0 - 5.5

0 0.25 0.5 0.75 1

Kilometres

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D01	30/01/2023	Draft issue	S.P	J.D

Client:
Cloghercor Wind Farm ltd.

Project:
Cloghercor Wind Farm

Title:
Figure 4:
Interpolated Peath Depths

Scale @ A4: 1:24,000

Prepared by: S.Pezzetta
Checked: J.Dillon
Date: January 2023

Project Director: D.Grehan

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Draft:
D01

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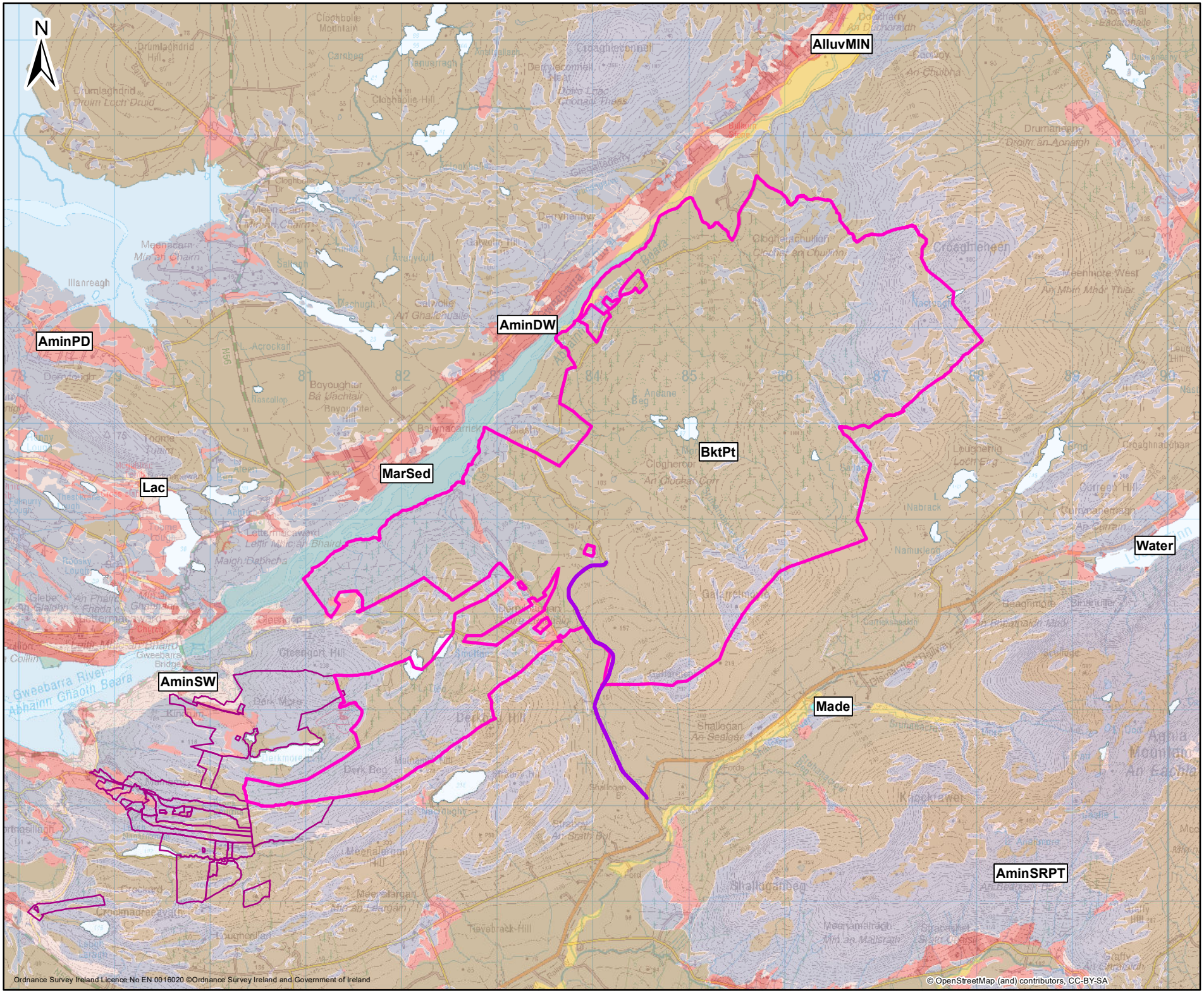

Legend *

- Proposed Wind Farm Site Boundary
- Turbine Delivery Route works
- Biodiversity Enhancement lands

Soils

- AlluvMIN - Mineral alluvium
- AminDW - Acid Brown Earths / Brown Podzolics
- AminPD - Surface water Gleys / Ground water Gleys Acidic
- AminSRPT - Podzols Peaty
- AminSW - Lithosols / Regosols
- BktPt - Blanket peat
- Lac
- Made
- MarSed
- Water

* all land identified is within Boundary of the Proposed Project

0 0.5 1 1.5 2
Kilometres

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Issue	Date	Description	By	Chkd.
A	24/01/2023	Final issue	S.P	J.D

Client: Cloghercor Wind Farm ltd.

Project: Cloghercor Wind Farm

Title: Figure 8-2: Soils Map

Scale @ A4: 1:50,000

Prepared by: S.Pezzetta | Checked: J.Dillon | Date: January 2023

Project Director: O.Fitzpatrick

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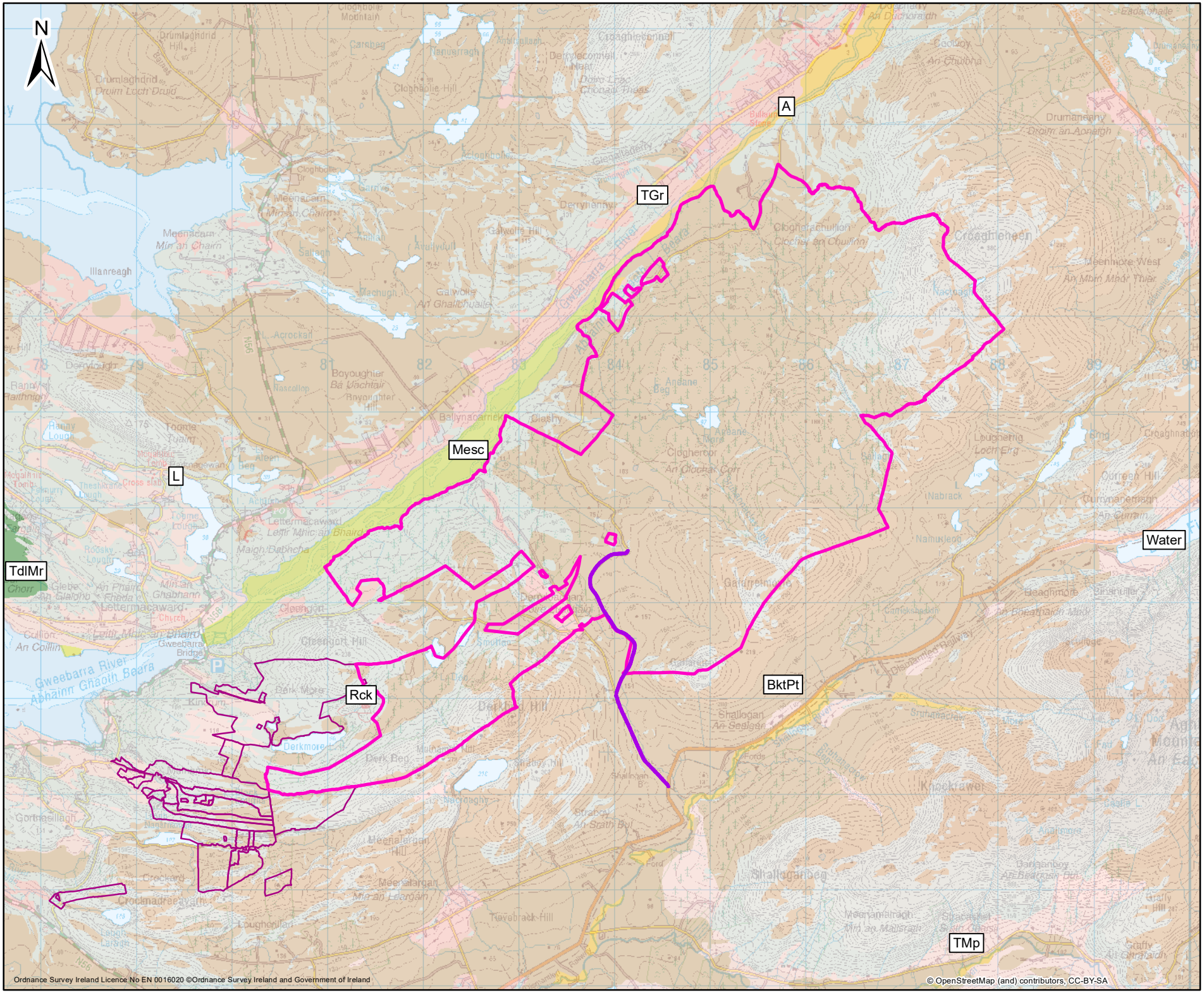

