Proposed Lissinagroagh Wind Farm Planning Stage Peat Stability Risk Assessment

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Status	**Description**	**Revision Code**
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S1	Suitable for Coordination. The file is available to be 'shared' and used by other disciplines as a background for their information.	P01, P02, etc
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CR	As Construction Record documentation, PDF, Models etc.	C01, C02, etc

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1. Introduction

In accordance with planning guidelines compiled by the Department of Housing, Local Government and Heritage (2006), 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 on behalf of FuturEnergy Ireland Ltd. (hereinafter "FEI") to carry out a planning stage peat stability risk assessment (PSRA) as part of the environmental impact assessment for the proposed Lissinagroagh Wind Farm site. FEI wish to apply to An Coimisiún Pleanála for planning permission to develop a wind farm in the townlands of Lisdarush, Shasmore, Faughary, Boleyboy, Cashelaveela, Tawnafeacle, Lissinagroagh and Tawnylust in north County Leitrim between the villages of Kiltyclogher to the northeast and Manorhamilton to the southwest. The closest turbine is located approximately 3 km northeast of Manorhamilton and approximately 4 km southwest of Kiltyclogher.

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 7 (the Land, Soils, and Geology chapter) of the Proposed Lissinagroagh Wind Farm Environmental Impact Assessment Report (EIAR) and its appendices.

1.1. Description of the Development

A summary of the overall proposed project is as follows:

Proposed Wind Farm

- Fourteen (14) wind turbines with a blade tip height range of 180-185 m, a rotor diameter range from 149 -163 m, a hub height range from 101 -110.5 m, and all associated foundations, hardstanding and assembly areas;
- A permanent meteorological mast with a height of 100 m, with a lightning finial extending above the mast;
- Modifications to an existing site access on the L61801 local road in the townland of Faughary in the west of the site, to be used as a permanent access during construction and operation (referred to as Permanent Access 1 on Drawings 10955-2070 and 2071);
- Modifications to an existing site access on the L61844 local road in the townland of Lissinagroagh in the southeast of the site, to be used as a temporary access during construction (referred to as Temporary Access 2 on Drawing 10955-2070);
- A new temporary access on the L6184 local road in the townland of Cherrybrook for use by turbine delivery vehicles during construction only and subsequent reinstatement (referred to as Temporary Access 1 on Drawings 10955-2070 and 2019);
- Approximately 7.95 km of new internal access tracks to include passing bays and associated drainage;

- Upgrade of approximately 8.35 km of existing access tracks, to include passing bays and associated drainage;
- Temporary and permanent drainage and sediment control systems;
- Ten (10) clear span bridges at watercourse crossings on the internal access track network and one (1) existing culvert extension;
- Three (3) borrow pits with a total volume of 298,080 m^3 for temporary use during construction. The borrow pits will subsequently be used for storage of excavated peat;
- Two (2) temporary construction compounds each on an area of 17,000 m^2, with associated temporary site offices, parking areas and security fencing;
- Seven (7) permanent access points on the L6184 local road to facilitate turbine delivery and construction works (referred to as Permanent Road Crossings 1, 2, 3, 4, 5, 6 and 7 on Drawing 10955-2070);
- A temporary road crossing of unnamed local road in the townland of Cherrybrook to facilitate turbine delivery vehicles during construction only (referred to as Temporary Road Crossing 1 on Drawing 10955-2070);
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed wind farm substation.
- All related site works and ancillary development including berms, landscaping, soil excavation and biodiversity enhancement areas;
- Ancillary forestry felling to facilitate construction and operation of the Proposed Project.

Proposed Grid Connection

- A permanent 110kV on-site electrical substation within a compound area of 11,600 m^2 to consist of:
  - An EirGrid control building containing worker welfare facilities and equipment store;
  - An Independent Power Producer (IPP) control building containing a high voltage switch room, site offices, kitchen facilities, storeroom and toilet amenities;
  - All electrical plant and infrastructure and grid ancillary services equipment;
  - A telecommunications mast;
  - Parking;
  - Lighting;
  - Security Fencing;
  - Wastewater holding tank;
  - Rainwater harvesting equipment;
  - All associated infrastructure and services including site works and signage;
- A 110 kV underground cable from the proposed on-site 110kV substation to the existing ESBN Srananagh Substation in the townland of Ballysumaghan, Co. Sligo, approximately 32 km in length, of which 30.6 km will be in the public road corridor;

- Eleven (11) existing bridge crossings, of which eight (8) will involve in-road HDD (Horizontal Directional Drilling), two (2) will involve off-road HDD and one (1) will be a standard crossing within the bridge deck;
- Eight (8) existing culvert crossings using open trenching with either an undercrossing or an overcrossing, depending on the depth of the culvert to be confirmed during pre-construction surveys;
- All related site works and ancillary development.

Proposed Turbine Delivery Route

- Temporary accommodations along the following public roads (R263, N56, N15, N16, L6184) including road widening, removal of vegetation, walls and street furniture to facilitate delivery of turbine components and oversize loads and subsequent reinstatement.

An overview of the proposed project is shown in drawing 10955-2010_Site Master Plan attached in Appendix 1.

The proposed wind farm site encompasses approximately 1,434 hectares (ha), of which approximately 1,200 ha are currently commercial forest owned by Coillte. The remaining approximately 234 ha are largely privately-owned third-party lands and comprise a mix of coniferous forestry, marginal agricultural land, peatbogs and transitional scrub.

The site ranges in elevation from 170 to 380 m AOD, with the eastern part of the site bordering Dough Mountain (462m). The northern turbines are situated within the Saddle Hill (375m) Coillte property at elevations between 280 and 310 m AOD generally in undulating terrain. The southern turbines are located between 170 m and 380m AOD.

The final locations of the main infrastructural components of the development are as shown on the Site Master Plan drawing 10955-2010 and are summarized as follows:

- Turbine T1, 2, 4, 5, 6: located in the north of the site in coniferous forestry at elevations ranging from approximately 270 m AOD (T1) to 350 m AOD (T5).
- Turbine T3: on the southwestern slope of Saddle Hill at an elevation of 350-360 m AOD in upland blanket bog.
- Turbines T7, T9: located in the central section of the site in marginal land/wet grassland at elevations of approximately 350 m AOD and 245m AOD, respectively.
- Turbines T8, T10, T11, T12: located in the southwest of the site in coniferous forestry at elevations ranging from 175 m AOD (T12) to 320 m AOD (T8).
- Turbine T13 and T14,: located in the southeast of the site in coniferous forestry that ranges in elevation from 200m AOD to 280m AOD.
- Site Entrances and Access Roads: two (2) proposed access points/site entrances to the wind farm site from the public road network – a western entrance from the L61801 and a southern entrance from the L6184

- Bridges: To facilitate construction of internal access tracks between the turbines and other infrastructure locations, eleven (11) watercourse crossings are required. This will involve the installation of ten (10) clear span bridges at various locations on the internal access track network and the extension of one (1) existing culvert.
- 110kV Wind Farm Substation: located in coniferous forestry in the west of the site close to the L61801 Local Road access and the western site entrance.
- Temporary Construction Compound: There will be two (2) temporary compounds; one located at the western end of the site near the proposed substation and the other located in the northern part of the site between T6 and T4.
- Permanent Meteorological Mast: a 100m-high mast will be installed east of the substation location and west of T12.

1.2. 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. Westmeath.

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 worked as a geotechnical engineering consultant undertaking a diverse range of environmental impact assessment and engineering design projects, including lead authorship of peat stability risk assessments for HV electrical installations, waste management facilities, and nine proposed wind farms. His expertise in soft ground characterisation, risk assessment, and risk mitigation is demonstrated though a number of papers he has presented at major conferences on topics such as floating roads on peat and the assessment of peat strength in the field.

1.3. 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 the proposed works as outlined in Section 2.1.

1.4. 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 strength measurement,
- Review of ground investigations carried out at the site,
- Review of digital terrain 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 of this assessment report.

2. Ground Investigation

2.1. 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 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 Chapter 7, the Land, Soils and Geology chapter, of the main EIAR and reproduced in Appendix 1 of this report. The ground investigation information is included in the Land, 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 Ireland mapping,
- EPA mapping,
- Publicly available satellite photography (Google Maps & Bing Maps), and
- LiDAR digital terrain model data.

2.2. Field work

Site surveys relating to the soil and geological environment and ground investigations were undertaken between October 2020 and November 2025. These surveys included multiple site walkovers by Ciaran Reilly & Associates and TOBIN staff and the following campaigns of intrusive ground investigation:

Phase 1 – 2021

- Rotary core drilling was undertaken at two locations by GII in November 2021 supervised by TOBIN, which correspond to the proposed met mast location and proposed Borrow Pit 2. These boreholes were drilled to provide details on the depth of overburden and bedrock lithology/type.
- Trial pits were completed at thirty-six (36) locations, to a maximum depth of 4.1 m below site grades.
- Sixteen (16) Russian Samples were completed to a maximum depth of 2.5 m below existing site grades (a Russian sampler, also called a Russian peat borer, is a hand-operated stainless steel tool used to collect virtually undisturbed samples of peat and soft sediment from the ground).

- Targeted walkovers were completed to support specific elements of the investigation.
- A peat depth assessment was undertaken in July 2021 using handheld peat probes, focusing on areas identified during the desk study and Phase 1 SI as potentially underlain by peat.

Phase 2 - 2024

- Rotary core drilling was undertaken at one (1) location by Causeway Geotech in September and November 2024, supervised by TOBIN, which corresponds to the locations of proposed turbine T7. The borehole was drilled to provide details on the depth of overburden and bedrock lithology/type. Standard penetration tests were carried out at standard depth intervals using a split spoon sampler or solid cone attachment during the rotary core drilling.
- Trial pits were completed at three (3) locations, to a maximum depth of 3.5 m below site grades by Causeway Geotech during the Phase 2 site investigation works.
- Thirty-nine (39) peat augers were conducted onsite by Causeway Geotech during the 2024 site investigation using an Edelman auger to a target depth of 2.00 metres or refusal. A follow-on peat probe was carried out if peat extended past 2.00 metres. The depth to this refusal was nominally taken as the thickness of peat at that location.
- A geophysical survey was completed by Apex Geophysics on the 7th of October 2024. The geophysical investigation consisted of 2D Electrical Resistivity Tomography and 2D Seismic Refraction profiling.

Phase 3 – 2025

- Rotary core drilling was undertaken at two (2) locations to a maximum depth of 12.8 mbgl, by GII in October 2025, supervised by TOBIN, which correspond to the locations of proposed borrow pit 2. The borehole was drilled to provide details on the depth of overburden and bedrock lithology/type. Standard penetration tests were carried out at standard depth intervals. One (1) of the rotary core drilled boreholes was finished as a groundwater monitoring well to enable water sampling and the determination of the equilibrium groundwater level.
- Trial pits were completed at eight (8) locations, to a maximum depth of 3.2 m below site grades by GII during the Phase 3 site investigation works.
- Ninety-seven (97) peat probes were conducted onsite in December by GII during the 2025 site investigation. The test consists of manually driving a cone on metre long extendible rods into the peat until a stiffer deposit or an obstruction is encountered. The depth to this refusal was nominally taken as the thickness of peat at that location.
- Seventeen (17) peat augers were conducted onsite in December 2025, by GII. The corkscrew shaped tip of the sampler is inserted into the ground. The operator then manually turns the T handle while using their body weight to rotate the sampler into the ground. The corkscrew sampler fills with material as it is rotated into the ground. The hand auger recovers a 300mm disturbed

sample which is recovered from the exploratory hole, logged, sampled and photographed.

