FEHILY TIMONEY

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

Appendix 9.1

Geotechnical & Peat Stability Assessment Report

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED BALLINAGREE WIND FARM

GEOTECHNICAL & PEAT STABILITY ASSESSMENT REPORT

Prepared for: Ballinagree Wind DAC

Ballinagree Wind farm

Date: January 2022

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1. NON-TECHNCIAL SUMMARY

Fehily Timoney and Company (FT) was engaged by Coillte and Ørsted to undertake a geotechnical and peat stability assessment of the proposed Ballinagree Wind Farm site. In accordance with planning guidelines compiled by the Department of the Environment, Heritage and Local Government (DoEHLG), where peat is present on a proposed wind farm development, a peat stability assessment is required.

A walkover including intrusive peat depth probing, desk study, stability analysis and risk assessment was carried out to assess the susceptibility of the site to peat failure following the principles in Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (PLHRAG, 2nd Edition, 2017).

The findings show that the proposed development has an acceptable margin of safety and is suitable for the proposed wind farm development. Based on the findings, recommendations and control measures for construction work in peat lands are suggested to ensure that all works adhere to an acceptable standard of safety.

The proposed development comprises 20 no. wind turbines and associated infrastructure. The site comprises flat to steep sloped agricultural land with areas of peat bog in the north.

Slope inclinations at the main infrastructure locations range from 4 to 16 degrees. Ground conditions comprised mainly of peaty topsoil or peat overlying silt overlying bedrock.

Peat depth recorded during the site walkovers from over 124 probes ranged from 0 to 3m with an average peat depth of 0.6m. 86% of the probes recorded peat depths of less than 1.0m with 95% of peat depth probes recorded peat depths of less than 2.0m. A number of localised readings recorded peat depths from 2.0 to 3m. Peat probing was focused on areas of the site where peat was identified during the site walkover and desk study (the northern area of the site). Average peat depth is given for the probes carried out, which may be higher than the actual average peat depth for the site..

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

The risk assessment uses the results of the stability analysis in combination with qualitative factors, which cannot be reasonably included in a stability calculation but nevertheless may affect the occurrence of peat instability, to assess the risk of peat failure at the site. The results of the risk assessment are given in Appendix A.

In summary, the proposed development site has an acceptable margin of safety and is considered to be at **low** risk of peat failure.

2. INTRODUCTION

2.1 Fehily Timoney and Company

Fehily Timoney and Company (FT) is an Irish engineering, environmental science and planning consultancy with offices in Cork, Dublin and Carlow. The practice was established in 1990 and currently has about 70 members of staff, including engineers, scientists, planners and technical support staff. FT deliver projects in Ireland and internationally in our core competency areas of Waste Management, Environment and Energy, Civils Infrastructure, Planning and GIS and Data Management.

2.2 Project Description

FT was engaged by Coillte to undertake an Environmental Impact Assessment of the proposed Ballinagree Wind Farm. As part of this assessment a geotechnical & peat stability assessment was required to be carried out.

The proposed Ballinagree Wind Farm is located approximately 10km south-east of Millstreet, Co. Cork.

The Ballinagree Wind Farm site, which comprises agricultural land, forestry and blanket peat which extends to an area of approximately 380 hectares contained to the north and north-east of the site. The site is located in the west of Co. Cork, between Millstreet and Macroom. The surrounding landscape comprises gently undulating to steep topography with land-use comprising forestry, agricultural land and peatland.

The development comprises the following:

(1) 20 no. wind turbines with a maximum overall blade tip height of up to 185m and all associated hard-standing areas

(2) 2 no. permanent meteorological masts up to 100m in height

(3) Provision of new site access tracks and associated drainage

(4) Temporary construction compound

(5) All works associated with the connection of the proposed wind farm to the national electricity grid, including the construction of an electricity substation

(6) New access junctions, improvements and temporary modifications to existing public road infrastructure to facilitate delivery of abnormal loads and construction access

(7) All associated site development works

2.3 Ground Investigation

Intrusive investigations were undertaken by Irish Drilling Limited at the proposed borrow pit locations, all proposed turbine locations and along the proposed access tracks. The purpose of the intrusive works was to confirm the geological succession underlying the site. The site investigations comprised the excavation of 64 no. trial pits to a maximum depth of 4.8m BGL and 5 no. rotary boreholes to a maximum depth of 15m BGL. The boreholes were carried out at each of the proposed borrow pit locations to assess the suitability of the material to be used as site-won material during construction.

2.4 Peat Stability Assessment Methodology

FT undertook the assessment following the principles in Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments, 2nd Edition (PLHRAG, 2017). The Peat Landslide Hazard and Risk Assessment Guide (PLHRAG) is used in this report as it provides best practice methods to identify, mitigate and manage peat slide hazards and associated risks in respect of consent applications for electricity generation projects.

The best practice guide was produced following peat failures in the Shetland Islands, Scotland in September 2003 but more pertinently following the peat failure in October 2003, during the construction of a wind farm at Derrybrien, County Galway, Ireland.

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

(1) Desk study

(2) Site reconnaissance including shear strength and peat depth measurements

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

(4) Factor of safety plan – compiled for the short-term critical condition (undrained) for points analysed along the proposed infrastructure envelope on site

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

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

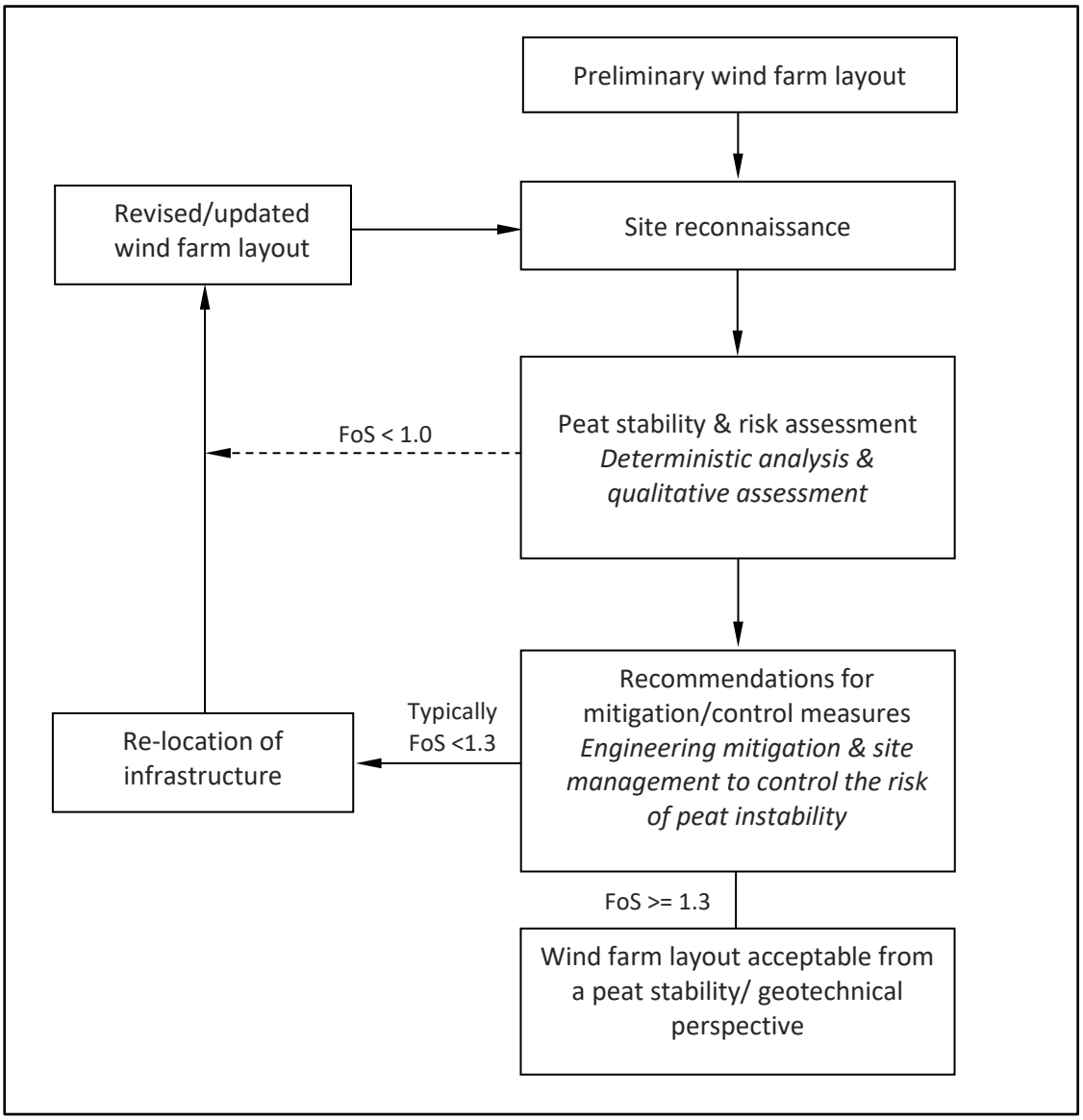

Figure 2-1: Methodology for Peat Stability Assessment

2.5 Peat Failure Definition

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

The potential for peat failure at this site is examined with respect to construction works and associated activity, operation works and decommissioning works.

2.6 Main Approaches to Assessing Peat Stability

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

(1) Geomorphological

(2) Qualitative (judgement)

(3) Index/Probabilistic (probability)

(4) Deterministic (factor of safety)

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

As part of FT's deterministic approach, a qualitative risk assessment is also carried out taking into account qualitative factors, which cannot necessarily be quantified, such as the presence of mechanically cut peat, quaking peat, bog pools, sub peat water flow, slope characteristics and numerous other factors. The qualitative factors used in the risk assessment are compiled based on FT's experience of assessments and construction in peat land sites and peat failures throughout Ireland and the UK. This approach follows the guidelines for geotechnical risk management as given in Clayton (2001), as referenced in the best practice for Peat Landslide Hazard and Risk Assessment Guide (PLHRAG, 2017), and takes into account the approach of MacCulloch (2005).

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

2.7 Peat Stability Assessment – Deterministic Approach

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

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

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

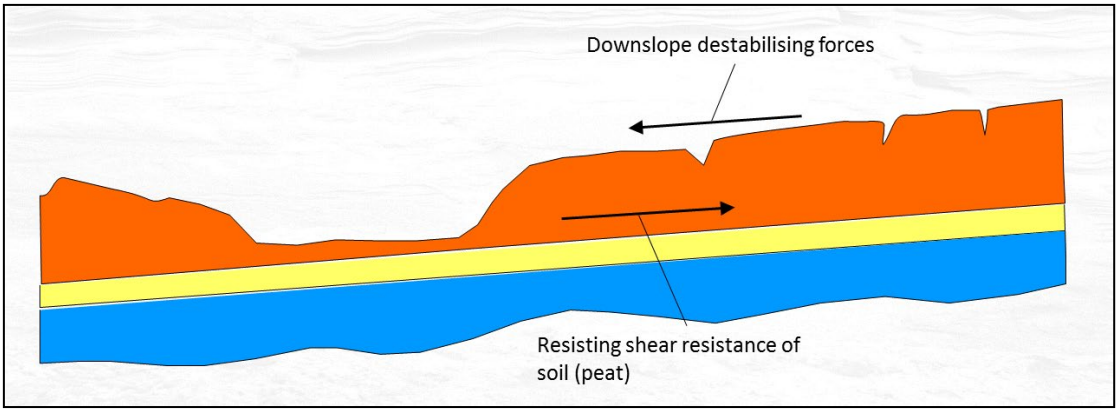

Figure 2-2: Peat Slope Showing Balance of Forces to Maintain Stability

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

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

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

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

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

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

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

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

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

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

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

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

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

3. DESK STUDY

3.1 Desk Study

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

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

The Geological Survey of Ireland (GSI, 1999) geological plans for the site were used to verify the soil and bedrock conditions.

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

The desk study also includes a review of both published literature and GSI online dataset viewer (GSI, 2021) on peat failures/landslides in the vicinity of the site.

3.2 Soils, Subsoil & Bedrock

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

The GSI subsoils maps indicates that the site is underlain by a combination of Till derived from Devonian Sandstones, Bedrock outcrop or sub-crop, Blanket Peat and Alluvium.

In relation to bedrock, the site location and surrounding area is underlain by the Ballytrasna Formation and the Caha Mountain Formation. The Ballytrasna Formation comprises dusky-red mudstone with subordinate pale-red sandstones. The Caha Mountain Formation is described as comprising purple and green siltstones and sandstones.

According to the GSI datasets, there are no karst features recorded within the proposed site. The nearest karst feature is Tubrid Well (526034E 590928N) which is located approximately 20km to the north-west of the proposed site.

The GSI Online Irish Geological Heritage database indicates that the proposed development area is not located in an area of specific geological heritage interest. The nearest site of significant geological heritage features to the study area is located approximately 3km to the east of the proposed development which is the Boggeragh Mountains. The Boggeragh Mountains is a Natural Heritage Area (NHA) that consists of upland blanket bog habitat.

3.3 Previous Failures

There are no recorded peat failures within the proposed development site (GSI, 2021). The nearest recorded failure is located some 20km west of the study area just north of Ballyvourney. No information is available on the size of this failure

The landslide susceptibility at the site was classified by the GSI (2021) as ranging from Low to Extreme. This only relates to the topography of the site and does not take any peat specific data into account (i.e. peat depths, etc). This is expected as there are certain areas across the site, predominantly in the west that are quite steep (slopes reaching up to 22 degrees).

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

3.4 Ground Investigation Findings

As mentioned in Section 2.3 above, intrusive investigations were undertaken by Irish Drilling Limited at the proposed borrow pit locations, at selected proposed turbine locations, along the proposed access tracks to confirm the geological succession underlying the site. A total of 64 no. trial pits to a maximum depth of 4.8m BGL and 6 no. rotary boreholes (at proposed borrow pit locations) to a maximum depth of 15m BGL were carried out. The trial pit and borehole logs and a ground investigation location map are included in Appendix 9.2 of the main EIAR.

Topsoil was encountered in areas across the site during the site walkover and intrusive investigations. The Topsoil was predominantly a peaty *sandy gravelly CLAY* (0.1 to 0.8 mbgl) with areas of MADE GROUND and PEAT also present across the site. Peat deposits of an amorphous peat were found predominantly in the northern area of the site.

Peat deposits were generally noted to be limited to the northern area of the site and typical thicknesses of between 0.1 – 2.7m. Peaty topsoil was present in areas of the southern area of the site.

The Topsoil and Peat deposits described above were found to overlie Glacial Till deposits either cohesive or granular in nature. Cohesive deposits encountered typically comprised *Soft to Stiff sandy gravelly SILT with high cobble and boulder content*. The granular Glacial Till deposits encountered typically comprised *Silty sandy GRAVEL with high cobble content.*

Weathered Bedrock of the Ballytrasna Formation was encountered during site investigations at depths of between 0 to 3.8m BGL where it was typically described as comprising *Weathered SILTSTONE or SANDSTONE*.

4. FINDINGS OF SITE RECONNAISSANCE

4.1 Site Reconnaissance

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

The following salient geomorphological features were considered:

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

The survey covered the proposed turbine locations and associated infrastructure and proposed access tracks.

The method adopted for carrying out the site reconnaissance relied on experienced practitioners carrying out a visual assessment of the site supplemented with measurement of slope inclinations.

4.2 Findings of Site Reconnaissance

The site reconnaissance comprised a walkover inspection of the site during January and August 2020 and March 2021. Weather conditions for the site visits were mainly dry.

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

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

(1) The site is predominantly agricultural land, forestry and peat. Areas of peat are located predominantly in the north of the site with localised areas of peaty topsoil found in the south.

(2) A series of peat depth probes were carried out on site. Peat depths recorded across the site ranged from 0.2 to 3m. Approximately 95 percent of peat depth probes recorded peat depths of less than 2.0m. A number of localised readings were recorded where peat depths were 2.0 to 3m.

(3) The peat depths recorded at the turbine locations where there was peat present (there was no peat encountered at 7 turbine locations) varied from 0 to 2m with an average depth of 0.63m[1].

(4) With respect to the new proposed access tracks, peat depths are typically less than 1.0m with localised depths of up to 3m recorded.

[1] Peat was recorded at 13 of the proposed turbine locations.

(5) Access tracks for the wind farm comprise the upgrade of existing agricultural/forestry tracks and the construction of new tracks. The construction of new tracks will be carried out using an excavate & replace construction technique which involves the removal and replacement of peat or soft ground where encountered.

(6) Slope angles at the turbine locations ranged from 2 to 16 degrees. These slope angle readings were obtained using a combination of readings taken during the site reconnaissance by FT using handheld equipment, such as the Silva Clino Master which has an accuracy of +/- 0.25 degrees and from contour survey plans for the site.

(7) The slope angle quoted typically reflects the slope within the footprint of each infrastructure location.

(8) No evidence of past failures or any significant signs of peat instability were noted on site.

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

(a) The site comprises relatively flat terrain with localised areas of peat in the north and north-east of the site. Peat depths recorded across the site ranged from 0 to 3m with an average depth of 0.6m. Peat probing was focused on areas of the site where peat was identified during the site walkover and desk study (the northern area of the site). Average peat depth is given for the probes carried out, which may be higher than the actual average peat depth for the site.

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

In summary, based on the findings from the site reconnaissance, the proposed development would be considered to have a low risk of peat instability.

5. SITE GROUND CONDITIONS

5.1 Soils & Subsoils

A review of the GSI subsoils maps in Section 3 indicates that the site is underlain by a combination of Till derived from Devonian Sandstones, Bedrock outcrop or sub-crop, Blanket Peat and Alluvium.

Based on the site walkover undertaken by FT and trial pits excavated by IDL, the superficial deposits for the site were typically described as peaty topsoil or spongy brown/black fibrous and amorphous Peat overlying typically firm and stiff slightly gravelly Silt/Clay. Where peat was present on site, peat depths ranged from 0 to 3m with an average depth of 0.6m. At turbine locations, peat depth ranged from 0-2.3m.

5.2 Bedrock

A review of the GSI bedrock maps in Section 3 indicates that the site location and surrounding area is underlain by the Ballytrasna Formation and the Caha Mountain Formation. The Ballytrasna Formation comprises dusky-red mudstone with subordinate pale-red sandstones. The Caha Mountain Formation is described as comprising purple and green siltstones and sandstones.