Legend ✱

- Proposed Wind Farm Site Boundary
- Turbine Delivery Route works
- Biodiversity Enhancement lands

Subsoils

- A, Alluvium
- BktPt, Blanket Peat
- L, Lacustrine sediments
- Mesc, Esturine silts and clays
- Rck, Bedrock outcrop or subcrop
- TGr, Till derived from granites
- TMp, Till derived from Metamorphic rocks
- TdlMr, Tidal Marsh
- Water

✱ all land identified is within Boundary of the Proposed Project

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Kilometres

NOTES
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Issue	Date	Description	By	Chkd.
A	24/01/2023	Final issue	S.P	J.D

Client: Cloghercor Wind Farm ltd.

Project: Cloghercor Wind Farm

Title: Figure 8-3: Subsoils Map

Scale @ A4: 1:50,000

Prepared by: S.Pezzetta | Checked: J.Dillon | Date: January 2023

Project Director: O.Fitzpatrick

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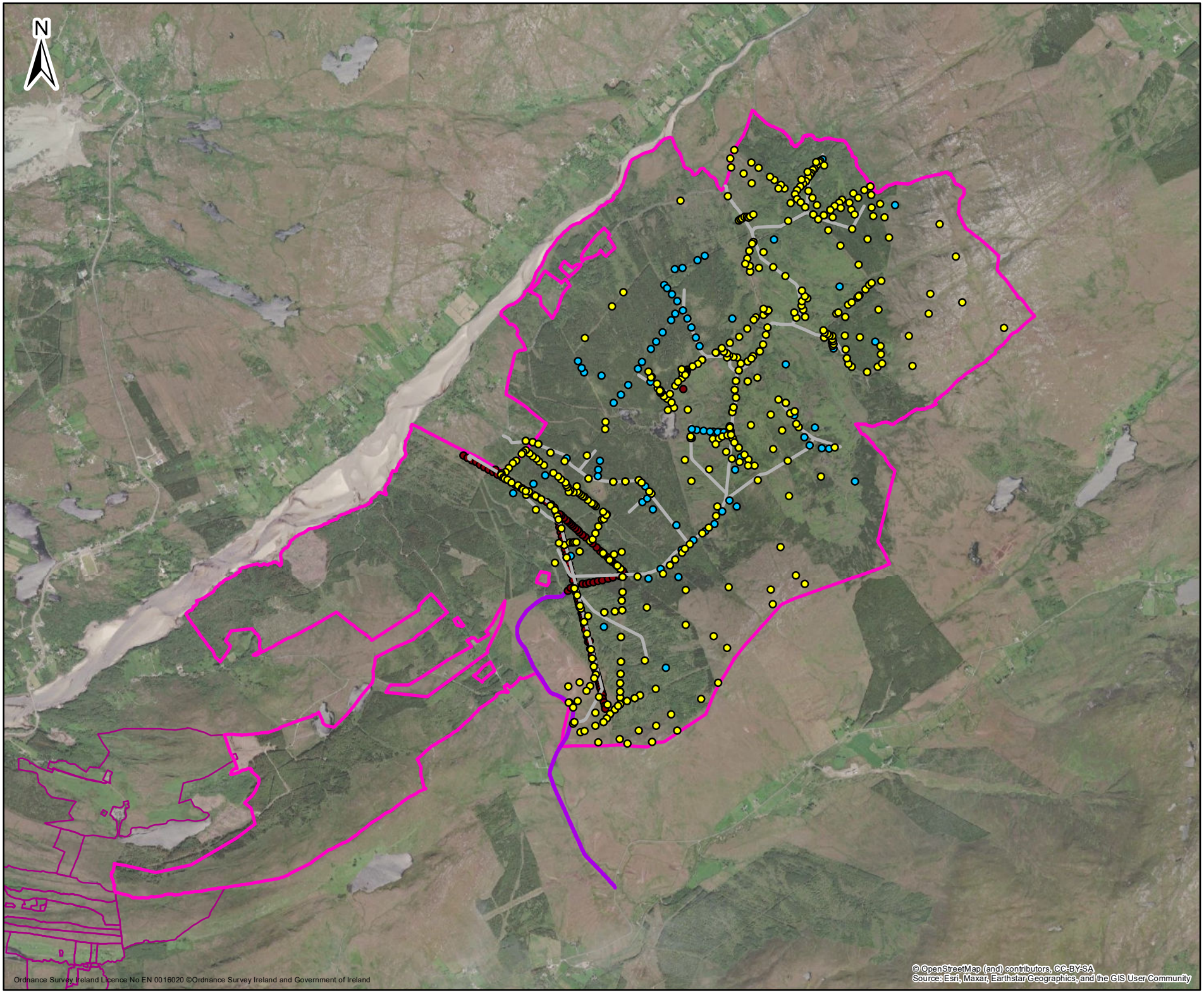

Legend *

- Proposed Wind Farm Site Boundary
- Turbine Delivery Route works
- Biodiversity Enhancement lands
- June 22 data
- Sept 22 data
- TLI Probes
- Internal Roads

* all land identified is within Boundary of the Proposed Project

0 0.25 0.5 0.75 1
Kilometres

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Issue	Date	Description	By	Chkd.
A	24/01/2023	Final issue	S.P	J.D

Client:
Cloghercor Wind Farm ltd.