All field work was conducted in compliance with best practice standards and relevant guidance, with oversight from qualified geologists and engineers. The locations of the site investigation works outlined above are shown in Figure 7-13 of Chapter 7 of the EIAR, reproduced in Appendix 1 of this report. The logs and records of the investigations can be found in Appendix 7-1 to Chapter 7 of the main EIAR.

A number of photographs taken during the walkover survey are presented in Figure 1 to Figure 5 as an aid to describing the general topography and landscape character of the site.

Figure 1 - Rough grazing lands near Turbine 2

Figure 2 - Outcropping rock near Turbine 5 and 6

Figure 3 - Typical clearance in upland forestry area near Turbine 4

Figure 4 – Overturned trees at edge of forestry on shallow peat

Figure 5 - View from road towards proposed Turbines 13 and 14

3. Detailed Site Assessment

3.1. Site Topography and Geomorphology

The site topography and geomorphology are discussed in detail in the Land, Soils & Geology Chapter of the EIAR and reference is made to the chapter herein. The proposed wind farm site is located in a relatively mountainous area. Saddle Hill in the northwest of the site is 375m AOD (above ordinance datum) and Dough Mountain is located within and along the eastern site boundary and has a maximum elevation of 462m AOD. The proposed wind farm site stretches through the valley between these two elevated areas and gently rises to the north. The southern portion of the site is where elevation is lowest at 140m AOD. As the site extends northwards through the valley between the two mountains, the elevation rises steadily to 285m AOD. The eastern section of the study area is mapped as mountain plateau, while the western section is mapped as mountain ridge, according to GSI physiographic mapping.

No karst features are mapped on the GSI karst database within the study area. A total of 76 unmapped karst features were mapped using aerial photograph, LiDAR data and site walkovers in the wind farm study area, to the west of Dough Mountain as detailed in Section 7.3.1.7 of the main EIAR. These karst features mainly include dolines (enclosed depressions) with some sinking streams and swallow holes. On the slopes of Dough Mountain, there are a number of ribbed moraines and stream gullies that flow from the mountain peak in a radial manner. Many of the streams are altered on the upgradient areas, likely due to natural geomorphological and hydrological processes which modify the channels and flow characteristics over time. Reference is made to Appendix 7-2 Karst Assessment of the main EIAR.

LiDAR digital terrain model data were obtained and interrogated to provide a generalised ground profile for peat stability assessment. The site layout is shown in 10955-2010_Site Master Plan included in Appendix 1.

3.2. Local Bedrock Geology

Geological Survey Ireland bedrock mapping shows that the site is underlain by bedrock of the Terryglass Formation, Ballysteen Formation, Waulsortian Limestones, and Lower Limestone Shale. One fault crosses the site access road and other faults are located within 600m of the site.

The proposed wind farm site is underlain by a number of bedrock formations as detailed in Table 7-5 of the main EIAR. Bedrock outcrops are present across the proposed wind farm site, particularly concentrated to the north and centre. Additionally, a number of geological faults run through the proposed wind farm site, contributing to the structural complexity of the area. The bedrock geology beneath the site is illustrated in Figure 7-10 of Chapter 7 of the main EIAR.

3.3. Local soils and subsoils

Geological Survey Ireland (GSI) quaternary mapping, representing the top 1.0 m of the soil column but excluding the topsoil, was reviewed and showed that Quaternary sediments within the site boundary are expected to consist of:

- Blanket Peat (BktPt);
- Till Derived from Namurian Sandstones and Shales (TNSSs);
- Scree
- Karstified Bedrock Outcrop or subcrop (KaRck);
- Bedrock outcrop or subcrop (Rck)
- Alluvium (A).

The majority of the northern portion of the site is mapped as blanket peat, with the southern section of the site dominated by till derived from Namurian sandstone and shales. Site investigations undertaken within the proposed wind farm site indicate that peat depths vary from 0.1 m to 4.5 m in the north and 0.1 m to 1.8 m in the south. Alluvium is mapped along the streams to the center and south of the site and is typically well sorted, loose silt and sand sized particles. Scree is also located to the west of the proposed wind farm site along the slopes of Dough Mountain; however, the proposed wind farm layout has avoided the scree areas.

The quaternary geology (subsoil) is shown in Figure 7-7 of Chapter 7 of the main EIAR. The findings of the site walkover survey were largely in line with the GSI mapping.

3.4. Water courses

The proposed wind farm is located in both the Drowes and Garvogue catchments. There are a number of watercourses within the site. These range from naturally occurring upland streams to modified drainage channels within forested areas at mid to lower elevations. The southeastern part of the site is characterised by a number of flashy watercourses in deep ravines, the majority of which have existing crossings in place as part of existing forest road network.

The watercourses of the Drowes catchment flow in a generally north easterly direction and those of the Garvogue catchment flow in a south westerly direction from the site. The more significant mapped watercourses are shown in Figure 6 and a typical watercourse in the south east of the site is shown in Figure 7.

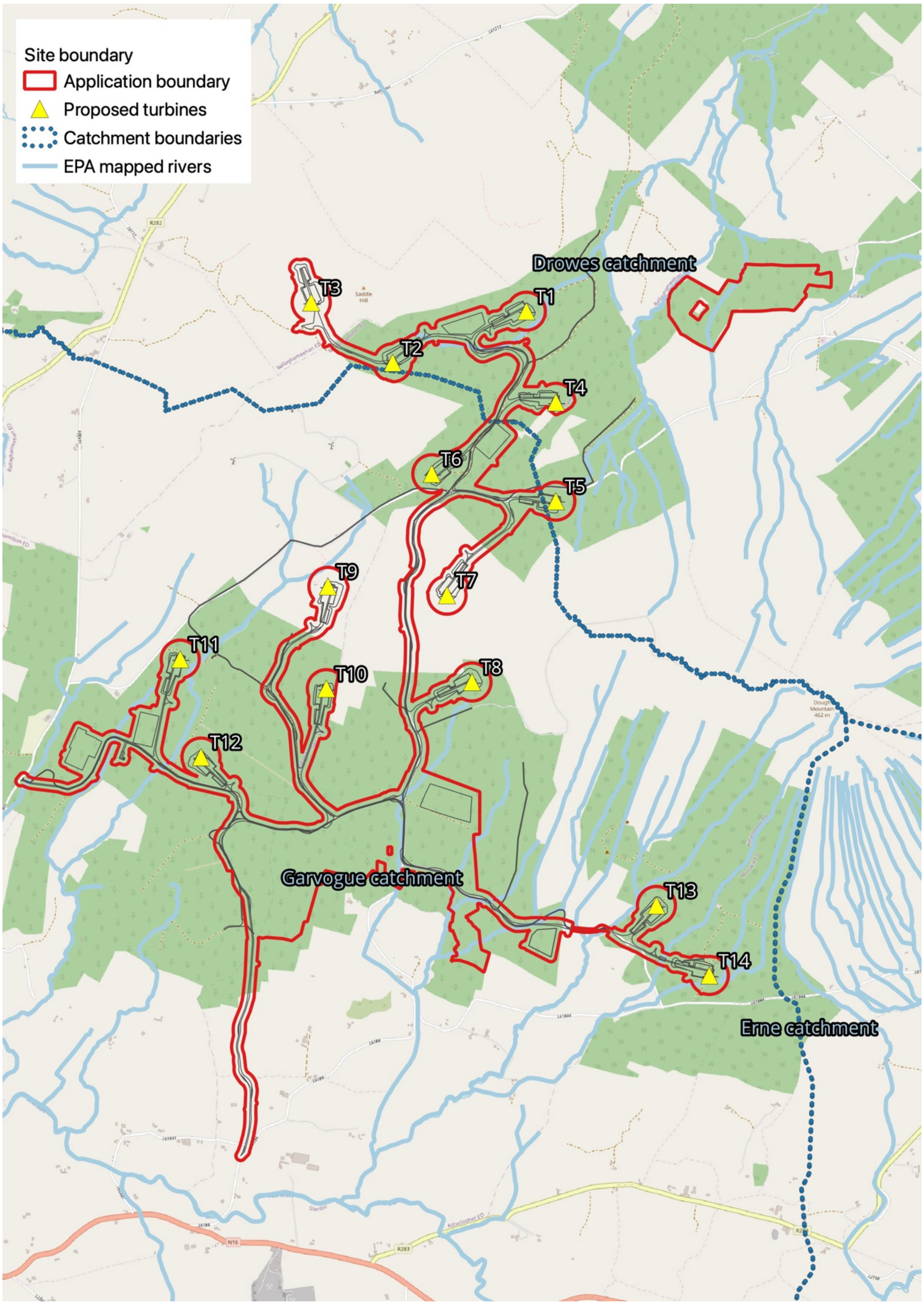

Figure 6 - EPA river networks (EPA, 2022)


Figure 7 - Typical existing watercourse in southeast of site

3.5. Previous failures

A review of the landslide information on the GSI Irish Landslides Database indicates 5 nr shallow peat landslides in the vicinity of the site and 2 nr shallow scree slides to the south of the site but all outside the application boundary. These were mapped during the GSI May 2005 landslide mapping pilot programme in the Northwest of Ireland and have been verified by study of satellite imagery. A map showing these mapped landslide extents is provided in Figure 8.