No karst features were identified in the survey area. The closest recorded karst feature is a spring noted approximately 10km to the west of the site.

6. PEAT DEPTHS, STRENGTH & SLOPE AT PROPOSED INFRASTRUCTURE LOCATIONS

As part of the site walkover, peat depth, in-situ peat strength and slope angles were recorded at various locations across the site. A map is displayed in Figure 6.1 displaying where the peat probe locations were taken across the site.

6.1 Peat Depth

Peat depth probes were carried out at/near to proposed turbine locations and access tracks and other main infrastructure elements. At turbine locations up to 5 probes were carried out around the turbine location, where accessible, and an average peat depth was calculated. This method was used predominantly in the northern area of the site where there was evidence of more extensive peat deposits.

6.2 Peat Strength

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

6.3 Slope Angle

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

The slope angle quoted typically reflects the slope within the footprint of each infrastructure location. It should be noted that slope angles derived from contour survey plans would be considered approximate, as such surveys are dependent on the density of survey data and do not always reflect local variations in ground topography. Slope angles recorded during the site reconnaissance by FT using handheld equipment would generally be deemed more accurate and representative of local topography.

6.4 Summary of Findings

Based on the peat depths recorded across the site by FT, the peat varied in depth from 0 to 3m with an average depth of 0.6m.

A summary of the peat depths at the proposed turbine and borrow pit locations is given in Table 6.1. The data presented in Table 6.1 is used in the peat stability assessment of the site. Peat depths are based on the data collected from both the trial pitting and peat probing.

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

Turbine	Easting	Northing	Peat Depth Range (m) (1)	Average Peat Depth (m)	Slope Angle (°) (2)	Factor of Safety (Load Condition 2)	
						Undrained	Drained
T1	534501	584042			4		
T2	534621	583586	0.3-0.8	0.6	4	37.72	10.26
T3	535181	583428	0.5-0.6	0.6	12	12.29	3.42
T4	535989	582819			6		
T5	536420	582647	0.2-0.3	0.3	4		
T6	535505	583151	0.2-0.3	0.1	10		
T7	536168	583308			12		
T8	536754	583185			4		
T9	536843	583683			6		
T10	536178	584279			6		
T11	535332	584249			6		
T12	535205	584703	0.2-0.4	0.3	8		
T13	536298	586077	0.5-0.6	0.5	14	12.50	3.01
T14	536707	586702	0.5-1.5	1	8	9.43	4.77
T15	537272	586528	0.4-0.6	0.5	6	20.52	7.00
T16	537466	586089	0.2-0.4	0.3	16		
T17	537125	585649	0.6-0.7	0.6	12	18.44	3.42
T18	538431	586680	1.7-2.3	2	2	26.76	17.18
T19	538959	586490	0.2-0.6	0.4	2	126.97	21.55
T20	539629	586861	0.8-1.3	1	4	30.18	9.54
BP1	533661	533661	0.1-0.4	0.3	14		
BP2	533478	533478			16		
BP3	537925	537925	0.8-1	0.9	4	25.72	25.72

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

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

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

In addition to probing, in-situ shear vane testing was carried out as part of the ground investigation. Strength testing was carried out at selected locations across the site to provide representative coverage of indicative peat strengths. The results of the vane testing with depth taken at the turbine locations are presented in Figure 6.2.

The hand vane results indicate undrained shear strengths in the range 10 to 62kPa across the whole site, with an average value of about 25kPa. The average value at turbine locations was recorded as 41kPA. The ground investigations that was carried out by Irish Drilling Ltd. consisted of a series of trial pits and boreholes. The peat depths encountered during the trial pitting correspond with the peat depths encountered during the peat probing.

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

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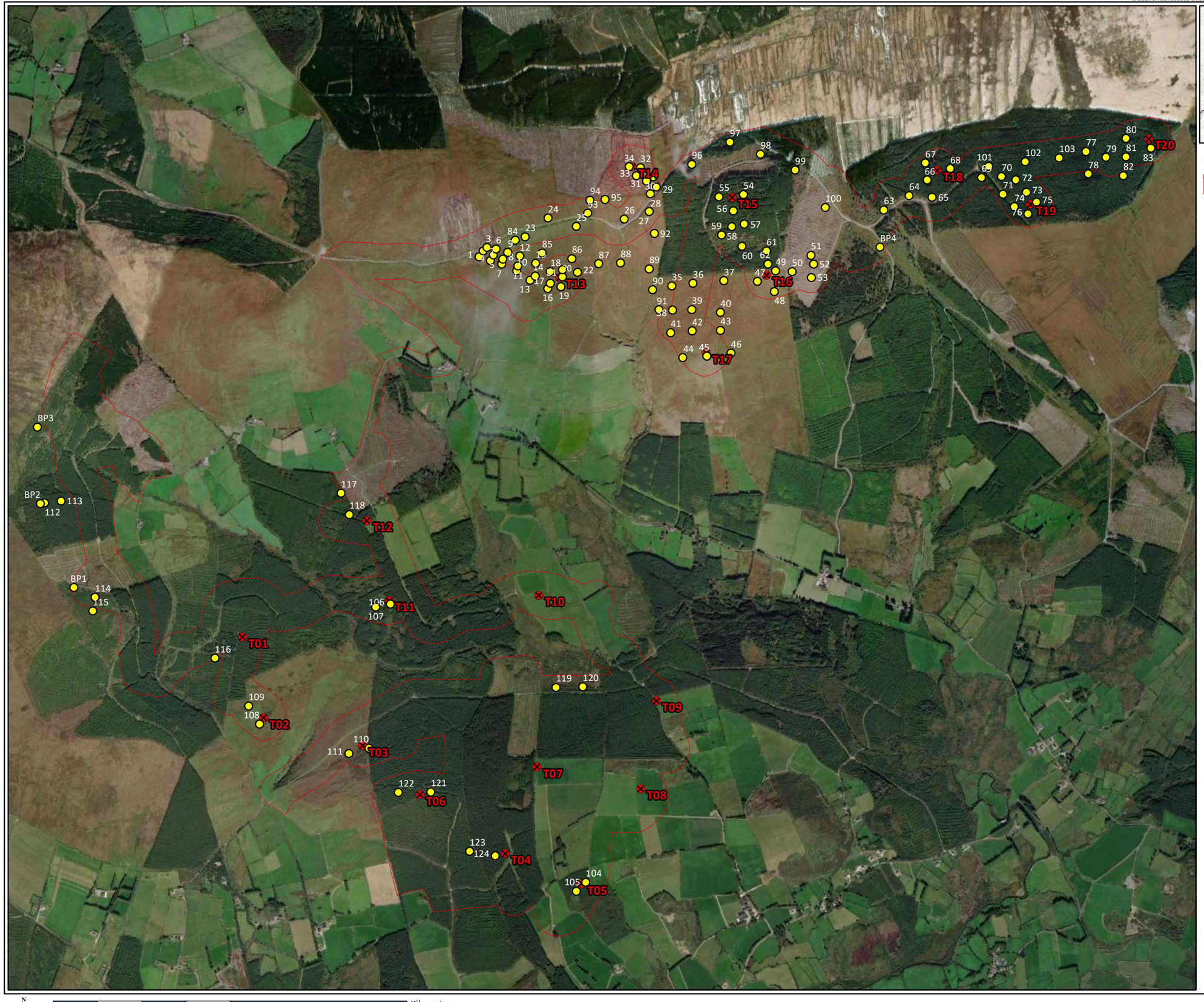

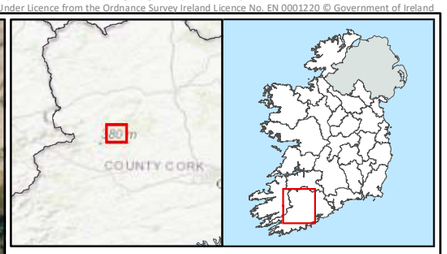

Legend

- Wind Farm Study Area
- Proposed Turbine Layout
- Peat Probe Locations

TITLE:	Peat Probing Locations		
PROJECT:	Ballinagree Wind Farm		
FIGURE NO:	-		
CLIENT:	Coillte and Ørsted		
SCALE:	1:21000	**REVISION:**	0
DATE:	22/09/2021	**PAGE SIZE:**	A3

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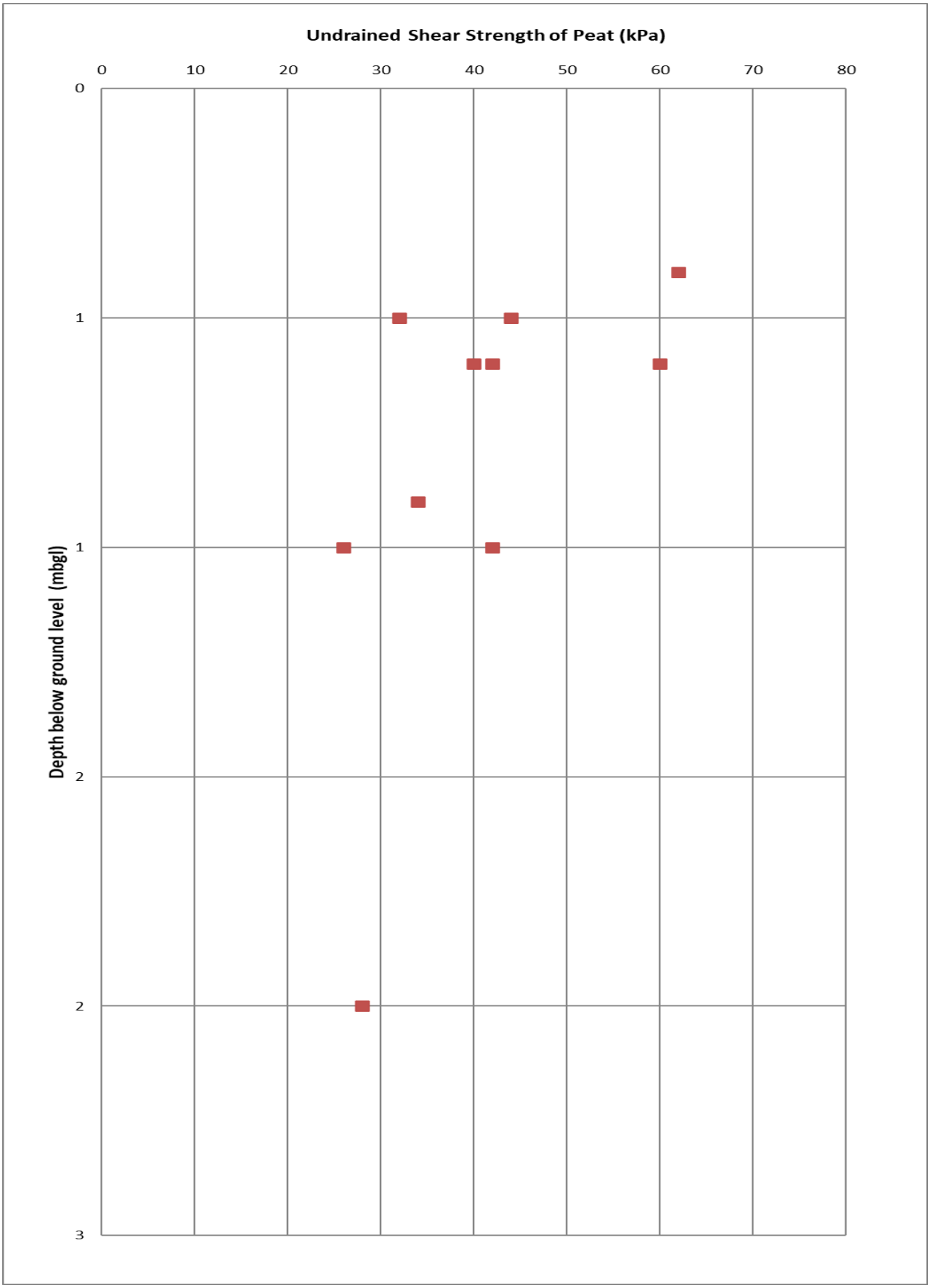

Figure 6-2: Undrained Shear Strength (c_u) Profile for Peat with Depth at Turbine Locations

7. PEAT STABILITY ASSESSMENTS

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

7.1 Methodology for Peat Stability Assessment

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

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

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

1. The undrained loading condition applies in the short-term during construction and until construction induced pore water pressures dissipate.
2. The drained loading condition applies in the long-term. The condition examines the effect of the change in groundwater level as a result of rainfall on the existing stability of the natural peat slopes.

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

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

From Table 7.1 the values for c' ranged from 1.1 to 8.74kPa and ø' ranged from 21.6 to 43°. The average c' and ø' values are 4.5kPa and 30° respectively. Based on the above, it was considered to adopt a conservative approach and to use design values below the averages. For design the following general drained strength values have been used for the site:

c' = 4kPa
$ø'$ = 25°

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

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

7.2 Analysis to Determine Factor of Safety (Deterministic Approach)

The purpose of the analysis was to determine the Factor of Safety (FoS) of the peat slopes using infinite slope analysis. The analysis was carried out at the turbine locations, along the proposed access tracks and at various locations across the site.

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

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

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

Table 7.2: Factor of Safety Limits for Slopes

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

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

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

A lower bound undrained shear strength, c_u for the peat of 8kPa was selected for the assessment based on the c_u values recorded at the proposed development site. It should be noted that a c_u of 8kPa for the peat is considered a conservative value for the analysis and is not representative of all peat present across the site. As described in Section 6.4, the hand vane results indicate undrained shear strengths in the range 10 to 62kPa across the whole site, with an average value of about 25kPa. The average value at turbine locations was recorded as 41kPA. In-situ testing of the peat at the site suggests that peat strength is greater than 10 kPa across the site.

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

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

Where:

F = Factor of Safety
c_u = Undrained strength
γ = Bulk unit weight of material
z = Depth to failure plane assumed as depth of peat
α = Slope angle

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

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

Where:

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

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

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

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

(2) The slope angles used in the peat stability assessment were obtained using of readings taken during the site reconnaissance by FT using handheld equipment.

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

(4) A lower bound undrained shear strength, c_u for the peat of 8kPa was selected for the assessment. The lowest recorded value at the proposed development site during the walkover was 10kPa. It should be noted that a c_u of 8kPa for the peat is considered a conservative value for the analysis and is not representative of all peat present across the site. In reality, the peat at the proposed development site has a significantly higher undrained strength which is likely as a result of the extensive drainage & extraction works which have been carried out on site.

For the stability analysis two load conditions were examined, namely

Condition (1): no surcharge loading

Condition (2): surcharge of 10 kPa, equivalent to 1m of stockpiled peat assumed as a worst case.

7.3 Results of Analysis

7.3.1 Undrained Analysis for the Peat

The results of the undrained analysis for the natural peat slopes are presented in Appendix B and the results of the undrained analysis for the most critical load case (load condition 2) are shown on Figure 7.1. The undrained analysis for load condition 2 is considered the most critical load case as most peat failures occur in the short term upon loading of the peat surface. The results from the main infrastructure locations are summarised in Table 7.3. The results from all probe data taken across the site is included in Appendix B.

The calculated FoS for load condition 1 is in excess of 1.30 for each of the locations analysed with a range of FoS of 4.15 to in excess of 400 across the whole of the site (including turbine locations, access tracks, substation and temporary compound locations), indicating a low risk of peat instability across the site. The FoS at turbine locations where peat was present ranged from 18.87 to 444.4, indicating a low risk of peat instability at turbine locations.

The calculated FoS for load condition 2 is in excess of 1.30 for each of the locations analysed with a range of FoS of 3.01 to in excess of 100 across the whole of the site (including turbine locations, access tracks, substation and temporary compound locations, indicating a low risk of peat instability across the site. The FoS at turbine locations where peat was present ranged from 9.43 to 126.97, indicating a low risk of peat instability at turbine locations.

Table 7.3: Factor of Safety Results (Undrained Condition)

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T1	534501	584042	No Peat	
T2	534621	583586	100.59	37.72
T3	535181	583428	32.78	12.29
T4	535989	582819	No Peat	
T5	536420	582647	No Peat	
T6	535505	583151	No Peat	
T7	536168	583308	No Peat	
T8	536754	583185	No Peat	
T9	536843	583683	No Peat	

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T10	536178	584279	No Peat	
T11	535332	584249	No Peat	
T12	535205	584703	No Peat	
T13	536298	586077	37.49	12.50
T14	536707	586702	18.87	9.43
T15	537272	586528	61.56	20.52
T16	537466	586089	No Peat	
T17	537125	585649	49.17	18.44
T18	538431	586680	40.14	26.76
T19	538959	586490	444.40	126.97
T20	539629	586861	60.36	30.18
BP1	533661	533661	No Peat	
BP2	533503	533503	No Peat	
BP3	533478	533478	No Peat	
BP4	537925	537925	54.29	25.72

7.3.2 Drained Analysis for the Peat

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

The calculated FoS for load condition 1 is in excess of 1.30 for each of the locations analysed with a range of FoS of 1.56 to in excess of 70 across the whole of the site (including turbine locations, access tracks, substation and temporary compound locations, indicating a low risk of peat instability across the site. The FoS at turbine locations where peat was present ranged from 5.28 to 42.02, indicating a low risk of peat instability at turbine locations.

The calculated FoS for load condition 2 is in excess of 1.30 for each of the locations analysed with a range of FoS of 1.99 to in excess of 20 across the whole of the site (including turbine locations, access tracks, substation and temporary compound locations, indicating a low risk of peat instability across the site. The FoS at turbine locations where peat was present ranged from 3.01 to 21.55, indicating a low risk of peat instability at turbine locations.

Table 7.4: Factor of Safety Results (Drained Conditions)

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T1	534501	584042	No Peat	
T2	534621	583586	16.25	10.26
T3	535181	583428	5.47	3.42
T4	535989	582819	No Peat	
T5	536420	582647	No Peat	
T6	535505	583151	No Peat	
T7	536168	583308	No Peat	
T8	536754	583185	No Peat	
T9	536843	583683	No Peat	
T10	536178	584279	No Peat	
T11	535332	584249	No Peat	
T12	535205	584703	No Peat	
T13	536298	586077	5.28	3.01
T14	536707	586702	6.22	4.77
T15	537272	586528	12.13	7.00
T16	537466	586089	No Peat	
T17	537125	585649	5.47	3.42
T18	538431	586680	19.09	17.18
T19	538959	586490	42.02	21.55
T20	539629	586861	12.42	9.54
BP1	533661	533661	No Peat	
BP2	533503	533503	No Peat	
BP3	533478	533478	No Peat	
BP4	537925	537925	13.06	9.69

7.3.3 Summary of Results

The results above state that the FoS for both drained and undrained conditions at all infrastructure locations and along proposed access tracks are in excess of 1.30. This indicates that the site has a low risk of peat instability. There are areas located in the north where the FoS ranges from 1.56 to 3.63. These values are above the 1.30 allowance and there is no proposed infrastructure at these locations, therefore these areas with lower factors of safety also indicate a low risk of instability.