Project:
Cloghercor Wind Farm

Title:
Figure 8-4
GII -
Site Investigation locations

Scale @ A4: 1:40,000

Prepared by: S.Pezzetta
Checked: J.Dillon
Date: January 2023

Project Director: O.Fitzpatrick

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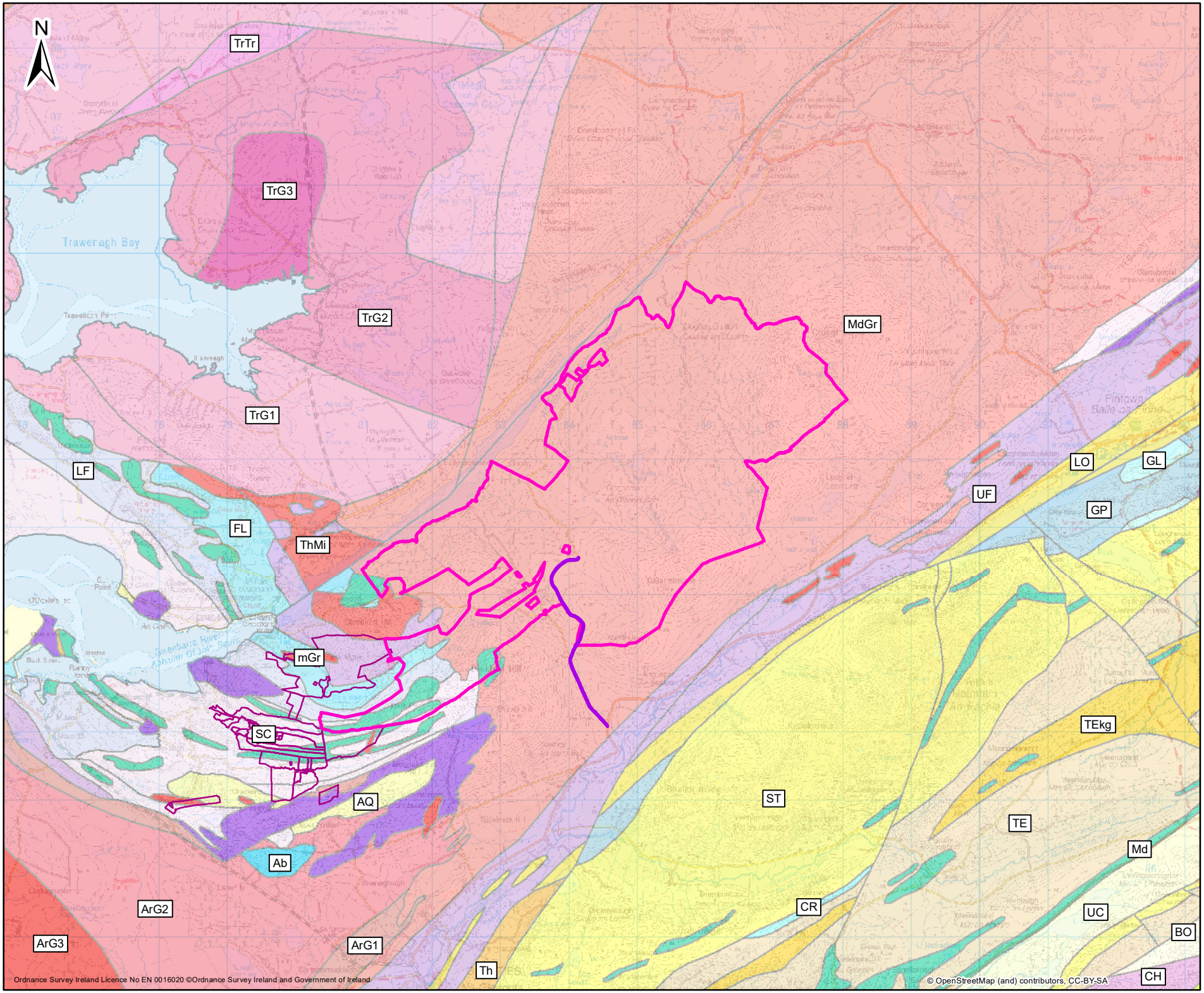

Legend *

- Proposed Wind Farm Site Boundary
- Turbine Delivery Route works
- Biodiversity Enhancement lands

Bedrock Geology

- Ards Quartzite Formation
- Boultypatrick (Grit) Formation
- Cranford Limestone Formation
- Croaghubbrid Pelite Formation
- Croveenananta Formation
- Falcarragh Limestone Formation
- Glencolumbkille Limestone Formation
- Glencolumbkille Pelite Formation
- Ardara Granite, G1 variety
- Ardara Granite, G2 variety
- Ardara Granite, G3 variety
- Thorr Granite
- Thorr Granite migmatitic facies
- Main Donegal Granite
- Microgranite and related rocks
- Trawenagh Bay Biotite Granite
- Trawenagh Bay Biotite-muscov. Grani
- Trawenagh Bay Biotite-muscov. Grani
- Trawenagh Bay Aplogranite
- Trawenagh Bay Transitional G1/G2 Gr
- Lower Falcarragh Pelite Formation
- Loughros Formation
- Appinite suite
- Appinite suite intrusive breccia
- Metadolerite
- Port Askaig Formation
- Sessiagh-Clonmass Formation
- Slieve Tooey Quartzite Formation
- Termon Formation
- Knockletteragh Member
- Upper Crana Quartzite Formation
- Upper Falcarragh Pelite Formation

* all land identified is within Boundary of the Proposed Project

0 0.5 1 1.5 2
Kilometres

NOTES
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2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	24/01/2023	Final issue	S.P	J.D

Client: Cloghercor Wind Farm ltd.

Project: Cloghercor Wind Farm

Title: Figure 8-5 Bedrock Geology Map

Scale @ A4: 1:70,000

Prepared by: S.Pezzetta | Checked: J.Dillon | Date: January 2023

Project Director: O.Fitzpatrick

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APPENDIX 2: PEAT STABILITY CALCULATIONS

Peat stability calculations for Cloghercor Wind Farm
Deterministic stability calculcation outputs
Undrained Case 1 and Case 2