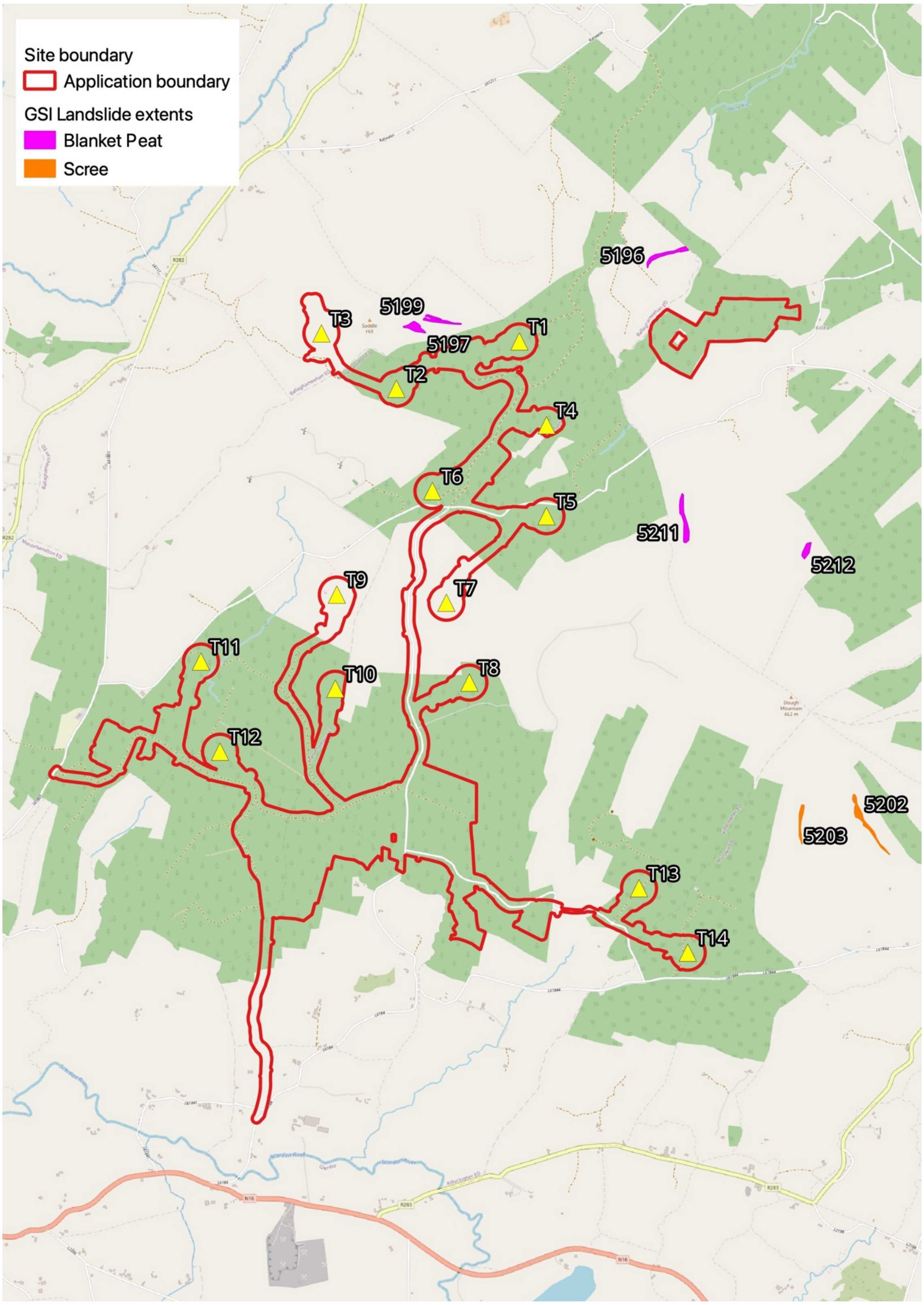

Figure 8 – Mapped landslide extents (Source: GSI National Landslide Susceptibility Mapping, 2021)

3.6. Landslide susceptibility

Geological Survey Ireland (2021) publish a national landslide susceptibility map based on a risk assessment approach taking various factors such as topography and soil type into account. 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 and electricity generation infrastructure can alter these parameters in the temporary and/or permanent case.

The mapped landslide susceptibility for the site is shown in Figure 9 and summarised in Table 1. Assessments were made based on “worst case” conditions so that the most onerous rating for each feature was considered where a feature crossed two or more susceptibility ratings.

Two items of proposed infrastructure including Turbine 1 and Borrow pit 1 are in an area mapped as “high” susceptibility, eight are in “moderately high”, two in moderately low” and the remaining items of infrastructure are mapped as being in areas of “low” landslide susceptibility.

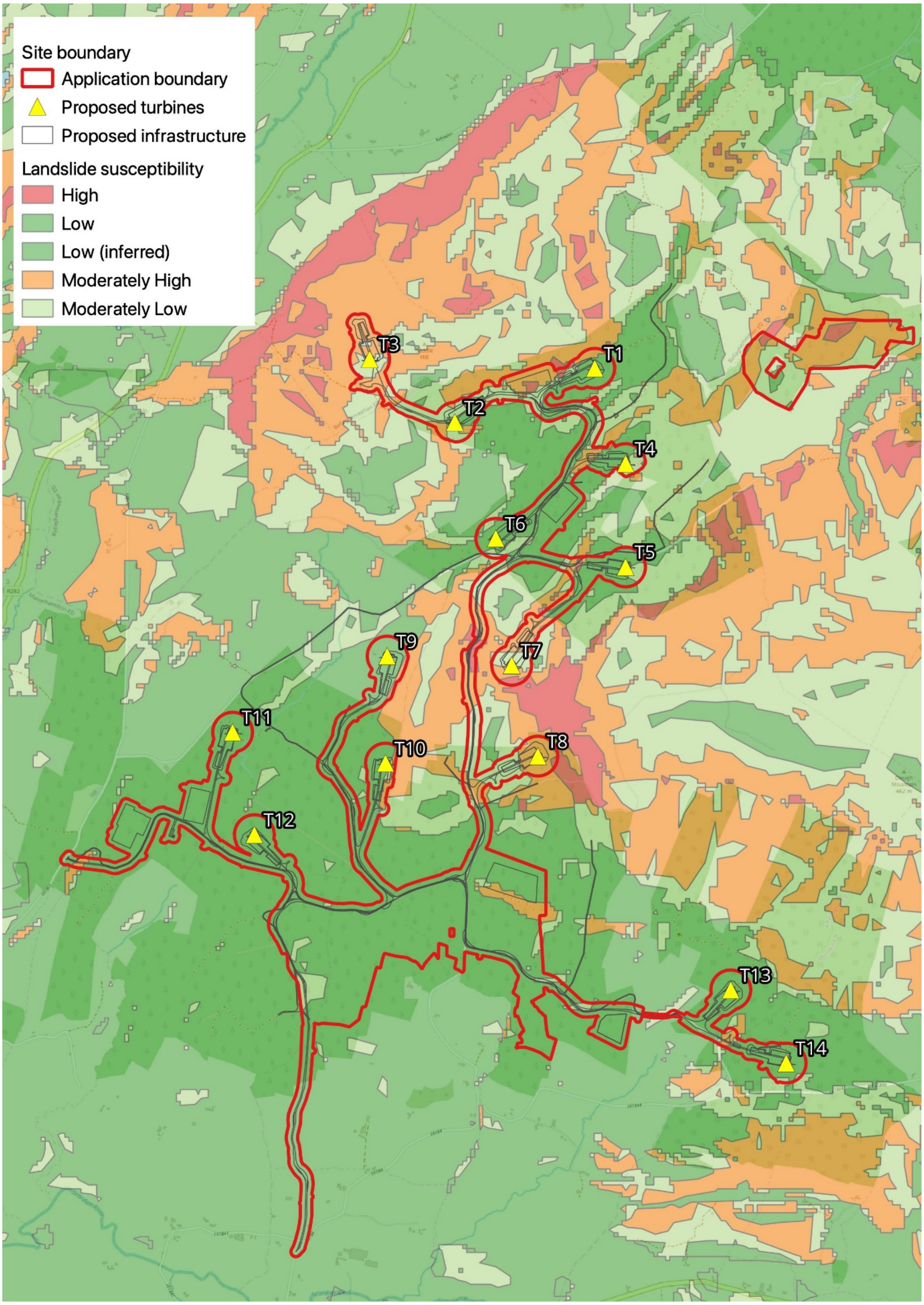

Figure 9 - Landslide susceptibility (GSI, 2021)

Table 1 – Landslide susceptibility (from GSI data, 2021)

Feature	Susceptibility	Comment
Turbine 1	Low	Hardstand extends into "high"
Borrow pit 1	High	Extending into "moderately high"
Turbine 2	Low	Extending into "moderately high"
Turbine 3	Moderately high	
Turbine 4	Moderately low	Extending into "moderately high"
Temp compound	Low	
Turbine 5	Low	Hardstand extends into "moderately low"
Turbine 6	Moderately low	
Turbine 7	Moderately low	Extending into "moderately high"
Turbine 8	Moderately high	Hardstand extends into "moderately low"
Turbine 9	Low	
Turbine 10	Low	Hardstand extents into "moderately high"
Turbine 11	Low	
Turbine 12	Low	
Temp compound	Low	
Met mast	Low	
Substation	Low	
Borrow pit 2	Moderately high	Majority of footprint in "low"
Borrow pit 3	Low	
Turbine 13	Low	
Turbine 14	Low	

During the geotechnical investigation involving 46 trial pits, 31 trial pits encountered peat. Peat encountered ranged from peaty topsoil less than 0.2m thick to depths of 3.5m. Where peat was encountered in exploratory holes, the average depth was 0.87m over the entire site. A higher average depth of peat of 1.1m was encountered over the north of the site (Turbines 1 to 7) and lower average depth of 0.66m to the south of the site (Turbines 8 to 14). The trial pits are summarised in Table 2 below. Of the trial pits with peat present, sidewall collapse or spalling was encountered in only 2 of the 31. This suggests that peat excavations at the site will likely be stable in the short term.

Table 2 - Trial pit summary

Investigation	Trial pit	Peat present?	Sidewall stability
Ground Investigations Ireland 2022	TP02	1.3m PEAT over GRAVEL	Stable
	TP04	0.6m PEAT over CLAY	Stable
	TP05	0.16m PEAT under Made Ground	Stable
	TP06	No	Stable
	TP09	0.8m PEAT over CLAY	Stable
	TP10	0.6m PEAT over CLAY	Stable
	TP11	0.3m PEAT over CLAY	Stable
	TP12	1.0m PEAT over CLAY	Stable
	TP13	0.6m PEAT over CLAY	Stable
	TP14	1.1m PEAT over CLAY	Stable
	TP17	0.7m PEAT over CLAY	Stable
	TP20	0.6m PEAT over CLAY	Stable
	TP21	1.3m PEAT over CLAY	Stable
	TP22	0.5m PEAT over CLAY	Stable
	TP24	1.2m PEAT over GRAVEL	Stable
	TP25	1.4m PEAT over GRAVEL	Stable
	TP27	1.3m PEAT over GRAVEL	Stable
	TP28	No	Stable
	TP31	0.8m PEAT over CLAY	Stable
	TP32	0.9m PEAT over CLAY	Stable
	TP33	No	Stable
	TP35	No	Stable
	TP36	No	Stable
	TP37	1.0m PEAT over CLAY	Stable
	TP38	1.8m very soft PEAT over CLAY	Side walls collapsing
	TP39	1.1m PEAT over CLAY	Stable
	TP41	0.6m PEAT over CLAY	Stable
	TP42	2.2m PEAT over presumed bedrock	Stable
	TP43	No	Stable
	TP44	0.5m PEAT over CLAY	Stable
	TP45	No	Stable
	TP49	No	Stable
	TP50	No	Stable
	TP51	0.3m PEAT over CLAY	Stable
	TP53	3.5m PEAT over CLAY	Side wall collapse
Causeway Geotech, 2024	TP244	0.5m PEAT	Stable
	TP245	No	Moderately stable
	TP246	No	Moderately stable
	TP01	0.2m PEAT over CLAY	Stable
	TP03	No	Stable

Ground Investigations Ireland, 2025	TP04	No	Stable
	TP05	No	Stable
	TP06	No	Stable
	TP07	0.3m PEAT over CLAY	Stable
	TP08	0.1m PEAT over CLAY	Stable
	TP09	0.2m PEAT over CLAY	Stable

3.7. Ground Investigation

Three phases of ground investigation (GI) were carried out at the site of the proposed Lissinagroagh Wind Farm as outlined in the previous section:

- Ground Investigations Ireland (2022).
- Causeway Geotech (2024), and
- Ground Investigations Ireland (2025).

In general, the ground investigation results align with the desk study results. Individual findings based on local intrusive investigations for assessment areas are presented in the qualitative peat stability risk assessment presented in Appendix 3. Local values are used where possible, with site-wide geotechnical parameter values being assessed based on the ground investigation data in Section 5.1 of this report.

