Oweninny Wind Farm Phase 3

Environmental Impact Assessment Report

Appendix 9.4 Peat Stability Risk Assessment

Oweninny Wind Farm Phase 3

Planning Stage Peat Stability Risk Assessment

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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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A1, A2, A3, etc	Approved and accepted as stage complete (C= Contractual/Complete)	C01, C02, etc
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Published for AIM Acceptance		
CR	As Construction Record documentation, PDF, Models etc	C01, C02, etc

Table of contents

1. Executive Summary

Ciaran Reilly & Associates has been instructed by TOBIN Consulting Engineers (TOBIN) on behalf of Bord na Mona to carry out a preliminary peat stability risk assessment (PSRA) for the proposed Oweninny Phase 3 wind farm site in North Mayo, west of Crossmolina and east of Bangor Erris, just north of the N59 road. The Phase 3 development will comprise a wind farm consisting of 18 wind turbines, with an overall maximum tip height of 200m within an overall site area of 2282ha.

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

Peat stability was assessed using both a qualitative approach and a deterministic approach. The findings of the planning stage PSRA are that following the application of common-place mitigation measures, the hazard ranking of the development is considered to be “low” to “negligible” for all areas. Common-place mitigation measures to be put in place during the detailed design and construction of the scheme may include but are not limited to stepping or battering back of excavations to a safe angle (as determined through a detailed slope stability assessment by a competent temporary works designer) or construction of a temporary sheet pile wall or rock fill berm to support the peat during construction. It is concluded that the site is suitable for the proposed development.

Best practice guidance regarding the design for and management of peat stability must be inherent in the detailed design and construction phases of the project and further recommendations in this regard are provided.

2. Introduction

In accordance with planning guidelines compiled by the Department of the Environment, Heritage and Local Government (DoEHLG) (2016), where peat is present on a proposed wind farm development, a peat stability assessment is required as part of the environmental impact assessment.

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 9 of the Oweninny Phase 3 Environmental Impact Assessment Report (EIAR) and its appendices. Where reference is made throughout this report to figures, these refer to the figures contained in the Appendices to Chapter 9 of the EIAR.

2.1. Description of the Development

The Proposed Development comprises the construction of 18 nr wind turbines and ancillary works. The turbines will have a maximum blade tip height of 200m above the top of the foundation level and will be accessible from internal access routes within the Bord na Móna site. The proposed development will comprise:

The proposed development will comprise:

- 18 no. wind turbines (including tower sections, nacelle, hub, and rotor blades) and all associated foundations and hard-standing areas in respect of each turbine;
- Decommissioning and removal of 21 no. existing Bellacorick Wind Farm wind turbines (including tower sections, nacelle, hub, and rotor blades);
- New internal site access roads, approximately 29,000m in length (permanent and temporary), passing bays, car parking and associated drainage;
- An amenity route through the site to the existing Visitors Centre with access from a local road off the N59 near Dooleeg;
- 2 no. borrow pits;
- 5 no. peat deposition areas;
- 1 No. permanent Meteorological Mast 120m high, and the decommissioning and removal of an existing 100m Meteorological Mast on site;
- 4 no. temporary construction compounds, including material storage, site welfare facilities, and site offices;
- 1 no. 110kV electrical substation compound. The electrical substation will have 2 No. control buildings, a 36m high telecommunications tower, associated electrical plant and equipment and a wastewater holding tank.
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed substation;

All works associated with the connection of the proposed wind farm to the national electricity grid, including a 110kV underground electrical cable from the proposed on-site electrical sub-station to the existing sub-station at Bellacorick;
All related site works and ancillary development including (but not limited to):

- Earthworks;

Peat management works;

- Site security;
- Groundwater and surface water management;
- Overburden (soils/peat) storage and management; and
- Site reinstatement, landscaping and erosion control.

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

- Improvements to existing access junction on the N59 to facilitate the delivery of abnormal loads and construction access;
- Improvements and temporary modifications to public road infrastructure to facilitate the delivery of abnormal loads;
- All related site works and ancillary development including (but not limited to):
    - Earthworks;
    - Main and assist cranes;
    - Peat management works;
    - Site security
    - Groundwater management, as required;
    - Overburden (soils/peat) storage and management; and
    - Site reinstatement, landscaping and erosion control, to be aligned with the existing site rehabilitation plan.
- A 10-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

All elements of the proposed project as listed above, including grid connection and any works required on public roads to accommodate turbine delivery, have been considered and are addressed as part of this EIAR.

The relevant proposed works are divided into discrete areas for the purposes of the risk assessment presented in this report. The site is divided based on topography and ground conditions and based on the hazard posed by instability at particular features. We were provided with the layout as file "OP3-BNM-GIS-INFR-01-P27 Internal Infrastructure.shp" and based our assessment on that file. 44 areas were assessed. The descriptions of the proposed areas to be assessed are as follows:

Table 1 – Areas for assessment

Number	Assessment area	Description
1	Export 110kV grid cable	Cable route from access road to Bellacorrick Power Station site
2	Access road public road to J5	Existing access road
3	Access road J5 to substation compound	Existing access road
4	Access road J6 to J9	Diversion off existing access road
5	Peat disposal area PDA1	Low lying cutover peat field
6	Substation compound	Low lying cutover peat field

Number	Assessment area	Description
7	T01	Cutaway peat adjacent railway track
8	T02	Cutaway peat, partially forested
9	T03	Cutaway peat
10	T04	Cutaway peat
11	T05	Cutaway peat
12	Access Road J9 to T01 location	Partially existing access road
13	Access Road J5 to J11	Partially existing railway bed
14	T06	Cutaway peat
15	Borrow Pit **BP-A (Area1)**	Cutaway peat, mapping indicates gravels to south
16	T07	Cutaway peat
17	Access Road J9 to J11	Existing access road
18	Access Road J10 to J12	Cutaway peat
19	Access Road J12 to J13	Cutaway peat & existing access track
20	Access Road J13 to T10	Wet cutaway peat
21	T08	Wet cutaway peat
22	T09	Wet cutaway peat
23	T10	Wet cutaway peat
24	Access Road J13 to J15	Existing access road, cutaway peat
25	T11	Cutaway peat
26	Peat disposal area PDA2	Cutaway peat
27	Access Road J14 to T18	Cutaway peat
28	T18	Cutaway peat
29	Borrow Pit **BP-D (Area 2)**	Gravel high point
30	Peat disposal area PDA3	Partly cutaway peat field
31	T17	Partly cutaway peat field
32	T16	Partly cutaway peat field
33	Access Road J15 to J17	Partial existing access road, partial cutaway peat field
34	T14	Partly cutaway peat field
35	Access Road J17 to T15	Partly cutaway peat field
36	T15	Partly cutaway peat field
37	Peat disposal area PDA4	Partly cutaway peat field
38	Access Road J17 to J18	Partly cutaway peat field
39	T12	Partly cutaway peat field
40	Met Mast MM-A	Partly cutaway peat field
41	T13	Partly cutaway peat field
42	Peat disposal area PDA5	Partly cutaway peat field
43	Amenity track	Existing access road

The Peat Disposal Areas will be filled with a maximum of 1.0m of peat. This will be taken account of in the assessment.

2.2. Statement of authority

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

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

2.3. Peat Failures

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

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

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

2.4. Methodology

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

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

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

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

3. Ground Investigation

3.1. Desk study

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

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

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

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

- Ordnance Survey historical mapping,
- Geological Survey of Ireland mapping,
- EPA mapping,
- Publicly available satellite photography (Google Maps & Bing Maps), and
- 1m DSM contours provided by TOBIN Consulting Engineers, 2021.

3.2. Field work

Site surveys relating to the soil and geological environment and ground investigations were undertaken between November 2020 and October 2021. These surveys included:

- A site walkover by TOBIN and Ciaran Reilly & Associates staff to review the ground conditions and assess the topography and geomorphology in August 2021,
- 41 nr peat probes by Ciaran Reilly & Associates staff in August 2021,
- 42 nr trial pits by Ground Investigations Ireland Ltd in November 2020
- 46 nr peat probes and 36 nr trial pits Ground Investigations Ireland Ltd between May and October 2021.

The logs and records of the investigations can be found in Appendices 9-1 to the Soils and Geology chapter of the main EIAR and the locations of investigations are shown in

Appendix 1 of this report. The observations made during the walkover survey are used to prepare the Peat Stability Risk Register included as Appendix 3 of this report.

4. Detailed Site Assessment

4.1. Site Topography and Geomorphology

The proposed wind farm area was formerly used for milled peat harvesting for the Bellacorick power station. Work on the development of the bogland around Bellacorick began in 1951. The bogland was drained to allow heavy machinery to operate on it. The initial construction of the power station got underway in 1958 and it opened in 1963. The power station was decommissioned in 2003 and demolished in 2007.

The Bellacorrick Wind Farm and Oweninny Wind Farm Phase 1 are located on and adjacent to the site and Oweninny Wind Farm Phase 2 is currently under construction. The site topography and geomorphology are discussed in detail in the Soils & Geology Chapter of the EIAR and reference is made to the chapter herein.

The site comprises mainly cutaway bog land with remaining intact bog blankets and some reforested areas. The topography of the site is undulating with elevation levels ranging from between 80mOD and 130mOD. Multiple drains have been cut into the landscape locally and appear to be stable in their present configurations. For the purposes of the stability assessment, an overall view was taken on the topography of the site and individual drainage features were not assessed.

4.2. Local Bedrock Geology

Geological Survey of Ireland bedrock mapping shows that the site is underlain by the Downpatrick Formation, which is described as cross bedded sandstone and siltstone. The nearest indicated bedrock outcrop is over 3000m from the site.

4.3. Local soils and subsoils

Geological Survey Ireland mapping categorises the majority of the site as “blanket peat”, with isolated areas of till derived from limestones and till derived from Devonian and Carboniferous sandstones, gravels derived from limestones and gravels derived from Devonian and Carboniferous sandstones, and alluvium associated with the Owenmore River.

4.4. Water courses

The site is drained by numerous streams and rivers of the Owenmore, Cloonaghmore, Shanvolahan, and Muing river subbasins of the Owenmore, Cloonaghmore, and Deel Rivers. Drainage channels provide for the drainage of the peat workings around the site. A map of the stream and river network in the vicinity of the site is provided in drawing 10889-018-RI-DRAIN-TOB-D02 included in Appendix 1.

Historical mapping (OSI 6" and 25" maps) show the site as unimproved peatlands with numerous large and small lakes. Several rivers are shown with their source in the peatlands, including the Owenmore and Muing Rivers, flowing north, south, east, and west out of the area. A similar pattern is evident today, with the addition of many engineered water channels to drain the peatlands for harvesting operations. In many cases these drains expose the underlying mineral soils.

The historical engineered drainage channels have, in general, served to mitigate the impact of a peat instability event by subdividing the peat mass into smaller "blocks", helping lower the general groundwater level, and providing buffer areas where an instability event is most likely to lessen rather than intensify.

4.5. Previous failures

A review of the landslide information on the GSI Irish Landslides Database indicated that the nearest recorded landslides occurred approximately 2.8km north east (GSI_LS13-0928, adjacent to the Owenmore River) and 6.7km north west (the Sheskin landslide of 1988, GSI_LS05-0019). These were bog slides in considerably steeper topographical settings than the present site. A map of these events in shown in Figure 1.

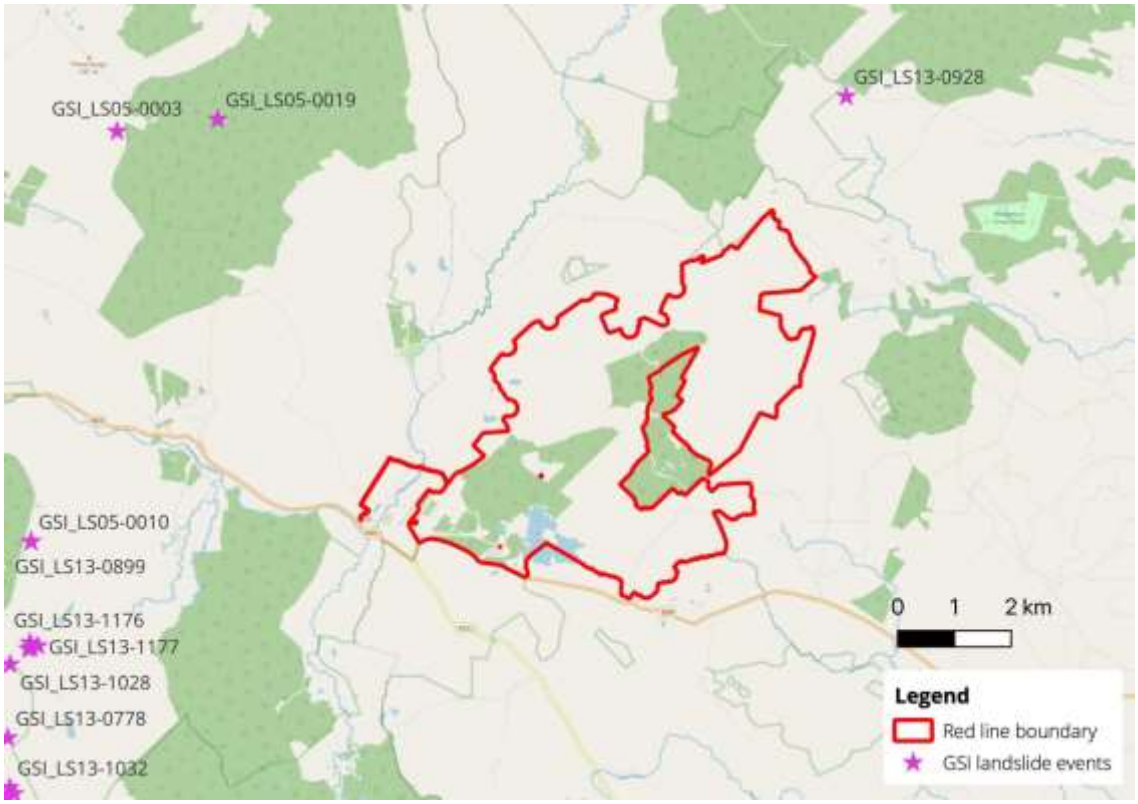

Figure 1 - Landslide events (GSI, 2021)

4.6. Landslide susceptibility

Figure 2 shows the GSI Landslide Susceptibility mapping for the site. The site is designated as "Moderately Low" or "Low" susceptibility. There are small areas mapped as "Moderately High" susceptibility, but these are located in wooded areas which the site infrastructure has been designed to avoid. It should be noted that the GSI risk assessment only accounts for the current site topographic and hydrological conditions. The development of electricity infrastructure can alter these parameters in the temporary and/or permanent case.