Nr	Assessment area	Description	Relevant GI	Description	$c_{u,fv,avg}$ kPa	Vane correction	$c_{u,k}$ kPa	$c_{u,d}$ kPa	Peat depth m	Slope deg	Surcharge m	Design surcharge m	Unit weight kN/m^3	Case 1 ODF	Case 2 ODF
1	Access road to T1	Fire road & forestry	PP127 to PP131, TOBIN probes	Probes found 0.3 to 1.8m peat		0.5	10.0	7.1	1.8	8.1	1	1.3	10	2.8	1.6
2	T1	Fire road & forestry	PP116 to PP128, GC001, TOBIN probes	Probes found 0.4 to 3.1m peat		0.5	10.0	7.1	3.1	8.0	1	1.3	10	1.7	1.2
3	T2 & access road	Fire road & forestry	TOBIN peat probes	Probes found 0.3 to 1.9m peat		0.5	10.0	7.1	1.9	12.1	1	1.3	10	1.8	1.1
4	Compound & borrow pit near T1	Fire road & forestry	PP110 to PP115, PP130 to PP133, TOBIN probes	Probes found 0.2 to 2.1m peat		0.5	10.0	7.1	2.1	9.8	1	1.3	10	2.0	1.3
5	T3 & access road	Forestry	PP069, PP070, GC003	Peat depth 0.5 to 2.5m		0.5	10.0	7.1	2.5	2.5	1	1.3	10	6.6	4.3
6	T4 & access road	Fire road & forestry	PP024, PP025, PP062, PP063, TOBIN probes	Probes found 0.0 to 2.2m peat		0.5	10.0	7.1	1.8	4.2	1	1.3	10	5.5	3.2
7	T5	Fire road & forestry	TP15, TP24, BH03, PP064, TOBIN probes	Peat depth 0.5 to 1.1m		0.5	10.0	7.1	1.1	10.1	1	1.3	10	3.7	1.7
8	T6 & access road	Fire road & forestry	PP075 to PP081, TOBIN probes	Probes found 0.8 to 3.6m peat		0.5	10.0	7.1	3.6	1.6	1	1.3	10	6.9	5.1
9	T7	Fire road & forestry	TP08, CRA & TOBIN probes	Probes found 0.5 to 3.6m peat		0.5	10.0	7.1	3.6	3.9	1	1.3	10	2.9	2.1
10	T8	Fire road & forestry	PP029 to PP037, TOBIN probes	Probes found 0.4 to 3.0m peat		0.5	10.0	7.1	2.5	7.0	1	1.3	10	2.4	1.6
11	T9 & access road	Fire road & forestry	PP026 to PP028, TOBIN probes	Probes found 0.0 to 2.3m peat		0.5	10.0	7.1	2.3	3.9	1	1.3	10	4.6	2.9
12	T10 & access road	Fire road & forestry	PP059 to PP061, TOBIN probes	Probes found 0.6 to 3.6m peat		0.5	10.0	7.1	3.6	2.3	1	1.3	10	5.0	3.7
13	T11 & access road	Forestry	PP009, PP010,PP020, PP094, TOBIN probes	Probes found 0.5 to 2.0m peat		0.5	10.0	7.1	2	7.9	1	1.3	10	2.6	1.6
14	Access road T12 to T7	Fire road & forestry	PP012-PP023, TP20	Probes found 0.0 to 1.1m peat	10	0.5	4.9	3.5	1.1	7.5	1	1.3	10	2.5	1.1
15	T12	Fire road & forestry	PP010, PP011, GC014, TOBIN probes	Probes found 0.9 to 2.4m peat		0.5	10.0	7.1	2.4	7.1	1	1.3	10	2.4	1.6
16	T13 & borrow pit	Fire road & forestry	TP07, TP13, BH02, GC015, GC151, GC152, TOBIN probes	Peat depth 1.0 to 4.0m	12	0.5	5.9	4.2	4	3.6	1	1.3	10	1.7	1.3
17	T14 & borrow pit	Forestry	PP005, PP051-PP056, TP16, GC016, TOBIN & CRA probes	Peat depth 0.0 to 1.4m	15	0.5	7.5	5.4	1.4	7.6	1	1.3	10	2.9	1.5
18	T15	Fire road & forestry	PP001, PP002, GC017, TOBIN probes	Probes found 0.33 to 1.0m peat		0.5	10.0	7.1	1	11.5	1	1.3	10	3.7	1.6
19	Substation compound	Fire road & forestry	PP040 to PP042, TLI & TOBIN probes	Probes found 0.5 to 1.1m peat		0.5	10.0	7.1	1.1	9.4	1	1.3	10	4.0	1.8
20	Public car park & grid connection	Clear ground, blanket peat	PP049, TLI probes	Probes found 0.0 to 2.3m peat		0.5	10.0	7.1	2.3	4.0	1	1.3	10	4.4	2.8
21	T16	Forestry	PP048, PP049, TLI & TOBIN probes	Probes found 0.9 to 2.6m peat		0.5	10.0	7.1	2.6	4.8	1	1.3	10	3.3	2.2
22	T17	Fire road & forestry	PP046, PP045, GC019, TLI & CRA probes	Probes found 0.3 to 2.8m peat	15	0.5	7.4	5.3	2.8	6.3	1	1.3	10	1.7	1.2
23	T18	Forestry	PP136, GC020, TOBIN probes	Probes found 1.0 to 2.0m peat		0.5	10.0	7.1	2	4.5	1	1.3	10	4.6	2.8
24	T19	Fire road & forestry	GC020, GC021, PP135, TOBIN probes	Probes found 0.9 to 2.2m peat		0.5	10.0	7.1	2	7.1	1	1.3	10	2.9	1.8
25	Grid connection route (near T19)	Underground cable route alongside existing OHL	Peat probes (TLI, TOBIN & CRA)	Probes found 1.3 to 6.1m peat		0.5	10.0	7.1	6.1	1.5	1	1.3	10	4.5	3.7
26	Access from main road	New access road	Peat probes (TOBIN & CRA)	Probe found 0.0 to 1.5m peat	16	0.5	8.0	5.7	1	8.4	1	1.3	10	4.0	1.7
27	Met mast	Met mast & access road	Peat probes (TOBIN & CRA)	Probes found 1.0 to 1.6m peat	8	0.5	4.0	2.9	1.6	5.0	1	1.3	10	2.1	1.1

Minimum	1.7	1.1
Average	3.3	2.0
Maximum	4.6	3.7

Notes:

Undrained shear strength of peat is limited to 10kPa (characteristic value) or local values if less than 10kPa.
Condition 1 relates to no surcharge loading.
Condition 2 takes account of a surcharge equivalent to fill depth of 1m of peat or typical construction traffic i.e. 10kPa.
Slope inclination (β) based on site readings and analysis of LiDAR data.
A minimum slope of 0.5 degrees has been considered.
Peat depths based on trial pits, boreholes, and peat probes at the site.

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Peat stability calculations for Cloghercor Wind Farm
Deterministic stability calculcation outputs
Drained Case 1 and Case 2