3.8. Impact of detailed site assessment

The detailed site assessment was used to guide the proposed location of infrastructure on the site (including micro siting) to minimise risk both in terms of peat stability and karst risk. See Chapter 7 and Appendix 7-2 Karst Assessment of the main EIAR for details on the management of karst risk. Details of how the site assessment was used to manage peat risk is outlined in this report.

4. Qualitative Peat Stability Assessment

4.1. Material properties

For the purposes of the peat stability assessment, material properties are assessed for Peat at the site. The results of the Ground Investigations Ireland (2022), Causeway Geotech (2024), and Ground Investigations Ireland (2025) ground investigations 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. 36 nr moisture content tests were carried out on samples of Peat for the GII (2021), CGL (2024), and GII (2025) investigations. The moisture content of the Peat ranged from 80% to 1052%. Taking the maximum moisture content of 1052% in TP42 and assuming an R value of 4, an undrained shear strength of 13.0kPa is assessed and assigned to the Peat at the site. This is a conservative assumption as it is based on the highest moisture content encountered across the entire site and where the Peat is drier, the undrained shear strength will be higher. 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' = 32° and c' = 5kPa.

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 3.

Table 3 – Characteristic parameter values

Material / Parameter	Peat
Bulk Weight (γ_k) [kN/m^3]	10
Undrained shear strength ($c_{u,k}$) [kPa]	13
Effective cohesion (c'_k)	4
Effective angle of shearing resistance (Φ'_k) [degrees]	30

4.2. Qualitative risk assessment procedure

The Scottish Government (2017) guidelines set out four categories of risk and recommend various mitigation / avoidance actions for each category. The categories of risk are:

1. Negligible;
2. Low;

3. Medium; and
4. High.

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 4 presents the scale of the likelihood and Table 5 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 4 – 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 5 – 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 4 and Table 5 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 6). 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 6 – 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.

Although the proposed wind farm and associated infrastructure is located in an elevated and undulating landscape with evidence of historical landslides in the wider area and mapped landslide susceptibility in the “high” to “low” range (Geological Survey Ireland, 2021), 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. Site specific data will be used to determine the optimum position of site infrastructure.

During the geotechnical investigation involving 46 trial pits, side wall collapse was only encountered in 2 of the 31 trial pits where peat was present. This suggests that peat excavations at the site will likely be stable in the short term and the likelihood of an excavation collapsing during construction is generally in the range “unlikely” to “likely” in the absence of mitigation.

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 will be put in place during the design and construction of the scheme to reduce the likelihood of an excavation collapsing. 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). If necessary, a temporary sheet pile wall or rock fill berm will be used 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 7. This assessment is based on information from the site-specific ground investigation undertaken, walkover surveys, geological maps from GSI, and the available aerial and satellite mapping. 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 7 – Peat Stability Risk Register Summary

Assessment Area	Pre-control measure risk rating	Post-control measure risk rating
Turbine 1	Medium	Low
Borrow pit 1	Medium	Low
Turbine 2	Medium	Low
Turbine 3	Medium	Low
Turbine 4	Medium	Low
Temp compound 1	Low	Negligible
Turbine 5	Low	Negligible
Turbine 6	Medium	Low
Turbine 7	Medium	Negligible
Turbine 8	Medium	Low
Turbine 9	Low	Negligible
Turbine 10	Low	Low
Turbine 11	Low	Negligible
Turbine 12	Low	Negligible
Temp compound 2	Low	Negligible
Met mast	Low	Negligible
Substation	Low	Negligible
Borrow pit 2	Low	Negligible
Borrow pit 3	Low	Negligible
Turbine 13	Low	Negligible
Turbine 14	Low	Negligible

Notes: Assessment based on mitigation measures suggested in Section 7 and the Peat Stability Risk Register in Appendix 3.

Eight of the assessment areas resulted in "medium" risk ratings prior to mitigation measures while the remaining 13 were "low". Following mitigation, all assessment areas are rated as either "low" or "negligible" risk, meaning the project may go ahead pending further investigation during the detailed design phase to refine the design.

Based on all assessment areas falling into the "low" or "negligible" risk category, it is concluded that the site is suitable for the proposed electricity generation development, subject to mitigations at the detailed design and construction phases.

5. 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.

5.1. 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 (minimum 0.3m assumed, higher local values used if found
γ_w = Unit weight of water
h_w = Height of water table above failure plane
β = Slope angle
φ' = Effective stress friction angle

5.2. Effects of peat deposition

The possible effects of peat deposition in the short term in the case of temporary storage of peat have been considered by the application of a 1m surcharge loading of peat in the calculations.

5.3. 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. 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 75% of the peat depth is conducted, where 0% equates to the peat being completely dry and 75% equates to the peat being saturated to 75% of the layer height. This is considered reasonable due to the steep slopes at the site and the effects of historical drainage of the peat at the site. 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.

5.4. Results and discussion

The results of the analysis are shown in Appendix 2 in three tables:

- Appendix 2 Table 1: short term (undrained) analysis
- Appendix 2 Table 2: long term (drained) analysis, saturated to 75%
- Appendix 2 Table 3: long term (drained) analysis, low water table

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. The peat surcharge loading has been factored as a variable loading in the calculations, which will be conservative in the long-term case.

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 “low” to “negligible” risk rating for peat instability is appropriate for the proposed development.

6. Recommendations

6.1. Construction phase:

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

- Client to appoint an appropriately qualified Geotechnical Engineer for the construction stage to review and update the mitigations proposed in this planning stage PSRA. Detailed design stage PSRA to be developed. At this stage the geotechnical designer may require additional site investigations to refine the design.
- 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 shall comprise:
    - Measures to maintain hydrology of area as far as possible such as swales along roads and regular cross drains beneath roads embankments.
    - Limiting heights of stockpiling of materials to 1.0m of peat or 0.5m of mineral soils and only for periods of less than 8 hours.
    - Works to cease during inclement weather
    - Excavated material to be removed to designated areas.
    - Site-specific temporary works design by competent temporary works designer to include stepping or battering back of excavations to a safe angle and construction of a temporary sheet pile wall or rock fill berm to support the peat during construction if deemed necessary.
    - Implementation of monitoring regime for peat movement to consist of movement monitoring posts upslope and downslope of all works areas on or adjacent to peat depths greater than 2.0m in addition to routine visual inspections of all areas surrounding work in peat.
- Client's Geotechnical Engineer/Site Geotechnical Supervisor to approve the method statement.
- Contractor to provide toolbox talks and on-site supervision prior to and during the works.
- Daily sign off by supervising staff on completed works.
- Works will be suspended if the forecast / weather monitoring suggests any of the following is likely to occur:
    - >10 mm/hr rainfall (i.e., high intensity local rainfall events);

- >25 mm rainfall in a 24-hour period (heavy frontal rainfall lasting most of the day); or
- >Half the monthly average rainfall in any 7 days.

6.2. 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, backfilled borrow pits, rock berms created at the top of cuttings, and movement monitoring posts after a significant rainfall event.

6.3. Decommissioning Phase

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

- Client to appoint an appropriately qualified Geotechnical Engineer for the decommissioning stage to review and update the mitigations proposed in the
- detailed design stage PSRA. Decommissioning phase PSRA to be developed.
- 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 after a significant rainfall event.

7. Summary and Conclusions

Ciaran Reilly & Associates was instructed by TOBIN on behalf of FEI Renewables Ireland Ltd. (FEI) to carry out a planning stage peat stability risk assessment (PSRA) as part of the environmental impact assessment for the proposed Lissinagroagh Wind Farm site. FEI wish to apply to An Coimisiún Pleanála for planning permission to develop a wind farm in the townlands of Lisdarush, Shasmore, Faughary, Boleyboy, Cashelaveela, Tawnafeacle, Lissinagroagh and Tawnylust in north County Leitrim between the villages of Kiltyclogher to the northeast and Manorhamilton to the southwest. The closest turbine is located approximately 3 km northeast of Manorhamilton and approximately 4 km southwest of Kiltyclogher.

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. This report should be read along with Chapter 7 (the Land, Soils, and Geology chapter) of the Proposed Lissinagroagh Wind Farm Environmental Impact Assessment Report (EIAR) and its appendices.

Following application of mitigation measures (detailed site assessment, planning stage micro siting of infrastructure to minimise risk, site-specific temporary and permanent works designs for areas of deeper peat and steeper slopes, monitoring, and common-place mitigation measures such as careful construction supervision for the other areas of the site, as outlined in Section 6), the findings of the planning stage PSRA indicate a "low" to "negligible" hazard ranking for instability related to the requirement for excavations on the site. 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 weather events where the peat becomes partially saturated, hence justifying the "low" to "negligible" hazard rankings assigned.

Best practice guidance regarding the management of peat stability will be inherent in the construction phase of the project and detailed recommendations are provided in Section 6 of this report.

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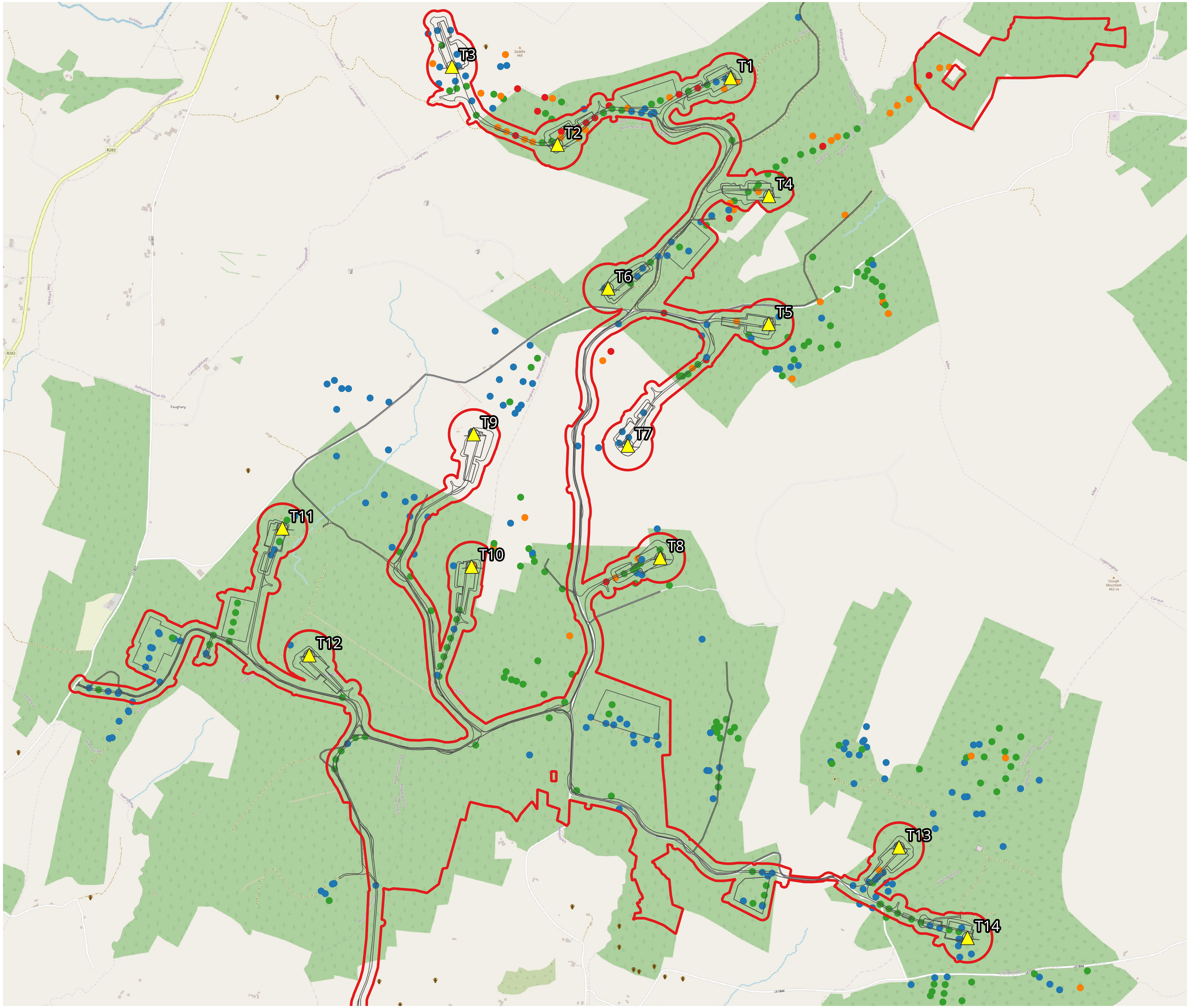
APPENDIX 1: SITE LAYOUT AND GROUND INVESTIGATION LOCATIONS