8. PEAT STABILITY RISK ASSESSMENT

A peat stability risk assessment was carried out for the main infrastructure elements at the wind farm. This approach takes into account guidelines for geotechnical/peat stability risk assessments as given in PLHRA (2017) and MacCulloch (2005).

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

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

Table 8.1: Risk Rating Legend

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

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

8.1 Summary of Risk Assessment Results

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

The risk rating for each infrastructure element at the proposed development is designated negligible with some mitigation/control measures being implemented on a precautionary basis. Sections of access tracks to the nearest infrastructure element will be subject to the same mitigation/control measures that apply to the nearest infrastructure element.

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

Table 8.2: Summary of Peat Stability Risk Register

Infrastructure	Pre-Control Measure Implementation Risk Rating	Pre-Control Measure Implementation Risk Rating Category	Notable Control Measures Required	Post-Control Measure Implementation Risk Rating	Post-Control Measure Implementation Risk Rating Category
Turbine T1	No peat recorded at location				
Turbine T2	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T3	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T4	No peat recorded at location				
Turbine T5	No peat recorded at location				
Turbine T6	No peat recorded at location				
Turbine T7	No peat recorded at location				
Turbine T10	No peat recorded at location				
Turbine T11	No peat recorded at location				
Turbine T12	No peat recorded at location				
Turbine T13	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T14	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T15	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T16	No peat recorded at location				
Turbine T17	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T18	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T19	Negligible	1 to 4	No	Negligible	1 to 4
Turbine T20	Negligible	1 to 4	No	Negligible	1 to 4
BP1	No peat recorded at location				
BP2	No peat recorded at location				
BP3	No peat recorded at location				
BP4	Negligible	1 to 4	No	Negligible	1 to 4

9. INDICATIVE FOUNDATION TYPE AND FOUNDATION DEPTH FOR TURBINES

9.1 Summary

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

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

Turbine No.	Relevant GI	Geology Encountered	Turbine Foundation Type	Comment
T1	T-01	0-0.5m: Topsoil 0.5-4.3m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T2	T-02	0-0.8m: Peat 0.8-1.7m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T3	T-03	0-0.8m: Peat 0.8-1.3m: Bedrock	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T4	T-04	0-0.1m: Peat 0.1-1.4m: Bedrock	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T5	T-05	0-2.1m: Made Ground 2.1-3.6m: Bedrock	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T6	T-06	0-0.3m: Peat 0.3-3m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T7	T-07	0-0.2m: Topsoil 0.2-2.5m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T8	T-08	0-0.3m: Topsoil 0.3-2.5m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.

Turbine No.	Relevant GI	Geology Encountered	Turbine Foundation Type	Comment
T9	T-09	0-0.1m: Topsoil 0.1- 4.8m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T10	T-10	0-0.2m: Topsoil 0.2-3.6m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T11	T-11	0-0.3m: Peat 0.3-4.6m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T12	T-12	0-0.2m: Topsoil 0.2-1.6m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T13	T-13	0-0.3m: Peat 0.3-4.5m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T14	T-14	0-1m: Peat 1-3.8m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T15	T-15	0-0.5m: Peat 0.5-2.1m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T16	T-16	0-0.3m: Peat 0.3-1m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T17	T-17	0-0.6m: Peat 0.6-2m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T18	T-18	0-2m: Peat 2-4.3m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T19	T-19	0-0.4m: Peat 0.4-1.4m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.
T20	T-20	0-0.7m: Peat 0.7-3.5m: Glacial Till	Gravity foundation	The site investigation works carried out indicate that a gravity foundation may be required.

It should be noted that further ground investigation will be carried out prior to construction at each turbine location in the form of a borehole with in-situ SPT testing at 1m intervals in the overburden and follow-on rotary core through bedrock to confirm the foundation types and founding stratums assumed in Table 10-1.

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

10. SUMMARY AND RECOMMENDATIONS

10.1 Summary

FT was engaged by Coillte and Ørsted to undertake a geotechnical and peat stability assessment of the proposed Ballinagree Wind Farm site.

The findings of the peat stability and general stability assessment displayed that the proposed development site has an acceptable margin of safety and is suitable for the proposed development. The findings include recommendations and control measures for construction work in peat lands to ensure that all works adhere to an acceptable standard of safety.

The site which comprises relatively flat/gently undulating terrain consisting predominantly of agricultural land with peat present in the north and north-east of the site.

Peat thicknesses recorded during the site walkover ranged from 0 to 3m with an average depth of 0.6m. 85% of the probes recorded peat depths of less than 1.0m. 95% of peat depth probes recorded peat depths of less than 2.0m. A number of localised readings were recorded where peat depths range from 2.0 to 3m.

Slope inclinations at the main infrastructure locations range from 4 to 16 degrees.

An analysis of peat sliding was carried out at the main infrastructure and borrow pit locations across the site for both the undrained and drained conditions. The purpose of the analysis was to determine the Factor of Safety (FoS) of the peat slopes.

For the undrained condition, the calculated FoS for load conditions 1 and 2 for the locations analysed, showed that all locations have an acceptable FoS of greater than 1.3, indicating a low risk of peat failure. The undrained analysis would be considered the most critical condition for the peat slopes.

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

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

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

10.2 Recommendations

The following recommendations are given.

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

The proposed construction method for most of the new proposed access tracks at the wind farm is excavate and replace type construction and floating roads where there is deeper peat located in the north of the site. The FoS along all of the proposed access tracks is above the 1.30 recommendation. The access tracks follow the slopes of the existing topography as much as possible therefore there should be no stability issues.

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

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APPENDIX A

Peat Stability Risk Registers

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

Location:	Turbine T2

Grid Reference (Eastings, Northings):	534621	583586
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.3 - 0.8	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 100.59 (u), 16.25 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	3	1	3	Negligible	No		3	1	3	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	3	1	3	Negligible	No		3	1	3	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T2**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person.

Note

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

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

Location:	Turbine T3

Grid Reference (Eastings, Northings):	535181	583428
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.5-0.6	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 32.78 (u), 5.47 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	3	1	3	Negligible	No		3	1	3	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	3	1	3	Negligible	No		3	1	3	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T3**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person.

Note

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

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

Location:	Turbine T13

Grid Reference (Eastings, Northings):	536298	586077
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.5-0.6	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 37.49 (u), 5.28 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	3	1	3	Negligible	No		3	1	3	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	3	1	3	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T13**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person.

Note

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

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

Location:	Turbine T14

Grid Reference (Eastings, Northings):	536707	586702
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.5-1.5	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 18.87 (u), 6.22 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	3	1	3	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	3	1	3	Negligible	No		3	1	3	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	3	1	3	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T14**
ii	Maintain hydrology of area as far as possible;
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
vi	Inspection & approval of turbine base sub-formation by a competent person.

Note

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

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

Location:	Turbine T15

Grid Reference (Eastings, Northings):	537272	586528
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.4-0.6	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 61.56 (u), 12.13 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	3	1	3	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	3	1	3	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	3	1	3	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T15**
ii	Maintain hydrology of area as far as possible;
iii	Use of experienced geotechnical staff for site investigation;
iv	Use of experienced contractors and trained operators to carry out the work;
v	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
vi	Inspection & approval of turbine base sub-formation by a competent person.

Note

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

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

Location:	Turbine T17

Grid Reference (Eastings, Northings):	537125	585649
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.6-0.7	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 49.17 (u), 5.47 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	3	1	3	Negligible	No		3	1	3	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	3	1	3	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	1	1	1	Negligible	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T17**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person.

Note

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

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

Location:	Turbine T18

Grid Reference (Eastings, Northings):	538431	586680
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	1.7-2.3	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 40.14 (u), 19.09 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	3	1	3	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	3	1	3	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	3	1	3	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T18**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person.

Note

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

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

Location:	Turbine T19

Grid Reference (Eastings, Northings):	665164	751792
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.2-0.6	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 40.14 (u), 42.02 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	3	1	3	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	3	1	3	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	3	1	3	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T19**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person.

Note

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

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

Location:	Turbine T20

Grid Reference (Eastings, Northings):	539629	586861
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.8 - 1.3	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 60.36 (u), 12.42 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	3	1	3	Negligible	No		2	1	2	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	3	1	3	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Relatively deep peat	3	1	3	Negligible	No		2	1	2	Negligible

	Control Measures to be Implemented Prior to/and During Construction for **Turbine T20**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person.

Note

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

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

Location:	Borrow Pit 3

Grid Reference (Eastings, Northings):	537925	537925
Distance to Watercourse (m)	> 150	
Min & Max Measured Peat Depth (m):	0.8-1	
Control Required:	No	

		Pre-Control Measure Implementation						Post-Control Measure Implementation			
Ref.	Contributory/Qualitative Factors to Potential Peat Failure	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating	Control Required	Control measures to be implemented during construction	Prob (Note 2)	Impact (Note 3)	Risk	Risk Rating
1	FOS = 54.29 (u), 13.06 (d)	1	1	1	Negligible	No	See Below	1	1	1	Negligible
2	Evidence of sub peat water flow	1	1	1	Negligible	No		1	1	1	Negligible
3	Evidence of surface water flow	3	1	3	Negligible	No		3	1	3	Negligible
4	Evidence of previous failures/slips	0	1	0	Not Applicable	No		0	1	0	Not Applicable
5	Type of vegetation	2	1	2	Negligible	No		2	1	2	Negligible
6	General slope characteristics upslope/downslope from infrastructure location	3	1	3	Negligible	No		2	1	2	Negligible
7	Evidence of very soft/soft clay at base of peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
8	Evidence of mechanically cut peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
9	Evidence of quaking or buoyant peat	0	1	0	Not Applicable	No		0	1	0	Not Applicable
10	Evidence of bog pools	0	1	0	Not Applicable	No		0	1	0	Not Applicable
11	Other	0	1	0	Not Applicable	No		0	1	0	Not Applicable

	Control Measures to be Implemented Prior to/and During Construction for **BP3**
i	Maintain hydrology of area as far as possible;
ii	Use of experienced geotechnical staff for site investigation;
iii	Use of experienced contractors and trained operators to carry out the work;
iv	Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
v	Inspection & approval of turbine base sub-formation by a competent person.

Note

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

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APPENDIX B

Calculated FOS for Peat Slopes on Site

Calculated FoS of Natural Peat Slopes for Ballinagree Wind Farm - Drained Analysis

Turbine No./Waypoint	Slope	Design c'	Bulk unit weight of Peat	Unit weight of Water	Depth of In situ Peat	Friction Angle	Surcharge Equivalent Placed Fill	Equivalent Total Depth of Peat (m)	Factor of Safety for Load Condition	
	α (deg)	c' (kPa)	γ (kN/m^3)	γ_w (kN/m^3)	(m)	ø' (deg)	Condition (2)	Condition (2)	Condition (1)	Condition (2)
									100% Water	100% Water
1	10	4	10.0	10.0	0.4	25	1.0	1.4	**5.85**	**3.56**
2	12	4	10.0	10.0	0.4	25	1.0	1.4	**4.92**	**2.97**
3	6	4	10.0	10.0	0.2	25	1.0	1.2	**19.24**	**6.90**
4	12	4	10.0	10.0	0.8	25	1.0	1.8	**4.65**	**3.29**
5	10	4	10.0	10.0	0.6	25	1.0	1.6	**3.90**	**3.11**
6	10	4	10.0	10.0	0.4	25	1.0	1.4	**8.49**	**4.32**
7	14	4	10.0	10.0	1	25	1.0	2.0	**3.57**	**2.72**
8	12	4	10.0	10.0	0.4	25	1.0	1.4	**7.11**	**3.60**
9	10	4	10.0	10.0	1.2	25	1.0	2.2	**4.59**	**3.71**
10	10	4	10.0	10.0	1	25	1.0	2.0	**4.98**	**3.81**
11	12	4	10.0	10.0	0.8	25	1.0	1.8	**4.65**	**3.29**
12	14	4	10.0	10.0	1.2	25	1.0	2.2	**3.29**	**2.64**
13	8	4	10.0	10.0	1.5	25	1.0	2.5	**5.25**	**4.48**
14	10	4	10.0	10.0	1	25	1.0	2.0	**2.34**	**2.49**
15	6	4	10.0	10.0	1.2	25	1.0	2.2	**3.21**	**3.77**
16	8	4	10.0	10.0	2	25	1.0	3.0	**4.77**	**4.29**
17	8	4	10.0	10.0	1.8	25	1.0	2.8	**1.61**	**2.22**
18	8	4	10.0	10.0	0.8	25	1.0	1.8	**3.63**	**3.46**
19	6	4	10.0	10.0	0.6	25	1.0	1.6	**6.41**	**5.18**
20	8	4	10.0	10.0	0.8	25	1.0	1.8	**6.95**	**4.93**
21	12	4	10.0	10.0	1	25	1.0	2.0	**1.97**	**2.08**
22	10	4	10.0	10.0	1.5	25	1.0	2.5	**1.56**	**1.99**
23	6	4	10.0	10.0	0.4	25	1.0	1.4	**9.62**	**5.92**
24	6	4	10.0	10.0	2	25	1.0	3.0	**6.36**	**5.72**
25	8	4	10.0	10.0	1.2	25	1.0	2.2	**5.74**	**4.64**
26	4	4	10.0	10.0	2.2	25	1.0	3.2	**9.28**	**8.46**
27	8	4	10.0	10.0	2	25	1.0	3.0	**4.77**	**4.29**
28	4	4	10.0	10.0	2	25	1.0	3.0	**9.54**	**8.58**
29	4	4	10.0	10.0	2	25	1.0	3.0	**9.54**	**8.58**
30	6	4	10.0	10.0	2.5	25	1.0	3.5	**5.98**	**5.54**
31	6	4	10.0	10.0	3	25	1.0	4.0	**5.72**	**5.40**
32	8	4	10.0	10.0	2.8	25	1.0	3.8	**4.35**	**4.08**
33	8	4	10.0	10.0	2.5	25	1.0	3.5	**4.48**	**4.15**
34	6	4	10.0	10.0	2.5	25	1.0	3.5	**5.98**	**5.54**
35	10	4	10.0	10.0	2.5	25	1.0	3.5	**3.58**	**3.31**
36	8	4	10.0	10.0	3	25	1.0	4.0	**4.29**	**4.04**
37	8	4	10.0	10.0	2	25	1.0	3.0	**4.77**	**4.29**
38	12	4	10.0	10.0	2	25	1.0	3.0	**3.18**	**2.85**
39	10	4	10.0	10.0	2.5	25	1.0	3.5	**3.58**	**3.31**
40	10	4	10.0	10.0	2.2	25	1.0	3.2	**3.71**	**3.38**
41	8	4	10.0	10.0	1.5	25	1.0	2.5	**5.25**	**4.48**
42	8	4	10.0	10.0	2	25	1.0	3.0	**4.77**	**4.29**
43	8	4	10.0	10.0	2	25	1.0	3.0	**4.77**	**4.29**
44	6	4	10.0	10.0	2.2	25	1.0	3.2	**6.19**	**5.64**
45	4	4	10.0	10.0	2.5	25	1.0	3.5	**8.97**	**8.31**
46	4	4	10.0	10.0	2	25	1.0	3.0	**9.54**	**8.58**
47	8	4	10.0	10.0	1.2	25	1.0	2.2	**5.74**	**4.64**
48	10	4	10.0	10.0	1.5	25	1.0	2.5	**4.20**	**3.58**
49	10	4	10.0	10.0	1	25	1.0	2.0	**4.98**	**3.81**
50	2	4	10.0	10.0	0.8	25	1.0	1.8	**27.69**	**19.72**
51	4	4	10.0	10.0	1.5	25	1.0	2.5	**10.50**	**8.97**
52	4	4	10.0	10.0	1.8	25	1.0	2.8	**9.86**	**8.72**
53	4	4	10.0	10.0	1.8	25	1.0	2.8	**9.86**	**8.72**
54	10	4	10.0	10.0	2	25	1.0	3.0	**3.81**	**3.42**
55	12	4	10.0	10.0	1.2	25	1.0	2.2	**3.83**	**3.09**
56	14	4	10.0	10.0	1.5	25	1.0	2.5	**3.01**	**2.55**
57	12	4	10.0	10.0	2	25	1.0	3.0	**3.18**	**2.85**
58	10	4	10.0	10.0	1.2	25	1.0	2.2	**4.59**	**3.71**
59	10	4	10.0	10.0	0.8	25	1.0	1.8	**5.57**	**3.94**
60	8	4	10.0	10.0	1.5	25	1.0	2.5	**5.25**	**4.48**
61	8	4	10.0	10.0	2	25	1.0	3.0	**4.77**	**4.29**
62	8	4	10.0	10.0	1.5	25	1.0	2.5	**5.25**	**4.48**
63	6	4	10.0	10.0	2	25	1.0	3.0	**6.36**	**5.72**
64	6	4	10.0	10.0	2.5	25	1.0	3.5	**5.98**	**5.54**
65	4	4	10.0	10.0	2.2	25	1.0	3.2	**9.28**	**8.46**
66	2	4	10.0	10.0	1.8	25	1.0	2.8	**19.72**	**17.45**
67	2	4	10.0	10.0	2	25	1.0	3.0	**19.09**	**17.18**