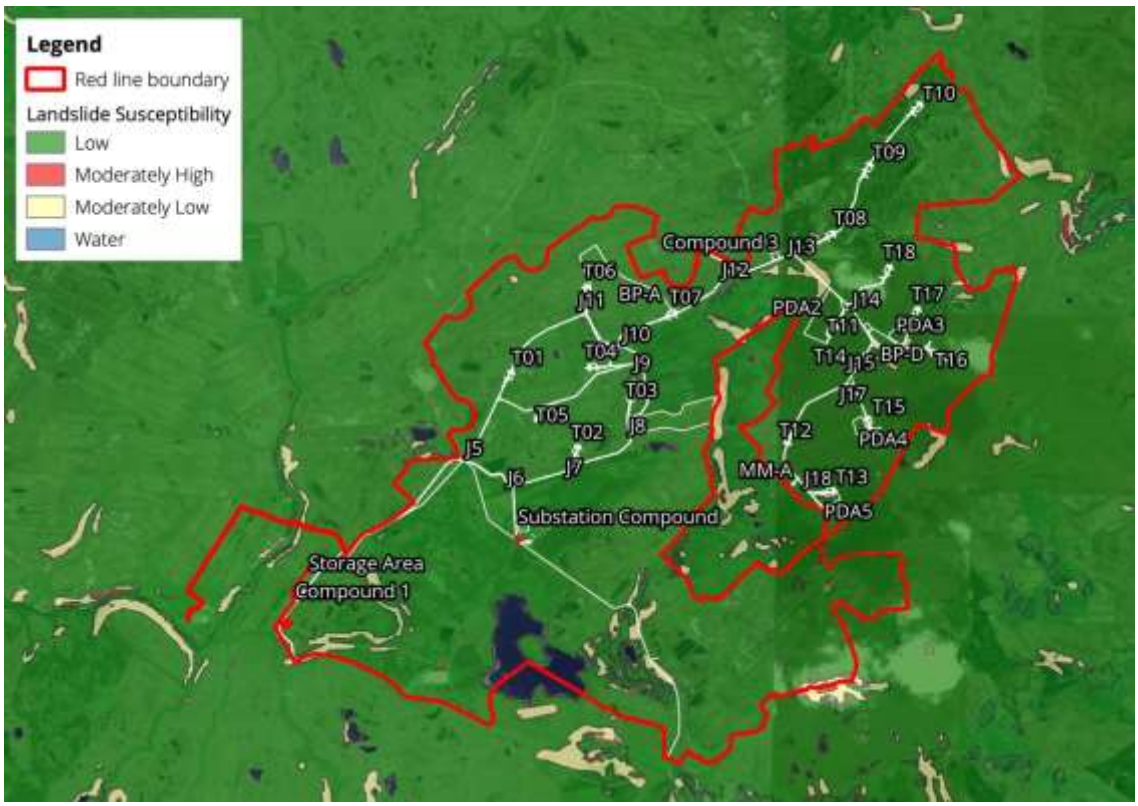

Figure 2 Landslide susceptibility mapping (GSI, 2021)

No evidence of historic peat failure was identified during the site walkover. During the geotechnical investigation by trial pits, some of the walls of the trial pits were unstable and collapsed, however this is not unexpected for steep-sided trial pits dug in peat and sand deposits.

4.7. Ground Investigation

A number of phases of ground investigation (GI) of the development area were carried out as outlined in the previous section. These investigations confirmed the general geology indicated in the geological mapping. The GI indicated that the site is generally covered in slightly sandy slightly gravelly pseudo-fibrous PEAT with rootlets and an organic odour which overlies SAND or SILT. Locations of the ground investigations are shown in Appendix 1, and details of each investigation location are presented in Appendix 9-1 to the Soils and Geology chapter of the EIAR.

5. Peat Stability Assessment

5.1. Material properties

For the purposes of the peat stability assessment, material properties are assessed for Peat at the site. The results of the Ground Investigations Ireland (2021 and 2022) investigations and our field assessments are used along with comparable experience to derive the required properties.

The peat is generally described as brown or dark brown slightly sandy slightly gravelly pseudo-fibrous PEAT with rootlets and an organic odour.

The correlation of Amaryan et al (1973) as cited by Carlsten (2000) is used, along with comparable experience, to estimate a characteristic undrained shear strength value for the Peat. 30 moisture content tests were carried out on samples of Peat. The moisture content of the Peat ranged from 183% to 1147%. Taking the median moisture content of 831% and assuming an R value of 4, a undrained shear strength of 16.0kPa is assessed. A conservative view is taken on this, and based on comparable experience, a characteristic undrained shear strength of 10kPa is assessed for the Peat at the site. Where relevant, local strengths are assessed based on local field vane measurements, with a vane correction of 0.5 used (Edil, 2001 and Mesri & Ajlouni, 2007).

Based on a range of published guidance including Long (2005) and O'Kelly and Zhang (2013), the Peat was assumed to have effective stress parameter values φ' = 30° and c' = 2kPa.

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

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

Table 2 – Characteristic parameter values

Material / Parameter	Peat
Bulk Weight (γ_k) [kN/m^3]	10
Undrained shear strength ($c_{u,k}$) [kPa]	10
Effective cohesion (c'_k)	2
Effective angle of shearing resistance (Φ'_k) [degrees]	30

5.2. Qualitative risk assessment procedure

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

1. Insignificant;
2. Significant;

3. Substantial; and
4. Serious.

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

Hazard Ranking = Hazard x Exposure

Where:

- Hazard = The likelihood of the (Peat or Soft Clay and Silt) landslide event occurring
- Exposure = The effect and consequences that the event may have

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

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

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

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

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

Using Table 3 and Table 4 it is possible to assign a hazard ranking for each zone by multiplying the hazard by the exposure. This will result in a hazard ranking between 1 to 25 (Table 5). Following the result, mitigation measures can be targeted.

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

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

The proposed substation and overhead line are located in a relatively flat area and the GSI database indicates that the susceptibility of this site to a landslide is "*Moderately Low*" to "*Low*" (GSI, 2021), as shown in the map in Figure 2.

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

During the geotechnical investigation by trial pits, some of the walls of the trial pits were unstable and collapsed. Given this, the likelihood of an excavation collapsing during construction is generally in the range "likely" to "probable" in the absence of mitigation, however it is noted that the peat workings at the site are cut to very steep angles with few signs of instability. A non-exhaustive listing of possible proposed mitigation measures is provided in Section 8 of this report.

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

Mitigation measures can be put in place during the construction of the scheme to reduce the likelihood of an excavation collapsing. Possible mitigation measures include stepping or battering back of excavations to a safe angle (as determined through a slope stability assessment by a competent temporary works designer) or construction of a temporary sheet pile wall or rock fill berm to support the peat during construction.

The assessment process described above was applied to discrete areas of the site, with common topography and ground conditions, and is summarised in Table 6. This

assessment is based on information from geological maps from GSI, the available aerial and satellite mapping, walkovers, and the site-specific ground investigation undertaken. The Peat Stability Risk Register that this summary table is derived from is presented in Appendix 3, where detailed risk registers for each assessment area are provided.

Table 6 – Peat Stability Risk Register Summary

Nr	Assessment area	**Pre-control measure risk rating**	**Post-control measure risk rating**
1	Export 110kV grid cable	Low	Low
2	Access road public road to J5	Negligible	Negligible
3	Access road J5 to substation compound	Negligible	Negligible
4	Access road J6 to J9	Low	Low
5	Peat disposal area PDA1	Low	Low
6	Substation compound	Low	Low
7	T01	Low	Low
8	T02	Low	Negligible
9	T03	Low	Low
10	T04	Low	Negligible
11	T05	Low	Negligible
12	Access Road J9 to T01 location	Low	Negligible
13	Access Road J5 to J11	Low	Negligible
14	T06	Low	Negligible
15	Borrow Pit BP-A	Low	Negligible
16	T07	Low	Negligible
17	Access Road J9 to J11	Negligible	Negligible
18	Access Road J10 to J12	Low	Low
19	Access Road J12 to J13	Low	Low
20	Access Road J13 to T10	Low	Low
21	T08	Low	Low
22	T09	Low	Low
23	T10	Low	Low
24	Access Road J13 to J15	Low	Low
25	T11	Low	Low
26	Peat disposal area PDA2	Low	Low
27	Access Road J14 to T18	Low	Low
28	T18	Low	Low
29	Borrow Pit BP-D	Low	Negligible
30	Peat disposal area PDA3	Low	Low
31	T17	Low	Low
32	T16	Low	Low

33	Access Road J15 to J17	Low	Low
34	T14	Low	Low
35	Access Road J17 to T15	Low	Low
36	T15	Low	Low
37	Peat disposal area PDA4	Low	Low
38	Access Road J17 to J18	Low	Low
39	T12	Low	Low
40	Met Mast MM-A	Low	Low
41	T13	Low	Low
42	Peat disposal area PDA5	Low	Low
43	Amenity track	Negligible	Negligible

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

In all cases, the risk of peat instability is classified as “Low” to “Negligible” following the implementation of suitable and common-place mitigation measures. It is concluded that the site is suitable for the proposed wind farm development.

6. Deterministic peat and soft soil stability assessment

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

Stability of a peat slope is dependent on several factors working in combination. The main factors that influence peat stability are slope angle, shear strength of peat, depth of peat, pore water pressure, and loading conditions. An adverse combination of factors could potentially result in a peat slide. An adverse condition of one of the above-mentioned factors alone is unlikely to result in peat failure.

6.1. Methodology

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

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

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

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

Where:

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

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

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

Where:

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

γ = Bulk unit weight of material
z = Depth to failure plane assumed as depth of peat
γ_w = Unit weight of water
h_w = Height of water table above failure plane
β = Slope angle
φ' = Effective stress friction angle

6.2. Effects of weather events

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

6.3. Results and discussion

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

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

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

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

7. Summary and Conclusions

Ciaran Reilly & Associates has been instructed by TOBIN Consulting Engineers (TOBIN) on behalf of Bord na Mona to carry out a planning stage peat stability risk assessment (PSRA) as part of the environmental impact assessment for the proposed Oweninny Phase 3 wind farm site in the townlands of Bellacorrick, Srahnakilly, Laghtanvack, Croaghaun West, Moneynierin, Corvoderry, and Shanvodinnaun between Crossmolina and Bangor Erris in County Mayo.

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

Following application of mitigation measures, the findings of the planning stage PSRA indicate a "negligible" to "low" hazard ranking for instability related to the requirement for excavations on the site. The collapse is likely to be localised to each individual excavation as opposed to having an effect on the whole project. Common-place mitigation measures can be put in place during the detailed design and construction of the scheme to reduce the likelihood of an excavation collapsing. Possible mitigation measures include stepping or battering back of excavations to a safe angle (as determined through a detailed slope stability assessment by a competent temporary works designer) or construction of a temporary sheet pile wall or rock fill berm to support the peat during construction. It is concluded that the site is suitable for the proposed development.

Deterministic stability assessments indicate the that materials will be stable in the short (undrained) and long (drained) term, hence justifying the "low" to "negligible" hazard ranking assigned.

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

8. Recommendations

8.1. Detailed Design

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

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

8.2. Construction Phase:

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

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

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

8.3. Operation and Maintenance Phase:

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

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

9. Geotechnical Risk Register

The planning stage Geotechnical Risk Register is shown in Table 7. This should be updated in the detailed design phase.

Table 7 – Geotechnical risk assessment

Hazard	Risk	Consequence	Proposed mitigation
Peat instability.	Landslide, landslip.	Environmental incidents. Injury or death. Cost increases. Delays.	See Appendix 3: Peat Stability Risk Register.
Greater extent and/or thickness of peat or soil soils.	Greater depth of excavation and replacement may be required, hence greater risk of instability.	Cost increases. Delays. Environmental incidents. Injury or death.	Several rounds of ground investigation carried out to reduce uncertainty of peat depth. Infrastructure proposed in optimised locations based on results of all investigations. Additional ground investigation to be carried out where required during detailed design.
Strength of peat.	Greater risk of instability.	Cost increases. Delays. Environmental incidents.	Peat strength conservatively assessed. Peat will not be used to found permanent structures.
Compressibility of peat and soft clay and silt.	Greater risk of instability.	Cost increases. Delays.	Peat will not be used to found permanent structures.
Difficulties in excavation of peat.	Risk to operatives and machinery	Injury or death. Costs. Delays.	Competent temporary works designer to be engaged for design of peat excavation works.
Disposal of peat.	Instability of peat disposal areas.	Cost increases. Delays. Environmental incidents.	Assessment carried out considering max 1.0m peat disposal. Peat to be placed subject to temporary works design and under supervision of competent engineering personnel.
Flooding / surface water ingress.	Flooding of works	Injury or death Costs Delays	Risk of flooding to be communicated to detailed design phase.