Nr	Assessment area	Description	Relevant GI	Description	φ'_k	φ'_d	c'k	c'd	Peat depth	Water level in peat	Slope (deg)	Surcharge	Design surcharge	Unit weight	Case 1	Case 2
					deg	*deg*	*kPa*	*kPa*	*m*	*m*	*deg*	*m*	*m*	*kN/m³*	*ODF*	*ODF*
1	Access road to T1	Fire road & forestry	PP127 to PP131, TOBIN probes	Probes found 0.3 to 1.8m peat	28	23.0	4.0	2.9	1.8	1.8	8.1	1	1.3	17	1.92	2.37
2	T1	Fire road & forestry	PP116 to PP128, GC001, TOBIN probes	Probes found 0.4 to 3.1m peat	28	23.0	4.0	2.9	3.1	3.1	8.0	1	1.3	16	1.59	2.02
3	T2 & access road	Fire road & forestry	TOBIN peat probes	Probes found 0.3 to 1.9m peat	28	23.0	4.0	2.9	1.9	1.9	12.1	1	1.3	15	1.18	1.50
4	Compound & borrow pit near T1	Fire road & forestry	PP110 to PP115, PP130 to PP133, TOBIN probes	Probes found 0.2 to 2.1m peat	28	23.0	4.0	2.9	2.1	2.1	9.8	1	1.3	14	1.32	1.76
5	T3 & access road	Forestry	PP069, PP070, GC003	Peat depth 0.5 to 2.5m	28	23.0	4.0	2.9	2.5	2.5	2.5	1	1.3	13	4.41	6.23
6	T4 & access road	Fire road & forestry	PP024, PP025, PP062, PP063, TOBIN probes	Probes found 0.0 to 2.2m peat	28	23.0	4.0	2.9	1.8	1.8	4.2	1	1.3	11	2.62	3.97
7	T5	Fire road & forestry	TP15, TP24, BH03, PP064, TOBIN probes	Peat depth 0.5 to 1.1m	28	23.0	4.0	2.9	1.1	1.1	10.1	1	1.3	12	1.68	2.06
8	T6 & access road	Fire road & forestry	PP075 to PP081, TOBIN probes	Probes found 0.8 to 3.6m peat	28	23.0	4.0	2.9	3.6	3.6	1.6	1	1.3	10	3.06	6.18
9	T7	Fire road & forestry	TP08, CRA & TOBIN probes	Probes found 0.5 to 3.6m peat	28	23.0	4.0	2.9	3.6	3.6	3.9	1	1.3	10	1.28	2.58
10	T8	Fire road & forestry	PP029 to PP037, TOBIN probes	Probes found 0.4 to 3.0m peat	28	23.0	4.0	2.9	2.5	2.5	7.0	1	1.3	10	1.01	1.85
11	T9 & access road	Fire road & forestry	PP026 to PP028, TOBIN probes	Probes found 0.0 to 2.3m peat	28	23.0	4.0	2.9	2.3	2.3	3.9	1	1.3	10	1.94	3.48
12	T10 & access road	Fire road & forestry	PP059 to PP061, TOBIN probes	Probes found 0.6 to 3.6m peat	28	23.0	4.0	2.9	3.6	3.6	2.3	1	1.3	10	2.21	4.47
13	T11 & access road	Forestry	PP009, PP010,PP020, PP094, TOBIN probes	Probes found 0.5 to 2.0m peat	28	23.0	4.0	2.9	2	2	7.9	1	1.3	10	1.10	1.87
14	Access road T12 to T7	Fire road & forestry	PP012-PP023, TP20	Probes found 0.0 to 1.1m peat	28	23.0	4.0	2.9	1.1	1.1	7.5	1	1.3	10	2.08	2.71
15	T12	Fire road & forestry	PP010, PP011, GC014, TOBIN probes	Probes found 0.9 to 2.4m peat	28	23.0	4.0	2.9	2.4	2.4	7.1	1	1.3	10	1.04	1.87
16	T13 & borrow pit	Fire road & forestry	TP07, TP13, BH02, GC015, GC151, GC152, TOBIN probes	Peat depth 1.0 to 4.0m	28	23.0	4.0	2.9	4	4	3.6	1	1.3	10	1.28	2.64
17	T14 & borrow pit	Forestry	PP005, PP051-PP056, TP16, GC016, TOBIN & CRA probes	Peat depth 0.0 to 1.4m	28	23.0	4.0	2.9	1.4	1.4	7.6	1	1.3	10	1.61	2.36
18	T15	Fire road & forestry	PP001, PP002, GC017, TOBIN probes	Probes found 0.33 to 1.0m peat	28	23.0	4.0	2.9	1	1	11.5	1	1.3	10	1.51	1.84
19	Substation compound	Fire road & forestry	PP040 to PP042, TLI & TOBIN probes	Probes found 0.5 to 1.1m peat	28	23.0	4.0	2.9	1.1	1.1	9.4	1	1.3	10	1.66	2.16
20	Public car park & grid connection	Clear ground, blanket peat & rock outcrop	PP049, TLI probes	Probes found 0.0 to 2.3m peat	28	23.0	4.0	2.9	2.3	2.3	4.0	1	1.3	10	1.89	3.40
21	T16	Forestry	PP048, PP049, TLI & TOBIN probes	Probes found 0.9 to 2.6m peat	28	23.0	4.0	2.9	2.6	2.6	4.8	1	1.3	10	1.40	2.61
22	T17	Fire road & forestry	PP046, PP045, GC019, TLI & CRA probes	Probes found 0.3 to 2.8m peat	28	23.0	4.0	2.9	2.8	2.8	6.3	1	1.3	10	1.00	1.90
23	T18	Forestry	PP136, GC020, TOBIN probes	Probes found 1.0 to 2.0m peat	28	23.0	4.0	2.9	2	2	4.5	1	1.3	10	1.94	3.31
24	T19	Fire road & forestry	GC020, GC021, PP135, TOBIN probes	Probes found 0.9 to 2.2m peat	28	23.0	4.0	2.9	2	2	7.1	1	1.3	10	1.24	2.10
25	Grid connection route (near T19)	Underground cable route alongside existing OHL	Peat probes (TLI, TOBIN & CRA)	Probes found 1.3 to 6.1m peat	28	23.0	4.0	2.9	6.1	6.1	1.5	1	1.3	10	2.10	4.58
26	Access from main road	New access road	Peat probes (TOBIN & CRA)	Probe found 0.0 to 1.5m peat	28	23.0	4.0	2.9	1	1	8.4	1	1.3	10	2.03	2.51
27	Met mast	Met mast & access road	Peat probes (TOBIN & CRA)	Probes found 1.0 to 1.6m peat	28	23.0	4.0	2.9	1.6	1.6	5	1	1.3	10	2.15	3.37

Minimum	1.0	1.5
Average	1.8	2.9
Maximum	4.4	6.2

Notes:

Characteristic drained shear strength of peat used.

Condition 1 relates to no surcharge loading.

Condition 2 takes account of a surcharge equivalent to fill depth of 1m of peat or typical construction traffic i.e. 10kPa.

Slope inclination (β) based on site readings and analysis of LiDAR data.

A minimum slope of 0.5 degrees has been considered.

Peat depths based on trial pits, boreholes, and peat probes at the site.

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APPENDIX 3: PEAT STABILITY RISK REGISTER

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 1
Location: Access road to T1

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.3 to 1.8m peat	4	4	**16**	3	4	**12**
Peat strength (kPa)	10	2	4	**8**	2	4	**8**
Topography							
Elevation (mOD)	10 to 50	1	3	**3**	1	3	**3**
Slope angle (deg.)	6 to 8	2	3	**6**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	4	**8**	1	4	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	3	**3**
Quantative assessment							
FOS - drained	1.9	2	4	**8**	2	4	**8**
FOS - undrained	1.6						
Total (pre / post control measures)		**76**			**56**		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**8**			6		
Overall hazard ranking		**Low**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from access road construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Inspection regime for access roads during works.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 2
Location: T1

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.4 to 3.1m peat	5	4	**20**	4	3	**12**
Peat strength (kPa)	10	3	4	**12**	2	3	**6**
Topography							
Elevation (mOD)	50 to 60	1	2	**2**	1	3	**3**
Slope angle (deg.)	7 to 8	3	2	**6**	2	3	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	2	**6**	2	2	**4**
Hydrology							
Distance from watercourse	100 to 150m	2	3	**6**	2	3	**6**
Evidence of surface water flow	No	2	3	**6**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	3	**3**
Quantative assessment							
FOS - drained	1.6	2	2	**4**	1	2	**2**
FOS - undrained	1.2						
Total (pre / post control measures)		**69**			**52**		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**7**			5		
Overall hazard ranking		**Low**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Site-specific temporary works design required at construction stage due to deeper peat, which may include soil or rock berms, sheet piles, or shallow slope angles with daily inspections.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 3
Location: T2 & access road

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.3 to 1.9m peat	4	3	**12**	4	3	**12**
Peat strength (kPa)	10	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	100 to 120	2	2	**4**	2	3	**6**
Slope angle (deg.)	7 to 12	3	3	**9**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	2	**6**	2	2	**4**
Hydrology							
Distance from watercourse	>150m	2	3	**6**	2	3	**6**
Evidence of surface water flow	No	2	3	**6**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	3	**3**
Quantative assessment							
FOS - drained	1.2	2	2	**4**	2	2	**4**
FOS - undrained	1.1						
Total (pre / post control measures)		**60**			60		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**6**			6		
Overall hazard ranking		**Low**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Inspection regime for access roads during works.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 4
Location: Compound & borrow pit near T1