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

Turbine No./Waypoint	Easting ITM	Northing ITM	Slope	Undrained shear strength	Bulk unit weight of Peat	Peat Depth	Surcharge Equivalent Placed Fill Depth (m)	Factor of Safety for Load Condition	
			β (deg)	c_u (kPa)	γ (kN/m^3)	(m)	Condition (2)	Condition (1)	Condition (2)
1	535840.291	586192.161	10	44	10	0.4	1.4	**64.32**	**18.38**
2	535865.12	586225.221	12	10	10	0.4	1.4	**12.29**	**3.51**
3	535886.336	586244.11	6		10	0.2	1.2		
4	535905.597	586170.305	12	12	10	0.8	1.8	**7.38**	**3.28**
5	535921.65	586202.86	10	12	10	0.6	1.6	**11.70**	**4.39**
6	535937.71	586236.032	10	12	10	0.4	1.4	**17.54**	**5.01**
7	535968.073	586150.65	14	18	10	1	2.0	**7.67**	**3.83**
8	535974.339	586178.385	12	10	10	0.4	1.4	**12.29**	**3.51**
9	536003.62	586216.642	10	12	10	1.2	2.2	**5.85**	**3.19**
10	536054.517	586111.836	10	12	10	1	2.0	**7.02**	**3.51**
11	536059.64	586139.586	12	14	10	0.8	1.8	**8.61**	**3.82**
12	536071.79	586195.061	14	16	10	1.2	2.2	**5.68**	**3.10**
13	536128.787	586060.198	8	18	10	1.5	2.5	**8.71**	**5.22**
14	536159.395	586082.986	10	12	10	1	2.0	**7.02**	**3.51**
15	536161.861	586156.511	6	10	10	1.2	2.2	**8.02**	**4.37**
16	536229.243	586013.48	8	14	10	2	3.0	**5.08**	**3.39**
17	536243.721	586042.347	8	14	10	1.8	2.8	**5.64**	**3.63**
18	536243.613	586108.488	8	18	10	0.8	1.8	**16.33**	**7.26**
19	536304.885	586024.258	6	20	10	0.6	1.6	**32.06**	**12.02**
20	536311.485	586078.26	8	22	10	0.8	1.8	**19.95**	**8.87**
21	536313.344	586119.341	12	14	10	1	2.0	**6.88**	**3.44**
22	536397.053	586104.984	10	16	10	1.5	2.5	**6.24**	**3.74**
23	536100.857	586305.951	6	10	10	0.4	1.4	**24.05**	**6.87**
24	536230.698	586410.607	6	12	10	2	3.0	**5.77**	**3.85**
25	536390.45	586364.68	8	12	10	1.2	2.2	**7.26**	**3.96**
26	536661.684	586404.497	4	28	10	2.2	3.2	**18.29**	**12.57**
27	536802.367	586448.144	8	16	10	2	3.0	**5.80**	**3.87**
28	536809.541	586547.88	4	18	10	2	3.0	**12.93**	**8.62**
29	536844.543	586586.997	4	18	10	2	3.0	**12.93**	**8.62**
30	536826.198	586643.787	6	14	10	2.5	3.5	**5.39**	**3.85**
31	536788.921	586620.771	6	14	10	3	4.0	**4.49**	**3.37**
32	536753.268	586695.707	8	16	10	2.8	3.8	**4.15**	**3.06**
33	536730.577	586650.254	8	16	10	2.5	3.5	**4.64**	**3.32**
34	536691.001	586701.442	6	18	10	2.5	3.5	**6.93**	**4.95**
35	536930.887	586027.739	10	18	10	2.5	3.5	**4.21**	**3.01**
36	537051.568	586041.977	8	18	10	3	4.0	**4.35**	**3.27**
37	537226.59	586056.46	8	16	10	2	3.0	**5.80**	**3.87**
38	536936.393	585890.137	12	22	10	2	3.0	**5.41**	**3.61**
39	537044.362	585894.027	10	20	10	2.5	3.5	**4.68**	**3.34**
40	537207.197	585878.994	10	24	10	2.2	3.2	**6.38**	**4.39**
41	536925.629	585762.631	8	18	10	1.5	2.5	**8.71**	**5.22**
42	537047.024	585772.533	8	14	10	2	3.0	**5.08**	**3.39**
43	537205.52	585776.098	8	20	10	2	3.0	**7.26**	**4.84**
44	536994.201	585621.142	6	22	10	2.2	3.2	**9.62**	**6.61**
45	537130.287	585631.478	4	24	10	2.5	3.5	**13.80**	**9.85**
46	537266.82	585647.067	4	30	10	2	3.0	**21.56**	**14.37**
47	537415.295	586052.235	8	12	10	1.2	2.2	**7.26**	**3.96**
48	537511.639	585996.014	10	16	10	1.5	2.5	**6.24**	**3.74**
49	537518.825	586113.058	10	16	10	1	2.0	**9.36**	**4.68**
50	537612.757	586107.865	2	32	10	0.8	1.8	**114.68**	**50.97**
51	537719.163	586200.798	4	30	10	1.5	2.5	**28.74**	**17.24**
52	537732.847	586151.487	4	28	10	1.8	2.8	**22.35**	**14.37**
53	537720.642	586074.992	4	28	10	1.8	2.8	**22.35**	**14.37**
54	537337.021	586544.934	10	16	10	2	3.0	**4.68**	**3.12**
55	537197.113	586531.858	12	16	10	1.2	2.2	**6.56**	**3.58**
56	537278.651	586451.404	14	20	10	1.5	2.5	**5.68**	**3.41**
57	537341.779	586377.363	12	22	10	2	3.0	**5.41**	**3.61**
58	537270.856	586362.183	10	20	10	1.2	2.2	**9.75**	**5.32**
59	537213.074	586315.624	10	14	10	0.8	1.8	**10.23**	**4.55**
60	537328.944	586251.118	8	12	10	1.5	2.5	**5.80**	**3.48**
61	537466.084	586225.29	8	14	10	2	3.0	**5.08**	**3.39**
62	537474.503	586151.628	8	16	10	1.5	2.5	**7.74**	**4.64**
63	538131.487	586456.513	6	16	10	2	3.0	**7.70**	**5.13**
64	538273.201	586538.513	6	16	10	2.5	3.5	**6.16**	**4.40**
65	538404.443	586529.473	4	58	10	2.2	3.2	**37.89**	**26.05**
66	538375.906	586626.87	2	58	10	1.8	2.8	**92.38**	**59.39**
67	538364.693	586722.199	2	50	10	2	3.0	**71.68**	**47.79**
68	538505.377	586690.792	2	48	10	2.2	3.2	**62.56**	**43.01**
69	538682.997	586639.774	2	12	10	1.5	2.5	**22.94**	**13.76**
70	538796.316	586646.108	4	14	10	2.2	3.2	**9.14**	**6.29**
71	538805.761	586545.857	4	18	10	2.5	3.5	**10.35**	**7.39**
72	538878.444	586627.485	6	20	10	2.5	3.5	**7.70**	**5.50**
73	538936.671	586556.306	4	22	10	3	4.0	**10.54**	**7.90**

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APPENDIX C

Methodology for Peat Stability Risk Assessment

Methodology for Peat Stability Risk Assessment

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

The main approaches for assessing peat stability include the following:

(a) Geomorphological

(b) Qualitative (judgement)

(c) Index/Probabilistic (probability)

(d) Deterministic (factor of safety)

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

Probability

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

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

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

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

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

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

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

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

Table B: Probability Scale

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

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

Impact

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

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

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

Table C: Impact Scale

Scale	Criteria	Impact
1	Proposed infrastructure element greater than 150m of watercourse	Negligible/None
2	Proposed infrastructure element within 150 to 101m of watercourse	Low
3	Proposed infrastructure element within 100 to 51m of watercourse	Medium
4	Proposed infrastructure element within 50 m of watercourse	High
5	Proposed infrastructure element within 50 m of watercourse, in an environmentally sensitive area	Extremely High

Risk Rating

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

The Risk Rating is calculated from: $R = P \times I$

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

Table D: Qualitative Risk Rating

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

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

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

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

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Appendix 9.2

Factual Ground Investigation Report

IRISH DRILLING LIMITED

LOUGHREA, CO. GALWAY, IRELAND

CONTRACT DRILLING
SITE INVESTIGATION

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BALLINAGREE WIND FARM

SITE INVESTIGATION CONTRACT FACTUAL REPORT

Coillte,
Newtownmountkennedy,
Co. Wicklow.

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

	Prepared by	Approved by	Rev. Issue Date:	Revision No.
	Ronan Killeen	Declan Joyce	15th June2021	21_C_101/02
Signature				

FOREWORD

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

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

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

Contents:

1.0 Introduction.

Irish Drilling Ltd. (IDL) was instructed by Fehily Timoney & Company, Consulting Engineers, on behalf of Coillte, to carry out a site investigation at the site of the proposed Ballinagree Wind Farm.

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

The fieldwork commenced on March 8th 2021 and was completed on May 14th 2021.

2.0 Site & Geology

The site is located near Ballinagree, County Cork.

The fieldwork was carried out predominantly on privately owned farmland and forestry lands owned by Coillte.

Site Plans, prepared by the client's representatives and amended by IDL to show approximate 'as-built' locations, are included with this report.

Geological Survey Maps of the area indicate that the site is underlain by the Old Red Sandstone Rock Formation.

3.0 Fieldwork.

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

DeltaBase 520 Rotary Core Drill Rig.
Hyundai HX140 Wide-Tracked Excavator.

Fieldwork carried out to date has included the following:

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

Wireline drilling techniques, using HQ size drill strings, were carried out to recover soil and rock core samples. The core samples recovered consisted of the following core diameters: 64mm (HQ).

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

A 50mm standpipe was installed in all five boreholes to allow for the monitoring of groundwater levels over a prolonged period of time.

The rotary core boreholes were carried out to depths ranging from 15.00m to 15.20m below ground level.

A summary of water levels recorded during the fieldwork period is included with this report as Appendix 3.

Sixty-three trial pits were excavated on site using a tracked excavator.

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

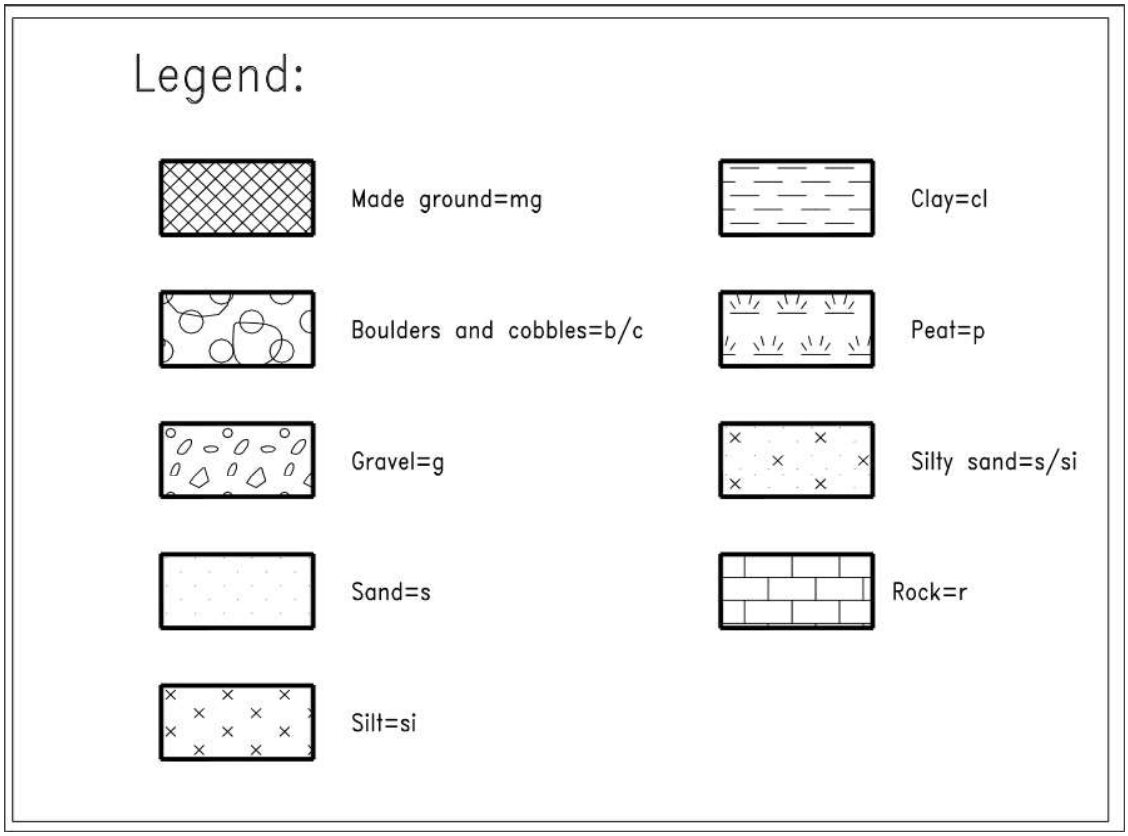
Small and bulk disturbed soil samples were recovered at each change in strata and returned to the laboratory and presented for testing.

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

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

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

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



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

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

Peat was encountered at many locations at a depth ranging from 0.10m to 2.80m below ground level.

Made ground was encountered at a number of trial pit locations to depths ranging from 0.70m to 2.10m to and consisted of slightly sandy gravelly clay and peat with roots and branches and/or gravel, cobbles and boulders.

Intact bedrock was encountered in the rotary core boreholes at depths ranging from 1.60m to 5.00m below ground level. Bedrock was not encountered at RC 02 to a depth of 15.00m bgl before borehole termination.

Intact bedrock in general is predominantly described as strong, locally very strong thinly-bedded siltstone.

Possible weathered bedrock was also encountered in a number of boreholes and many of the trial pits at shallower depths and for detailed descriptions of bedrock encountered please refer to the engineering logs included in appendix 1 of this report.

Bedding planes are defined as the surface that separates one stratum, layer or bed stratified rock from another. Discontinuity is defined as the plane of physical weakness where the tensile strength perpendicular to the discontinuity or the shear strength along the discontinuity is lower than that of the surrounding soil or rock material.

For detailed descriptions of the ground conditions encountered please refer to the engineering logs included in the appendices of this report.

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

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

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

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

Ronan Killeen
Chartered Engineer
Irish Drilling Limited
June 14th 2021

Appendix 01
Borehole Records (Rotary Core)

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Ballinagree Wind Farm	Co Cork	**RC01**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021C101	10-05-21 11-05-21	453.47	E 533,664.1 N 584,315.2

Engineer	Sheet	Rev.
Fehily Timoney & Co	1 of 2	1

RUN DETAILS						STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
0.00	40 (-) -	NA	451.87		(1.60) 1.60	0.00 - 1.60 : overburden.		Subangular fine to coarse brown and grey sandstone GRAVEL.		
2.00	53 (23) 0	15				1.60 - 11.00 Discontinuities, very closely and closely spaced, locally medium spaced, dipping 82 to 84°, stepped, smooth, with 0.5 to 2mm thick reddish brown silt smear.		Strong locally very strong thinly bedded reddish brown fine grained SILTSTONE.		
3.50	100 (65) 29	18 6								
5.00	100 (90) 41	5 8			(9.40)			5.00m to 11.00m : Drillers comment - slow progress.		
6.50	100 (92) 75	6								
8.00	100 (85) 41	9						8.00m to 12.00m: sandy.		
9.50	100 (78) 69	9 3	442.47		11.00	9.00 - 9.20 Joint, vertical dip, undulating, locally stepped, rough, with 0.5 to 1mm thick reddish brown silt smear, open.				
11.00										

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	15.20	water	100

GENERAL REMARKS

50mm standpipe installed. Response zone 3.00m to 15.20m bgl.

All dimensions in metres Scale 1:68.75	Client: Coillte	Method/ Plant Used: Hydreq	Bit: HQ Design	Driller: DK	Logged By: EAT

IDL AGS UK DH (SPTS) BALLINAGREE WF RC FILE 1 MAY 28 2021.GPJ IDL TP TEMPLATE.GDT 18/6/21

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Ballinagree Wind Farm	Co Cork	RC01

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021C101	10-05-21 11-05-21	453.47	E 533,664.1 N 584,315.2

Engineer	Sheet	Rev.
Fehily Timoney & Co	2 of 2	1

RUN DETAILS						STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
T0.05 12.20	100 (98) 96	2				11.00 - 15.20 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 2mm thick greenish grey silt smear.	Very strong locally extremely strong thinly bedded pinkish grey fine grained SANDSTONE.		
11.05	100 (83) 71	8			(4.20)		12.20m to 15.20m: grey. 12.65m to 13.00m: with fine to medium gravel sized clasts of white quartz.		
13.70		3							
T1.05 15.20	100 (94) 87	3	438.27		15.20		BH terminated at 15.20m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
10-05-21	17.00	12.20	1.00	99	63		
11-05-21	08.00	12.20	1.00	99	63		
11-05-21	12.00	15.20	1.00	99	63		

Rotary Flush

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

GENERAL REMARKS

50mm standpipe installed. Response zone 3.00m to 15.20m bgl.