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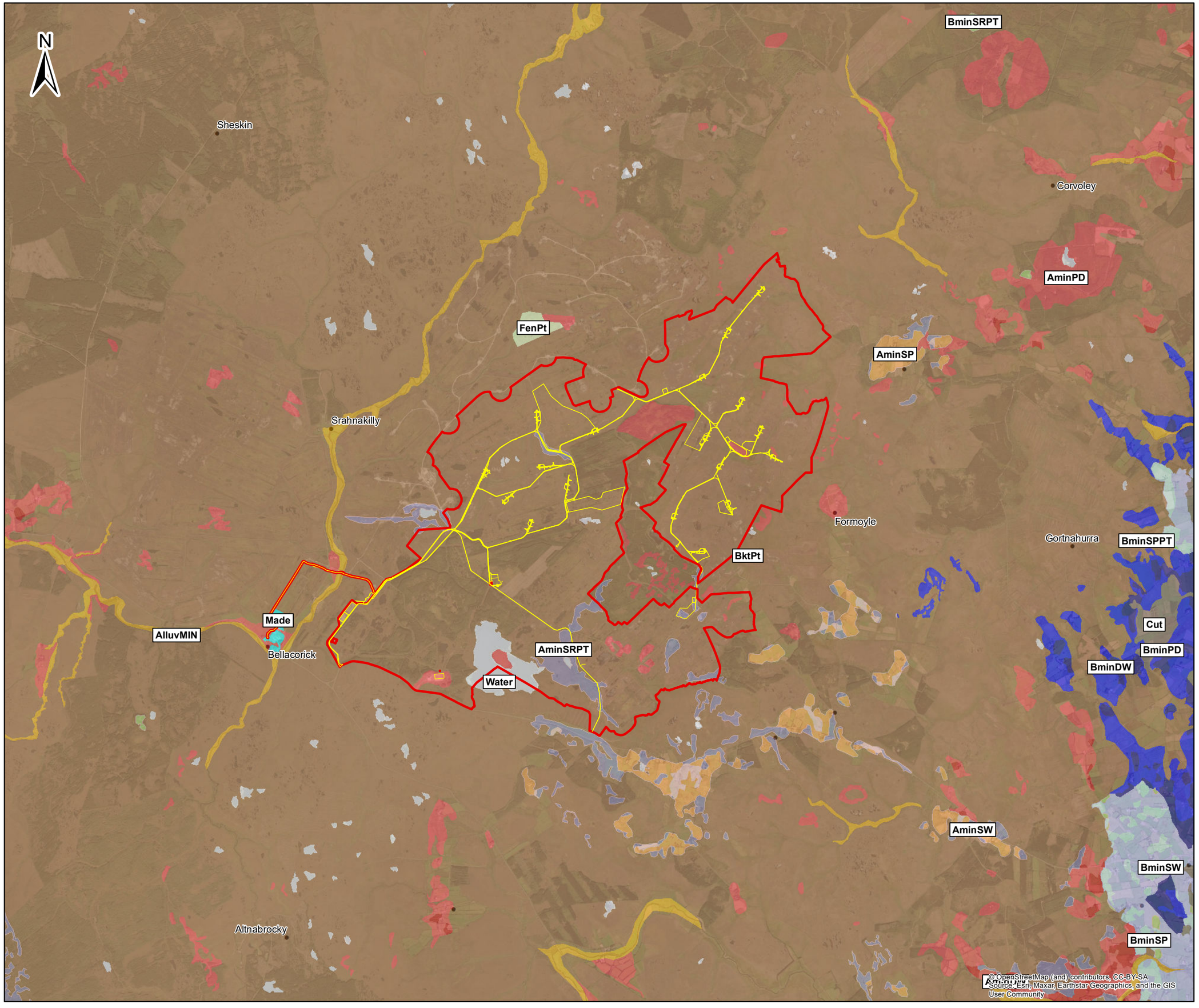
APPENDIX 1: GEOLOGICAL MAPPING & GROUND INVESTIGATION LOCATIONS



Legend

- Study Area
- Proposed Infrastructure

Soils

- AlluvMIN - Mineral alluvium
- AminDW - Acid Brown Earths / Brown Podzolics
- AminPD - Surface water Gleys / Ground water Gleys Acidic
- AminSP - Surface water Gleys / Ground water Gleys Shallow
- AminSRPT - Podzols Peaty
- AminSW - Lithosols / Regosols
- BktPt - Blanket peat
- BminDW - Grey Brown Podzolics / Brown Earths Basic
- BminPD - Surface water Gleys / Ground water Gleys Basic
- BminSP - Surface water Gleys / Ground water Gleys Shallow
- BminSPPT - Peaty Gleys Shallow
- BminSRPT - Lithosols Peats
- BminSW - Renzinas / Lithosols
- Cut - Raised Bog cutaway/cutover
- FenPT - Fen peat
- Made
- Water

0 0.5 1 1.5 2
Kilometres

NOTES

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D02	22/03/2023	Draft issue	S.P	J.D
D01	16/02/2023	Draft issue	S.P	J.D

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 9-2: Soils Map

Scale @ A3: 1:50,000

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

Project Director: D.Grehan

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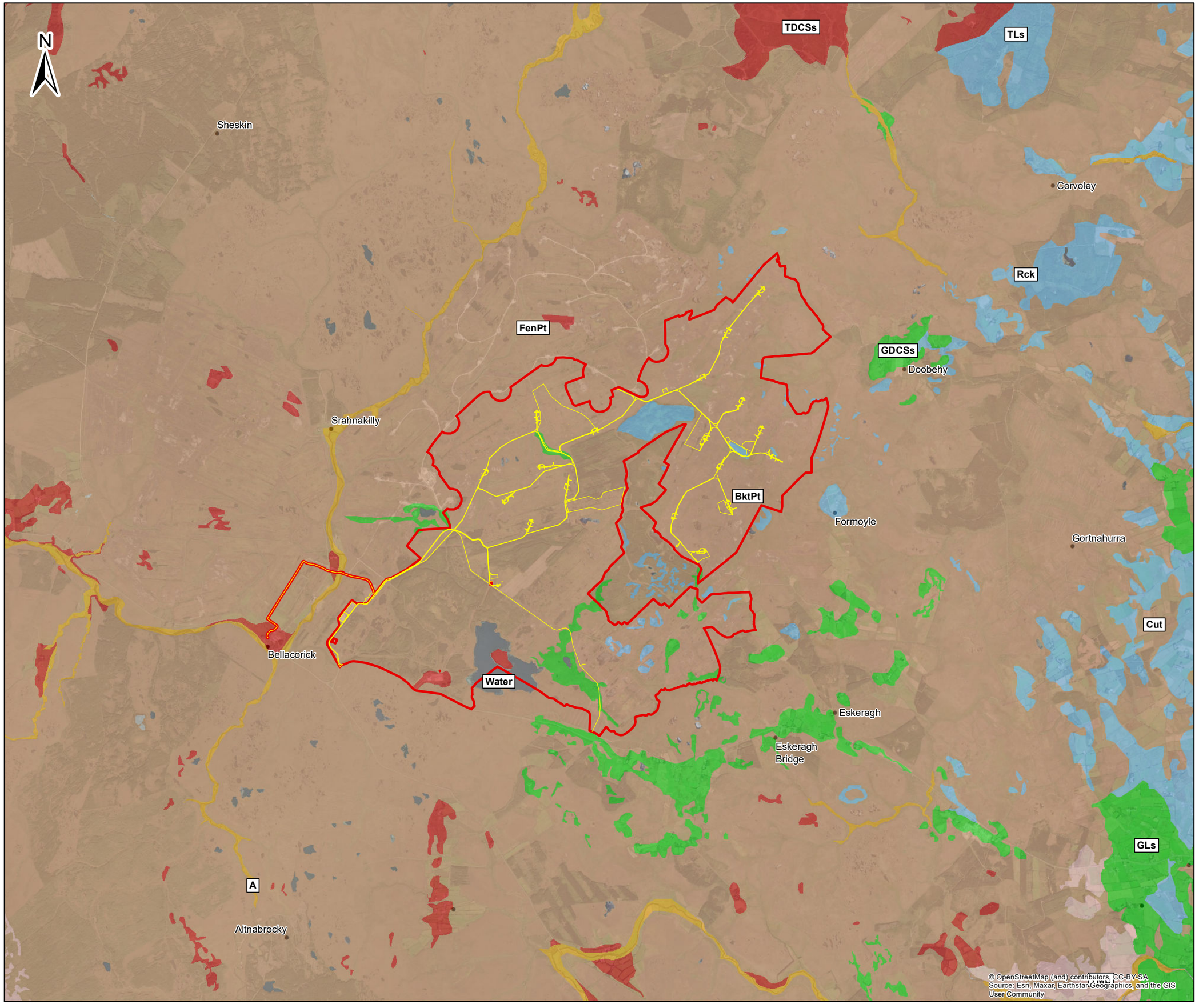

Legend

- Study Area
- Proposed Infrastructure

Subsoils

- A, Alluvium
- BktPt, Blanket Peat
- Cut, Cut over raised peat
- FenPt, Fen Peat
- GDCSs, Gravels derived from Devonian and Carboniferous sandstones
- GLs, Gravels derived from Limestones
- Rck, Bedrock outcrop or subcrop
- TDCSs, Till derived from Devonian and Carboniferous sandstones
- TLs, Till derived from limestones
- TMp, Till derived from Metamorphic rocks
- Water

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Kilometres

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Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 9-3: Subsoils Map

Scale @ A3: 1:50,000

Prepared by:	Checked:	Date:
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Project Director: D.Grehan

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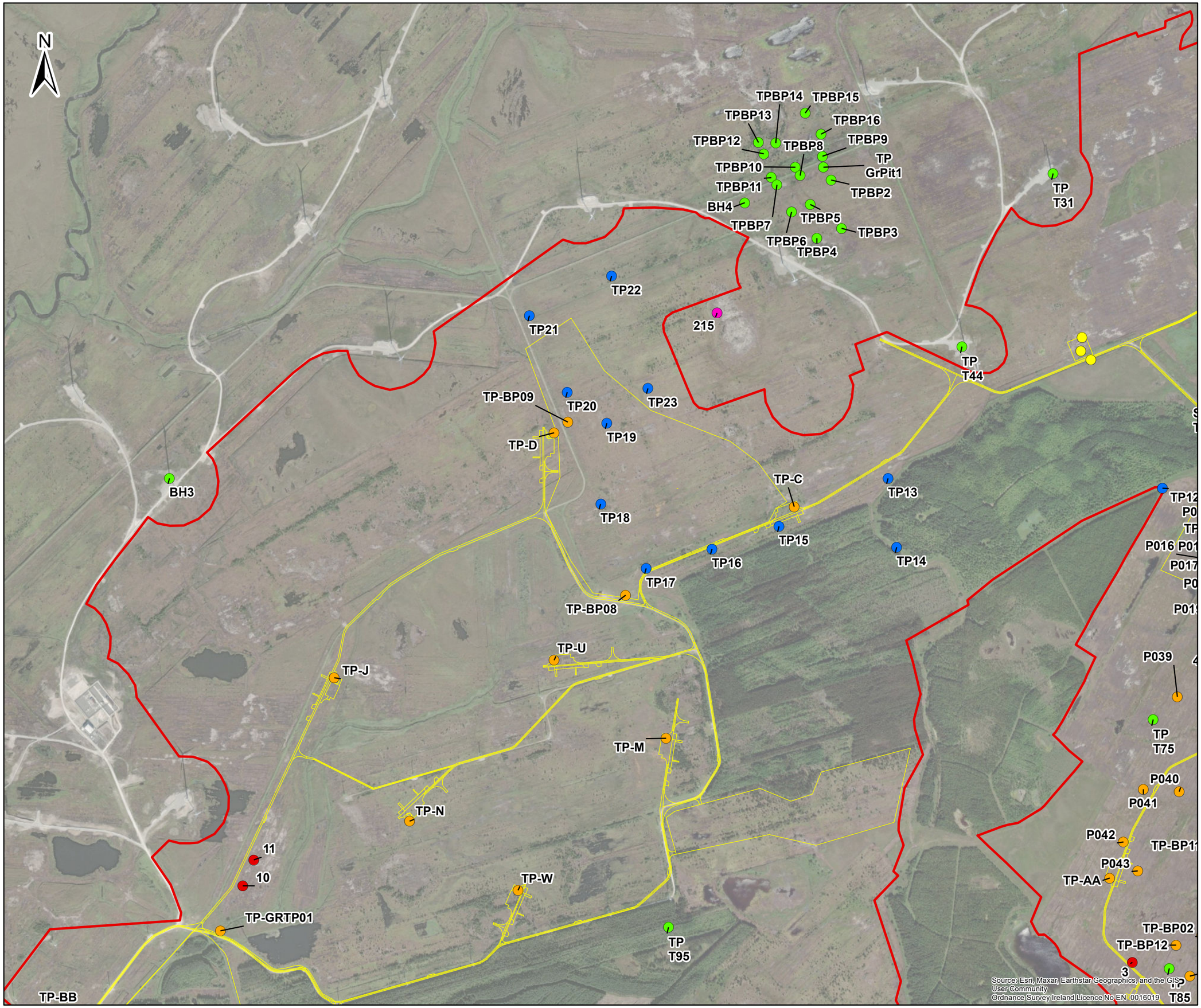

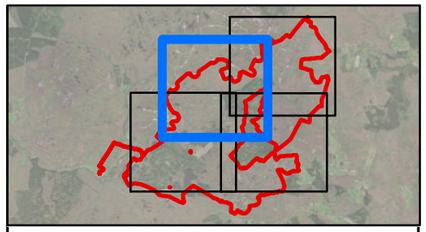

Legend

- Study Area
- Proposed Infrastructure
- Historical SI
- Phase 1 SI
- Phase 2 - Peat Depths
- Trial Pits - September 2021
- Trial Pits - August 2021
- Peat Probes - August 2021

0 150 300 450 600
Meters

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D01	16/02/2023	Draft issue	S.P	J.D

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 9-4 A Site Investigation Locations