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.2 to 2.1m peat	2	3	**6**	2	2	**4**
Peat strength (kPa)	10	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	50 to 80	2	3	**6**	1	3	**3**
Slope angle (deg.)	6 to 10	3	3	**9**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	2	3	**6**
Hydrology							
Distance from watercourse	50 to 100m	3	3	**9**	2	3	**6**
Evidence of surface water flow	No	2	3	**6**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	3	**3**
Quantative assessment							
FOS - drained	1.3	3	2	**6**	2	2	**4**
FOS - undrained	1.3						
Total (pre / post control measures)		**64**			**51**		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**6**			**5**		
Overall hazard ranking		**Low**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Due to size of excavatioin & likelihood it will be open for a long time, specific temporary works design required including temporary slope stability measures, e.g. rock berm, shallow slope angles, daily inspections, etc.
3	Maintain hydrology of area as far as possible.
4	Installation of interceptor drains upslope of works to divert any surface water away from compound & borrow pit area.
5	Use of experienced geotechnical staff for detailed design & temporary works design.
6	Engage experienced contractors and trained operatives to carry out the work.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 5
Location: T3 & access road

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Peat depth 0.5 to 2.5m	3	3	**9**	2	2	**4**
Peat strength (kPa)	10	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	40 to 70	2	3	**6**	1	3	**3**
Slope angle (deg.)	7 to 8	3	3	**9**	3	3	**9**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	2	3	**6**
Hydrology							
Distance from watercourse	Access road crosses watercourse	4	4	**16**	4	4	**16**
Evidence of surface water flow	Yes	4	4	**16**	3	4	**12**
Evidence of subsurface flow	No	3	4	**12**	2	4	**8**
Quantative assessment							
FOS - drained	4.4	2	3	**6**	1	2	**2**
FOS - undrained	4.3						
Total (pre / post control measures)		**95**			**70**		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**10**			**7**		
Overall hazard ranking		**Medium**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible, including adequate sizing of watercourse diversion routes & culverts.
3	Installation of interceptor drains upslope of works to divert any surface water away from construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Hydrological assessment of stream flows at detailed design stage to inform culvert sizing.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 6
Location: T4 & access road

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.0 to 2.2m peat	3	3	**9**	2	3	**6**
Peat strength (kPa)	10	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	70 to 100	3	4	**12**	2	4	**8**
Slope angle (deg.)	3 to 5	3	3	**9**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately low	2	3	**6**	2	3	**6**
Hydrology							
Distance from watercourse	50 to 100m	4	4	**16**	4	3	**12**
Evidence of surface water flow	Yes	4	4	**16**	3	4	**12**
Evidence of subsurface flow	Yes	4	4	**16**	3	4	**12**
Quantative assessment							
FOS - drained	2.6	2	2	**4**	2	2	**4**
FOS - undrained	3.2						
Total (pre / post control measures)		**98**			79		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**10**			8		
Overall hazard ranking		**Medium**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine & road construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 7
Location: T5

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Peat depth 0.5 to 1.1m	2	2	**4**	2	2	**4**
Peat strength (kPa)	10	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	100 to 170m	4	4	**16**	4	3	**12**
Slope angle (deg.)	8 to 11	4	4	**16**	4	3	**12**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	2	3	**6**
Hydrology							
Distance from watercourse	50 to 100m	4	4	**16**	4	3	**12**
Evidence of surface water flow	Yes	4	4	**16**	3	3	**9**
Evidence of subsurface flow	No	3	4	**12**	2	3	**6**
Quantative assessment							
FOS - drained	1.7	3	2	**6**	2	2	**4**
FOS - undrained	1.7						
Total (pre / post control measures)		**105**			75		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**11**			8		
Overall hazard ranking		**Medium**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 8
Location: T6 & access road

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.8 to 3.6m peat	4	4	**16**	4	4	**16**
Peat strength (kPa)	10	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	95 to 110	3	3	**9**	3	2	**6**
Slope angle (deg.)	2	2	3	**6**	2	3	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	Access road crosses watercourse	4	4	**16**	3	3	**9**
Evidence of surface water flow	Yes	4	4	**16**	3	3	**9**
Evidence of subsurface flow	No	3	4	**12**	2	3	**6**
Quantative assessment							
FOS - drained	3.1	3	2	**6**	2	2	**4**
FOS - undrained	5.1						
Total (pre / post control measures)			**95**			**70**	
Max possible			**250**			**250**	
Overall hazard assessment (pre / post control measures)			**10**			**7**	
Overall hazard ranking			**Medium**			**Low**	

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible, including adequate sizing of watercourse diversion routes & culverts.
3	Installation of interceptor drains upslope of works to divert any surface water away from construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Hydrological assessment of stream flows at detailed design stage to inform culvert sizing.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 9
Location: T7

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.5 to 3.6m peat	4	4	**16**	4	4	**16**
Peat strength (kPa)	10	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	90 to 110	3	3	**9**	3	2	**6**
Slope angle (deg.)	3 to 4	2	3	**6**	2	3	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	Access road crosses watercourse	4	4	**16**	3	3	**9**
Evidence of surface water flow	Yes	4	4	**16**	3	3	**9**
Evidence of subsurface flow	No	3	4	**12**	2	3	**6**
Quantative assessment							
FOS - drained	1.3	4	2	**8**	3	2	**6**
FOS - undrained	2.1						
Total (pre / post control measures)				**97**			**72**
Max possible				**250**			**250**
Overall hazard assessment (pre / post control measures)				**10**			**7**
Overall hazard ranking				**Medium**			**Low**

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible, including adequate sizing of watercourse diversion routes & culverts.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Site-specific temporary works design required at construction stage due to deeper peat, which may include soil or rock berms, sheet piles, or shallow slope angles with daily inspections.
7	Hydrological assessment of stream flows at detailed design stage to inform culvert sizing.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 10
Location: T8

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.4 to 3.0m peat	4	4	**16**	4	4	**16**
Peat strength (kPa)	10	4	3	**12**	4	3	**12**
Topography							
Elevation (mOD)	150 to 185	4	4	**16**	3	3	**9**
Slope angle (deg.)	4 to 7	3	3	**9**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	2	**6**	3	2	**6**
Hydrology							
Distance from watercourse	>200m	2	2	**4**	2	2	**4**
Evidence of surface water flow	No	2	2	**4**	2	2	**4**
Evidence of subsurface flow	No	2	4	**8**	2	3	**6**
Quantative assessment							
FOS - drained	1.0	4	4	**16**	3	3	**9**
FOS - undrained	1.6						
Total (pre / post control measures)		**95**			79		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**10**			8		
Overall hazard ranking		**Medium**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Site-specific temporary works design required at construction stage due to deeper peat, which may include soil or rock berms, sheet piles, or shallow slope angles with daily inspections.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 11
Location: T9 & access road

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.0 to 2.3m peat	3	3	**9**	3	3	**9**
Peat strength (kPa)	10	3	3	**9**	3	3	**9**
Topography							
Elevation (mOD)	150 to 185	4	4	**16**	3	3	**9**
Slope angle (deg.)	3 to 4	3	3	**9**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	<50m, access road crosses	4	4	**16**	4	3	**12**
Evidence of surface water flow	Yes	4	4	**16**	4	3	**12**
Evidence of subsurface flow	No	2	4	**8**	2	3	**6**
Quantative assessment							
FOS - drained	1.9	3	3	**9**	3	3	**9**
FOS - undrained	2.9						
Total (pre / post control measures)		**100**			83		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**10**			8		
Overall hazard ranking		**Medium**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible, including adequate sizing of watercourse diversion routes & culverts.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine & road construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Hydrological assessment of stream flows at detailed design stage to inform culvert sizing.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 12
Location: T10 & access road