All dimensions in metres Scale 1:68.75	Client: Coillte	Method/ Plant Used: Hydreq	Bit: HQ Design	Driller: DK	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Ballinagree Wind Farm	Co Cork	RC02

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021C101	06-05-21 07-05-21	451.68	E 533,542.9 N 584,539.0

Engineer	Sheet	Rev.
Fehily Timoney & Co	1 of 2	1

RUN DETAILS				STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Discontinuities / Detail / Main	Geology	Instrument/ Backfill
0.00	33 (-) -	NA			(12.20)	0.00 - 10.00 : overburden. Very stiff light reddish brown sandy gravelly SILT with cobbles. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of green sandstone and reddish brown siltstone. Cobbles are of greenish grey sandstone.		
2.00	27 (-) -							
3.50	27 (-) -							
5.00	60 (-) -							
6.50	80 (-) -							
8.00	53 (-) -							
06.05 9.50 07.05	40 (-) -							
11.00								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
06-05-21	17.00	9.50	3.00	99	63		
07-05-21	08.00	9.50	3.00	99	63		

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	15.00	polymer	0

GENERAL REMARKS

10 litres polydrill used.
50mm standpipe installed.
Response zone 3.00m to 15.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Coillte	Method/ Plant Used: Hydreq	Bit: HQ Design	Driller: DK	Logged By: EAT

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Ballinagree Wind Farm	Co Cork	RC02

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021C101	06-05-21 07-05-21	451.68	E 533,542.9 N 584,539.0

Engineer	Sheet	Rev.
Fehily Timoney & Co	2 of 2	1

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
	67 (-)		439.48		12.20					
12.50			439.18		12.50			Dark orangish brown SILT.		
	27 (-)	NA			(2.50)			Orangish brown slightly silty fine and medium SAND.		
14.00										
	80 (-)									
07.05 15.00			436.68		15.00					
								BH terminated at 15.00m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
07-05-21	12.00	15.00	3.00	99	63		

Rotary Flush

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

GENERAL REMARKS

10 litres polydrill used.
50mm standpipe installed.
Response zone 3.00m to 15.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Coillte	Method/ Plant Used: Hydreq	Bit: HQ Design	Driller: DK	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Ballinagree Wind Farm	Co Cork	RC03

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021C101	11-05-21 12-05-21	458.80	E 533,670.6 N 585,235.0

Engineer	Sheet	Rev.
Fehily Timoney & Co	1 of 2	1

RUN DETAILS				STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology / Instrument / Backfill
0.00	50 (18) 0	NA	458.10		(0.70) 0.70	0.00 - 0.70 : overburden.	Subangular fine to medium reddish brown siltstone GRAVEL.	
1.60	100 (15) 0	NI	456.50		(1.60) 2.30	0.70 - 2.30 Non-intact as weathered rock.	Weathered SILTSTONE rock. Recovered as angular fine to coarse gravel sized clasts of medium strong thinly laminated reddish brown fine grained SILTSTONE.	
3.90	100 (85) 39	7 15				2.30 - 15.00 Discontinuities, very closely spaced, locally medium and closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 2mm thick light pinkish brown silt smear.	Strong locally very strong thinly bedded bluish grey slightly sandy fine and medium grained SILTSTONE.	
5.00	100 (91) 47	15						
6.50	100 (67) 18	13 15					6.00m to 15.00m : Drillers comment - slow progress.	
8.00	100 (91) 21	20						
9.50	100 (82) 61	5 7			(12.70)	7.80 - 8.25 Joint, subvertical dip, planar, smooth, with light orangish brown and dark orangish brown iron stain and powder, open.		
T1.05 11.00	100 (96) 47	12						

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
11-05-21	17.00	11.00		99	63		
12-05-21	08.00	11.00		99	63		

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	15.00	water	100

GENERAL REMARKS

50mm standpipe installed. Response zone 3.00m to 15.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Coillte	Method/ Plant Used: Hydreq	Bit: HQ Design	Driller: DK	Logged By: EAT

IDL AGS UK DH (SPTS) BALLINAGREE WF RC FILE 1 MAY 28 2021.GPJ IDL TP TEMPLATE.GDT 18/6/21

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Ballinagree Wind Farm	Co Cork	RC03

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021C101	11-05-21 12-05-21	458.80	E 533,670.6 N 585,235.0

Engineer	Sheet	Rev.
Fehily Timoney & Co	2 of 2	1

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
12.05 12.50	100 (97) 43	15 10				11.00 - 12.35 2 No parallel joints, subvertical dip, stepped, smooth, with 0.5 to 3mm thick grey silt smear, open.	10.90m to 10.95m: subvertical white quartz vein. Strong locally very strong thinly bedded bluish grey slightly sandy fine and medium grained SILTSTONE. *(continued)*		
14.00	100 (91) 54	4 NI 7				13.20 - 13.20 Non-intact as angular fine and medium gravel sized clasts.			
12.05 15.00	100 (96) 94	2	443.80		15.00		BH terminated at 15.00m bgl on REs instruction.		

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
12-05-21	17.00	15.00		99	63		

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

GENERAL REMARKS

50mm standpipe installed. Response zone 3.00m to 15.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Coillte	Method/ Plant Used: Hydreq	Bit: HQ Design	Driller: DK	Logged By: EAT

IDL AGS UK DH (SPTS) BALLINAGREE WF RC FILE 1 MAY 28 2021.GPJ IDL TP TEMPLATE.GDT 18/6/21

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Ballinagree Wind Farm	Co Cork	**RC04**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021C101	05-05-21 06-05-21	420.01	E 537,944.7 N 586,373.4

Engineer	Sheet	Rev.
Fehily Timoney & Co	1 of 2	1

RUN DETAILS

Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)
0.00			419.91		0.10
	25 (-) -				
2.00		NA			(3.80)
	73 (-) -				
3.50			416.11		3.90
	80 (17) 0	NI	415.31		(0.80) 4.70
5.00		7			
	100 (81) 22	10			
6.50		15			
	100 (88) 34	10			
8.00		8			
	100 (57) 16	9			
9.50					(10.30)
	100 (93) 87	2			
05.05 11.00					

STRATA

DESCRIPTION			Geology	Instrument/ Backfill
Discontinuities	Detail	Main		
0.00 - 3.90 : overburden.		Dark brown amorphus PEAT. Subrounded to subangular fine to coarse green siltstone and reddish brown sandstone GRAVEL with a little dark orangish brown silt.		
3.90 - 4.70 Non-intact as probable weathered rock.		Probable weathered SILTSTONE rock. Recovered as angular fine to coarse gravel sized clasts of medium strong and weak dark greyish green fine grained SILTSTONE.		
4.70 - 15.00 Discontinuities, closely and very closely spaced, locally medium spaced, dipping 76 to 78 and 18 to 20°, stepped, smooth, with 0.5 to 1mm thick reddish brown silt smear.		Strong locally very strong thinly bedded greenish grey slightly sandy fine grained SILTSTONE.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
05-05-21	17.00	11.00	2.50	99	63		
06-05-21	08.00	11.00	2.50	99	63		

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	15.00	water	<100

GENERAL REMARKS

50mm standpipe installed. Response zone 3.00m to 15.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Coillte	Method/ Plant Used: Hydreq	Bit: HQ Design	Driller: DK	Logged By: EAT

IDL AGS UK DH (SPTS) BALLINAGREE WF RC FILE 1 MAY 28 2021.GPJ IDL TP TEMPLATE.GDT 18/6/21

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Ballinagree Wind Farm	Co Cork	**RC04**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021C101	05-05-21 06-05-21	420.01	E 537,944.7 N 586,373.4

Engineer	Sheet	Rev.
Fehily Timoney & Co	2 of 2	1

RUN DETAILS						STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
06.05								Strong locally very strong thinly bedded greenish grey slightly sandy fine grained SILTSTONE. *(continued)*		
	100 (97) 71	9								
12.50										
	100 (85) 63	3 5								
14.00										
	100 (84) 73	8								
06.05 15.00			405.01		15.00	14.50 - 14.90 2 No parallel joints, subvertical dip, planar, smooth, with 0.5 to 1mm thick reddish brown silt smear and minor orangish brown iron stain, open.		BH terminated at 15.00m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
06-05-21	13.00	15.00	2.50	99	63		

Rotary Flush

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

GENERAL REMARKS

50mm standpipe installed. Response zone 3.00m to 15.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Coillte	Method/ Plant Used: Hydreq	Bit: HQ Design	Driller: DK	Logged By: EAT

IDL AGS UK DH (SPTS) BALLINAGREE WF RC FILE 1 MAY 28 2021.GPJ IDL TP TEMPLATE.GDT 18/6/21

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Ballinagree Wind Farm	Co Cork	**RC05**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021C101	13-05-21 14-05-21	324.56	E 536,518.2 N 583,047.0

Engineer	Sheet	Rev.
Fehily Timoney & Co	1 of 2	1

RUN DETAILS						STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
0.00	50 (-) -					0.00 - 5.00 : overburden.	Very stiff light orangish brown sandy gravelly SILT with cobbles. Sand is fine to coarse. Gravel is subangular fine to coarse of brown and grey sandstone. Cobbles are of brown and grey sandstone.		
2.00	53 (-) -	NA			(5.00)				
3.50	80 (-) -								
5.00			319.56		5.00				
6.50	100 (85) 7	12 / 3				5.00 - 15.10 Discontinuities, very closely spaced, locally medium and closely spaced, dipping 18 to 20 and 82 to 84°, stepped, smooth, with 0.5 to 2mm thick pinkish brown silt smear and minor dark orangish brown iron stain.	Strong thinly laminated light grey fine and medium grained SILTSTONE.		
8.00	100 (91) 50	5							
9.50	100 (86) 43	8 / 6							
11.00	100 (75) 47	11			(10.10)				

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	15.10	water	100

GENERAL REMARKS

50mm standpipe installed. Response zone 3.00m to 15.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Coillte	Method/ Plant Used: Hydreq	Bit: HQ Design	Driller: DK	Logged By: EAT

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Ballinagree Wind Farm	Co Cork	RC05

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021C101	13-05-21 14-05-21	324.56	E 536,518.2 N 583,047.0

Engineer	Sheet	Rev.
Fehily Timoney & Co	2 of 2	1

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
	100 (87) 67	NI 2				11.00 - 11.20 Non-intact as light brown silt.	Strong thinly laminated light grey fine and medium grained SILTSTONE. *(continued)* 11.15m to 11.20m: light brown silt.		
T3.05 12.50 T4.05		5							
	100 (91) 65	2							
14.00									
	100 (93) 91	0							
T4.05 15.10			309.46		15.10		BH terminated at 15.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
13-05-21	17.00	12.50	2.00	99	63		
14-05-21	08.00	12.50	2.00	99	63		
14-05-21	13.00	15.10	2.00	99	63		

Rotary Flush

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

GENERAL REMARKS

50mm standpipe installed. Response zone 3.00m to 15.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Coillte	Method/ Plant Used: Hydreq	Bit: HQ Design	Driller: DK	Logged By: EAT

IDL AGS UK DH (SPTS) BALLINAGREE WF RC FILE 1 MAY 28 2021.GPJ IDL TP TEMPLATE.GDT 18/6/21

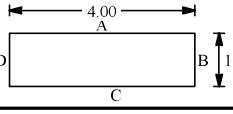
Appendix 02
Trial Pit Records

PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-01**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 534,469.3 N 584,030.7**
Rig: Hyundai HX140L	
Rev: DRAFT	
Ground level: 322.11m O.D.	**DATE: 10.3.21**

GROUNDWATER

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

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									
							321.61	0.50	TOPSOIL: Grass over firm brown silty peaty SILT.
			B	0.50-1.00					Light brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with high cobble content. Cobbles are subangular to subrounded of siltstone.
1									
									1.50m: damp clayey with low boulder content. Boulders are of siltstone. Boulders are <1000mm in diameter.
2			B	2.00-2.50					
3			B	3.00-3.50					
4			B	4.00-4.20					4.00m: hard digging.
							317.81	4.30	
									END
									TP terminated at 4.30m bgl.
5									

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

Scale: 1:25

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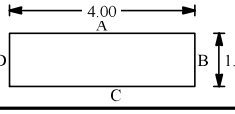
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-02**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 534,613.6 N 583,603.8**
	Rig: Hyundai HX140L
	Rev: DRAFT
Ground level: 314.20m O.D.	**DATE: 10.3.21**

GROUNDWATER

Water strikes: Rose to after:
1st: 2.60m
2nd:
3rd:

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.50-0.60			313.40	0.80	Plastic wet brown amorphous PEAT. H8.
1			B	1.00-1.50					Firm bluish grey sandy gravelly SILT with high cobble content. Gravel is subangular to subrounded fine to coarse of siltstone. Cobbles are subangular to subrounded of siltstone.
2							311.70	2.50	
		1	B	2.50-2.70			311.50	2.70	Firm to stiff orangish brown slightly gravelly silty CLAY with high cobble content and low boulder content. Boulders are of siltstone.
						END			TP terminated at 2.70m bgl. Obstruction as boulders.
3									
4									
5									

Remarks: Ingress of water at 2.60m bgl. TP backfilled with arisings.

Scale: 1:25

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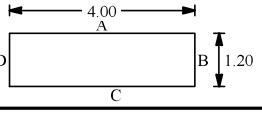
PROJECT: Ballinagree Wind Farm	**TRIALPIT:** T-03
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 535,184.8 N 583,481.4
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 292.63m O.D.	**DATE:** 8.3.21

GROUNDWATER

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

PIT DIRECTION: 340-160
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.50-0.60			291.83	0.80	Grass over spongy moist dark brown pseudo fibrous PEAT. H7.
1			B	1.00-1.30			291.33	1.30	Weathered SILTSTONE rock. Recovered as orangish brown sandy gravelly silt as residual siltstone rock.
2			B	2.00-3.00					Weathered SILTSTONE rock. Recovered as angular to subangular gravel cobble and boulder sized clasts of siltstone with orangish brown silty sandy gravel matrix.
3									
4							288.13	4.50	
5						END			TP terminated at 4.50m bgl. Obstruction as possible boulder sized clasts or intact rock.

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

Scale: 1:25

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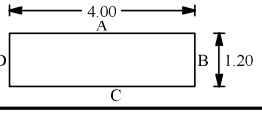
PROJECT: Ballinagree Wind Farm	**TRIALPIT:** T-04
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 535,510.0 N 583,150.2
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 362.79m O.D.	**DATE:** 8.3.21

GROUNDWATER

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

PIT DIRECTION: 020-200
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							362.69	0.10	Plastic damp dark brown amorphous PEAT. H8.
									Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of grey and brown siltstone with soft brown sandy clay matrix.
1			B	1.00-1.40					1.00m: damp and hard digging.
							361.39	1.40	
						END			TP terminated at 1.40m bgl.
2									
3									
4									
5									

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

Scale: 1:25

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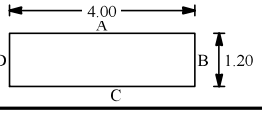
PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-05**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 536,007.9 N 582,795.3**
	Rig: Hyundai HX140L
	Rev: DRAFT
Ground level: 319.05m O.D.	**DATE: 8.3.21**

GROUNDWATER

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

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									MADE GROUND: Soft to firm orangish brown sandy gravelly CLAY with much soft dark brown peat with roots and branches.
1			B	1.00-2.00					
2							316.95	2.10	
									Weathered SILTSTONE rock. Recovered as angular cobble sized clasts of weak siltstone with brown silty gravel and sand matrix.
3			B	3.00-3.50					3.00m: hard digging.
							315.45	3.60	
						END			TP terminated at 3.60m bgl. Unable to progress TP - sidewall collapse.
4									
5									

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

Scale: 1:25

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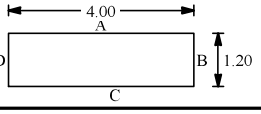
PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-06**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 536,370.9 N 582,607.7**
Ground level: 298.35m O.D.	**DATE: 15.3.21**

GROUNDWATER

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

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.20-0.30			298.05	0.30	Plastic dark brown sandy gravelly amorphous PEAT with medium cobble content and low boulder content. H8.
			B	0.50					Orangish brown silty sandy angular to subrounded fine to coarse sandstone and siltstone GRAVEL with medium cobble content. Cobbles are angular to subrounded of sandstone and siltstone.
1			B	1.00-1.50					1.00m: with low boulder content. Boulders are of sandstone and siltstone. Boulders are <500mm in diameter.
									1.50m: with high boulder content. Boulders are angular of siltstone. Hard digging.
2									
			B	2.50-3.00					
3							295.35	3.00	
						END			TP terminated at 3.00m bgl. Obstruction as siltstone rock.
4									
5									

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

Scale: 1:25

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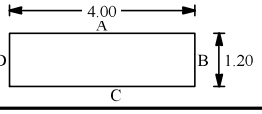
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** T-07
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 536,749.8 N 583,186.8
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 311.75m O.D.	**DATE:** 15.3.21

GROUNDWATER

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

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							311.55	0.20	TOPSOIL: Grass over firm dark grey silty sandy gravelly SILT.
			B	0.50-1.00			311.15	0.60	Orangish brown mottled dark grey peaty silty sandy GRAVEL with low cobble content.
1			B	1.00-1.50					Light brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with high cobble content. Cobbles are angular to subrounded of siltstone.
2			B	2.00-2.50					2.00m: with low boulder content. Boulders are of siltstone. Boulders are <1000mm in diameter.
			B	2.50-2.90			309.25	2.50	Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of strong grey siltstone with sandy silty matrix.
3						END	308.85	2.90	TP terminated at 2.90m bgl. Obstruction as rock.
4									
5									

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

Scale: 1:25

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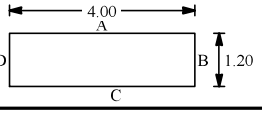
PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-08**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 536,168.6 N 583,300.5**
Rig: Hyundai HX140L	
Rev: DRAFT	
Ground level: 323.14m O.D.	**DATE: 16.3.21**

GROUNDWATER

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

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							322.84	0.30	TOPSOIL: Grass over sandy gravelly peaty CLAY with low cobble content.
			B	0.50-0.60			322.34	0.80	Orangish brown silty sandy angular to subangular fine to coarse siltstone GRAVEL with medium cobble content and low boulder content. Cobbles are angular to subangular of siltstone. Boulders are angular to subangular of siltstone. Boulders are <400mm in diameter.
1			B	1.00-1.50					Light brown mottled black silty sandy angular to subangular fine to coarse siltstone GRAVEL with high cobble content and low boulder content. Cobbles are angular to subangular of siltstone. Boulders are subangular to subrounded of siltstone.
									1.50m: black mottling absent with high boulder content. Cobbles are angular. Boulders are angular.
2			B	2.00-2.50			320.64	2.50	
			B	2.50-3.00			320.04	3.10	Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of strong grey siltstone with some silty sandy gravel. Boulders are <400mm in diameter.
3						END			TP terminated at 3.10m bgl. Obstruction as siltstone rock.
4									
5									

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

Scale: 1:25

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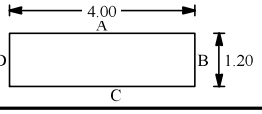
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** T-10
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 536,842.1 N 583,687.7
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
Ground level: 252.79m O.D.	**Rev:** DRAFT
GROUNDWATER Water strikes: 1st: dry Rose to after: 2nd: 3rd:	**DATE:** 9.3.21
PIT DIRECTION: 045-225 **PIT DIMENSION:** 1.20 * 4.00m **LOGGED BY:** AG	Shoring/Support: N/A Stability: Pit stable.



Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							252.69	0.10	TOPSOIL: Grass over soft gravelly CLAY with rootlets.
			B	0.50-1.00					Firm orangish brown sandy gravelly SILT with low cobble content. Gravel is subangular to subrounded fine to coarse of siltstone. Cobbles are subangular to subrounded of siltstone and sandstone.
1							251.79	1.00	
			B	1.50-2.00					Light brown silty sandy GRAVEL with high cobble content and low boulder content. Cobbles are subangular to subrounded of siltstone. Boulders are subangular to subrounded of siltstone. Boulders are <1000mm in diameter.
2							250.09	2.70	
			B	3.00-3.50					Very stiff orangish brown sandy gravelly CLAY with medium cobble content and medium boulder content. Gravel is subangular to subrounded fine to coarse of various lithologies. Cobbles are subangular to subrounded of various lithologies. Boulders are subangular to subrounded.
3							248.79	4.00	
			B	4.00-4.50					Light brown gravelly fine SAND with medium cobble content and low boulder content. Boulders are subangular of sandstone.
4							247.99	4.80	
						END			TP terminated at 4.80m bgl. Obstruction as possible rock.
5									

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

Scale: 1:25

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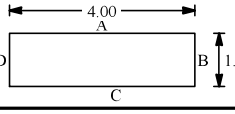
PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-11**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 536,177.4 N 584,287.5**
Ground level: 263.58m O.D.	**Rig: Hyundai HX140L**
	Rev: DRAFT
	DATE: 12.3.21

GROUNDWATER

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

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							263.38	0.20	TOPSOIL: Soft dark brown peaty SILT with high cobble content.
			B	0.50-1.00			262.18	1.40	Stiff light brown sandy gravelly SILT with medium cobble content. Gravel is subangular to subrounded fine to coarse of siltstone. Cobbles are subangular to subrounded of siltstone.
1		▼							
			B	1.50-2.00					Light brown clayey silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with medium cobble content and low boulder content. Cobbles are subangular to subrounded of siltstone. Boulders are of siltstone. Boulders are <400mm in diameter.
2									2.00m: with high boulder content. Boulders are angular of siltstone.
3			B	3.00-3.60			259.98	3.60	
						END			TP terminated at 3.60m bgl. Unable to progress TP - sidewall collapse.
4									
5									

Remarks: Seepage of water at 1.00m bgl. TP backfilled with arisings.

Scale: 1:25

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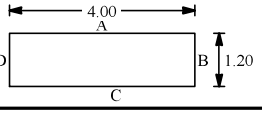
PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-12**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 535,308.9 N 584,244.1**
Ground level: 290.91m O.D.	**Rig: Hyundai HX140L**
	Rev: DRAFT
	DATE: 12.3.21

GROUNDWATER

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

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.20-0.30			290.61	0.30	Plastic dark grey amorphous PEAT. H8.
			B	0.50-1.00			290.11	0.80	Orangish brown silty gravelly SAND.
1			B	1.00-1.50					Light brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with high cobble content. Cobbles are subangular to subrounded of siltstone.
2			B	2.00-2.50					1.50m: with high boulder content. Boulders are angular to subangular of siltstone. Boulders are <1000mm in diameter. Hard digging.
3									
4			B	4.00-4.50			286.31	4.60	
						END			TP terminated at 4.60m bgl.
5									

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

Scale: 1:25

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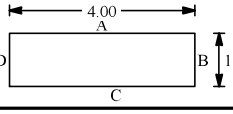
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** T-13
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 535,226.0 N 584,685.7
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 317.42m O.D.	**DATE:** 11.3.21

GROUNDWATER

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

PIT DIRECTION: 010-190
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.10-0.20			317.22	0.20	TOPSOIL: Grass over dark brown peaty gravelly SILT.
			B	0.50-1.00			315.82	1.60	Brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with medium cobble content. Cobbles are subangular to subrounded of siltstone.
2		1	B	1.60-2.00			314.62	2.80	Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of strong siltstone with brown silty sandy gravel matrix.
						END			TP terminated at 2.80m bgl. Unable to progress TP - sidewall collapse and boulder sized clasts.
5									

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

Scale: 1:25

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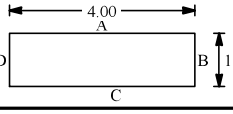
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm **LOCATION: Co Cork**		**TRIALPIT: T-14** **Sheet 1 of 1**
CLIENT: Coillte **ENGINEER: Fehily Timoney & Co**	**Co-ordinates:** **E 536,300.7 N 586,069.0**	**Rig: Hyundai HX140L** **Rev: DRAFT**
Ground level: 413.33m O.D.		**DATE: 16.3.21**

GROUNDWATER

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

PIT DIRECTION: 140-320
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.20-0.30			413.03	0.30	Grass over plastic dark brown amorphous PEAT. H8.
			B	0.50-1.00					Orangish brown becoming light brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with medium cobble content and low boulder content. Cobbles are subangular to subrounded of siltstone. Boulders are subrounded of siltstone. Boulders are <800mm in diameter.
1									
			B	1.50-2.00					
2							411.03	2.30	
			B	2.50-3.00					Stiff light brown slightly sandy gravelly CLAY with low cobble content and low boulder content. Gravel is subangular to subrounded fine to coarse of siltstone. Boulders are of siltstone.
3									
4			B	4.00-4.50			408.83	4.50	
						END			TP terminated at 4.50m bgl. Obstruction.
5									

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

Scale: 1:25

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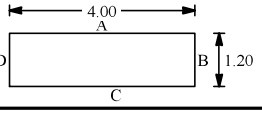
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-15**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 536,701.7 N 586,667.7**
Rig: Hyundai HX140L	
Rev: DRAFT	
Ground level: 430.26m O.D.	**DATE: 18.3.21**

GROUNDWATER

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

PIT DIRECTION: 020-200
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.50-0.60					Spongy dark brown silty pseudo fibrous PEAT. H7.
							429.26	1.00	
1			B	1.00-2.00					Light brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with medium cobble content. Cobbles are subangular to subrounded of siltstone.
2			B	2.00-3.00					2.50m: with high boulder content.
3							426.46	3.80	
4			B	4.00-4.50					Weathered MUDSTONE rock. Recovered as angular cobble and boulder sized clasts of medium strong to strong light brown mudstone with sandy gravel matrix.
							425.76	4.50	
						END			TP terminated at 4.50m bgl. Obstruction as rock.
5									

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

Scale: 1:25

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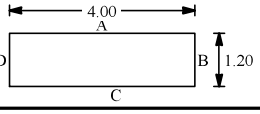
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-16**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 537,278.9 N 586,509.5**
Ground level: 471.77m O.D.	**Rig: Hyundai HX140L**
	Rev: DRAFT
	DATE: 18.3.21

GROUNDWATER

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

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.20-0.30					Plastic dark brown amorphous PEAT. H8.
			B	0.50-1.00			471.27	0.50	Firm light grey sandy gravelly SILT with high cobble content. Gravel is angular to subangular fine to coarse of siltstone. Cobbles are angular to subangular of siltstone.
1							470.67	1.10	Light grey and purple silty peaty sandy angular to subangular fine to coarse purple siltstone GRAVEL with high cobble content. Cobbles are angular to subangular of purple siltstone.
			B	1.50-2.00					
2							469.67	2.10	2.00m: hard digging.
						END			TP terminated at 2.10m bgl. Obstruction.
3									
4									
5									

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

Scale: 1:25

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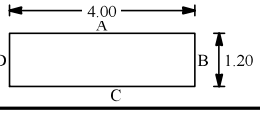
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-17**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 537,464.8 N 586,081.3**
Rig: Hyundai HX140L	
Rev: DRAFT	
Ground level: 443.86m O.D.	**DATE: 22.3.21**

GROUNDWATER

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

PIT DIRECTION: 090-270
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							443.56	0.30	Firm black pseudo fibrous PEAT.
			B	0.50-1.00			442.86	1.00	Dark brown silty peaty sandy subangular to angular fine to coarse siltstone GRAVEL with high cobble content and medium boulder content. Cobbles are angular of siltstone. Boulders are angular of siltstone.
1			B	1.50-1.70			442.16	1.70	Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of strong purple siltstone with sandy gravelly silt matrix.
						END			TP terminated at 1.70m bgl. Obstruction as siltstone rock.
2									
3									
4									
5									

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

Scale: 1:25

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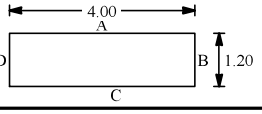
PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-18**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 537,119.6 N 585,649.1**
Ground level: 382.92m O.D.	**Rig: Hyundai HX140L**
	Rev: DRAFT
	DATE: 22.3.21

GROUNDWATER

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

PIT DIRECTION: 090-270
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.50-0.60			382.32	0.60	Plastic dark brown amorphous PEAT. H8.
1			B	1.00			381.72	1.20	Brown silty sandy peaty subangular to subrounded fine to coarse siltstone GRAVEL with high cobble content and low boulder content. Cobbles are subangular to subrounded of siltstone. Boulders are angular of siltstone. Boulders are <400mm in diameter.
2			B	1.50-2.00			380.92	2.00	Grey silty sandy angular to subrounded fine to coarse siltstone GRAVEL with high cobble content and low boulder content. Cobbles are angular of siltstone. Boulders are angular of siltstone. Boulders are <400mm in diameter.
							380.42	2.50	Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of siltstone with some silty sand.
3						END			TP terminated at 2.50m bgl. Obstruction as siltstone rock.
4									
5									

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

Scale: 1:25

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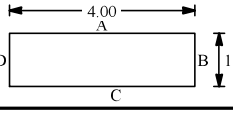
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-19**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 538,387.6 N 586,604.2**
Ground level: 406.91m O.D.	**Rig: Hyundai HX140L**
	Rev: DRAFT
	DATE: 22.3.21

GROUNDWATER

Water strikes: Rose to after:
1st: 0.00m
2nd:
3rd:

PIT DIRECTION: 090-270
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									Plastic dark brown amorphous PEAT. H8.
1			D	1.00-1.10					
2			B	2.00-2.50			404.91	2.00	Soft to firm grey sandy gravelly SILT with high cobble content. Gravel is subangular to subrounded fine to coarse of siltstone. Cobbles are subangular to subrounded of siltstone.
3			B	3.00-3.50			404.11	2.80	Orangish brown silty sandy subangular to subrounded fine to coarse siltstone and sandstone GRAVEL with high cobble content. Cobbles are subangular to subrounded of siltstone and sandstone .
4			B	4.00-4.30			402.61	4.30	
5						END			TP terminated at 4.30m bgl. Unable to progress TP - sidewall collapse.

Remarks: Seepage of water from g/l to 2.00m bgl. TP backfilled with arisings.

Scale: 1:25

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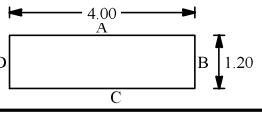
PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-20A**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 537,752.8 N 586,154.8**
	Rig: Hyundai HX140L
	Rev: DRAFT
Ground level: 442.49m O.D.	**DATE: 22.3.21**

GROUNDWATER

Water strikes: Rose to after:
1st: 0.50m
2nd:
3rd:

PIT DIRECTION: 300-120
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.20-0.30			442.09	0.40	Spongy brown pseudo fibrous PEAT.
			B	0.50-1.00			441.09	1.40	Grey silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with high cobble content and low boulder content. Cobbles are subangular to subrounded of siltstone. Boulders are angular of siltstone.
1			B	1.50-2.00			440.49	2.00	Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of strong purple siltstone with grey silty gravelly sandy matrix.
2						END			TP terminated at 2.00m bgl. Obstruction as siltstone rock.
3									
4									
5									

Remarks: Seepage of water from 0.50m to 2.00m bgl. TP backfilled with arisings.

Scale: 1:25

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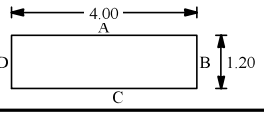
PROJECT: Ballinagree Wind Farm	**TRIALPIT: T-21A**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 536,222.8 N 586,176.1**
Ground level: 433.26m O.D.	**Rig: Hyundai HX140L**
	Rev: DRAFT
	DATE: 22.3.21

GROUNDWATER

Water strikes: Rose to after:
1st: 0.00m
2nd:
3rd:

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.50-0.60			432.56	0.70	Plastic dark brown amorphous PEAT. H8.
1			B	1.00-1.30			431.96	1.30	Soft grey sandy gravelly peaty SILT with high cobble content. Gravel is subangular to subrounded fine to coarse of siltstone. Cobbles are subangular to subrounded of siltstone. Boulders are <400mm in diameter.
2			B	2.00-2.50					Brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with high cobble content and low boulder content. Cobbles are subangular to subrounded of siltstone. Boulders are subangular of siltstone.
3			B	3.00-3.50			429.76	3.50	3.00m: hard digging.
						END			TP terminated at 3.50m bgl. Obstruction as boulders.
4									
5									

Remarks: Seepage of water from g/l to 1.30m bgl. TP backfilled with arisings.

Scale: 1:25

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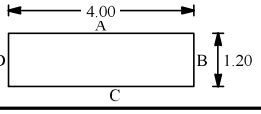
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-01
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 535,968.8 N 586,172.2
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
Ground level: 447.20m O.D.	**Rev:** DRAFT
GROUNDWATER Water strikes: 1st: 0.50m Rose to after: 2nd: 3rd:	**DATE:** 16.3.21
PIT DIRECTION: 180-360 **PIT DIMENSION:** 1.20 * 4.00m **LOGGED BY:** AG	Shoring/Support: N/A Stability: Pit moderately stable.



Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.20-0.30			446.80	0.40	Plastic dark brown amorphous PEAT. H8.
			B	0.50-1.00			446.00	1.20	Soft to firm grey mottled dark brown sandy gravelly peaty SILT with medium cobble content. Gravel is subangular to subrounded fine to coarse of siltstone. Cobbles are subangular to subrounded of siltstone.
1									
2			B	1.50-2.00			444.70	2.50	Light orangish brown silty sandy angular to subangular fine to coarse siltstone GRAVEL with high cobble content and low boulder content. Cobbles are angular to subangular of siltstone. Boulders are subangular of siltstone.
						END			TP terminated at 2.50m bgl. Obstruction as boulders.
3									
4									
5									

Remarks: Seepage of water at 0.50m bgl. TP backfilled with arisings.

Scale: 1:25

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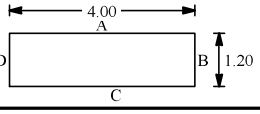
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-02**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 536,203.5 N 586,063.6**
Ground level: 420.72m O.D.	**Rig: Hyundai HX140L**
	Rev: DRAFT
	DATE: 16.3.21

GROUNDWATER

Water strikes: Rose to after:
1st: 0.50m
2nd:
3rd:

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							420.52	0.20	Soft dark brown silty PEAT.
			B	0.50-1.00			419.92	0.80	Soft grey sandy gravelly SILT with medium cobble content. Gravel is angular to subrounded fine to coarse of siltstone. Cobbles are angular to subrounded of siltstone.
1			B	1.00-1.50					Orangish brown silty sandy angular to subrounded fine to coarse siltstone GRAVEL with high cobble content. Cobbles are angular to subrounded of siltstone.
2			B	2.00-2.50					2.00m: with high boulder content. Boulders are angular. Boulders are <500mm in diameter.
3									
4			B	4.00-4.50			416.22	4.50	
						END			TP terminated at 4.50m bgl on REs instruction.
5									

Remarks: Seepage of water at 0.50m bgl. TP backfilled with arisings.

Scale: 1:25

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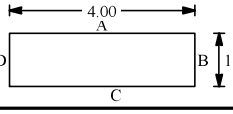
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-03**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 536,820.2 N 586,612.3**
Ground level: 432.73m O.D.	**Rig: Hyundai HX140L**
	Rev: DRAFT
	DATE: 18.3.21

GROUNDWATER

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

PIT DIRECTION: 340-160
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.50-0.60					Spongy wet dark brown pseudo fibrous PEAT. H5.
1									
2			B	2.00-2.50			430.73	2.00	Orangish brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with medium cobble content. Cobbles are subangular to subrounded of siltstone.
						END	430.23	2.50	TP terminated at 2.50m bgl. Unable to progress TP - sidewall collapse.
3									
4									
5									

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

Scale: 1:25

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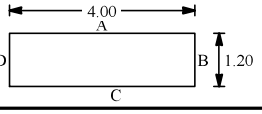
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-04**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 537,062.6 N 586,054.3**
	Rig: Hyundai HX140L
	Rev: DRAFT
Ground level: 411.19m O.D.	**DATE: 22.3.21**

GROUNDWATER

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

PIT DIRECTION: 090-270
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									
							410.89	0.30	Spongy dark brown pseudo fibrous PEAT. H7.
			B	0.50-1.00					Orangish brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with medium cobble content. Cobbles are subangular to subrounded of siltstone.
1									
			B	1.50-2.00					1.50m: with low boulder content. Boulders are subangular of siltstone. Boulders are <500mm in diameter.
2							409.19	2.00	
						END			TP terminated at 2.00m bgl. Obstruction as possible boulders.
3									
4									
5									

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

Scale: 1:25

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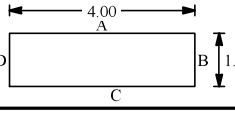
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-05**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 537,059.4 N 585,712.9**
	Rig: Hyundai HX140L
	Rev: DRAFT
Ground level: 383.79m O.D.	**DATE: 22.3.21**

GROUNDWATER

Water strikes: Rose to after:
1st: 0.00m
2nd:
3rd:

PIT DIRECTION: 090-270
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							383.49	0.30	Spongy dark brown pseudo fibrous PEAT. H7.
			B	0.50-1.00					Brown silty sandy peaty subangular to subrounded fine to coarse sandstone GRAVEL with medium cobble content. Cobbles are subangular to subrounded of sandstone.
1							382.49	1.30	
			B	1.30-2.00					Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of strong brown siltstone with silty sandy gravelly matrix.
2							381.79	2.00	
						END			TP terminated at 2.00m bgl. Unable to progress TP - sidewall collapse and hard digging.
3									
4									
5									

Remarks: Seepage of water from g/l to 0.30m bgl. TP backfilled with arisings.

Scale: 1:25

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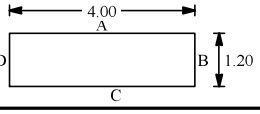
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-06
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 537,267.8 N 586,461.8
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 472.96m O.D.	**DATE:** 18.3.21

GROUNDWATER

Water strikes: Rose to after:
1st: 1.40m
2nd:
3rd:

PIT DIRECTION: 020-200
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.20-0.30					Plastic dark brown amorphous PEAT. H8.
							472.46	0.50	
			B	0.50-1.00					Light grey silty sandy angular fine to coarse siltstone GRAVEL with high cobble content and medium boulder content.
1							471.86	1.10	
		1	B	1.10-1.50					Weathered SILTSTONE rock. Recovered as angular boulder sized clasts of strong purple siltstone with a little sandy gravelly silt.
							471.46	1.50	
						END			TP terminated at 1.50m bgl. Obstruction as rock.
2									
3									
4									
5									

Remarks: Seepage of water from 1.40m to 1.50m bgl. TP backfilled with arisings.