Scale @ A3: 1:12,000

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

Project Director: D.Grehan

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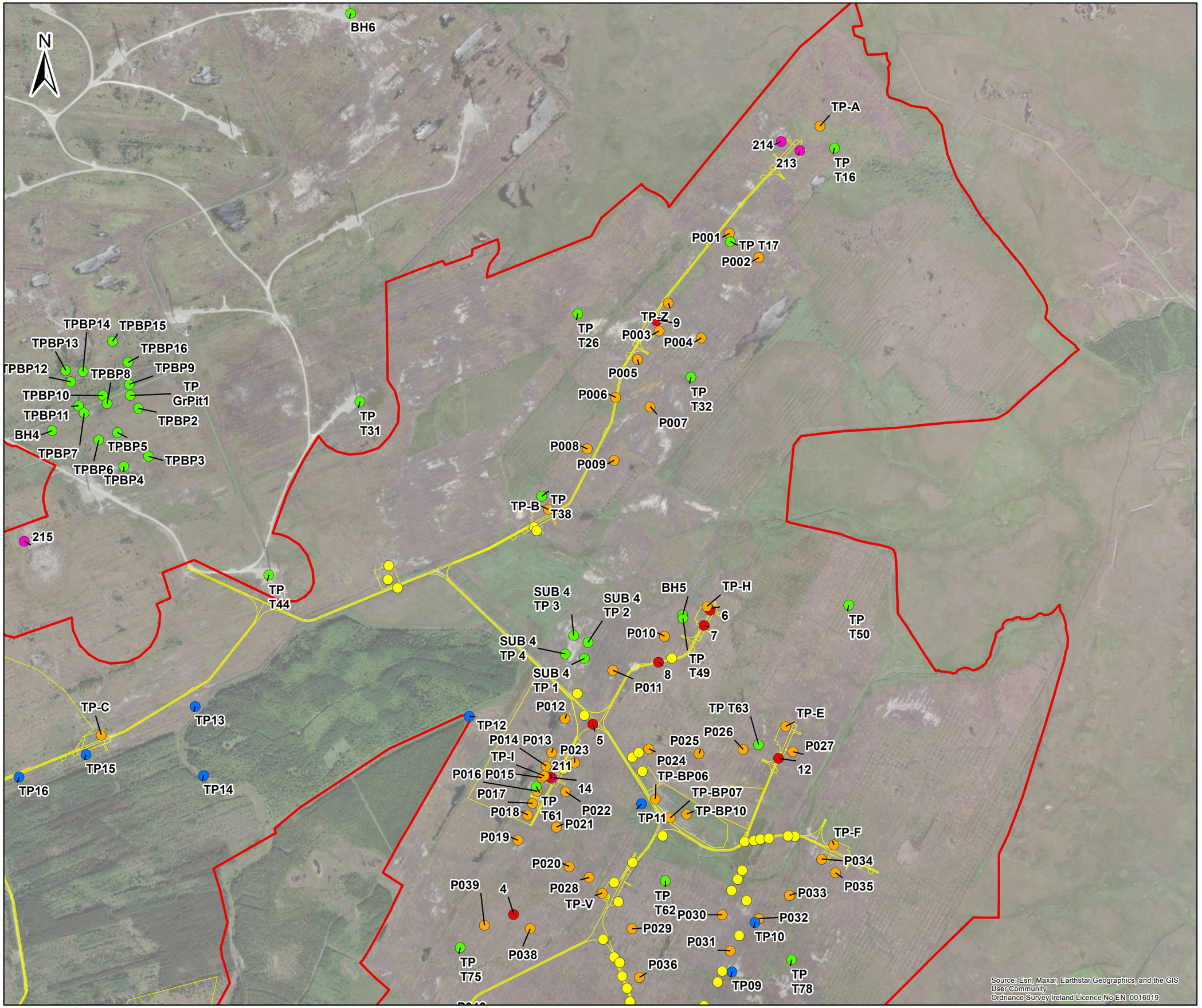

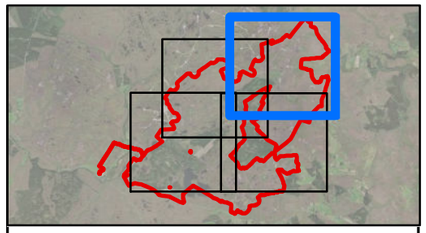

Legend

- Study Area
- Proposed Infrastructure
- Historical SI
- Phase 1 SI
- Phase 2 - Peat Depths
- Trial Pits - September 2021
- Trial Pits - August 2021
- Peat Probes - August 2021

0 150 300 450 600
Meters

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D01	16/02/2023	Draft issue	S.P	J.D

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 9-4 B Site Investigation Locations

Scale @ A3: 1:12,000

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Project Director: D.Grehan

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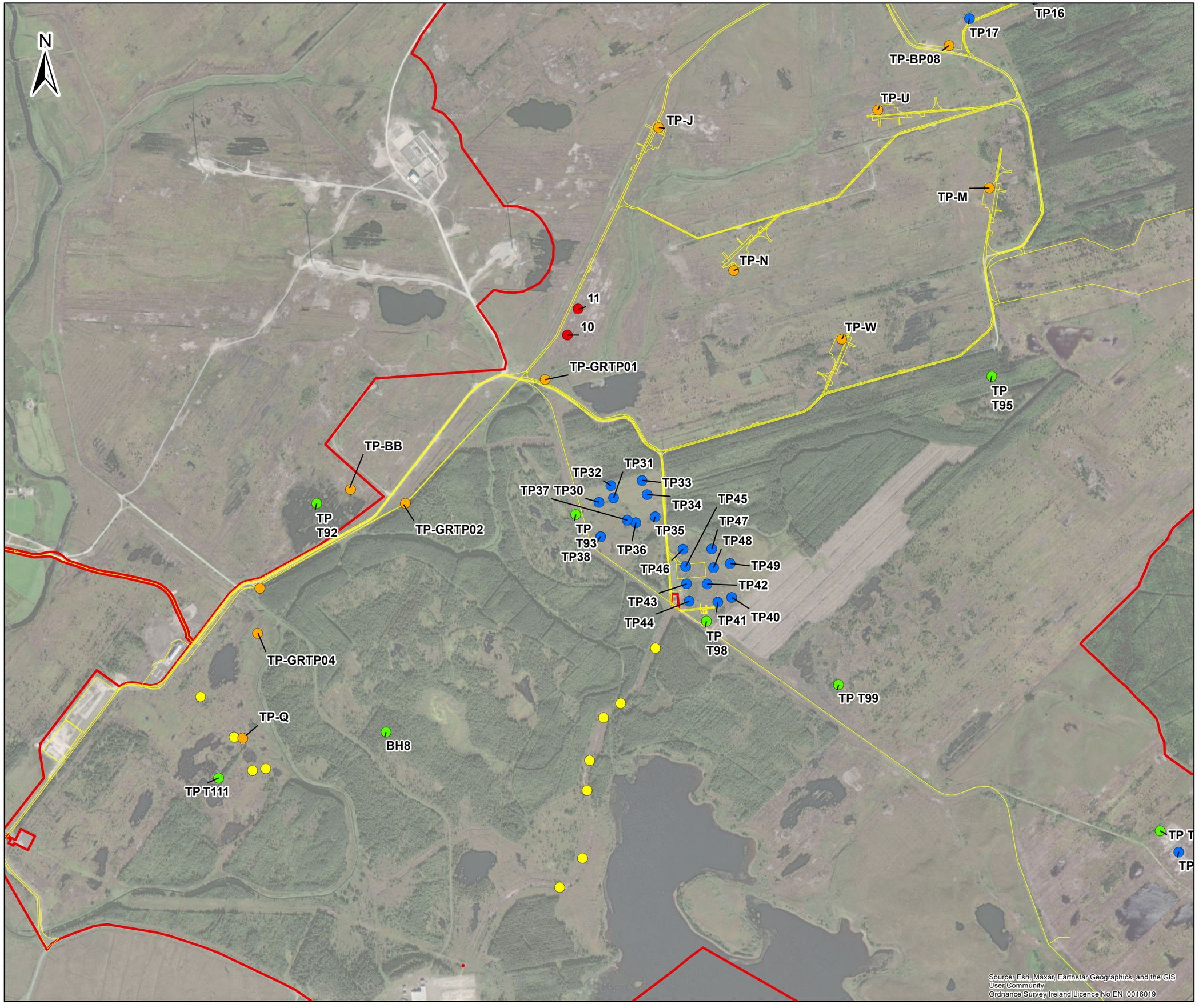

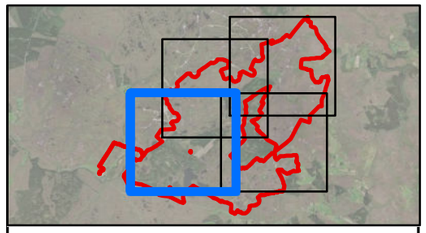

Legend

- Study Area
- Proposed Infrastructure
- Historical SI
- Phase 1 SI
- Phase 2 - Peat Depths
- Trial Pits - September 2021
- Trial Pits - August 2021
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0 150 300 450 600
Meters

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D01	16/02/2023	Draft issue	S.P	J.D
Issue	Date	Description	By	Chkd.

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 9-4 C Site Investigation Locations

Scale @ A3: 1:12,000

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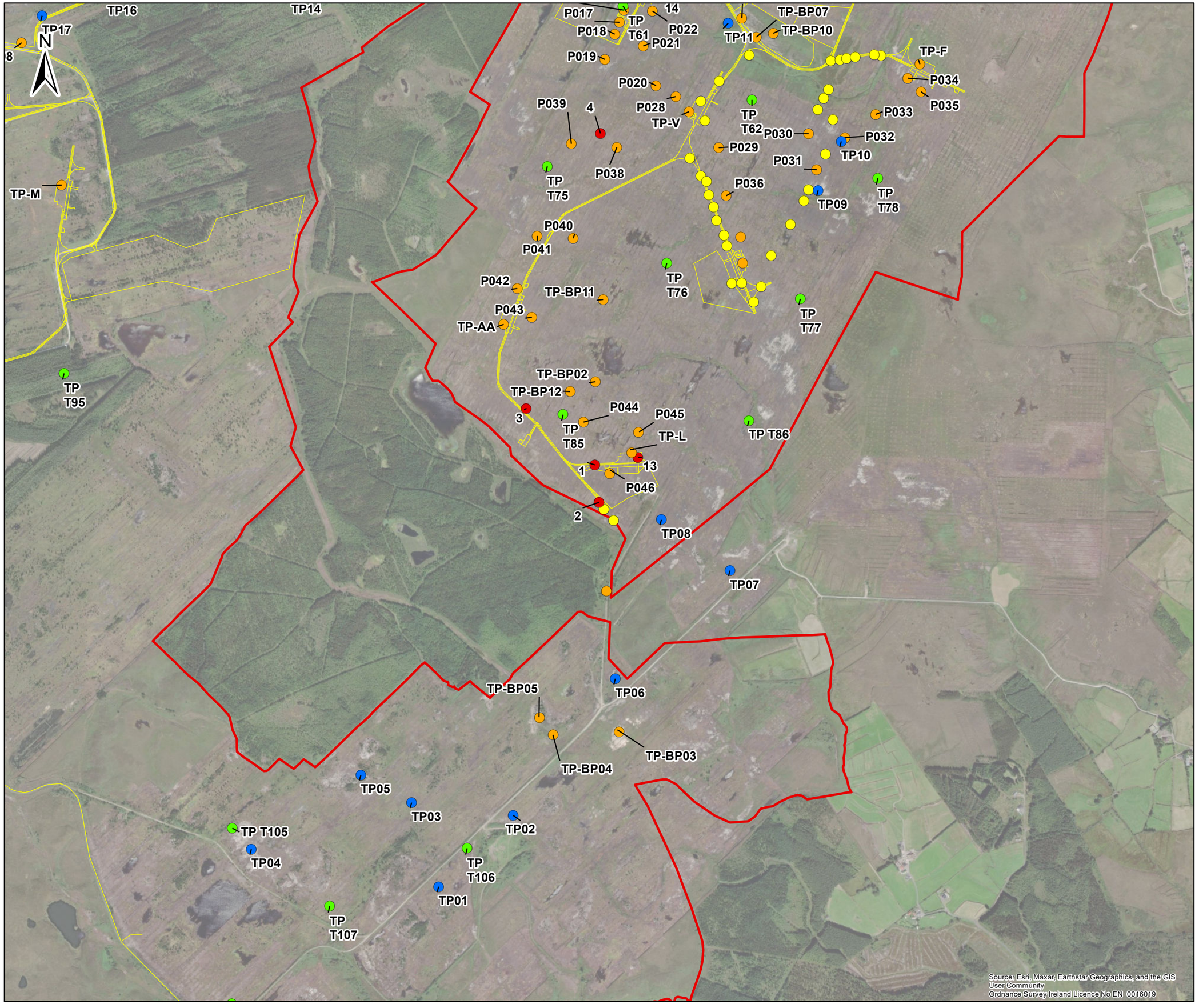

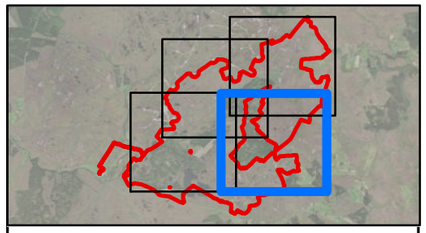

Legend

- Study Area
- Proposed Infrastructure
- Historical SI
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- Phase 2 - Peat Depths
- Trial Pits - September 2021
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0 150 300 450 600
Meters