Peat depth map

Proposed Lissinagroagh Wind Farm

Doc Nr: P21004_DR001
Rev: P02
Scale: 1:14000 @ A3
Date: 01.04.26
Drawn: CR
Background: OpenStreetMap

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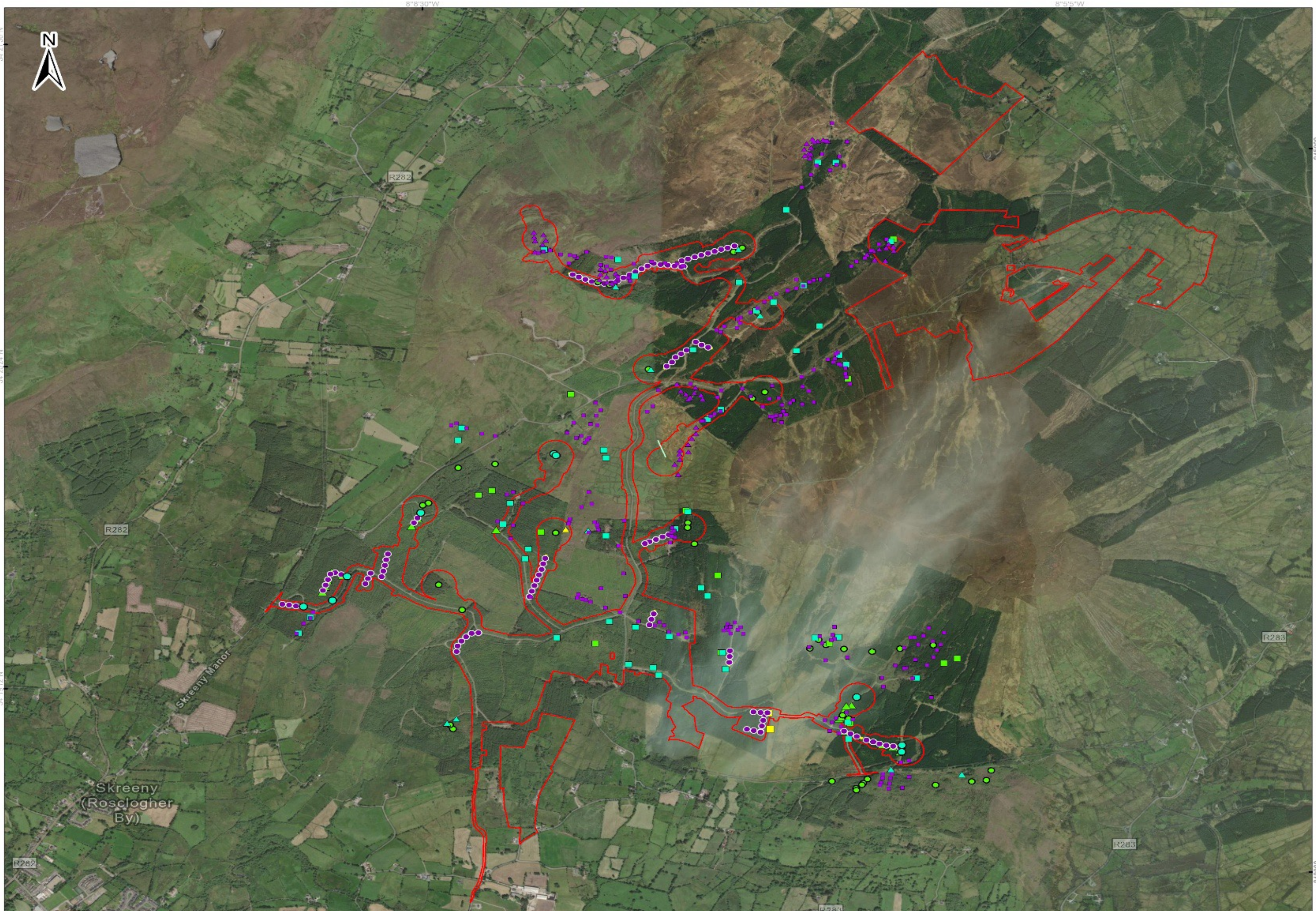

Legend

Application Boundary

2021
- Peat Probes

2022
- Peat Probes
- Trial Pits
- Gouge Auger
- Brash Lines

2024
- Trial Pits
- Gouge Auger
- Boreholes

2025
- Boreholes
- Gouge Auger
- Peat Probes
- Trial Pits
- Brash Lines

0 0.5 1
Kilometers

Spatial Reference
Datum: IRENET95
EPSG: 2157

Copyrights:
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community,

Rev	Date	Description	By	Chkd.
A	26/03/2026	First issue	S.P	S.R

Client:

FuturEnergy Ireland

Project:

Lissinagroagh Wind Farm

Title:

Figure 7-13:
Site Investigation Location Map
Overview

Scale @ A3: 1:22,000

Prepared by:	Checked by:	Date:
S.Pezzella	S.Ryan	March 2026

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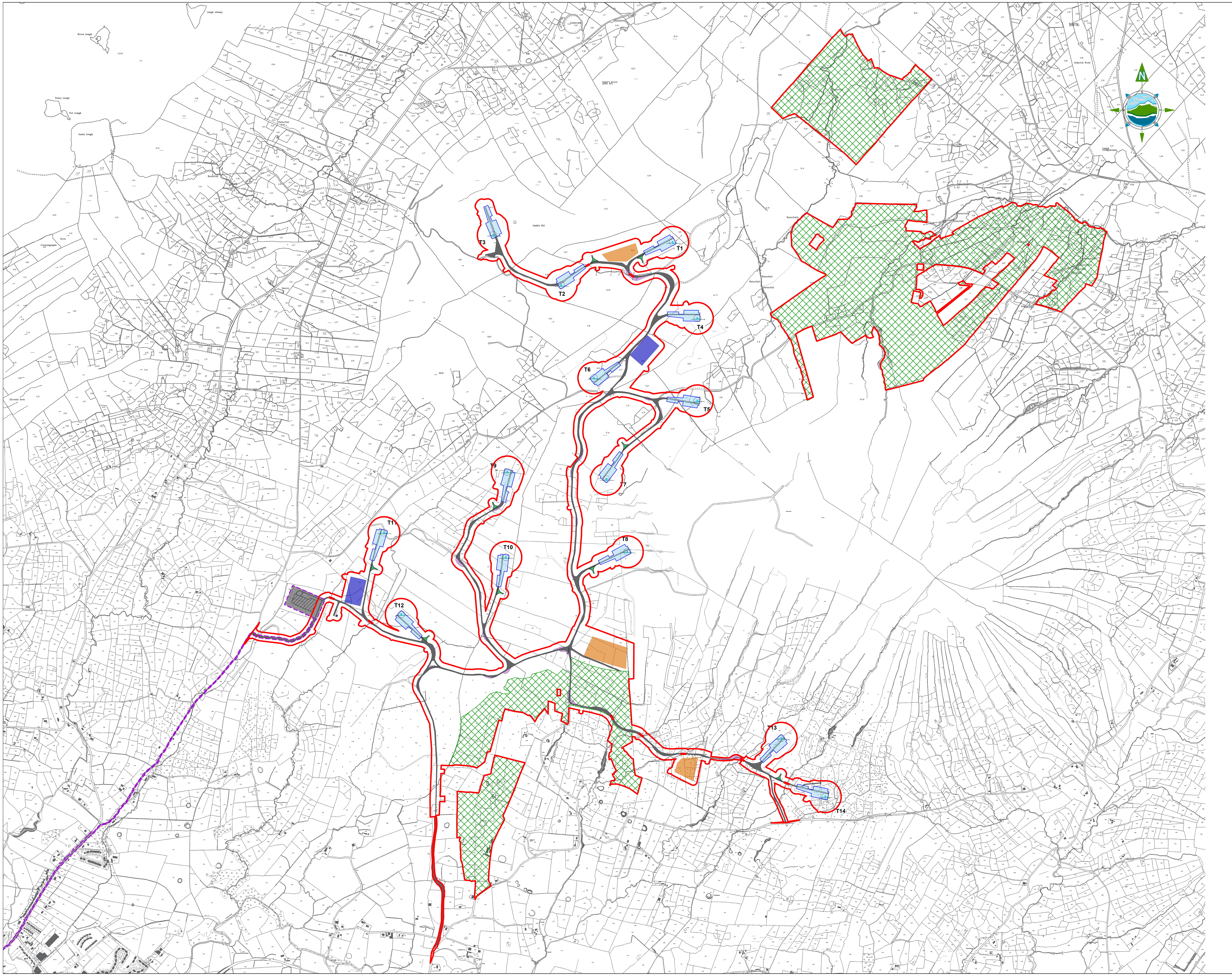
Map Ref: 10955-016-SI-S.BO-TOB-A_overview

Draft: A



GENERAL LEGEND

- PLANNING APPLICATION BOUNDARY
- PROPOSED PERMANENT ACCESS ROAD
- PROPOSED TURBINE HARDSTAND
- PROPOSED TURBINE LOCATION
- PROPOSED CLEAR SPAN BRIDGE
- PROPOSED SUBSTATION & GRID ROUTE (Submitted Separately)
- PROPOSED TEMPORARY COMPOUND LOCATION
- VEHICLE TURNING AREA
- PROPOSED BORROW PIT
- VEHICLE OVERRUN AREA
- BIODIVERSITY MANAGEMENT AREA
- PROPOSED CULVERT EXTENSION (Bottomless)

Drawing References:

For details of temporary compounds refer to drg. no:	10955-2030.
For details of turbine hardstands refer to drg. no:	10955-2031.
For details of turbine structures refer to drg. no:	10955-2032.
For details of track construction refer to drg. no:	10955-2033.
For details of met mast refer to drg. no:	10955-2036.
For temporary security hut details refer to drg. no:	10955-2038.
For temporary wheelwash details refer to drg. no:	10955-2039.
For details of turbine foundations refer to drg. no:	10955-2040.
For surface water drainage layouts refer to drg. no:	10955-2050 - 2056.
For surface water drainage details refer to drg. no:	10955-2065.
For details of clear span bridge refer to drg. no:	10955-2066.
For details of culvert extension refer to drg. no:	10955-2066.
For details of site access refer to drg. no:	10955-2070 - 2078.
For details of borrow pits refer to drg. no:	10955-2090 - 2092.