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.6 to 3.6m peat	5	4	**20**	4	4	**16**
Peat strength (kPa)	10	5	4	**20**	4	4	**16**
Topography							
Elevation (mOD)	100 to 115	3	3	**9**	3	2	**6**
Slope angle (deg.)	1 to 3	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	100 to 150m	3	4	**12**	3	4	**12**
Evidence of surface water flow	No	2	4	**8**	2	3	**6**
Evidence of subsurface flow	No	2	4	**8**	2	3	**6**
Quantative assessment							
FOS - drained	2.2	3	2	**6**	2	2	**4**
FOS - undrained	3.7						
Total (pre / post control measures)		**95**			**78**		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**10**			8		
Overall hazard ranking		**Medium**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine & road construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Site-specific temporary works design required at construction stage due to deeper peat, which may include soil or rock berms, sheet piles, or shallow slope angles with daily inspections.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 13
Location: T11 & access road

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.5 to 2.0m peat	4	4	**16**	4	3	**12**
Peat strength (kPa)	10	4	4	**16**	4	3	**12**
Topography							
Elevation (mOD)	100 to 165	4	4	**16**	3	3	**9**
Slope angle (deg.)	4 to 8	3	4	**12**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	50 to 100m	3	4	**12**	3	4	**12**
Evidence of surface water flow	Yes	4	4	**16**	3	4	**12**
Evidence of subsurface flow	No	2	4	**8**	2	3	**6**
Quantative assessment							
FOS - drained	1.1	4	3	**12**	3	2	**6**
FOS - undrained	1.6						
Total (pre / post control measures)				**116**			86
Max possible				**250**			**250**
Overall hazard assessment (pre / post control measures)				**12**			9
Overall hazard ranking				**Medium**			**Low**

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine & road construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Site-specific temporary works design required at construction stage due to deeper peat, which may include soil or rock berms, sheet piles, or shallow slope angles with daily inspections.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 14
Location: Access road T12 to T7

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.0 to 1.1m peat	3	4	**12**	3	3	**9**
Peat strength (kPa)	5	5	4	**20**	4	3	**12**
Topography							
Elevation (mOD)	115 to 170	4	4	**16**	3	3	**9**
Slope angle (deg.)	7 to 8	3	4	**12**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	2	2	**4**
Hydrology							
Distance from watercourse	Access road crosses watercourse	5	4	**20**	4	4	**16**
Evidence of surface water flow	Yes	4	4	**16**	3	4	**12**
Evidence of subsurface flow	No	2	4	**8**	2	3	**6**
Quantative assessment							
FOS - drained	2.1	4	4	**16**	3	3	**9**
FOS - undrained	1.1						
Total (pre / post control measures)		**133**			90		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**13**			9		
Overall hazard ranking		**Medium**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible, including adequate sizing of watercourse diversion routes & culverts.
3	Installation of interceptor drains upslope of works to divert any surface water away from road construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Hydrological assessment of stream flows at detailed design stage to inform culvert sizing.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 15
Location: T12

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.9 to 2.4m peat	4	4	**16**	3	3	**9**
Peat strength (kPa)	10	4	4	**16**	4	3	**12**
Topography							
Elevation (mOD)	150 to 180	4	4	**16**	3	3	**9**
Slope angle (deg.)	6 to 7	3	4	**12**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	2	2	**4**
Hydrology							
Distance from watercourse	>150m	3	3	**9**	3	2	**6**
Evidence of surface water flow	No	2	2	**4**	2	2	**4**
Evidence of subsurface flow	No	2	2	**4**	2	2	**4**
Quantative assessment							
FOS - drained	1.0	4	4	**16**	3	3	**9**
FOS - undrained	1.6						
Total (pre / post control measures)		**106**			70		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**11**			**7**		
Overall hazard ranking		**Medium**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Site-specific temporary works design required at construction stage due to deeper peat, which may include soil or rock berms, sheet piles, or shallow slope angles with daily inspections.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 16
Location: T13 & borrow pit

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Peat depth 1.0 to 4.0m	5	4	**20**	4	4	**16**
Peat strength (kPa)	6	5	4	**20**	4	4	**16**
Topography							
Elevation (mOD)	90 to 110	3	3	**9**	3	3	**9**
Slope angle (deg.)	3 to 4	3	3	**9**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	3	**6**	2	3	**6**
Hydrology							
Distance from watercourse	50 to 100m	3	3	**9**	3	2	**6**
Evidence of surface water flow	Yes	4	3	**12**	4	2	**8**
Evidence of subsurface flow	Yes	4	3	**12**	4	2	**8**
Quantative assessment							
FOS - drained	1.3	4	4	**16**	3	3	**9**
FOS - undrained	1.3						
Total (pre / post control measures)		**117**			91		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**12**			9		
Overall hazard ranking		**Medium**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Quaking peat observed at site - access road moved to north as mitigation measure.
3	Maintain hydrology of area as far as possible.
4	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
5	Use of experienced geotechnical staff for detailed design & temporary works design.
6	Engage experienced contractors and trained operatives to carry out the work.
7	Site-specific temporary works design required at construction stage due to deeper peat, which may include soil or rock berms, sheet piles, or shallow slope angles with daily inspections.
8	Due to size of excavatioin & likelihood it will be open for a long time, specific temporary works design required including temporary slope stability measures, e.g. rock berm, shallow slope angles, daily inspections, etc.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 17
Location: T14 & borrow pit

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Peat depth 0.0 to 1.4m	3	3	**9**	3	3	**9**
Peat strength (kPa)	8	4	4	**16**	4	4	**16**
Topography							
Elevation (mOD)	110 to 150	3	3	**9**	2	3	**6**
Slope angle (deg.)	6 to 8	4	4	**16**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	3	3	**9**
Hydrology							
Distance from watercourse	50 to 100m	4	3	**12**	3	3	**9**
Evidence of surface water flow	Yes	4	3	**12**	4	2	**8**
Evidence of subsurface flow	Yes	4	3	**12**	4	2	**8**
Quantative assessment							
FOS - drained	1.6	3	3	**9**	3	3	**9**
FOS - undrained	1.5						
Total (pre / post control measures)		**108**			87		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**11**			9		
Overall hazard ranking		**Medium**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Due to size of excavatioin & likelihood it will be open for a long time, specific temporary works design required including temporary slope stability measures, e.g. rock berm, shallow slope

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 18
Location: T15

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.33 to 1.0m peat	3	3	**9**	3	3	**9**
Peat strength (kPa)	10	3	3	**9**	3	3	**9**
Topography							
Elevation (mOD)	150 to 180	4	4	**16**	3	4	**12**
Slope angle (deg.)	10 to 12	5	4	**20**	4	4	**16**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	High	5	4	**20**	3	4	**12**
Hydrology							
Distance from watercourse	50 to 100m	4	3	**12**	3	3	**9**
Evidence of surface water flow	Yes	4	3	**12**	4	2	**8**
Evidence of subsurface flow	No	2	2	**4**	2	2	**4**
Quantative assessment							
FOS - drained	1.5	3	3	**9**	3	3	**9**
FOS - undrained	1.6						
Total (pre / post control measures)				**115**			92
Max possible				**250**			**250**
Overall hazard assessment (pre / post control measures)				**12**			9
Overall hazard ranking				**Medium**			**Low**

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 19
Location: Substation compound

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.5 to 1.1m peat	3	3	**9**	3	3	**9**
Peat strength (kPa)	10	3	3	**9**	3	3	**9**
Topography							
Elevation (mOD)	110 to 155	4	4	**16**	3	4	**12**
Slope angle (deg.)	8 to 10	4	4	**16**	3	4	**12**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	High	5	4	**20**	3	4	**12**
Hydrology							
Distance from watercourse	50 to 100m	3	3	**9**	3	3	**9**
Evidence of surface water flow	Yes	4	3	**12**	4	2	**8**
Evidence of subsurface flow	No	2	2	**4**	2	2	**4**
Quantative assessment							
FOS - drained	1.7	3	3	**9**	3	3	**9**
FOS - undrained	1.8						
Total (pre / post control measures)				**108**			88
Max possible				**250**			**250**
Overall hazard assessment (pre / post control measures)				**11**			9
Overall hazard ranking				**Medium**			**Low**