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Client: Bord na Móna

Project:
Oweninny Wind Farm
Phase 3

Title:
Figure 9-4 D
Site Investigation Locations

Scale @ A3: 1:12,000

Prepared by:	Checked:	Date:
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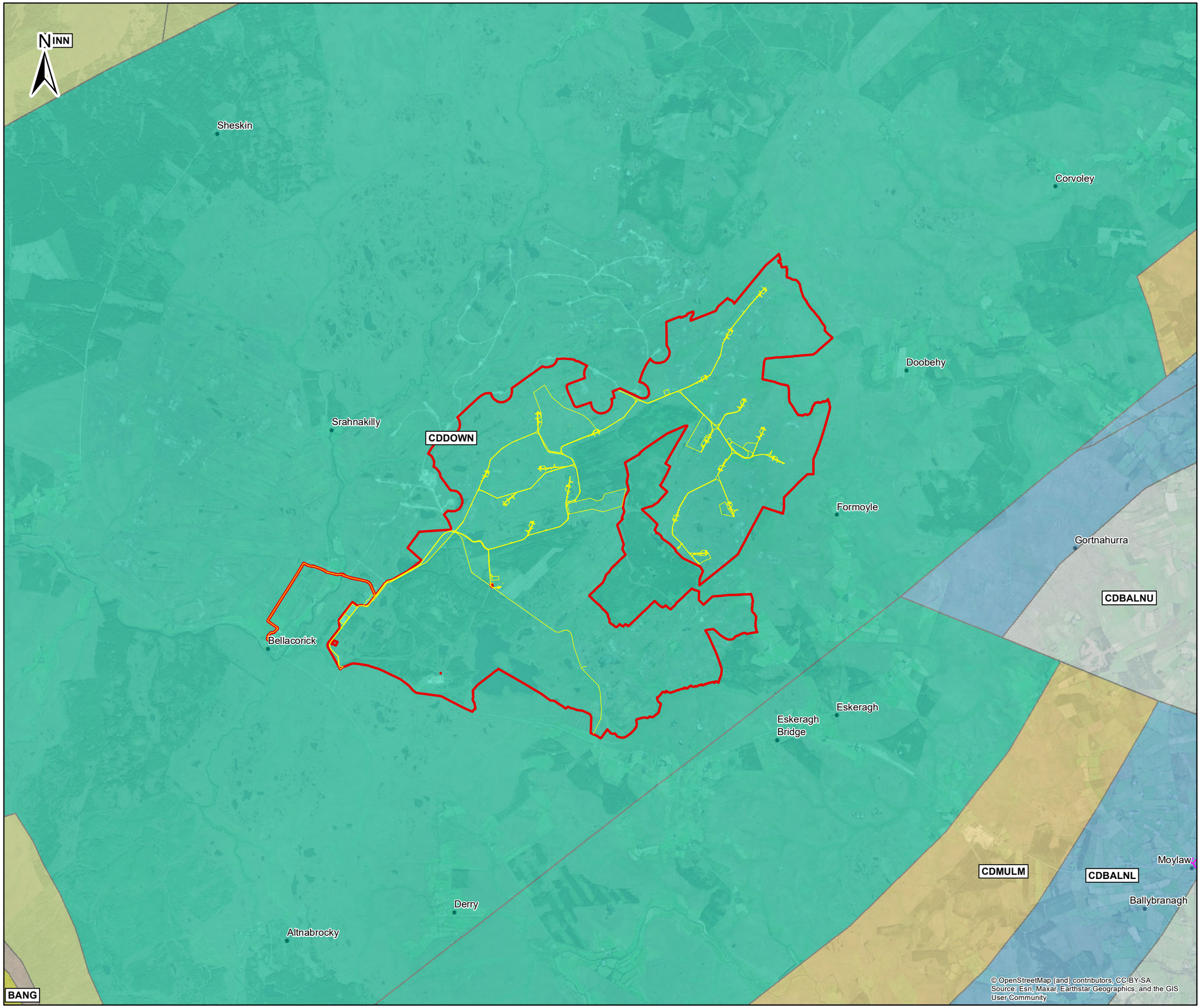

Legend

- Study Area
- Proposed Infrastructure

Bedrock Geology

- BANG - Bangor/Corslieve Formation
- CDBALNL - Ballina Limestone Formation (Lower)
- CDBALNU - Ballina Limestone Formation (Upper)
- CDDOWN - Downpatrick Formation
- CDMULM - Mullaghmore Sandstone Formation
- GLENR - Glencullin River Formation
- MINN - Minnaun Sandstone Formation

0 0.5 1 1.5 2
Kilometres

NOTES

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D01	16/02/2023	Draft issue	S.P	J.D

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 9-5: Regional Bedrock Geology, Mineral and Aggregate Resources

Scale @ A3: 1:50,000

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

Project Director: D.Grehan

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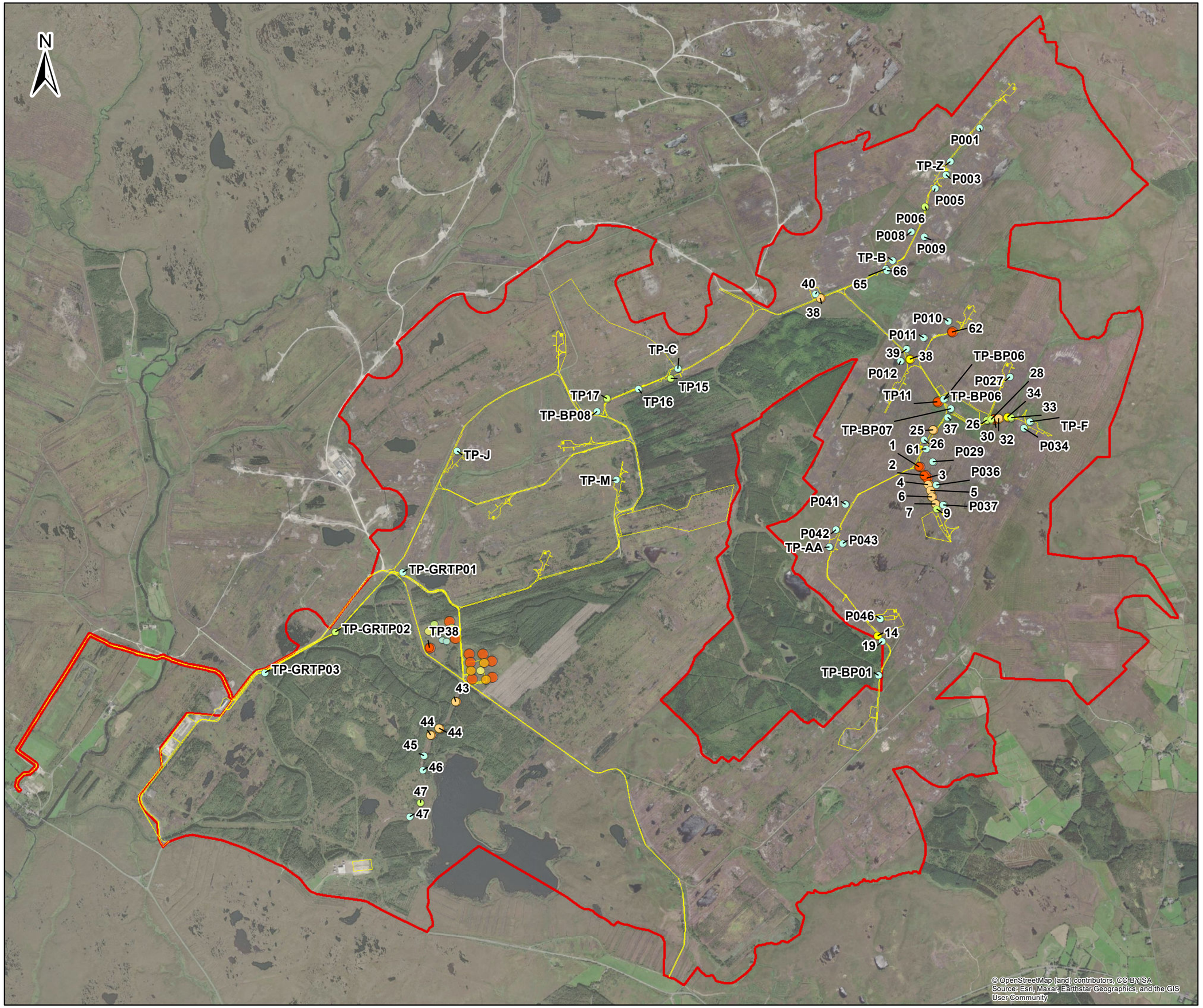

Legend

Study Area

Peat Depth (m)

- 0.0 - 0.3
- 0.4 - 1.0
- 1.1 - 1.7
- 1.8 - 2.5
- 2.6 - 3.7

0 0.25 0.5 0.75 1

Kilometres

NOTES

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

Issue	Date	Description	By	Chkd.
D02	22/03/2023	Draft issue	S.P	J.D
D01	16/02/2023	Draft issue	S.P	J.D

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 9-6: Peat Probes within 10m of Access Roads

Scale @ A3: 1:25,000

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

Project Director: D.Grehan

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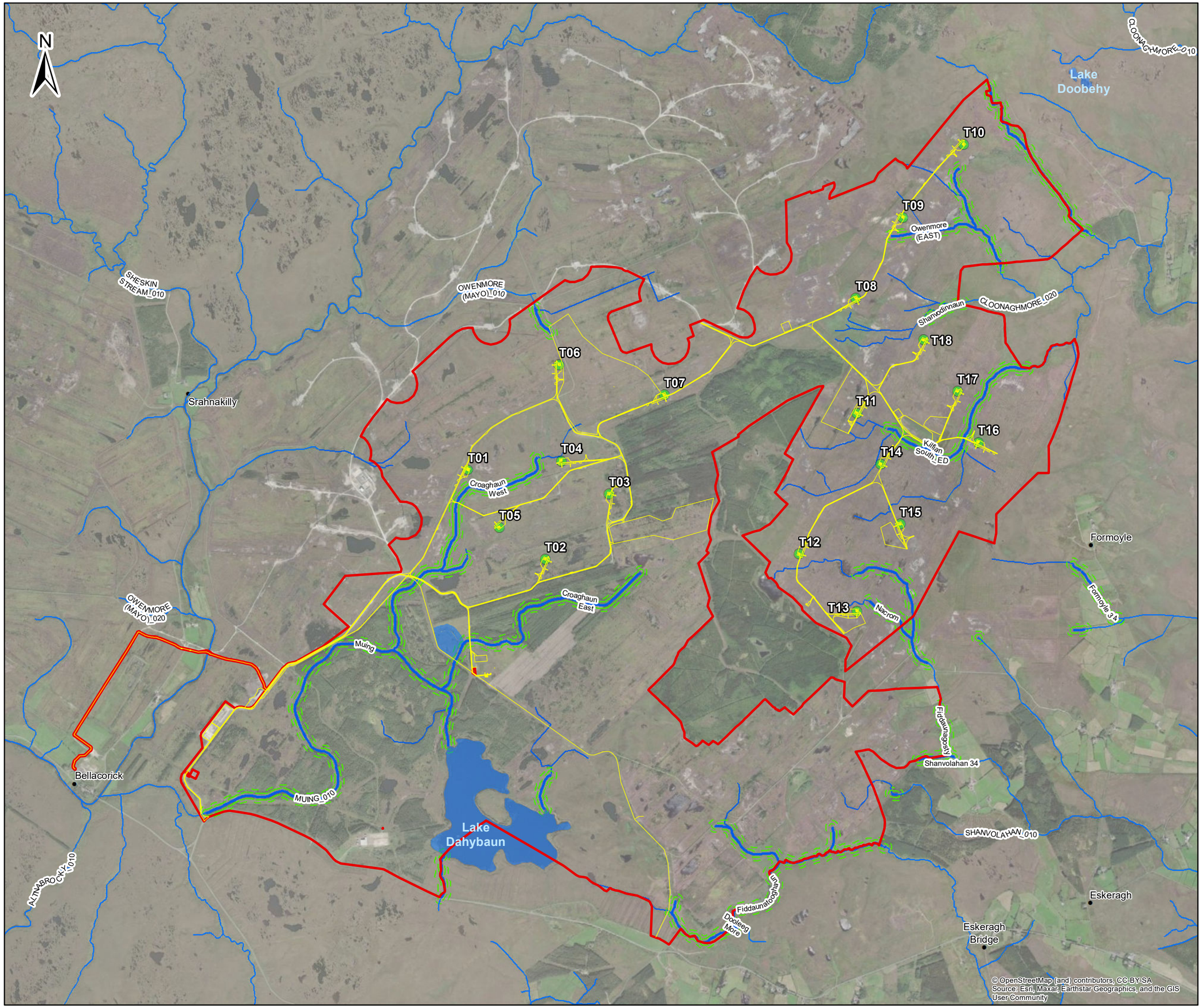
Draft: D02



Legend

- Study Area
- Proposed Turbine Locations
- Proposed Infrastructure
- Rivers
- Lakes
- 25 to 50m buffer from Rivers
- Site drains

0 0.25 0.5 0.75 1
Kilometres

NOTES

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Issue	Date	Description	By	Chkd.
D02	22/03/2023	Draft issue	S.P	J.D
D01	16/02/2023	Draft issue	S.P	J.D

Client: Bord na Móna

Project: Oweninny Wind Farm Phase 3

Title: Figure 11-2: Existing Surface Water Features and Drainage within the Site Boundary

Scale @ A3: 1:28,000

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

Project Director: D.Grehan

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Draft: D02

APPENDIX 2: PEAT STABILITY CALCULATIONS

Peat stability calculations for Oweninny Wind Farm Phase 3
Deterministic stability calculcation outputs
Undrained Case 1 and Case 2