NOTES:

1. DRAWINGS FOR PLANNING PURPOSES ONLY.
2. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
3. GRID REFERENCES TO ITM.
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Co. Leitrim
Tailte Éireann 1:5,000 Sheet No's: 0812, 0813, 0854, 0855, 0902, 0903, 0958 & 0959.

Rev	Date	Description	By	Chkd.
A	02.04.26	ISSUED FOR PLANNING	MN	SR

Client: FuturEnergy Ireland

Project: LISSINAGROAGH WIND FARM

Title: SITE MASTER PLAN

Scale @ A1: 1:11,000

Prepared by: M. Nolan
Checked by: S. Ryan
Date: April 2026

Drawing Status: Planning

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Drawing No.: 10955-2010

Revision: A

APPENDIX 2: PEAT STABILITY CALCULATIONS

Appendix 2 Table 1

Peat stability calculations for Lissinagroagh Wind Farm

Deterministic stability calculcation outputs

Undrained Case 1 and Case 2

Nr	Assessment area	Land use	Relevant GI	Description	$c_{u,fv,avg}$	Vane correction	$c_{u,k}$	$c_{u,d}$	Peat depth	Slope	Surcharge	Design surcharge	Unit weight	Case 1	Case 2
					kPa		*kPa*	*kPa*	*m*	*deg*	*m*	*m*	*kN/m³*	*ODF*	*ODF*
1	Turbine 1	Forestry	GA111, GA123 2024, peat probing 2025	Topsoil over PEAT to 2.8m bgl	-	0.5	13.0	9.3	2.8	11.2	1	1.3	10	1.7	1.2
2	Borrow pit 1	Forestry	Peat probing 2025	3.3m PEAT	-	0.5	13.0	9.3	3.3	11.0	1	1.3	10	1.5	1.1
3	Turbine 2	Forestry	TP42, TP27 2022, peat probing 2025	4.5m PEAT from probes, very soft in TP42	19	0.5	9.6	6.9	4.5	6.2	1	1.3	10	1.4	1.1
4	Turbine 3	Rough grazing, peat	Peat probing 2025	2.1m PEAT	-	0.5	13.0	9.3	2.1	12.0	1	1.3	10	2.2	1.3
5	Turbine 4	Forestry	TP24, TP25 2022, GA113 2024, probes 2021, 2025	1.8m PEAT from probes, 1.4m from TPs, 2.0m from GA	31	0.5	13.0	9.3	2.0	15.4	1	1.3	10	1.8	1.1
6	Temp compound 1	Forestry	TP45 2002, peat probing 2021, 2025	0.8m PEAT from probes, no peat in TP45	-	0.5	13.0	9.3	0.8	5.7	1	1.3	10	11.6	4.4
7	Turbine 5	Forestry	GA101, GA102 2024, peat probes 2021	2.0m PEAT from probes, 1.0m in GA102	-	0.5	13.0	9.3	2.0	6.0	1	1.3	10	4.5	2.7
8	Turbine 6	Forestry	GA128, GA142 2024, probes 2025	1.6m PEAT in augers, 0.9m in probes	-	0.5	13.0	9.3	1.6	16.6	1	1.3	10	2.1	1.2
9	Turbine 7	Rough grazing, peat	BH001, GA281 2024, probes 2021, 2025	3.1m in probes, 0.4m in BH, 0 in GA	-	0.5	13.0	9.3	3.1	9.0	1	1.3	10	1.9	1.4
10	Turbine 8	Forestry	TP17 2024, GA110, GA112, GA130 2024	2.8 in probes, 1.8m in GA, 0.7 in TP17	27	0.5	13.0	9.3	2.8	8.7	1	1.3	10	2.2	1.5
11	Turbine 9	Rough grazing	TP31 2022, TP05, TP06 2025, peat probing 2021	0.8m in TPs, 0.4m in nearby probes	24	0.5	12.0	8.6	0.8	7.7	1	1.3	10	8.1	3.1
12	Turbine 10	Forestry	TP32 2022, GA106 2024, probing 2021, 2025	2m in probes, 1.6m in GA, 0.9m in TP	19	0.5	9.5	6.8	2.0	7.8	1	1.3	10	2.5	1.5
13	Turbine 11	Forestry	GA107, GA115 2024, peat probes 2025	0m in GA, 1.0m in peat probes	-	0.5	13.0	9.3	1.0	6.3	1	1.3	10	8.5	3.7
14	Turbine 12	Forestry	GA104, GA114, GA126 2024	1.1m PEAT in GA	-	0.5	13.0	9.3	1.1	5.9	1	1.3	10	8.3	3.8
15	Temp compound 2	Forestry	Peat probing 2025	1.1m PEAT in probes	-	0.5	13.0	9.3	1.1	6.2	1	1.3	10	7.9	3.6
16	Met mast	Forestry	Peat probing 2025	0.8m PEAT in probes	-	0.5	13.0	9.3	0.8	8.8	1	1.3	10	7.7	2.9
17	Substation	Forestry	Peat probing & GA 2025	0.6m PEAT in probes, 0.5m in GA	-	0.5	13.0	9.3	0.6	7.9	1	1.3	10	11.4	3.6
18	Borrow pit 2	Forestry	TP11, TP12 2022, probes 2021, 2025	1.2m PEAT in probes	-	0.5	13.0	9.3	1.2	7.4	1	1.3	10	6.0	2.9
19	Borrow pit 3	Forestry	Peat probing 2025	0.9m PEAT in probes	-	0.5	13.0	9.3	0.9	9.8	1	1.3	10	6.2	2.5
20	Turbine 13	Forestry, forest road	GA118, GA119 2024, TP07, GA09-GA13 2025	1.0m PEAT in GA 2025, 0.3m PEAT in TP07	-	0.5	13.0	9.3	1.0	5.2	1	1.3	10	10.2	4.4
21	Turbine 14	Forestry, forest road	GA117 2024, TP08, TP09, GA16-18, probes 2025	0.2m PEAT in TPs, 0.7m in GA, 1.2m in probes	-	0.5	13.0	9.3	1.2	9.5	1	1.3	10	4.8	2.3

Notes:

Undrained shear strength of peat is limited to 13kPa (characteristic value) or local values if less than 13kPa.

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 analysis of LiDAR data.

Peat depths based on desk study, walkover, trial pits, boreholes, and gouge augers at the site.

GA = gouge auger

TP = trial pit

BH = borehole

	Case 1	Case 2
Minimum	1.4	1.1
Average	5.4	2.4
Maximum	11.6	4.4

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Appendix 2 Table 2

Peat stability calculations for Lissinagroagh Wind Farm

Deterministic stability calculcation outputs

Drained Case 1 and Case 2, high groundwater

Nr	Assessment area	Land use	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/m^3*	*ODF*	*ODF*
1	Turbine 1	Forestry	GA111, GA123 2024, peat probing 2025	Topsoil over PEAT to 2.8m bgl	32	26.6	5.0	3.6	2.8	2.1	11.2	1	1.3	10	1.33	1.71
2	Borrow pit 1	Forestry	Peat probing 2025	3.3m PEAT	32	26.6	5.0	3.6	3.3	2.475	11.0	1	1.3	10	1.25	1.62
3	Turbine 2	Forestry	TP42, TP27 2022, peat probing 2025	4.5m PEAT from probes, very soft in TP42	32	26.6	5.0	3.6	4.5	3.375	6.2	1	1.3	10	1.96	2.56
4	Turbine 3	Rough grazing, peat	Peat probing 2025	2.1m PEAT	32	26.6	5.0	3.6	2.1	1.575	12.0	1	1.3	10	1.46	1.80
5	Turbine 4	Forestry	TP24, TP25 2022, GA113 2024, probes 2021, 2025	1.8m PEAT from probes, 1.4m from TPs, 2.0m from GA	32	26.6	5.0	3.6	2	1.5	15.4	1	1.3	10	1.18	1.43
6	Temp compound 1	Forestry	TP45 2002, peat probing 2021, 2025	0.8m PEAT from probes, no peat in TP45	32	26.6	5.0	3.6	0.8	0.6	5.7	1	1.3	10	5.79	5.28
7	Turbine 5	Forestry	GA101, GA102 2024, peat probes 2021	2.0m PEAT from probes, 1.0m in GA102	32	26.6	5.0	3.6	2	1.5	6.0	1	1.3	10	2.98	3.68
8	Turbine 6	Forestry	GA128, GA142 2024, probes 2025	1.6m PEAT in augers, 0.9m in probes	32	26.6	5.0	3.6	1.6	1.2	16.6	1	1.3	10	1.26	1.45
9	Turbine 7	Rough grazing, peat	BH001, GA281 2024, probes 2021, 2025	3.1m in probes, 0.4m in BH, 0 in GA	32	26.6	5.0	3.6	3.1	2.325	9.0	1	1.3	10	1.58	2.05
10	Turbine 8	Forestry	TP17 2024, GA110, GA112, GA130 2024	2.8 in probes, 1.8m in GA, 0.7 in TP17	32	26.6	5.0	3.6	2.8	2.1	8.7	1	1.3	10	1.71	2.20
11	Turbine 9	Rough grazing	TP31 2022, TP05, TP06 2025, peat probing 2021	0.8m in TPs, 0.4m in nearby probes	32	26.6	5.0	3.6	0.8	0.6	7.7	1	1.3	10	4.34	3.94
12	Turbine 10	Forestry	TP32 2022, GA106 2024, probing 2021, 2025	2m in probes, 1.6m in GA, 0.9m in TP	32	26.6	5.0	3.6	2	1.5	7.8	1	1.3	10	2.29	2.82
13	Turbine 11	Forestry	GA107, GA115 2024, peat probes 2025	0m in GA, 1.0m in peat probes	32	26.6	5.0	3.6	1	0.75	6.3	1	1.3	10	4.46	4.49
14	Turbine 12	Forestry	GA104, GA114, GA126 2024	1.1m PEAT in GA	32	26.6	5.0	3.6	1.1	0.825	5.9	1	1.3	10	4.47	4.68
15	Temp compound 2	Forestry	Peat probing 2025	1.1m PEAT in probes	32	26.6	5.0	3.6	1.1	0.825	6.2	1	1.3	10	4.26	4.45
16	Met mast	Forestry	Peat probing 2025	0.8m PEAT in probes	32	26.6	5.0	3.6	0.8	0.6	8.8	1	1.3	10	3.80	3.44
17	Substation	Forestry	Peat probing & GA 2025	0.6m PEAT in probes, 0.5m in GA	32	26.6	5.0	3.6	0.6	0.45	7.9	1	1.3	10	5.34	4.16
18	Borrow pit 2	Forestry	TP11, TP12 2022, probes 2021, 2025	1.2m PEAT in probes	32	26.6	5.0	3.6	1.2	0.9	7.4	1	1.3	10	3.34	3.60
19	Borrow pit 3	Forestry	Peat probing 2025	0.9m PEAT in probes	32	26.6	5.0	3.6	0.9	0.675	9.8	1	1.3	10	3.13	2.99
20	Turbine 13	Forestry, forest road	GA118, GA119 2024, TP07, GA09-GA13 2025	1.0m PEAT in GA 2025, 0.3m PEAT in TP07	32	26.6	5.0	3.6	1	0.75	5.2	1	1.3	10	5.37	5.42
21	Turbine 14	Forestry, forest road	GA117 2024, TP08, TP09, GA16-18, probes 2025	0.2m PEAT in TPs, 0.7m in GA, 1.2m in probes	32	26.6	5.0	3.6	1.2	0.9	9.5	1	1.3	10	2.63	2.82

	Case 1	Case 2
Minimum	1.18	1.4
Average	2.9	3.1
Maximum	5.8	5.3

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 analysis of LiDAR data.