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 20
Location: Public car park & grid connection

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.0 to 2.3m peat	4	3	**12**	3	3	**9**
Peat strength (kPa)	10	3	3	**9**	3	3	**9**
Topography							
Elevation (mOD)	60 to 100	3	3	**9**	3	2	**6**
Slope angle (deg.)	3 to 4	3	4	**12**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately low	2	3	**6**	2	3	**6**
Hydrology							
Distance from watercourse	> 200m	2	4	**8**	2	3	**6**
Evidence of surface water flow	Yes	4	4	**16**	3	3	**9**
Evidence of subsurface flow	No	2	2	**4**	2	2	**4**
Quantative assessment							
FOS - drained	1.9	3	3	**9**	3	3	**9**
FOS - undrained	2.8						
Total (pre / post control measures)		**89**			**71**		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**9**			**7**		
Overall hazard ranking		**Low**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 21
Location: T16

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.9 to 2.6m peat	3	3	**9**	3	2	**6**
Peat strength (kPa)	10	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	90 to 100	3	3	**9**	3	2	**6**
Slope angle (deg.)	3 to 5	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	Access road crosses watercourse	3	4	**12**	2	3	**6**
Evidence of surface water flow	Yes	4	4	**16**	3	3	**9**
Evidence of subsurface flow	No	2	2	**4**	2	2	**4**
Quantative assessment							
FOS - drained	1.4	2	2	**4**	2	2	**4**
FOS - undrained	2.2						
Total (pre / post control measures)		**75**			**53**		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**8**			**5**		
Overall hazard ranking		**Low**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible, including adequate sizing of watercourse diversion routes & culverts.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 22
Location: T17

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.3 to 2.8m peat	4	3	**12**	3	2	**6**
Peat strength (kPa)	7	4	4	**16**	3	3	**9**
Topography							
Elevation (mOD)	95 to 120	3	3	**9**	3	2	**6**
Slope angle (deg.)	4 to 7	3	3	**9**	3	2	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	3	2	**6**
Hydrology							
Distance from watercourse	100 to 150m	3	4	**12**	2	3	**6**
Evidence of surface water flow	Yes	4	4	**16**	3	3	**9**
Evidence of subsurface flow	No	2	2	**4**	2	2	**4**
Quantative assessment							
FOS - drained	1.0	4	3	**12**	3	3	**9**
FOS - undrained	1.2						
Total (pre / post control measures)		**103**			65		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**10**			**7**		
Overall hazard ranking		**Medium**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible, including adequate sizing of watercourse diversion routes & culverts.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 23
Location: T18

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 1.0 to 2.0m peat	3	4	**12**	3	3	**9**
Peat strength (kPa)	10	3	3	**9**	3	3	**9**
Topography							
Elevation (mOD)	120 to 140	3	3	**9**	3	2	**6**
Slope angle (deg.)	3 to 5	3	3	**9**	3	2	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	3	2	**6**
Hydrology							
Distance from watercourse	50 to 100m	3	3	**9**	2	3	**6**
Evidence of surface water flow	No	2	2	**4**	2	2	**4**
Evidence of subsurface flow	No	2	2	**4**	2	2	**4**
Quantative assessment							
FOS - drained	1.9	3	3	**9**	3	3	**9**
FOS - undrained	2.8						
Total (pre / post control measures)		**78**			63		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**8**			6		
Overall hazard ranking		**Low**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 24
Location: T19

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 0.9 to 2.2m peat	3	4	**12**	3	3	**9**
Peat strength (kPa)	10	3	3	**9**	3	3	**9**
Topography							
Elevation (mOD)	125 to 165	4	4	**16**	3	3	**9**
Slope angle (deg.)	5 to 7	4	4	**16**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	3	2	**6**
Hydrology							
Distance from watercourse	100 to 150m	2	3	**6**	2	3	**6**
Evidence of surface water flow	No	2	2	**4**	2	2	**4**
Evidence of subsurface flow	No	2	2	**4**	2	2	**4**
Quantative assessment							
FOS - drained	1.2	3	3	**9**	3	3	**9**
FOS - undrained	1.8						
Total (pre / post control measures)		**89**			69		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**9**			**7**		
Overall hazard ranking		**Low**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 25
Location: Grid connection route (near T19)

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 1.3 to 6.1m peat	5	5	**25**	5	4	**20**
Peat strength (kPa)	10	5	4	**20**	5	3	**15**
Topography							
Elevation (mOD)	120 to 180	4	4	**16**	3	3	**9**
Slope angle (deg.)	1 to 2	3	3	**9**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	3	2	**6**
Hydrology							
Distance from watercourse	Crosses watercourse	4	4	**16**	3	3	**9**
Evidence of surface water flow	Yes	4	4	**16**	3	3	**9**
Evidence of subsurface flow	No	2	2	**4**	2	2	**4**
Quantative assessment							
FOS - drained	2.1	3	3	**9**	3	3	**9**
FOS - undrained	3.7						
Total (pre / post control measures)				**128**			89
Max possible				**250**			**250**
Overall hazard assessment (pre / post control measures)				**13**			9
Overall hazard ranking				**Medium**			**Low**

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible, including adequate sizing of watercourse diversion routes & culverts.
3	Installation of interceptor drains upslope of works to divert any surface water away from OHL construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Site-specific temporary works design required at construction stage due to deeper peat, which may include soil or rock berms, sheet piles, or shallow slope angles with daily inspections.
7	Hydrological assessment of stream flows at detailed design stage to inform culvert sizing.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 26
Location: Access from main road

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probe found 0.0 to 1.5m peat	2	3	**6**	2	3	**6**
Peat strength (kPa)	8	3	3	**9**	2	3	**6**
Topography							
Elevation (mOD)	100 to 120	4	4	**16**	3	3	**9**
Slope angle (deg.)	5 to 9	3	3	**9**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	3	2	**6**
Hydrology							
Distance from watercourse	50 to 100m	3	2	**6**	2	2	**4**
Evidence of surface water flow	Yes	4	4	**16**	3	3	**9**
Evidence of subsurface flow	No	2	2	**4**	2	2	**4**
Quantative assessment							
FOS - drained	2.0	2	2	**4**	2	2	**4**
FOS - undrained	1.7						
Total (pre / post control measures)		**83**			**56**		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**8**			**6**		
Overall hazard ranking		**Low**			**Low**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from OHL construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

CLOGHERCOR WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 27
Location: Met mast

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Probes found 1.0 to 1.6m peat	3	3	**9**	2	3	**6**
Peat strength (kPa)	4	4	4	**16**	2	3	**6**
Topography							
Elevation (mOD)	55 to 65	3	3	**9**	2	2	**4**
Slope angle (deg.)	3 to 5	3	3	**9**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	100 to 150m	2	2	**4**	1	1	**1**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	No	2	2	**4**	2	2	**4**
Quantative assessment							
FOS - drained	2.1	2	2	**4**	2	2	**4**
FOS - undrained	1.1						
Total (pre / post control measures)		**72**			**41**		
Max possible		**250**			**250**		
Overall hazard assessment (pre / post control measures)		**7**			4		
Overall hazard ranking		**Low**			**Negligible**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from OHL construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.