Nr	Assessment area	Description	Relevant GI	$c_{u,fv,avg}$ kPa	Vane correction	$c_{u,k}$ kPa	$c_{u,d}$ kPa	Peat depth m	Slope (deg) deg	Surcharge m	Design surcharge m	Unit weight kN/m^3	Case 1 ODF	Case 2 ODF
1	Export 110kV grid cable	Cutaway peat, river crossing, mineral soil	BH1,BH11,BH12,TP5, etc. Bellacorrick Power Station	18	0.5	8.8	6.3	2.3	2.1	1	1.3	10	7.5	4.8
2	Access road public road to J5	Existing access road			0.5	-	-	-	-	1	1.3	10	-	-
3	Access road J5 to substation cc	Existing access road			0.5	-	-	-	-	1	1.3	10	-	-
4	Access road J6 to J9	Diversion off existing access road	TP-M, TP-W	26	0.5	10.0	7.1	0.9	2.0	1	1.3	10	23.1	9.5
5	Peat disposal area PDA1	Low lying cutover peat field	TP-M, TP-W	26	0.5	10.0	7.1	0.9	1.0	1	1.3	10	46.2	18.9
6	Substation compound	Low lying cutover peat field	TP40 to 49	20	0.5	10.0	7.1	3.7	2.0	1	1.3	10	5.6	4.1
7	T01	Cutaway peat adjacent railway track	TP-J	26	0.5	10.0	7.1	1.9	3.5	1	1.3	10	6.2	3.7
8	T02	Cutaway peat, partially forested	TP-W		0.5	10.0	7.1	0.5	2.0	1	1.3	10	40.8	11.3
9	T03	Cutaway peat	TP-M	29	0.5	10.0	7.1	0.9	4.0	1	1.3	10	11.4	4.7
10	T04	Cutaway peat	TP-U	20	0.5	10.0	7.1	0.9	1.0	1	1.3	10	44.6	18.3
11	T05	Cutaway peat	TP-N	23	0.5	10.0	7.1	0.8	0.7	1	1.3	10	76.9	29.3
12	Access Road J9 to T01 location	Partially existing access road	TP-J, TP-U, TP-N	25	0.5	10.0	7.1	1.9	4.1	1	1.3	10	5.3	3.2
13	Access Road J5 to J11	Partially existing railway bed	TP-GRTP01, TP-J, TP18	25	0.5	10.0	7.1	1.9	1.4	1	1.3	10	15.9	9.4
14	T06	Cutaway peat	TP-D, TP-BP09	20	0.5	10.0	7.1	0.9	3.6	1	1.3	10	12.8	5.2
15	Borrow Pit BP-A (Area 1)	Cutaway peat, mapping indicates gravels to south	TP15-TP23, TP-BP08, TP-BP09, TP-D	24	0.5	10.0	7.1	1.9	1.5	1	1.3	10	14.1	8.4
16	T07	Cutaway peat	TP15, TP-C		0.5	10.0	7.1	0.5	2.0	1	1.3	10	41.9	11.6
17	Access Road J9 to J11	Existing access road	TP-BP08		0.5	-	-		-	1	1.3	10	-	-
18	Access Road J10 to J12	Cutaway peat	TP15-TP17,TP-C,TP13,	28	0.5	10.0	7.1	0.9	2.4	1	1.3	10	18.8	7.7
19	Access Road J12 to J13	Cutaway peat & existing access track	P112-P117		0.5	10.0	7.1	2.4	1.9	1	1.3	10	8.9	5.8
20	Access Road J13 to T10	Wet cutaway peat	TP-A, TP-B, TP-Z, P001 to P009	26	0.5	10.0	7.1	1.8	2.2	1	1.3	10	10.2	5.9
21	T08	Wet cutaway peat	TP-B	33	0.5	10.0	7.1	1.8	1.5	1	1.3	10	15.3	8.9
22	T09	Wet cutaway peat	TP-Z, P003-P005.	24	0.5	10.0	7.1	1.2	2.7	1	1.3	10	12.7	6.1
23	T10	Wet cutaway peat	TP-A, P001, P002	17	0.5	8.7	6.2	1.45	2.59	1	1.3	10	9.5	5.0
24	Access Road J13 to J15	Existing access road, cutaway peat	P012,P024,P117-P120,TP11,TP-BP06,TP-BP07,TP-BP10		0.5	10.0	7.1	2.5	2.37	1	1.3	10	6.9	4.5
25	T11	Cutaway peat	P013-P019, P021-P023, TP-I		0.5	10.0	7.1	2.3	3.00	1	1.3	10	5.9	3.8
26	Peat disposal area PDA2	Cutaway peat	P013-P019, TP-I, TP12		0.5	10.0	7.1	2.3	1.80	1	1.3	10	9.9	6.3
27	Access Road J14 to T18	Cutaway peat	TP-H, P010, P011		0.5	10.0	7.1	3	2.93	1	1.3	10	4.7	3.3
28	T18	Cutaway peat	TP-H, P010, P011		0.5	10.0	7.1	3	3.02	1	1.3	10	4.5	3.2
29	Borrow Pit BP-D (Area 2)	Gravel high point	TP-BP10		0.5	-	-	0.2	-	1	1.3	10	-	-
30	Peat disposal area PDA3	Partly cutaway peat field	P134-P139, P026, P207,TP-E	19	0.5	9.6	6.8	3	3.04	1	1.3	10	4.3	3.0
31	T17	Partly cutaway peat field	P026, P027, TP-E	21	0.5	10.0	7.1	4.5	1.79	1	1.3	10	5.1	3.9
32	T16	Partly cutaway peat field	TP-F,P034, P035,	31	0.5	10.0	7.1	1	3.17	1	1.3	10	12.9	5.6
33	Access Road J15 to J17	Partial existing access road, partial cutaway peat field	TP-BP07, TP11, P121-P126, P029		0.5	10.0	7.1	3.2	2.14	1	1.3	10	6.0	4.3
34	T14	Partly cutaway peat field	P121-P127,TP-V,P028,P029	21	0.5	10.0	7.1	3.2	0.79	1	1.3	10	16.3	11.6
35	Access Road J17 to T15	Partly cutaway peat field	P029,P036,P037,TP-G		0.5	10.0	7.1	2.6	0.81	1	1.3	10	19.5	13.0
36	T15	Partly cutaway peat field	TP-G, P037		0.5	10.0	7.1	0.9	2.45	1	1.3	10	18.6	7.6
37	Peat disposal area PDA4	Partly cutaway peat field	TP-G, P037		0.5	10.0	7.1	0.9	1.23	1	1.3	10	36.9	15.1
38	Access Road J17 to J18	Partly cutaway peat field	P126-P132,P040-P044, TP-AA, TP-BP12	22	0.5	10.0	7.1	3.5	1.70	1	1.3	10	6.9	5.0
39	T12	Partly cutaway peat field	P043	19	0.5	9.3	6.6	2.7	1.68	1	1.3	10	8.4	5.7
40	Met Mast MM-A	Partly cutaway peat field	TP-BP12, P044,TP-AA, TP-BP02	17	0.5	8.4	6.0	2.7	1.71	1	1.3	10	7.4	5.0
41	T13	Partly cutaway peat field	TP08, P045, P046, TP-L	27	0.5	10.0	7.1	1.7	2.65	1	1.3	10	9.1	5.1
42	Peat disposal area PDA5	Partly cutaway peat field	TP08, P045, P046, TP-L	27	0.5	10.0	7.1	1.7	2.65	1	1.3	10	9.1	5.1
43	Amenity track	Existing access road			0.5	-	-	-	-	1	1.3	10	-	-

	Case 1	Case 2
Minimum	4.3	3.0
Average	16.3	7.7
Maximum	76.9	29.3

Notes:

Undrained shear strength of peat is limited to 10kPa (characteristic value) or local values if less than 10kPa.

Condition 1 relates to no surcharge loading.

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

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

A minimum slope of 0.5 degrees has been considered.

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

30/03/2023

Peat stability calculations for Oweninny Wind Farm Phase 3
Deterministic stability calculcation outputs
Drained Case 1 and Case 2

Nr	Assessment area	Description	Relevant GI	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	Export 110kV grid cable	Cutaway peat, river crossing, mineral soil	BH1,BH11,BH12,TP5, etc. Bellacorrick Power Station	30	24.8	2.0	1.4	2.3	2.3	2.1	1	1.3	10	1.94	5.79
2	Access road public road to J5	Existing access road									1	1.3	10	-	-
3	Access road J5 to substation cc	Existing access road									1	1.3	10	-	-
4	Access road J6 to J9	Diversion off existing access road	TP-M, TP-W	30	24.8	2.0	1.4	0.9	0.9	2.0	1	1.3	10	4.88	9.93
5	Peat disposal area PDA1	Low lying cutover peat field	TP-M, TP-W	30	24.8	2.0	1.4	0.9	0.9	1.0	1	1.3	10	9.74	19.85
6	Substation compound	Low lying cutover peat field	TP40 to 49	30	24.8	2.0	1.4	3.7	3.7	2.0	1	1.3	10	1.37	4.47
7	T01	Cutaway peat adjacent railway track	TP-J	30	24.8	2.0	1.4	1.9	1.9	3.5	1	1.3	10	1.38	3.89
8	T02	Cutaway peat, partially forested	TP-W	30	24.8	2.0	1.4	0.5	0.5	2.0	1	1.3	10	8.41	11.85
9	T03	Cutaway peat	TP-M	30	24.8	2.0	1.4	0.9	0.9	4.0	1	1.3	10	2.41	4.90
10	T04	Cutaway peat	TP-U	30	24.8	2.0	1.4	0.9	0.9	1.0	1	1.3	10	9.42	19.20
11	T05	Cutaway peat	TP-N	30	24.8	2.0	1.4	0.8	0.8	0.7	1	1.3	10	16.14	30.77
12	Access Road J9 to T01 location	Partially existing access road	TP-J, TP-U, TP-N	30	24.8	2.0	1.4	1.9	1.9	4.1	1	1.3	10	1.19	3.36
13	Access Road J5 to J11	Partially existing railway bed	TP-GRTP01, TP-J, TP18	30	24.8	2.0	1.4	1.9	1.9	1.4	1	1.3	10	3.55	10.04
14	T06	Cutaway peat	TP-D, TP-BP09	30	24.8	2.0	1.4	0.9	0.9	3.6	1	1.3	10	2.69	5.48
15	Borrow Pit BP-A	Cutaway peat, mapping indicates gravels to south	TP15-TP23, TP-BP08, TP-BP09, TP-D	30	24.8	2.0	1.4	1.9	1.9	1.5	1	1.3	10	3.14	8.89
16	T07	Cutaway peat	TP15, TP-C	30	24.8	2.0	1.4	0.5	0.5	2.0	1	1.3	10	8.64	12.18
17	Access Road J9 to J11	Existing access road	TP-BP08								1	1.3	10	-	-
18	Access Road J10 to J12	Cutaway peat	TP15-TP17,TP-C,TP13,	30	24.8	2.0	1.4	0.9	0.9	2.4	1	1.3	10	3.97	8.09
19	Access Road J12 to J13	Cutaway peat & existing access track	P112-P117	30	24.8	2.0	1.4	2.4	2.4	1.9	1	1.3	10	2.05	6.19
20	Access Road J13 to T10	Wet cutaway peat	TP-A, TP-B, TP-Z, P001 to P009	30	24.8	2.0	1.4	1.8	1.8	2.2	1	1.3	10	2.27	6.31
21	T08	Wet cutaway peat	TP-B	30	24.8	2.0	1.4	1.8	1.8	1.5	1	1.3	10	3.41	9.46
22	T09	Wet cutaway peat	TP-Z, P003-P005.	30	24.8	2.0	1.4	1.2	1.2	2.7	1	1.3	10	2.74	6.45
23	T10	Wet cutaway peat	TP-A, P001, P002	30	24.8	2.0	1.4	1.45	1.45	2.59	1	1.3	10	2.38	6.08
24	Access Road J13 to J15	Existing access road, cutaway peat	P012,P024,P117-P120,TP11,TP-BP06,TP-BP07,TP-BP10	30	24.8	2.0	1.4	2.5	2.5	2.37	1	1.3	10	1.59	4.86
25	T11	Cutaway peat	P013-P019, P021-P023, TP-I	30	24.8	2.0	1.4	2.3	2.3	3.00	1	1.3	10	1.36	4.05
26	Peat disposal area PDA2	Cutaway peat	P013-P019, TP-I, TP12	30	24.8	2.0	1.4	2.3	2.3	1.80	1	1.3	10	2.25	6.74
27	Access Road J14 to T18	Cutaway peat	TP-H, P010, P011	30	24.8	2.0	1.4	3	3	2.93	1	1.3	10	1.11	3.50
28	T18	Cutaway peat	TP-H, P010, P011	30	24.8	2.0	1.4	3	3	3.02	1	1.3	10	1.07	3.39
29	Borrow Pit BP-D	Gravel high point	TP-BP10					0.2	0.2		1	1.3	10	-	-
30	Peat disposal area PDA3	Partly cutaway peat field	P134-P139, P026, P207,TP-E	30	24.8	2.0	1.4	3	3	3.04	1	1.3	10	1.07	3.37
31	T17	Partly cutaway peat field	P026, P027, TP-E	30	24.8	2.0	1.4	4.5	4.5	1.79	1	1.3	10	1.30	4.32
32	T16	Partly cutaway peat field	TP-F,P034, P035,	30	24.8	2.0	1.4	1	1	3.17	1	1.3	10	2.75	5.91
33	Access Road J15 to J17	Partial existing access road, partial cutaway peat field	TP-BP07, TP11, P121-P126, P029	30	24.8	2.0	1.4	3.2	3.2	2.14	1	1.3	10	1.43	4.60
34	T14	Partly cutaway peat field	P121-P127,TP-V,P028,P029	30	24.8	2.0	1.4	3.2	3.2	0.79	1	1.3	10	3.89	12.49
35	Access Road J17 to T15	Partly cutaway peat field	P029,P036,P037,TP-G	30	24.8	2.0	1.4	2.6	2.6	0.81	1	1.3	10	4.53	13.96
36	T15	Partly cutaway peat field	TP-G, P037	30	24.8	2.0	1.4	0.9	0.9	2.45	1	1.3	10	3.92	7.98
37	Peat disposal area PDA4	Partly cutaway peat field	TP-G, P037	30	24.8	2.0	1.4	0.9	0.9	1.23	1	1.3	10	7.78	15.86
38	Access Road J17 to J18	Partly cutaway peat field	P126-P132,P040-P044, TP-AA, TP-BP12	30	24.8	2.0	1.4	3.5	3.5	1.70	1	1.3	10	1.67	5.43
39	T12	Partly cutaway peat field	P043	30	24.8	2.0	1.4	2.7	2.7	1.68	1	1.3	10	2.11	6.55
40	Met Mast MM-A	Partly cutaway peat field	TP-BP12, P044,TP-AA, TP-BP02	30	24.8	2.0	1.4	2.7	2.7	1.71	1	1.3	10	2.06	6.41
41	T13	Partly cutaway peat field	TP08, P045, P046, TP-L	30	24.8	2.0	1.4	1.7	1.7	2.65	1	1.3	10	2.01	5.46
42	Peat disposal area PDA5	Partly cutaway peat field	TP08, P045, P046, TP-L	30	24.8	2.0	1.4	1.7	1.7	2.65	1	1.3	10	2.01	5.46
43	Amenity track	Existing access road									1	1.3	10	-	-

	Case 1	Case 2
Minimum	1.1	3.4
Average	3.6	8.3
Maximum	16.1	30.8

Notes:

Characteristic drained shear strength of peat used.

Condition 1 relates to no surcharge loading.

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

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

A minimum slope of 0.5 degrees has been considered.

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

30/03/2023

APPENDIX 3: PEAT STABILITY RISK REGISTER

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 1
Location: Export 110kV grid cable

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat, river crossing, mineral soil	4	5	**20**	3	4	**12**
Peat depth & condition	BH1: 0.6m peat over silty SAND and GRAVEL, BH11: 0.53m peat, TP5: 0.3m peat, TP11: 0.6m peat, BH12: 0.46m peat	4	4	**16**	3	4	**12**
Peat strength (kPa)	8.8	2	4	**8**	2	4	**8**
Topography							
Elevation (mOD)	75 to 90	2	3	**6**	1	2	**2**
Slope angle (deg.)	2 to 3	2	3	**6**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low / moderately low	3	3	**9**	2	2	**4**
Hydrology							
Distance from watercourse	Crosses watercourse	4	4	**16**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	3	**3**
Quantative assessment							
FOS - drained	1.9	2	4	**8**	2	3	**6**
FOS - undrained	4.8						
Total (pre / post control measures)				**107**			70
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**10**			6
Overall hazard ranking				**Low**			**Low**

Control Measures	
1	Develop design stage Peat Stability Risk Assessment.
2	Maintain hydrology of area as far as possible.
3	Minimise depth of dig for cable ducting where possible.
4	Use existing bridge for cable route if possible - avoid excavations in river bank or river bed.
5	Installation of interceptor drains upslope of works to divert any surface water away from cable route
6	Use of experienced geotechnical staff for detailed design & temporary works design.
7	Engage experienced contractors and trained operatives to carry out the work.