Peat depths based on desk study, walkover, trial pits, boreholes, and gouge augers at the site.

GA = gouge auger

TP = trial pit

BH = borehole

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Appendix 2 Table 3

Peat stability calculations for Lissinagroagh Wind Farm

Deterministic stability calculcation outputs

Drained Case 1 and Case 2, low groundwater

Nr	Assessment area	Land use	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	Turbine 1	Forestry	GA111, GA123 2024, peat probing 2025	Topsoil over PEAT to 2.8m bgl	32	26.6	5.0	3.6	2.8	0	11.2	1	1.3	10	3.18	2.97
2	Borrow pit 1	Forestry	Peat probing 2025	3.3m PEAT	32	26.6	5.0	3.6	3.3	0	11.0	1	1.3	10	3.14	2.98
3	Turbine 2	Forestry	TP42, TP27 2022, peat probing 2025	4.5m PEAT from probes, very soft in TP42	32	26.6	5.0	3.6	4.5	0	6.2	1	1.3	10	5.36	5.19
4	Turbine 3	Rough grazing, peat	Peat probing 2025	2.1m PEAT	32	26.6	5.0	3.6	2.1	0	12.0	1	1.3	10	3.19	2.87
5	Turbine 4	Forestry	TP24, TP25 2022, GA113 2024, probes 2021, 2025	1.8m PEAT from probes, 1.4m from TPs, 2.0m from GA	32	26.6	5.0	3.6	2.0	0	15.4	1	1.3	10	2.52	2.24
6	Temp compound 1	Forestry	TP45 2002, peat probing 2021, 2025	0.8m PEAT from probes, no peat in TP45	32	26.6	5.0	3.6	0.8	0	5.7	1	1.3	10	9.45	6.67
7	Turbine 5	Forestry	GA101, GA102 2024, peat probes 2021	2.0m PEAT from probes, 1.0m in GA102	32	26.6	5.0	3.6	2.0	0	6.0	1	1.3	10	6.48	5.80
8	Turbine 6	Forestry	GA128, GA142 2024, probes 2025	1.6m PEAT in augers, 0.9m in probes	32	26.6	5.0	3.6	1.6	0	16.6	1	1.3	10	2.49	2.13
9	Turbine 7	Rough grazing, peat	BH001, GA281 2024, probes 2021, 2025	3.1m in probes, 0.4m in BH, 0 in GA	32	26.6	5.0	3.6	3.1	0	9.0	1	1.3	10	3.91	3.69
10	Turbine 8	Forestry	TP17 2024, GA110, GA112, GA130 2024	2.8 in probes, 1.8m in GA, 0.7 in TP17	32	26.6	5.0	3.6	2.8	0	8.7	1	1.3	10	4.10	3.83
11	Turbine 9	Rough grazing	TP31 2022, TP05, TP06 2025, peat probing 2021	0.8m in TPs, 0.4m in nearby probes	32	26.6	5.0	3.6	0.8	0	7.7	1	1.3	10	7.06	4.98
12	Turbine 10	Forestry	TP32 2022, GA106 2024, probing 2021, 2025	2m in probes, 1.6m in GA, 0.9m in TP	32	26.6	5.0	3.6	2.0	0	7.8	1	1.3	10	4.96	4.44
13	Turbine 11	Forestry	GA107, GA115 2024, peat probes 2025	0m in GA, 1.0m in peat probes	32	26.6	5.0	3.6	1.0	0	6.3	1	1.3	10	7.78	5.94
14	Turbine 12	Forestry	GA104, GA114, GA126 2024	1.1m PEAT in GA	32	26.6	5.0	3.6	1.1	0	5.9	1	1.3	10	8.05	6.32
15	Temp compound 2	Forestry	Peat probing 2025	1.1m PEAT in probes	32	26.6	5.0	3.6	1.1	0	6.2	1	1.3	10	7.66	6.01
16	Met mast	Forestry	Peat probing 2025	0.8m PEAT in probes	32	26.6	5.0	3.6	0.8	0	8.8	1	1.3	10	6.16	4.34
17	Substation	Forestry	Peat probing & GA 2025	0.6m PEAT in probes, 0.5m in GA	32	26.6	5.0	3.6	0.6	0	7.9	1	1.3	10	8.00	5.00
18	Borrow pit 2	Forestry	TP11, TP12 2022, probes 2021, 2025	1.2m PEAT in probes	32	26.6	5.0	3.6	1.2	0	7.4	1	1.3	10	6.17	4.96
19	Borrow pit 3	Forestry	Peat probing 2025	0.9m PEAT in probes	32	26.6	5.0	3.6	0.9	0	9.8	1	1.3	10	5.27	3.87
20	Turbine 13	Forestry, forest road	GA118, GA119 2024, TP07, GA09-GA13 2025	1.0m PEAT in GA 2025, 0.3m PEAT in TP07	32	26.6	5.0	3.6	1.0	0	5.2	1	1.3	10	9.38	7.16
21	Turbine 14	Forestry, forest road	GA117 2024, TP08, TP09, GA16-18, probes 2025	0.2m PEAT in TPs, 0.7m in GA, 1.2m in probes	32	26.6	5.0	3.6	1.2	0	9.5	1	1.3	10	4.84	3.88

	Case 1	Case 2
Minimum	2.5	2.1
Average	5.5	4.5
Maximum	9.4	6.7

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 analysis of LiDAR data.

Peat depths based on desk study, walkover, trial pits, boreholes, and gouge augers at the site.

GA = gouge auger

TP = trial pit

BH = borehole

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APPENDIX 3: PEAT STABILITY RISK REGISTER

PROPOSED LISSINAGROAGH WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 1
Location: Turbine 1

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	Topsoil over PEAT to 2.8m bgl	4	4	**16**	2	2	**4**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	274.3 to 306.8	3	3	**9**	2	2	**4**
Slope angle (deg.)	11.2	4	4	**16**	3	3	**9**
Evidence of previous slips	Yes, GSI mapped	4	4	**16**	3	3	**9**
Landslide susceptibility	High	4	4	**16**	3	3	**9**
Hydrology							
Distance from watercourse	30m	3	4	**12**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	Suspected karst nearby	4	4	**16**	3	3	**9**
Quantative assessment							
FOS - drained	1.3	4	4	**16**	4	3	**12**
FOS - undrained	1.2						
Total (pre / post control measures)		**144**			**77**		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**13**			**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 to divert any surface water away from works.
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.

PROPOSED LISSINAGROAGH WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 2
Location: Borrow pit 1

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	3.3m PEAT	4	4	**16**	2	3	**6**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	292 to 320	3	3	**9**	2	2	**4**
Slope angle (deg.)	11.0	4	4	**16**	3	3	**9**
Evidence of previous slips	Yes, GSI mapped	5	4	**20**	3	3	**9**
Landslide susceptibility	High	4	4	**16**	3	3	**9**
Hydrology							
Distance from watercourse	50m	3	4	**12**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	Suspected karst nearby	4	4	**16**	3	3	**9**
Quantative assessment							
FOS - drained	1.3	4	4	**16**	4	3	**12**
FOS - undrained	1.1						
Total (pre / post control measures)		**148**			79		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**13**			**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 to divert any surface water away from works.
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.

PROPOSED LISSINAGROAGH WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 3
Location: Turbine 2

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	4.5m PEAT from probes, very soft in TP42	5	4	**20**	3	3	**9**
Peat strength (kPa)	9.6	4	4	**16**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	320.6 to 342	4	3	**12**	2	2	**4**
Slope angle (deg.)	6.2	3	3	**9**	3	3	**9**
Evidence of previous slips	Yes, GSI mapped	5	4	**20**	3	3	**9**
Landslide susceptibility	Moderately high	3	3	**9**	3	3	**9**
Hydrology							
Distance from watercourse	Access road crosses	5	4	**20**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	Suspected karst nearby	4	4	**16**	3	3	**9**
Quantative assessment							
FOS - drained	2.0	3	3	**9**	3	3	**9**
FOS - undrained	1.1						
Total (pre / post control measures)		**149**			79		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**14**			**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 to divert any surface water away from works.
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.

PROPOSED LISSINAGROAGH WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 4
Location: Turbine 3

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	2.1m PEAT	4	4	**16**	3	3	**9**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Cutaway peat	4	4	**16**	2	2	**4**
Topography							
Elevation (mOD)	326.4 to 372	4	3	**12**	2	2	**4**
Slope angle (deg.)	12.0	4	4	**16**	3	3	**9**
Evidence of previous slips	No	3	2	**6**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	3	3	**9**
Hydrology							
Distance from watercourse	>200m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	Suspected karst nearby	4	4	**16**	3	3	**9**
Quantative assessment							
FOS - drained	1.5	4	4	**16**	3	3	**9**
FOS - undrained	1.3						
Total (pre / post control measures)		**129**			69		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**12**			6		
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 to divert any surface water away from works.
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.

PROPOSED LISSINAGROAGH WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 5
Location: Turbine 4

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	1.8m PEAT from probes, 1.4m from TPs, 2.0m from GA	3	3	**9**	3	3	**9**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	310 to 328.3	4	3	**12**	2	2	**4**
Slope angle (deg.)	15.4	4	4	**16**	3	3	**9**
Evidence of previous slips	No	3	2	**6**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	3	3	**9**
Hydrology							
Distance from watercourse	>200m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	Suspected karst nearby	4	4	**16**	3	3	**9**
Quantative assessment							
FOS - drained	1.2	4	5	**20**	3	4	**12**
FOS - undrained	1.1						
Total (pre / post control measures)		**119**			72		
Max possible		**275**			**275**		
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, including adequate sizing of watercourse diversion routes & culverts.
3	Installation of interceptor drains upslope to divert any surface water away from works.
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.

PROPOSED LISSINAGROAGH WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 6
Location: Temp compound 1

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	0.8m PEAT from probes, no peat in TP45	2	2	**4**	2	2	**4**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	326 to 331.7	4	3	**12**	2	2	**4**
Slope angle (deg.)	5.7	3	3	**9**	2	2	**4**
Evidence of previous slips	No	3	2	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	>200m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	Suspected karst nearby	4	4	**16**	3	3	**9**
Quantative assessment							
FOS - drained	5.8	3	3	**9**	2	2	**4**
FOS - undrained	4.4						
Total (pre / post control measures)		**91**			**49**		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**8**			**4**		
Overall hazard ranking		**Low**			**Negligible**		

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Engage experienced contractors and trained operatives to carry out the work.
3	Installation of interceptor drains upslope to divert any surface water away from works.

Assessment area nr: 7
Location: Turbine 5

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	2.0m PEAT from probes, 1.0m in GA102	3	3	**9**	3	3	**9**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	2	2	**4**	2	2	**4**
Topography							
Elevation (mOD)	328 to 349	4	3	**12**	2	2	**4**
Slope angle (deg.)	6.0	3	3	**9**	2	2	**4**
Evidence of previous slips	No	3	2	**6**	2	2	**4**
Landslide susceptibility	Moderately low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	100	3	3	**9**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	Suspected karst nearby	4	4	**16**	3	3	**9**
Quantative assessment							
FOS - drained	3.0	2	2	**4**	2	2	**4**
FOS - undrained	2.7						
Total (pre / post control measures)		**91**			**54**		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**8**			**5**		
Overall hazard ranking		**Low**			**Negligible**		

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

PROPOSED LISSINAGROAGH WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 8
Location: Turbine 6

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	1.6m PEAT in augers, 0.9m in probes	3	3	**9**	3	3	**9**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	295 to 316	4	3	**12**	2	2	**4**
Slope angle (deg.)	16.6	4	4	**16**	3	3	**9**
Evidence of previous slips	No	3	2	**6**	2	2	**4**
Landslide susceptibility	Moderately low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	>200m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	Suspected karst nearby	4	4	**16**	3	3	**9**
Quantative assessment							
FOS - drained	1.3	4	4	**16**	3	3	**9**
FOS - undrained	1.2						
Total (pre / post control measures)		**110**			64		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**10**			6		
Overall hazard ranking		**Medium**			**Low**		

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

PROPOSED LISSINAGROAGH WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 9
Location: Turbine 7

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	3.1m in probes, 0.4m in BH, 0 in GA	4	3	**12**	3	3	**9**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Cutaway peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	333 to 351.4	4	3	**12**	2	2	**4**
Slope angle (deg.)	9.0	4	4	**16**	2	2	**4**
Evidence of previous slips	No	3	2	**6**	2	2	**4**
Landslide susceptibility	Moderately high	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	100	3	3	**9**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	Suspected karst nearby	5	4	**20**	3	3	**9**
Quantative assessment							
FOS - drained	1.6	3	3	**9**	2	2	**4**
FOS - undrained	1.4						
Total (pre / post control measures)		**115**			54		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**10**			5		
Overall hazard ranking		**Medium**			**Negligible**		

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

PROPOSED LISSINAGROAGH WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 10
Location: Turbine 8

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	2.8 in probes, 1.8m in GA, 0.7 in TP17	4	4	**16**	3	3	**9**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	305.8 to 332.8	4	3	**12**	2	2	**4**
Slope angle (deg.)	8.7	4	3	**12**	3	2	**6**
Evidence of previous slips	No	3	2	**6**	2	2	**4**
Landslide susceptibility	Moderately high	3	3	**9**	2	2	**4**
Hydrology							
Distance from watercourse	Adjacent	4	4	**16**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	Suspected karst nearby	5	4	**20**	3	3	**9**
Quantative assessment							
FOS - drained	1.7	3	3	**9**	2	2	**4**
FOS - undrained	1.5						
Total (pre / post control measures)		**127**			61		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**12**			6		
Overall hazard ranking		**Medium**			**Low**		

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

Assessment area nr: 11
Location: Turbine 9

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	0.8m in TPs, 0.4m in nearby probes	3	2	**6**	2	2	**4**
Peat strength (kPa)	12	3	3	**9**	2	2	**4**
Visible surface geology	Topsoil, rough grazing	2	2	**4**	2	2	**4**
Topography							
Elevation (mOD)	238.6 to 259.5	3	3	**9**	2	2	**4**
Slope angle (deg.)	7.7	3	3	**9**	2	2	**4**
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	Adjacent	4	4	**16**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	Suspected karst nearby	5	4	**20**	3	3	**9**
Quantative assessment							
FOS - drained	4.3	2	2	**4**	2	2	**4**
FOS - undrained	3.1						
Total (pre / post control measures)		**99**			54		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**9**			**5**		
Overall hazard ranking		**Low**			**Negligible**		

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

PROPOSED LISSINAGROAGH WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 12
Location: Turbine 10

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	2m in probes, 1.6m in GA, 0.9m in TP	3	3	**9**	2	2	**4**
Peat strength (kPa)	9.5	4	4	**16**	3	3	**9**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	222.4 to 256	3	2	**6**	2	2	**4**
Slope angle (deg.)	7.8	3	3	**9**	3	2	**6**
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	>200m	3	3	**9**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	Suspected karst nearby	5	4	**20**	3	3	**9**
Quantative assessment							
FOS - drained	2.3	3	3	**9**	2	2	**4**
FOS - undrained	1.5						
Total (pre / post control measures)		**109**			56		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**10**			5		
Overall hazard ranking		**Low**			**Low**		

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

Assessment area nr: 13
Location: Turbine 11

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	0m in GA, 1.0m in peat probes	3	3	**9**	2	2	**4**
Peat strength (kPa)	13	4	4	**16**	3	3	**9**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	180 to 194.9	2	2	**4**	2	2	**4**
Slope angle (deg.)	6.3	3	3	**9**	3	2	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	1	1	**1**
Hydrology							
Distance from watercourse	Adjacent	5	4	**20**	3	2	**6**
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	4.5	2	2	**4**	2	2	**4**
FOS - undrained	3.7						
Total (pre / post control measures)		**92**			**50**		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**8**			**5**		
Overall hazard ranking		**Low**			**Negligible**		

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

Assessment area nr: 14
Location: Turbine 12

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	1.1m PEAT in GA	2	2	**4**	2	2	**4**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	159 to 176.6	2	2	**4**	2	2	**4**
Slope angle (deg.)	5.9	3	3	**9**	3	2	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	1	1	**1**
Hydrology							
Distance from watercourse	70m	3	3	**9**	2	2	**4**
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	4.5	2	2	**4**	2	2	**4**
FOS - undrained	3.8						
Total (pre / post control measures)		**69**			**43**		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**6**			4		
Overall hazard ranking		**Low**			**Negligible**		

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

Assessment area nr: 15
Location: Temp compound 2

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	1.1m PEAT in probes	3	3	**9**	2	2	**4**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	151 to 170	2	2	**4**	2	2	**4**
Slope angle (deg.)	6.2	3	3	**9**	3	2	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	1	1	**1**
Hydrology							
Distance from watercourse	<50m	3	3	**9**	2	2	**4**
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	4.3	2	2	**4**	2	2	**4**
FOS - undrained	3.6						
Total (pre / post control measures)		**74**			43		
Max possible		**275**			**275**		
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	Installation of interceptor drains upslope to divert any surface water away from works.
3	Use of experienced geotechnical staff for detailed design & temporary works design.
4	Engage experienced contractors and trained operatives to carry out the work.
5	Maintain hydrology of area as far as possible, including adequate sizing of watercourse diversion routes & culverts.

Assessment area nr: 16
Location: Met mast

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	0.8m PEAT in probes	3	3	**9**	2	2	**4**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	147.4 to 154.2	2	2	**4**	2	2	**4**
Slope angle (deg.)	8.8	3	3	**9**	3	2	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	1	1	**1**
Hydrology							
Distance from watercourse	<50m	3	3	**9**	2	2	**4**
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	3.8	2	2	**4**	2	2	**4**
FOS - undrained	2.9						
Total (pre / post control measures)		**74**			43		
Max possible		**275**			**275**		
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	Installation of interceptor drains upslope to divert any surface water away from works.
3	Use of experienced geotechnical staff for detailed design & temporary works design.
4	Engage experienced contractors and trained operatives to carry out the work.
5	Maintain hydrology of area as far as possible, including adequate sizing of watercourse diversion routes & culverts.

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Assessment area nr: 17
Location: Substation

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	0.6m PEAT in probes, 0.5m in GA	2	2	**4**	2	2	**4**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	147.9 to 166	2	2	**4**	2	2	**4**
Slope angle (deg.)	7.9	4	3	**12**	3	2	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	1	1	**1**
Hydrology							
Distance from watercourse	<100m	3	3	**9**	2	2	**4**
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	5.3	2	2	**4**	2	2	**4**
FOS - undrained	3.6						
Total (pre / post control measures)		**72**			43		
Max possible		**275**			**275**		
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	Installation of interceptor drains upslope to divert any surface water away from works.
3	Use of experienced geotechnical staff for detailed design & temporary works design.
4	Engage experienced contractors and trained operatives to carry out the work.
5	Maintain hydrology of area as far as possible, including adequate sizing of watercourse diversion routes & culverts.

Assessment area nr: 18
Location: Borrow pit 2

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	1.2m PEAT in probes	3	3	**9**	2	2	**4**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	231.8 to 260.5	3	3	**9**	2	2	**4**
Slope angle (deg.)	7.4	4	3	**12**	3	2	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Moderately high	4	4	**16**	3	3	**9**
Hydrology							
Distance from watercourse	50m	4	3	**12**	3	2	**6**
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	3.3	3	3	**9**	2	2	**4**
FOS - undrained	2.9						
Total (pre / post control measures)		**102**			**53**		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**9**			**5**		
Overall hazard ranking		**Low**			**Negligible**		

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

Assessment area nr: 19
Location: Borrow pit 3

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	0.9m PEAT in probes	2	2	**4**	2	2	**4**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	199.5 to 214.1	3	3	**9**	2	2	**4**
Slope angle (deg.)	9.8	4	3	**12**	3	2	**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	<50m	4	4	**16**	3	2	**6**
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	3.1	3	3	**9**	2	2	**4**
FOS - undrained	2.5						
Total (pre / post control measures)		**89**			48		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**8**			4		
Overall hazard ranking		**Low**			**Negligible**		

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

PROPOSED LISSINAGROAGH WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 20
Location: Turbine 13

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	1.0m PEAT in GA 2025, 0.3m PEAT in TP07	3	3	**9**	2	2	**4**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	221.9 to 263.2	4	3	**12**	2	2	**4**
Slope angle (deg.)	5.2	3	3	**9**	3	2	**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	<50m	4	4	**16**	3	3	**9**
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	5.4	2	2	**4**	2	2	**4**
FOS - undrained	4.4						
Total (pre / post control measures)		**89**			**51**		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**8**			**5**		
Overall hazard ranking		**Low**			**Negligible**		

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

PROPOSED LISSINAGROAGH WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 21
Location: Turbine 14

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Peat depth & condition	0.2m PEAT in TPs, 0.7m in GA, 1.2m in probes	3	3	**9**	2	2	**4**
Peat strength (kPa)	13	3	3	**9**	2	2	**4**
Visible surface geology	Drained peat	3	3	**9**	2	2	**4**
Topography							
Elevation (mOD)	223 to 246.4	4	3	**12**	2	2	**4**
Slope angle (deg.)	9.5	4	4	**16**	3	2	**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	Stream crossing part of works	5	4	**20**	4	3	**12**
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	2.6	3	3	**9**	2	2	**4**
FOS - undrained	2.3						
Total (pre / post control measures)		**105**			54		
Max possible		**275**			**275**		
Overall hazard assessment (pre / post control measures)		**10**			**5**		
Overall hazard ranking		**Low**			**Negligible**		

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