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 2
Location: Access road public road to J5

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Existing access road	2	4	**8**	2	2	**4**
Peat depth & condition	-	1	1	**1**	1	1	**1**
Peat strength (kPa)	-	1	1	**1**	1	1	**1**
Topography							
Elevation (mOD)	75 to 85	2	3	**6**	1	2	**2**
Slope angle (deg.)	N/A	2	3	**6**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low / moderately low	3	3	**9**	2	2	**4**
Hydrology							
Distance from watercourse	< 50m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	2	2	**4**	2	2	**4**
Evidence of subsurface flow	No	1	2	**2**	1	2	**2**
Quantative assessment							
FOS - drained	-	1	1	**1**	1	1	**1**
FOS - undrained	-						
Total (pre / post control measures)				**48**			**31**
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**4**			**3**
Overall hazard ranking				**Negligible**			**Negligible**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 3
Location: Access road J5 to substation compound

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Existing access road	2	4	**8**	2	2	**4**
Peat depth & condition	-	1	1	**1**	1	1	**1**
Peat strength (kPa)	-	1	1	**1**	1	1	**1**
Topography							
Elevation (mOD)	75 to 85	2	3	**6**	1	2	**2**
Slope angle (deg.)	N/A	2	3	**6**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	< 50m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	2	2	**4**	2	2	**4**
Evidence of subsurface flow	No	1	2	**2**	1	2	**2**
Quantative assessment							
FOS - drained	-	1	1	**1**	1	1	**1**
FOS - undrained	-						
Total (pre / post control measures)				**43**			**31**
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**4**			**3**
Overall hazard ranking				**Negligible**			**Negligible**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 4
Location: Access road J6 to J9

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Diversion off existing access road	4	5	**20**	3	4	**12**
Peat depth & condition	TP-M found 0.9 of peat, TP-W found 0.2m of peat	4	4	**16**	3	4	**12**
Peat strength (kPa)	10.0	2	4	**8**	2	4	**8**
Topography							
Elevation (mOD)	75 to 90	2	3	**6**	1	2	**2**
Slope angle (deg.)	2.0	3	3	**9**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	>150m	3	3	**9**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	2	**4**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	4.9	2	3	**6**	2	2	**4**
FOS - undrained	9.5						
Total (pre / post control measures)				**96**			60
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**9**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 5
Location: Peat disposal area PDA1

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Low lying cutover peat field	3	3	**9**	3	2	**6**
Peat depth & condition	TP-M found 0.9 of peat, TP-W found 0.2m of peat	2	3	**6**	2	2	**4**
Peat strength (kPa)	10.0	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	90 to 100	3	3	**9**	2	2	**4**
Slope angle (deg.)	1.0	3	3	**9**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low / moderately low	3	2	**6**	2	2	**4**
Hydrology							
Distance from watercourse	< 100m	3	4	**12**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	9.7	2	2	**4**	2	2	**4**
FOS - undrained	18.9						
Total (pre / post control measures)				**79**			**53**
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**7**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 6
Location: Substation compound

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Low lying cutover peat field	3	3	**9**	3	2	**6**
Peat depth & condition	TPs fround 1.5 to 3.7 peat over clay, sand & gravel	3	3	**9**	2	3	**6**
Peat strength (kPa)	10.0	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	80 to 85	2	3	**6**	2	2	**4**
Slope angle (deg.)	2.0	3	3	**9**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	< 100m	3	4	**12**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	1.4	4	3	**12**	3	2	**6**
FOS - undrained	4.1						
Total (pre / post control measures)			**85**			**57**	
Max possible			**275**			**275**	
Overall hazard assessment (pre / post control measures)			**8**			**5**	
Overall hazard ranking			**Low**			**Low**	

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 7
Location: T01

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat adjacent railway track	3	3	**9**	3	2	**6**
Peat depth & condition	TP-J found 1.9m PEAT over firm SILT	3	3	**9**	2	3	**6**
Peat strength (kPa)	10.0	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	80 to 90	2	3	**6**	2	2	**4**
Slope angle (deg.)	3.5	3	3	**9**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	< 100m	3	4	**12**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	1.4	4	3	**12**	3	2	**6**
FOS - undrained	3.7						
Total (pre / post control measures)			**85**			**57**	
Max possible			**275**			**275**	
Overall hazard assessment (pre / post control measures)			**8**			**5**	
Overall hazard ranking			**Low**			**Low**	

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 8
Location: T02

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat, partially forested	3	3	**9**	3	2	**6**
Peat depth & condition	TP-W found 0.2m of PEAT over soft to firm SILT	2	2	**4**	2	2	**4**
Peat strength (kPa)	10.0	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	80 to 90	2	3	**6**	2	2	**4**
Slope angle (deg.)	2.0	3	3	**9**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	3	3	**9**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	8.4	2	3	**6**	2	2	**4**
FOS - undrained	11.3						
Total (pre / post control measures)				**71**			48
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	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 9
Location: T03

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat	3	3	**9**	3	2	**6**
Peat depth & condition	TP-M found 0.9m of PEAT over firm SILT	2	3	**6**	2	2	**4**
Peat strength (kPa)	10.0	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	85 to 95	3	3	**9**	2	2	**4**
Slope angle (deg.)	4.0	4	3	**12**	3	2	**6**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	2.4	2	3	**6**	2	2	**4**
FOS - undrained	4.7						
Total (pre / post control measures)			**74**			50	
Max possible			**275**			**275**	
Overall hazard assessment (pre / post control measures)			**7**			5	
Overall hazard ranking			**Low**			**Low**	

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 10
Location: T04

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat	3	3	**9**	3	2	**6**
Peat depth & condition	TP-U found 0.9m of PEAT over soft SILT	2	3	**6**	2	2	**4**
Peat strength (kPa)	10.0	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	85 to 90	3	3	**9**	2	2	**4**
Slope angle (deg.)	1.0	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	100 - 150m	3	2	**6**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	9.4	2	2	**4**	2	2	**4**
FOS - undrained	18.3						
Total (pre / post control measures)				**66**			**48**
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	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 11
Location: T05

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat	3	3	**9**	3	2	**6**
Peat depth & condition	TP-N found 0.8m of PEAT over soft SILT	2	3	**6**	2	2	**4**
Peat strength (kPa)	10.0	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	80 to 85	2	2	**4**	2	2	**4**
Slope angle (deg.)	0.7	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	100 - 150m	3	2	**6**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	16.1	2	2	**4**	2	2	**4**
FOS - undrained	29.3						
Total (pre / post control measures)				**61**			48
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	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 12
Location: Access Road J9 to T01 location

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partially existing access road	2	2	**4**	2	2	**4**
Peat depth & condition	TP-J found 1.9m PEAT over firm SILT, TP-U found 0.9m of PEAT over soft SILT, TP-N found 0.8m of PEAT over soft SILT	3	3	**9**	2	2	**4**
Peat strength (kPa)	10.0	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	85 to 100m	3	2	**6**	2	2	**4**
Slope angle (deg.)	4.1	4	3	**12**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	1.2	3	3	**9**	2	2	**4**
FOS - undrained	3.2						
Total (pre / post control measures)			**72**			46	
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	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from access road construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Inspection regime for access roads during works.

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 13
Location: Access Road J5 to J11

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partially existing railway bed	2	2	**4**	2	2	**4**
Peat depth & condition	TP-GRTP01 found 1.4m of PEAT over firm SILT, TP-J found 1.9m PEAT over firm SILT, TP18 found 0.4m of PEAT over firm to stiff CLAY	3	3	**9**	2	2	**4**
Peat strength (kPa)	10.0	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	80 to 95m	3	2	**6**	2	2	**4**
Slope angle (deg.)	1.4	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	< 50m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	3.6	3	3	**9**	2	2	**4**
FOS - undrained	9.4						
Total (pre / post control measures)				**64**			46
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	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from access road construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.
6	Inspection regime for access roads during works.

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 14
Location: T06

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat	3	3	**9**	2	2	**4**
Peat depth & condition	TP-D found 0.9m PEAT over SAND, TP-BP09 found 0.8m PEAT over SAND	2	2	**4**	2	2	**4**
Peat strength (kPa)	10.0	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	95 to 100m	3	2	**6**	2	2	**4**
Slope angle (deg.)	3.6	3	3	**9**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	2.7	2	2	**4**	2	2	**4**
FOS - undrained	5.2						
Total (pre / post control measures)				**64**			46
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	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from turbine construction area.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 15
Location: Borrow Pit BP-A (Area 1)

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat, mapping indicates gravels to south	2	2	**4**	2	2	**4**
Peat depth & condition	TP15-TP23 found 0.1 to 1.0 to PEAT over mineral soil, TP-BP08 found Made Ground of sand to 0.8m bgl over PEAT to 1.9m. TP-D found 0.9m PEAT over SAND, TP-BP09 found 0.8m PEAT over SAND	2	2	**4**	2	2	**4**
Peat strength (kPa)	10.0	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	90 to 100m	3	2	**6**	2	2	**4**
Slope angle (deg.)	1.5	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	< 50m	3	3	**9**	2	3	**6**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	3.1	2	2	**4**	2	2	**4**
FOS - undrained	8.4						
Total (pre / post control measures)				**59**			48
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**5**			**4**
Overall hazard ranking				**Low**			**Negligible**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 16
Location: T07

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat	3	3	**9**	2	2	**4**
Peat depth & condition	TP15 found 0.4m PEAT over GRAVEL, TP-C found 0.2m PEAT over soft SILT	2	2	**4**	2	2	**4**
Peat strength (kPa)	10.0	2	3	**6**	2	3	**6**
Topography							
Elevation (mOD)	95 to 100m	3	2	**6**	2	2	**4**
Slope angle (deg.)	2.0	3	2	**6**	2	2	**4**
Evidence of previous slips	No	2	3	**6**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	8.6	2	2	**4**	2	2	**4**
FOS - undrained	11.6						
Total (pre / post control measures)				**61**			46
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	Maintain hydrology of area as far as possible.
3	Installation of interceptor drains upslope of works to divert any surface water away from borrow pit.
4	Use of experienced geotechnical staff for detailed design & temporary works design.
5	Engage experienced contractors and trained operatives to carry out the work.

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 17
Location: Access Road J9 to J11

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Existing access road	2	2	**4**	2	2	**4**
Peat depth & condition	TP-BP08 found Made Ground of sand to 0.8m bgl over PEAT to 1.9m	2	2	**4**	2	2	**4**
Peat strength (kPa)	-	2	2	**4**	2	2	**4**
Topography							
Elevation (mOD)	90 to 100m	2	2	**4**	2	2	**4**
Slope angle (deg.)	N/A	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	2	2	**4**	2	3	**6**
Evidence of subsurface flow	No	1	2	**2**	1	2	**2**
Quantative assessment							
FOS - drained	-	1	1	**1**	1	1	**1**
FOS - undrained	-						
Total (pre / post control measures)			**39**			**41**	
Max possible			**275**			**275**	
Overall hazard assessment (pre / post control measures)			**4**			**4**	
Overall hazard ranking			**Negligible**			**Negligible**	

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 18
Location: Access Road J10 to J12

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat	3	3	**9**	2	2	**4**
Peat depth & condition	TP15 to TP17 0.25 to 0.9m PEAT over mineral soil, TP-C found 0.2m PEAT over soft SILT, TP13 found 0.7m of PEAT over soft to firm SILT	2	2	**4**	2	2	**4**
Peat strength (kPa)	10.0	2	2	**4**	2	2	**4**
Topography							
Elevation (mOD)	90 to 105m	2	2	**4**	2	2	**4**
Slope angle (deg.)	2.4	3	3	**9**	3	2	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low / moderately low	3	3	**9**	3	3	**9**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	2	2	**4**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	4.0	2	2	**4**	2	2	**4**
FOS - undrained	7.7						
Total (pre / post control measures)				**58**			51
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**5**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 19
Location: Access Road J12 to J13

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat & existing access track	2	2	**4**	2	2	**4**
Peat depth & condition	P112-P117 found 0.0 to 2.4m PEAT, steep cut to south of road	4	3	**12**	3	3	**9**
Peat strength (kPa)	10.0	2	2	**4**	2	2	**4**
Topography							
Elevation (mOD)	100 to 110m	2	2	**4**	2	2	**4**
Slope angle (deg.)	1.9	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low / moderately low	3	3	**9**	3	3	**9**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	2	2	**4**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	2.0	3	3	**9**	2	2	**4**
FOS - undrained	5.8						
Total (pre / post control measures)				**61**			54
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**6**			5
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 20
Location: Access Road J13 to T10

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Wet cutaway peat	4	3	**12**	3	3	**9**
Peat depth & condition	TP-A found 0.4m PEAT over firm SILT, TP-B found 1.8m PEAT over firm SILT. TP-Z found 1.2m PEAT over firm SILT. P001 to P009 found 0.25 to 1.45m PEAT	3	3	**9**	3	2	**6**
Peat strength (kPa)	10.0	2	2	**4**	2	2	**4**
Topography							
Elevation (mOD)	95 to 110m	2	2	**4**	2	2	**4**
Slope angle (deg.)	2.2	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	< 50m	3	4	**12**	2	4	**8**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	2.3	2	3	**6**	2	2	**4**
FOS - undrained	5.9						
Total (pre / post control measures)				**71**			**55**
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**6**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 21
Location: T08

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Wet cutaway peat	4	3	**12**	3	3	**9**
Peat depth & condition	TP-B found 1.8m PEAT over firm SILT	3	3	**9**	3	2	**6**
Peat strength (kPa)	10.0	2	2	**4**	2	2	**4**
Topography							
Elevation (mOD)	100m	2	2	**4**	2	2	**4**
Slope angle (deg.)	1.5	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	3	**6**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	3.4	2	2	**4**	2	2	**4**
FOS - undrained	8.9						
Total (pre / post control measures)				**63**			51
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**6**			5
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 22
Location: T09

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Wet cutaway peat	4	3	**12**	3	3	**9**
Peat depth & condition	TP-Z found 1.2m PEAT over firm SILT. P003-P005 found 0.3 to 1.2m PEAT.	2	3	**6**	2	2	**4**
Peat strength (kPa)	10.0	2	2	**4**	2	2	**4**
Topography							
Elevation (mOD)	95 to 100m	2	2	**4**	2	2	**4**
Slope angle (deg.)	2.7	3	3	**9**	2	3	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	< 50m	3	4	**12**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	2.7	2	2	**4**	2	2	**4**
FOS - undrained	6.1						
Total (pre / post control measures)				**71**			56
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**6**			5
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 23
Location: T10

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Wet cutaway peat	4	3	**12**	3	3	**9**
Peat depth & condition	TP-A found 0.4m of peat over firm to stiff SILT. P001 found 1.45m of peat, P002 found 0.95m of peat.	2	3	**6**	2	2	**4**
Peat strength (kPa)	8.7	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	95 to 100m	2	2	**4**	2	2	**4**
Slope angle (deg.)	2.6	3	3	**9**	2	3	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	< 50m	3	4	**12**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	2.4	2	2	**4**	2	2	**4**
FOS - undrained	5.0						
Total (pre / post control measures)				**76**			58
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**7**			5
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 24
Location: Access Road J13 to J15

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Existing access road, cutaway peat	3	3	**9**	2	2	**4**
Peat depth & condition	P012 found 0.8m PEAT, P024 found 2.5m PEAT, P117-P120 found 1.8 to 2.4m PEAT,TP11 found 2.9m PEAT, TP-BP06,TP-BP07 &TP-BP10 found less than 0.2m PEAT.	4	3	**12**	4	2	**8**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	95 to 110m	2	2	**4**	2	2	**4**
Slope angle (deg.)	2.4	3	3	**9**	2	3	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low / moderately low	3	3	**9**	3	3	**9**
Hydrology							
Distance from watercourse	50 - 100m	2	3	**6**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	1.6	3	3	**9**	2	3	**6**
FOS - undrained	4.5						
Total (pre / post control measures)			**83**			**59**	
Max possible			**275**			**275**	
Overall hazard assessment (pre / post control measures)			**8**			**5**	
Overall hazard ranking			**Low**			**Low**	

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 25
Location: T11

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat	3	3	**9**	2	2	**4**
Peat depth & condition	P013-P019 & P021-P023 found 0.3 to 2.3m PEAT. TP-I found 1.8m PEAT over SAND	4	3	**12**	4	2	**8**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	100m	2	2	**4**	2	2	**4**
Slope angle (deg.)	3.0	3	3	**9**	2	3	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	1.4	3	3	**9**	2	3	**6**
FOS - undrained	3.8						
Total (pre / post control measures)			**76**			54	
Max possible			**275**			**275**	
Overall hazard assessment (pre / post control measures)			**7**			5	
Overall hazard ranking			**Low**			**Low**	

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 26
Location: Peat disposal area PDA2

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat	3	3	**9**	2	2	**4**
Peat depth & condition	P013-P019 found 0.3 to 2.3m PEAT. TP-I found 1.8m PEAT over SAND. TP12 found over 3.9m PEAT but located far from DPA2.	4	3	**12**	4	2	**8**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	100 to 105m	2	2	**4**	2	2	**4**
Slope angle (deg.)	1.8	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	2.3	2	2	**4**	2	2	**4**
FOS - undrained	6.3						
Total (pre / post control measures)				**66**			50
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**6**			5
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 27
Location: Access Road J14 to T18

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat	3	3	**9**	2	2	**4**
Peat depth & condition	TP-H found 3.0m PEAT over silt. P010 2m P011 0.8m	4	3	**12**	4	2	**8**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	90 to 100m	2	2	**4**	2	2	**4**
Slope angle (deg.)	2.9	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	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	1.1	3	3	**9**	3	2	**6**
FOS - undrained	3.3						
Total (pre / post control measures)				**76**			**54**
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**7**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 28
Location: T18

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Cutaway peat	3	3	**9**	2	2	**4**
Peat depth & condition	TP-H found 3.0m PEAT over silt. P010 2m P011 0.8m	4	3	**12**	4	2	**8**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	90 to 95m	2	2	**4**	2	2	**4**
Slope angle (deg.)	3.0	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	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	1.1	3	3	**9**	3	2	**6**
FOS - undrained	3.2						
Total (pre / post control measures)				**76**			**54**
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**7**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 29
Location: Borrow Pit BP-D (Area 2)

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Gravel high point	2	2	**4**	1	1	**1**
Peat depth & condition	TP-BP10 found 0.2m of PEAT over SAND. BP-D is a local high point.	2	2	**4**	1	1	**1**
Peat strength (kPa)	-	1	1	**1**	1	1	**1**
Topography							
Elevation (mOD)	100 to 110m	2	2	**4**	2	2	**4**
Slope angle (deg.)	N/A	2	2	**4**	2	1	**2**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low / moderately low	3	3	**9**	3	3	**9**
Hydrology							
Distance from watercourse	< 50m	3	3	**9**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	-	1	1	**1**	1	1	**1**
FOS - undrained	-						
Total (pre / post control measures)				**52**			35
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**5**			3
Overall hazard ranking				**Low**			**Negligible**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 30
Location: Peat disposal area PDA3

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partly cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	Adjacent GI found peat up to 4.5m thick	4	3	**12**	4	2	**8**
Peat strength (kPa)	9.6	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	90 to 105m	2	2	**4**	2	2	**4**
Slope angle (deg.)	3.0	3	3	**9**	3	2	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low / moderately low	3	3	**9**	3	3	**9**
Hydrology							
Distance from watercourse	100 - 150m	3	3	**9**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	1.1	3	3	**9**	3	2	**6**
FOS - undrained	3.0						
Total (pre / post control measures)				**86**			59
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**8**			5
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 31
Location: T17

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partly cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	P026 found 4.5m of peat, P027 found an obstruction at 0.45m bgl, TP-E found 1.6m of slightly sandy slightly gravelly PEAT.	4	3	**12**	4	2	**8**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	85 to 95m	2	2	**4**	2	2	**4**
Slope angle (deg.)	1.8	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	100 - 150m	3	3	**9**	2	3	**6**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	1.3	3	3	**9**	2	2	**4**
FOS - undrained	3.9						
Total (pre / post control measures)			**76**			52	
Max possible			**275**			**275**	
Overall hazard assessment (pre / post control measures)			**7**			5	
Overall hazard ranking			**Low**			**Low**	

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 32
Location: T16

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partly cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	TP-F found 0.6m of PEAT over soft SILT, P034 found PEAT to 0.3m, and P035 found PEAT to 1.0m.	2	2	**4**	2	2	**4**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	90 to 95m	2	2	**4**	2	2	**4**
Slope angle (deg.)	3.2	3	3	**9**	2	3	**6**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	50 - 100m	2	3	**6**	2	3	**6**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	2.7	2	2	**4**	2	2	**4**
FOS - undrained	5.6						
Total (pre / post control measures)				**65**			50
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**6**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 33
Location: Access Road J15 to J17

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partial existing access road, partial cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	Trial pits near J15 found mineral soil near surface, trial pits & probes to south near J17 found peat to 3.2m	4	3	**12**	4	2	**8**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	95 to 100m	2	2	**4**	2	2	**4**
Slope angle (deg.)	2.1	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	Crosses watercourse	4	3	**12**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	1.4	3	3	**9**	3	2	**6**
FOS - undrained	4.3						
Total (pre / post control measures)				**84**			59
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**8**			5
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 34
Location: T14

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partly cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	Probes found PEAT 1.6 to 3.2m thick, TP-V found 3.1m of PEAT.	4	3	**12**	3	3	**9**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	95 to 100m	2	2	**4**	2	2	**4**
Slope angle (deg.)	0.8	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	100 - 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	3.9	2	2	**4**	2	2	**4**
FOS - undrained	11.6						
Total (pre / post control measures)				**66**			**51**
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**6**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 35
Location: Access Road J17 to T15

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partly cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	Probes found 0.9 to 2.6m of PEAT, TP-G found 0.4 of PEAT over soft to firm SILT	4	3	**12**	4	2	**8**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	95 to 105m	2	2	**4**	2	2	**4**
Slope angle (deg.)	0.8	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	3	3	**9**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	4.5	2	2	**4**	2	2	**4**
FOS - undrained	13.0						
Total (pre / post control measures)				**66**			**55**
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**6**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 36
Location: T15

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partly cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	P037 found 0.9m of PEAT, TP-G found 0.4 of PEAT over soft to firm SILT	2	2	**4**	2	2	**4**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	100 to 105m	2	2	**4**	2	2	**4**
Slope angle (deg.)	2.4	3	3	**9**	3	3	**9**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	3.9	2	2	**4**	2	2	**4**
FOS - undrained	7.6						
Total (pre / post control measures)				**63**			**51**
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**6**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 37
Location: Peat disposal area PDA4

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partly cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	P037 found 0.9m of PEAT, TP-G found 0.4 of PEAT over soft to firm SILT	2	2	**4**	2	2	**4**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	100 to 105m	2	2	**4**	2	2	**4**
Slope angle (deg.)	1.2	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	3	3	**9**	3	3	**9**
Hydrology							
Distance from watercourse	100 - 150m	3	3	**9**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	7.8	2	2	**4**	2	2	**4**
FOS - undrained	15.1						
Total (pre / post control measures)				**68**			**51**
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**6**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 38
Location: Access Road J17 to J18

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partly cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	TP-AA found 2.7m PEAT, TP-BP12 found 2.0m PEAT. Probes found 1.3 to 3.5m PEAT	4	4	**16**	4	3	**12**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	100 to 105m	2	2	**4**	2	2	**4**
Slope angle (deg.)	1.7	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	100 - 150m	3	2	**6**	3	2	**6**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	1.7	3	3	**9**	3	2	**6**
FOS - undrained	5.0						
Total (pre / post control measures)			**77**			58	
Max possible			**275**			**275**	
Overall hazard assessment (pre / post control measures)			**7**			5	
Overall hazard ranking			**Low**			**Low**	

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 39
Location: T12

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partly cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	P042 found 1.3m peat, P043 found 2.3m peat, TP-AA found 2.7m peat	4	4	**16**	4	3	**12**
Peat strength (kPa)	9.3	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	100 to 105m	2	2	**4**	2	2	**4**
Slope angle (deg.)	1.7	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	2.1	3	3	**9**	2	2	**4**
FOS - undrained	5.7						
Total (pre / post control measures)				**75**			**54**
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**7**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 40
Location: Met Mast MM-A

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partly cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	Trial pits found 2.0 to 2.7, probe P044 1.4m peat	4	3	**12**	3	3	**9**
Peat strength (kPa)	8.4	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	100 to 105m	2	2	**4**	2	2	**4**
Slope angle (deg.)	1.7	2	2	**4**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	> 150m	2	2	**4**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	2.1	3	3	**9**	2	2	**4**
FOS - undrained	5.0						
Total (pre / post control measures)				**71**			**51**
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**6**			**5**
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 41
Location: T13

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partly cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	Probes found 1.0 to 1.7m peat, TP08 found 1.7m of peat over stiff CLAY, TP-L found 0.8m PEAT over soft to firm SILT	3	3	**9**	3	2	**6**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	100 to 105m	2	2	**4**	2	2	**4**
Slope angle (deg.)	2.7	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	100 - 150m	3	3	**9**	2	3	**6**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	2.0	3	3	**9**	2	2	**4**
FOS - undrained	5.1						
Total (pre / post control measures)			**78**			52	
Max possible			**275**			**275**	
Overall hazard assessment (pre / post control measures)			**7**			5	
Overall hazard ranking			**Low**			**Low**	

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 42
Location: Peat disposal area PDA5

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Partly cutaway peat field	3	3	**9**	2	2	**4**
Peat depth & condition	Probes found 1.0 to 1.7m peat, TP08 found 1.7m of peat over stiff CLAY, TP-L found 0.8m PEAT over soft to firm SILT	3	3	**9**	3	2	**6**
Peat strength (kPa)	10.0	3	3	**9**	3	2	**6**
Topography							
Elevation (mOD)	100 to 105m	2	2	**4**	2	2	**4**
Slope angle (deg.)	2.7	3	3	**9**	2	2	**4**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low	3	3	**9**	3	3	**9**
Hydrology							
Distance from watercourse	100 - 150m	3	3	**9**	2	2	**4**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	2.0	2	2	**4**	2	2	**4**
FOS - undrained	5.1						
Total (pre / post control measures)				**78**			53
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**7**			5
Overall hazard ranking				**Low**			**Low**

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

OWENINNY PHASE 3 WIND FARM - PEAT STABILITY RISK REGISTER

Assessment area nr: 43
Location: Amenity track

Factor	Value	Pre-control measures			Post-control measures		
		Probability	Impact	Risk	Probability	Impact	Risk
Ground conditions							
Visible geology/land use	Existing access road	3	3	**9**	2	2	**4**
Peat depth & condition	-	1	1	**1**	1	1	**1**
Peat strength (kPa)	-	1	1	**1**	1	1	**1**
Topography							
Elevation (mOD)	80 to 95m	2	2	**4**	2	2	**4**
Slope angle (deg.)	-	1	1	**1**	1	1	**1**
Evidence of previous slips	No	2	2	**4**	2	2	**4**
Landslide susceptibility	Low / moderately low	2	2	**4**	2	2	**4**
Hydrology							
Distance from watercourse	Crosses watercourse	4	3	**12**	3	2	**6**
Evidence of surface water flow	Yes	3	3	**9**	2	3	**6**
Evidence of subsurface flow	No	1	3	**3**	1	2	**2**
Quantative assessment							
FOS - drained	-	1	1	**1**	1	1	**1**
FOS - undrained	-						
Total (pre / post control measures)				**49**			34
Max possible				**275**			**275**
Overall hazard assessment (pre / post control measures)				**4**			**3**
Overall hazard ranking				**Negligible**			**Negligible**

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