Scale: 1:25

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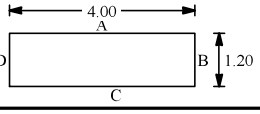
PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-07
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 537,555.8 N 586,095.0
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 444.54m O.D.	**DATE:** 22.3.21

GROUNDWATER

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

PIT DIRECTION: 090-270
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							444.24	0.30	Plastic dark brown amorphous PEAT. H8.
			B	0.50-1.00			443.44	1.10	Orangish brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with high cobble content and low boulder content. Cobbles are subangular to subrounded of siltstone. Boulders are are subangular of siltstone.
1									
			B	1.50-2.00					Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of strong bluish grey siltstone with brown silty sand matrix.
2							442.14	2.40	
						END			TP terminated at 2.40m bgl. Obstruction as rock.
3									
4									
5									

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

Scale: 1:25

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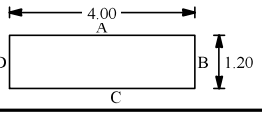
PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-08**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 537,563.1 N 586,197.1**
	Rig: Hyundai HX140L
	Rev: DRAFT
Ground level: 464.45m O.D.	**DATE: 18.3.21**

GROUNDWATER

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

PIT DIRECTION: 045-225
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.20-0.30					Plastic dark brown amorphous PEAT. H8.
			B	0.50-1.50			463.95	0.50	Weathered SANDSTONE rock. Recovered as angular cobble and boulder sized clasts of strong greyish brown fine grained sandstone with silty peat matrix.
1			B	1.50-2.00			462.95	1.50	Weathered SANDSTONE rock. Recovered as angular cobble and boulder sized clasts of strong light brown and grey fine grained sandstone with brown sandy silt matrix.
2						END	462.45	2.00	TP terminated at 2.00m bgl. Obstruction as rock.
3									
4									
5									

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

Scale: 1:25

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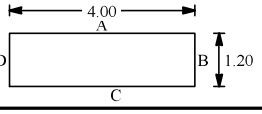
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-09**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 538,173.4 N 586,397.8**
Rig: Hyundai HX140L	
Rev: DRAFT	
Ground level: 403.12m O.D.	**DATE: 19.3.21**

GROUNDWATER

Water strikes: Rose to after:
1st: 1.50m
2nd:
3rd:

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									Spongy dark brown pseudo fibrous PEAT. H5.
1		1	D	1.00-1.10			401.32	1.80	
2			B	2.00-2.50					Firm to stiff grey sandy gravelly SILT with low cobble content and occasional rootlets. Gravel is subangular to subrounded fine to coarse of siltstone. Cobbles are subangular to subrounded of siltstone.
3			B	3.00-3.50					3.00m: with medium cobble content.
4			B	4.00-4.30			398.82	4.30	
						END			TP terminated at 4.30m bgl. Maximum reach of excavator.
5									

Remarks: Seepage of water from 1.50m to 2.00m bgl. TP backfilled with arisings.

Scale: 1:25

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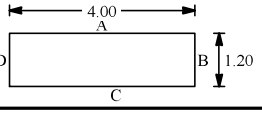
PROJECT: Ballinagree Wind Farm **LOCATION: Co Cork**		**TRIALPIT: TP-10** **Sheet 1 of 1**
CLIENT: Coillte **ENGINEER: Fehily Timoney & Co**	**Co-ordinates:** **E 538,334.4 N 586,568.4**	**Rig: Hyundai HX140L** **Rev: DRAFT**
Ground level: 406.93m O.D.		**DATE: 19.3.21**

GROUNDWATER

Water strikes: Rose to after:
1st: 0.00m
2nd:
3rd:

PIT DIRECTION: 045-225
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									Plastic dark brown amorphous PEAT. H9.
1			D	1.00-1.30					
2							404.23	2.70	
3			B	3.00-3.50					Grey silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with high cobble content. Cobbles are subangular to subrounded of siltstone. 3.00m: with low boulder content. Boulders are subangular of siltstone. Boulders are <400mm in diameter.
4							402.53	4.40	
5						END			TP terminated at 4.40m bgl on REs instruction.

Remarks: Seepage of water from g/l to 2.70m bgl. TP backfilled with arisings.

Scale: 1:25

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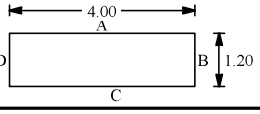
PROJECT: Ballinagree Wind Farm		**TRIALPIT: TP-11A**
LOCATION: Co Cork		**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**	**Rig: Hyundai HX140L**
ENGINEER: Fehily Timoney & Co	**E 536,988.0 N 586,756.1**	**Rev: DRAFT**
Ground level: 425.45m O.D.		**DATE: 22.3.21**

GROUNDWATER

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

PIT DIRECTION: 045-225
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									
									MADE GROUND: Firm grey sandy gravelly CLAY with medium cobble content and low boulder content.
							424.45	1.00	
1									Spongy dark brown pseudo fibrous PEAT. H7.
			D	1.50-1.60					
							423.55	1.90	
2			B	2.00-2.30					Grey silty sandy subangular to subrounded fine to coarse sandstone GRAVEL with low cobble content. Cobbles are subangular to subrounded of sandstone.
							423.15	2.30	
									Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of strong purple and grey siltstone with silty gravelly sand matrix.
3			B	3.00-3.40					
							422.05	3.40	
						END			TP terminated at 3.40m bgl. Obstruction as rock.
4									
5									

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

Scale: 1:25

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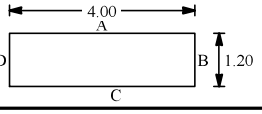
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-12**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 539,009.0 N 586,731.0**
Ground level: 398.35m O.D.	**Rig: Hyundai HX140L**
	Rev: DRAFT
	DATE: 19.3.21

GROUNDWATER

Water strikes: Rose to after:
1st: 0.50m
2nd:
3rd:

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									Spongy brown pseudo fibrous PEAT. H7.
1			D	1.00-1.10					
2							396.15	2.20	
			B	2.50-3.00					Very stiff grey sandy gravelly SILT with medium cobble content. Gravel is subangular to subrounded fine to coarse of siltstone. Cobbles are subangular to subrounded of siltstone.
3							394.75	3.60	
									Weathered SANDSTONE rock. Recovered as angular cobble and boulder sized clasts of strong brown fine grained sandstone with silty gravelly sandy matrix.
4			B	4.00-4.30			394.05	4.30	
						END			TP terminated at 4.30m bgl. Maximum reach of excavator.
5									

Remarks: Seepage of water at 0.50m bgl. TP backfilled with arisings.

Scale: 1:25

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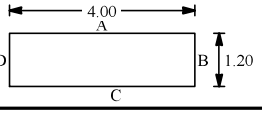
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-13
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 539,514.3 N 586,805.8
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 386.43m O.D.	**DATE:** 19.3.21

GROUNDWATER

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

PIT DIRECTION: 010-190
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									Spongy dark brown pseudo fibrous PEAT. H7.
1			D	1.00-1.10					
2							384.23	2.20	
			B	2.50-3.00					Light brown silty sandy subangular to subrounded fine to coarse siltstone and sandstone GRAVEL with medium cobble content. Cobbles are subangular to subrounded of siltstone and sandstone.
3									3.00m: with high cobble content and low boulder content. Boulders are subangular to subrounded. Boulders are <400mm in diameter.
							382.63	3.80	
4			B	4.00-4.30					Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of strong orangish brown siltstone with silty sand matrix. Boulders are <400mm in diameter.
							382.13	4.30	
						END			TP terminated at 4.30m bgl. Maximum reach of excavator.
5									

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

Scale: 1:25

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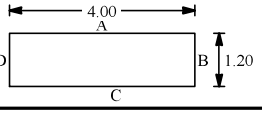
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-14
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 533,448.8 N 585,310.6
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 514.96m O.D.	**DATE:** 11.3.21

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									Reddish brown silty sandy angular to subrounded fine to coarse sandstone and siltstone GRAVEL with high cobble content. Cobbles are subangular to subrounded of sandstone and siltstone.
			B	0.50-1.00					
1									
2									2.00m: clayey with high boulder content. Boulders are angular. Boulders are <400mm in diameter.
			B	2.20-2.50					
							512.26	2.70	
						END			TP terminated at 2.70m bgl. Obstruction as possible rock.
3									
4									
5									

Remarks: Ingress of surface water. TP dry on excavation. TP backfilled with arisings.

Scale: 1:25

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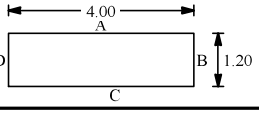
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-15
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 533,606.6 N 584,845.9
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
Ground level: 434.27m O.D.	**Rev:** DRAFT
GROUNDWATER Water strikes: 1st: 0.30m Rose to after: 2nd: 3rd:	**DATE:** 11.3.21
PIT DIRECTION: **PIT DIMENSION:** 1.20 * 4.00m **LOGGED BY:** AG	Shoring/Support: N/A Stability: Pit stable.



Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									
		▼	D	0.20-0.30			433.97	0.30	Plastic damp dark grey slightly silty amorphous PEAT. H9.
			B	0.50-1.00					Reddish brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with low cobble content. Cobbles are subangular to subrounded of siltstone.
1									1.50m: with medium cobble and low boulder content. Boulders are subangular. Boulders are <400mm in diameter.
2			B	2.00-2.50					2.00m: with high boulder content. Boulders are <500mm in diameter.
							431.77	2.50	
						END			TP terminated at 2.50m bgl. Obstruction as rock.
3									
4									
5									

Remarks: Slight seepage of water at 0.30m bgl. TP backfilled with arisings.

Scale: 1:25

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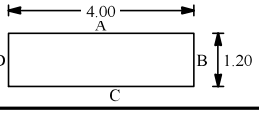
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-16
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 533,559.2 N 584,334.7
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 461.95m O.D.	**DATE:** 10.3.21

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.20-0.30			461.65	0.30	Plastic dark grey silty amorphous PEAT with roots. H9.
									Brown silty sandy angular to subangular fine to coarse GRAVEL of various lithologies with low cobble content. Cobbles are subangular to subrounded of various lithologies.
1			B	1.00-1.50					
									1.50m: with high cobble.
2			B	2.00-2.50			459.35	2.60	
									Purple silty sandy angular siltstone GRAVEL with high cobble content.
3			B	3.00-3.50					3.00m: brown.
4							457.25	4.70	
						END			TP terminated at 4.70m bgl.
5									

Remarks: Seepage of water at 3.00m bgl. TP backfilled with arisings.

Scale: 1:25

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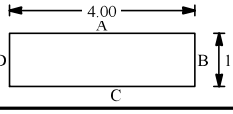
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-17
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 534,510.1 N 583,678.8
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 314.85m O.D.	**DATE:** 10.3.21

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									
							314.55	0.30	TOPSOIL: Grass over peaty silty sandy CLAY.
			B	0.50-1.00					Light brown silty sandy subangular to subrounded fine to coarse GRAVEL of various lithologies with high cobble content and low boulder content. Cobbles are angular to subangular of various lithologies. Boulders are of siltstone. Boulders are <1200mm in diameter.
1									
2			B	2.00-2.30			312.55	2.30	
						END			TP terminated at 2.30m bgl. Unable to progress TP - sidewall collapse.
3									
4									
5									

Remarks: Ingress of surface water. TP dry on excavation. TP backfilled with arisings.

Scale: 1:25

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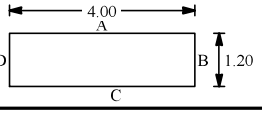
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-18
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 534,442.4 N 583,869.3
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 317.14m O.D.	**DATE:** 10.3.21

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.20-0.30			316.84	0.30	Plastic dark brown amorphous PEAT with rootlets. H8.
			B	0.50-1.00			315.84	1.30	Stiff greyish brown sandy gravelly CLAY with medium cobble content. gravel is subangular to subrounded of siltstone. Cobbles are subangular to subrounded of siltstone.
1									
2			B	2.00-2.30			314.84	2.30	Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of siltstone with orangish brown silty gravelly sandy matrix.
						END			TP terminated at 2.30m bgl.
3									
4									
5									

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

Scale: 1:25

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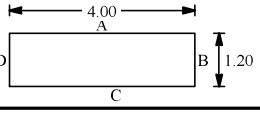
PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-19
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 534,489.8 N 584,122.2
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 320.32m O.D.	**DATE:** 10.3.21

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									
							319.62	0.70	MADE GROUND: Brown silty sandy angular siltstone COBBLES with low boulder content.
1			B	1.00-1.50					Light brown silty sandy GRAVEL with high cobble content and low boulder content. Boulders are of siltstone. 1.00m: hard digging.
							318.32	2.00	
2						END			TP terminated at 2.00m bgl. Obstruction.
3									
4									
5									

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

Scale: 1:25

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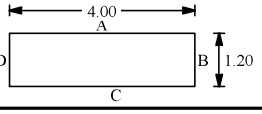
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm **LOCATION: Co Cork**		**TRIALPIT: TP-20** **Sheet 1 of 1**
CLIENT: Coillte **ENGINEER: Fehily Timoney & Co**	**Co-ordinates:** **E 534,822.3 N 584,194.8**	**Rig: Hyundai HX140L** **Rev: DRAFT**
Ground level: 291.60m O.D.		**DATE: 9.3.21**

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									
			B	0.50-1.00					MADE GROUND: Granular fill. Grey sandy GRAVEL with high cobble content.
							290.90	0.70	
1			B	1.00-2.00					Light brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with high cobble content. Cobbles are subangular to subrounded of siltstone. 1.00m: with high boulder content. Boulders are <500mm in diameter. Hard digging.
2							289.60	2.00	
						END			TP terminated at 2.00m bgl. Obstruction as boulders.
3									
4									
5									

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

Scale: 1:25

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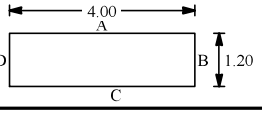
PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-21
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 535,279.2 N 584,270.4
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 291.53m O.D.	**DATE:** 12.3.21

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.30-0.40			291.13	0.40	Plastic dark brown amorphous PEAT. H9.
							290.83	0.70	Dark brown peaty GRAVEL with occasional roots.
1			B	1.00-1.50					Light brown silty sandy angular to subangular fine to coarse siltstone GRAVEL with medium cobble content. Cobbles are angular to subangular of siltstone and sandstone.
			B	1.50-2.00					1.50m: with high boulder content. Boulders are subangular to angular of siltstone. Boulders are <500mm in diameter. Hard digging.
2							289.33	2.20	
						END			TP terminated at 2.20m bgl. Obstruction as boulders.
3									
4									
5									

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

Scale: 1:25

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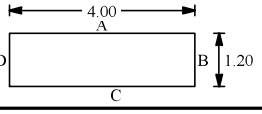
PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-22
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 535,151.4 N 584,709.7
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 318.94m O.D.	**DATE:** 11.3.21

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							318.74	0.20	Plastic dark brown amorphous PEAT. H9.
			B	0.50-1.00			317.64	1.30	Yellowish orangish brown silty sandy GRAVEL of various lithologies with high cobble content and low boulder content. Boulders are angular of siltstone. Boulders are <400mm in diameter.
1									
			B	1.50-2.00			316.84	2.10	Brown stained dark brown silty sandy angular fine to coarse siltstone GRAVEL with high cobble content and high boulder content. Cobbles are subangular to angular of siltstone. Boulders are subangular to angular of siltstone.
2									
						END			TP terminated at 2.10m bgl. Obstruction as possible rock.
3									
4									
5									

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

Scale: 1:25

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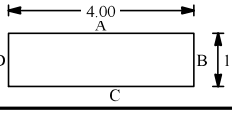
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-23
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 536,285.0 N 584,253.2
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 260.51m O.D.	**DATE:** 11.1.00

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							260.21	0.30	TOPSOIL: Grass over soft dark brown peaty SILT.
			B	0.50-1.00					Firm orangish brown sandy gravelly SILT with medium cobble content and low boulder content. Gravel is subangular to subrounded fine to coarse of siltstone. Cobbles are of siltstone. Boulders are of siltstone.
1		▼1							1.00m: with high boulder content.
			B	1.50-2.00					
2									
			B	2.50-3.00					
3							257.11	3.40	
						END			TP terminated at 3.40m bgl. Unable to progress TP - sidewall collapse.
4									
5									

Remarks: Seepage of water at 1.00m bgl. TP backfilled with arisings.

Scale: 1:25

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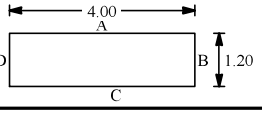
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-24
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 536,563.3 N 583,973.0
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 241.60m O.D.	**DATE:** 12.3.21

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							241.40	0.20	TOPSOIL: Grass over soft greyish brown silty peaty CLAY.
			B	0.50					Soft to firm light brown sandy gravelly SILT with medium cobble content. Gravel is angular to subangular fine to coarse of siltstone. Cobbles are angular to subangular of siltstone.
1									
			B	1.50-2.00					
2							239.20	2.40	
						END			TP terminated at 2.40m bgl. Obstruction as boulders.
3									
4									
5									

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

Scale: 1:25

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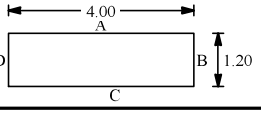
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-25
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 535,895.8 N 583,722.1
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 258.45m O.D.	**DATE:** 9.3.21

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.10-0.20			258.25	0.20	Plastic dark brown amorphous PEAT with roots. H8.
									Light brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with medium cobble content and low boulder content. Cobbles are subangular to subrounded of siltstone. Boulders are <600mm in diameter.
1									
			B	1.50-2.00					
2									2.00m: with high cobble content and high boulder content. Boulders are <500mm in diameter.
3									
			B	3.50-4.00					
4							254.15	4.30	
						END			TP terminated at 4.30m bgl. Obstruction as boulders.
5									

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

Scale: 1:25

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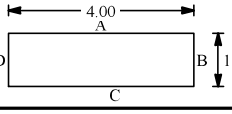
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-26
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 535,732.2 N 583,708.8
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
Ground level: 262.10m O.D.	**Rev:** DRAFT
GROUNDWATER Water strikes: 1st: 1.00m 2nd: 2.00m 3rd: Rose to after:	**DATE:** 9.3.21
PIT DIRECTION: **PIT DIMENSION:** 1.20 * 4.00m **LOGGED BY:** AG	Shoring/Support: N/A Stability: Pit unstable. Sidewall collapse.



Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									
			B	1.00			260.40	1.70	MADE GROUND: Soft to firm orangish brown sandy gravelly CLAY with much soft dark brown peat with roots and branches.
							259.60	2.50	Orangish brown silty sandy GRAVEL with medium cobble content and low boulder content. Boulders are subangular to subrounded of siltstone and sandstone.
						END			TP terminated at 2.50m bgl. Unable to progress TP - sidewall collapse.
1									
2									
3									
4									
5									

Remarks: Seepage of water at 1.00m bgl. Ingress of water at 2.00m bgl. TP backfilled with arisings.

Scale: 1:25

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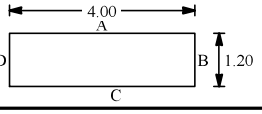
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-27**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 535,628.9 N 583,583.9**
	Rig: Hyundai HX140L
	Rev: DRAFT
Ground level: 282.19m O.D.	**DATE: 9.3.21**

GROUNDWATER

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

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									
			B	0.50-1.00					Weathered rock. Recovered as angular cobble and boulder sized clasts of strong grey and brown siltstone/sandstone with peaty sandy gravelly silt matrix. Boulders are <1500mm in diameter.
1							281.19	1.00	
						END			TP terminated at 1.00m bgl. Obstruction as rock.
2									
3									
4									
5									

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

Scale: 1:25

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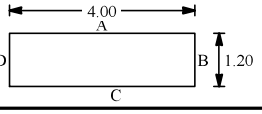
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-28A
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 538,763.6 N 586,720.2
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 401.06m O.D.	**DATE:** 22.3.21

GROUNDWATER

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

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									Spongy brown pseudo fibrous PEAT. H7.
1			D	1.00-1.10					
2							398.56	2.50	
			B	2.50-3.00					Grey silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with medium cobble content. Cobbles are subangular to subrounded of siltstone.
3							397.56	3.50	
			B	3.50-4.10					Weathered SANDSTONE rock. Recovered as angular cobble and boulder sized clasts of medium strong greenish brown fine grained sandstone with grey silty sandy matrix.
4							396.96	4.10	
						END			TP terminated at 4.10m bgl. Maximum reach of excavator.
5									

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

Scale: 1:25

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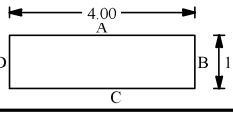
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm **LOCATION: Co Cork**		**TRIALPIT: TP-29** **Sheet 1 of 1**
CLIENT: Coillte **ENGINEER: Fehily Timoney & Co**	**Co-ordinates:** **E 536,880.7 N 583,582.3**	**Rig: Hyundai HX140L** **Rev: DRAFT**
Ground level: 253.37m O.D.		**DATE: 9.3.21**

GROUNDWATER

Water strikes: Rose to after:
1st: 1.50m
2nd:
3rd:

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							253.17	0.20	TOPSOIL: Grass over soft sandy gravelly CLAY with rootlets.
			B	0.50-1.00			252.17	1.20	Orangish brown silty sandy GRAVEL with high cobble content and low boulder content. Boulders are subangular to subrounded of siltstone.
1		1							
2			B	2.00					Stiff locally soft to firm orangish brown sandy gravelly SILT with high cobble content and high boulder content. Boulders are subangular to subrounded of siltstone.
			B	2.50-3.00			250.37	3.00	
3							END		TP terminated at 3.00m bgl. Unable to progress TP - sidewall collapse.
4									
5									

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

Scale: 1:25

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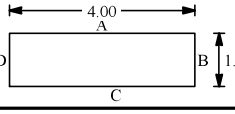
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm **LOCATION:** Co Cork		**TRIALPIT:** TP-30 **Sheet** 1 of 1
CLIENT: Coillte **ENGINEER:** Fehily Timoney & Co	**Co-ordinates:** E 536,822.0 N 583,346.4	**Rig:** Hyundai HX140L **Rev:** DRAFT
Ground level: 284.08m O.D.		**DATE:** 15.3.21

GROUNDWATER

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

PIT DIRECTION: 100-280
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			B	0.50-1.00					Orangish brown silty sandy GRAVEL with high cobble content and low boulder content. Gravel is angular to subrounded fine to coarse of siltstone. Cobbles are angular to subrounded of siltstone. Boulders are angular of strong greenish grey siltstone.
							283.08	1.00	
1									Weathered SANDSTONE rock. Recovered as angular to subangular cobble and boulder sized clasts of strong yellowish brown fine grained sandstone with a little silty sandy gravel. Boulders are <400mm in diameter.
							282.08	2.00	
2						END			TP terminated at 2.00m bgl. Unable to progress TP - sidewall collapse. Obstruction as rock.
3									
4									
5									

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

Scale: 1:25

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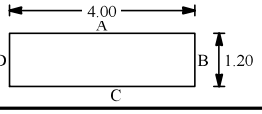
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-31
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 536,324.1 N 583,322.0
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 315.86m O.D.	**DATE:** 16.3.21

GROUNDWATER

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

PIT DIRECTION: 090-270
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							315.66	0.20	TOPSOIL: Firm dark brown sandy gravelly peaty CLAY.
			B	0.50-1.00			315.26	0.60	Firm dark grey silty gravelly PEAT with low cobble content.
1			B	1.00-1.50					Orangish brown becoming light brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with medium cobble content and low boulder content. Cobbles are subangular to subrounded of siltstone. Boulders are are subangular to subrounded of siltstone.
2							313.26	2.60	
							312.66	3.20	Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of strong greyish green siltstone with brown silty sandy gravelly matrix.
3			B	3.00-3.20					
						END			TP terminated at 3.20m bgl. Obstruction as rock.
4									
5									

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

Scale: 1:25

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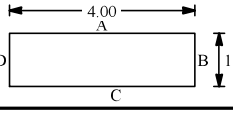
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm **LOCATION:** Co Cork		**TRIALPIT:** TP-32A **Sheet** 1 of 1
CLIENT: Coillte **ENGINEER:** Fehily Timoney & Co	**Co-ordinates:** E 539,261.2 N 586,751.8	**Rig:** Hyundai HX140L **Rev:** DRAFT
Ground level: 393.78m O.D.		**DATE:** 22.3.21

GROUNDWATER

Water strikes: Rose to after:
1st: 0.30m
2nd:
3rd:

PIT DIRECTION: 180-360
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									Spongy brown pseudo fibrous PEAT. H7.
1			D	1.00-1.10					
2							390.98	2.80	
3			B	3.00-3.30			390.48	3.30	Grey silty sandy subangular to subrounded fine to coarse sandstone GRAVEL with medium cobble content and low boulder content. Cobbles are subangular to subrounded of sandstone. Boulders are subangular to subrounded of sandstone.
						END			TP terminated at 3.30m bgl. Unable to progress TP - sidewall collapse.
4									
5									

Remarks: Seepage of water at 0.30m bgl. TP backfilled with arisings.

Scale: 1:25

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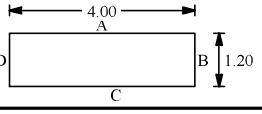
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT:** TP-33
LOCATION: Co Cork	**Sheet** 1 of 1
CLIENT: Coillte	**Co-ordinates:** E 535,745.1 N 583,198.4
ENGINEER: Fehily Timoney & Co	**Rig:** Hyundai HX140L
	Rev: DRAFT
Ground level: 343.24m O.D.	**DATE:** 8.3.21

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							342.94	0.30	Plastic dark brown amorphous PEAT with roots. H8.
			B	0.50-1.00					Weathered SILTSTONE rock. Recovered as angular cobble sized clasts of siltstone with orangish brown sandy gravel silt matrix.
1			B	1.00-1.20			342.24	1.00	
							342.04	1.20	Weathered SILTSTONE rock. Recovered as angular to subangular cobble and boulder sized clasts of strong brown siltstone with brown sandy silt matrix.
						END			TP terminated at 1.20m bgl. Obstruction as rock.
2									
3									
4									
5									

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

Scale: 1:25

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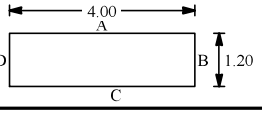
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-34**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 535,433.6 N 583,104.9**
	Rig: Hyundai HX140L
	Rev: DRAFT
Ground level: 364.77m O.D.	**DATE: 8.3.21**

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							364.67	0.10	Plastic dry dark brown amorphous PEAT with roots. H8.
									Weathered SILTSTONE rock. Recovered as angular to subangular cobble and boulder sized clasts of siltstone with brown silty sandy matrix.
1			B	1.00-1.20					1.00m: hard digging.
							363.57	1.20	
						END			TP terminated at 1.20m bgl. Obstruction as rock.
2									
3									
4									
5									

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

Scale: 1:25

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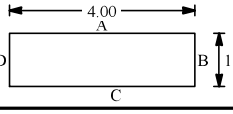
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-35**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 535,656.2 N 582,858.5**
	Rig: Hyundai HX140L
	Rev: DRAFT
Ground level: 324.13m O.D.	**DATE: 8.3.21**

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.10-0.20			323.93	0.20	Plastic damp dark brown amorphous PEAT. H8.
									Weathered SILTSTONE rock. Recovered as tabular and angular cobble and boulder sized clasts. Boulders are <400mm in diameter.
1			B	1.00-1.20					1.00m: hard digging.
							322.83	1.30	
						END			TP terminated at 1.30m bgl. Obstruction as rock.
2									
3									
4									
5									

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

Scale: 1:25

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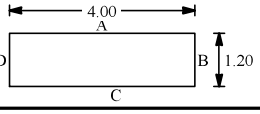
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-36**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 535,904.0 N 582,812.5**
	Rig: Hyundai HX140L
	Rev: DRAFT
Ground level: 359.63m O.D.	**DATE: 8.3.21**

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.20-0.30			359.33	0.30	Plastic damp dark brown amorphous PEAT. H8.
			B	1.00-1.50			358.13	1.50	Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of strong grey fine grained siltstone with a little peaty silt. Boulders are <500mm in diameter. TP terminated at 1.30m bgl. Obstruction as rock.
1									END
2									
3									
4									
5									

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

Scale: 1:25

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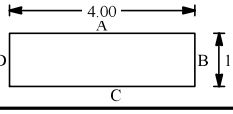
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-37**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 536,061.0 N 582,675.4**
Ground level: 306.73m O.D.	**Rig: Hyundai HX140L**
	Rev: DRAFT
	DATE: 8.3.21

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							306.53	0.20	MADE GROUND: Firm brown silty sandy GRAVEL.
									Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of grey and brown siltstone with a little brown silty sandy gravel.
1			B	1.00-1.50			305.23	1.50	
						END			TP terminated at 1.50m bgl. Obstruction as rock.
2									
3									
4									
5									

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

Scale: 1:25

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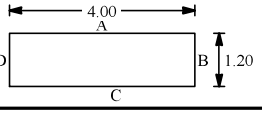
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-38**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 536,281.7 N 582,448.6**
	Rig: Hyundai HX140L
	Rev: DRAFT
Ground level: 288.01m O.D.	**DATE: 15.3.21**

GROUNDWATER

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

PIT DIRECTION: 050-230
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							287.71	0.30	TOPSOIL: Firm dark brown peaty CLAY with low cobble content.
			B	0.50-1.00			287.21	0.80	Firm light grey mottled light brown sandy gravelly SILT with high cobble content and low boulder content. Gravel is angular to subangular fine to coarse of siltstone. Cobbles are angular to subangular of siltstone. Boulders are angular.
1		▼	B	1.00-1.50			286.81	1.20	Grey and brown silty GRAVEL with high cobble content. Cobbles are of siltstone.
			B	1.50-1.70			286.31	1.70	Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of very strong grey siltstone with a little brown sandy gravelly silt.
						END			TP terminated at 1.70m bgl. Obstruction as rock.
2									
3									
4									
5									

Remarks: Seepage of water at 1.00m bgl. TP backfilled with arisings.

Scale: 1:25

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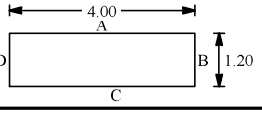
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm		**TRIALPIT: TP-39**
LOCATION: Co Cork		**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**	**Rig: Hyundai HX140L**
ENGINEER: Fehily Timoney & Co	**E 536,469.4 N 582,750.2**	**Rev: DRAFT**
Ground level: 297.50m O.D.		**DATE: 15.3.21**

GROUNDWATER

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

PIT DIRECTION: 270-090
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							297.30	0.20	TOPSOIL: Grass over soft dark brownish grey sandy gravelly silty CLAY with medium cobble content.
			B	0.50-1.00					Yellowish brown silty sandy subangular to subrounded fine to coarse mudstone GRAVEL with high cobble content. Cobbles are subangular to subrounded of mudstone.
1									
									1.50m: with high boulder content. Boulders are angular of weak to strong brown mudstone. Boulders are <500mm in diameter.
2			B	2.00-2.50					
3			B	3.00-3.50			294.00	3.50	
						END			TP terminated at 3.50m bgl. Unable to progress TP - sidewall collapse. Obstruction as rock.
4									
5									

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

Scale: 1:25

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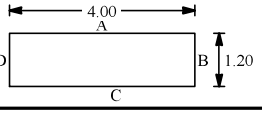
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm **LOCATION:** Co Cork		**TRIALPIT:** TP-40 **Sheet** 1 of 1
CLIENT: Coillte **ENGINEER:** Fehily Timoney & Co	**Co-ordinates:** E 536,493.1 N 582,922.6	**Rig:** Hyundai HX140L **Rev:** DRAFT
Ground level: 312.18m O.D.		**DATE:** 15.3.21

GROUNDWATER

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

PIT DIRECTION: 045-225
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									
							311.78	0.40	TOPSOIL: Grass over silty sandy gravelly CLAY with low cobble content.
			B	0.50-1.00					Yellowish brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with high cobble content. Cobbles are subangular to subrounded of greyish green siltstone.
1									1.00m: with boulders. Boulders are subangular to subrounded. Boulders are <500mm in diameter. Hard digging.
			B	1.50-2.00					
2							310.18	2.00	
							END		TP terminated at 2.00m bgl. Obstruction as boulders as possible rock.
3									
4									
5									

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

Scale: 1:25

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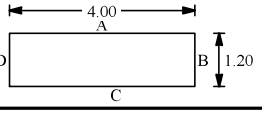
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-41**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:**
ENGINEER: Fehily Timoney & Co	**E 536,653.0 N 583,262.4**
	Rig: Hyundai HX140L
	Rev: DRAFT
Ground level: 315.54m O.D.	**DATE: 15.3.21**

GROUNDWATER

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

PIT DIRECTION: 020-200
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							315.14	0.40	TOPSOIL: Grass over firm dark brown sandy gravelly peaty CLAY with rootlets.
			B	0.50-1.00					Orangish brown to light brown silty sandy angular to subangular fine to coarse siltstone GRAVEL with high cobble content. Cobbles are angular to subangular of siltstone.
1			B	1.00-1.50					1.00m: with high boulder content. Boulders are angular of strong grey siltstone.
							314.04	1.50	
						END			TP terminated at 1.50m bgl. Obstruction as rock.
2									
3									
4									
5									

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

Scale: 1:25

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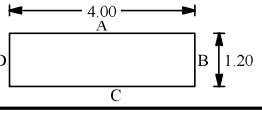
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm	**TRIALPIT: TP-42**
LOCATION: Co Cork	**Sheet 1 of 1**
CLIENT: Coillte	**Co-ordinates:** E 538,106.6 N 586,230.9 — **Rig: Hyundai HX140L**
ENGINEER: Fehily Timoney & Co	**Rev: DRAFT**
Ground level: 407.75m O.D.	**DATE: 18.3.21**

GROUNDWATER

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

PIT DIRECTION: 130-310
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0			D	0.50-0.60			406.85	0.90	Plastic dark brown amorphous PEAT. H8.
1			B	1.00-1.50			405.95	1.80	Light brown silty sandy subangular to subrounded fine to coarse siltstone GRAVEL with medium high cobble content. Cobbles are subangular to subrounded of siltstone.
2			B	2.00-2.50			404.55	3.20	Weathered SILTSTONE rock. Recovered as angular cobble and boulder sized clasts of strong greyish brown siltstone with grey silty sand and gravel matrix.
3		▼				END			TP terminated at 3.20m bgl. Obstruction.
4									
5									

Remarks: Seepage of water at 3.00m bgl. TP backfilled with arisings.

Scale: 1:25

Irish drilling LTD

Ph.
Fax

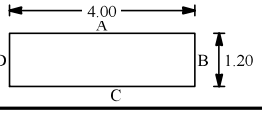
TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

PROJECT: Ballinagree Wind Farm **LOCATION:** Co Cork		**TRIALPIT:** TP-43 **Sheet** 1 of 1
CLIENT: Coillte **ENGINEER:** Fehily Timoney & Co	**Co-ordinates:** E 533,521.2 N 585,062.7	**Rig:** Hyundai HX140L **Rev:** DRAFT
Ground level: 452.47m O.D.		**DATE:** 11.3.21

GROUNDWATER

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

PIT DIRECTION:
PIT DIMENSION: 1.20 * 4.00m
LOGGED BY: AG



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

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									Brown silty sandy subangular to subrounded fine to coarse GRAVEL of various lithologies with medium cobble content. Cobbles are subangular to subrounded of various lithologies.
			B	0.50-1.00					
1									1.00m: with low boulder content. Boulders are angular of grey siltstone. Boulders are <500mm in diameter.
									1.50m: Boulders are <1500mm in diameter.
2			B	2.00-2.50					2.00m: hard digging.
							449.97	2.50	
						END			TP terminated at 2.50m bgl. Obstruction as boulders.
3									
4									
5									

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

Scale: 1:25

Irish drilling LTD

Ph.
Fax

TRIAL PIT VANE & WL RISES BALLINAGREE WF TPS ALL FILE MAR 29 2021.GPJ IRISHDRL.GDT 18/6/21

Appendix 03
Groundwater Readings

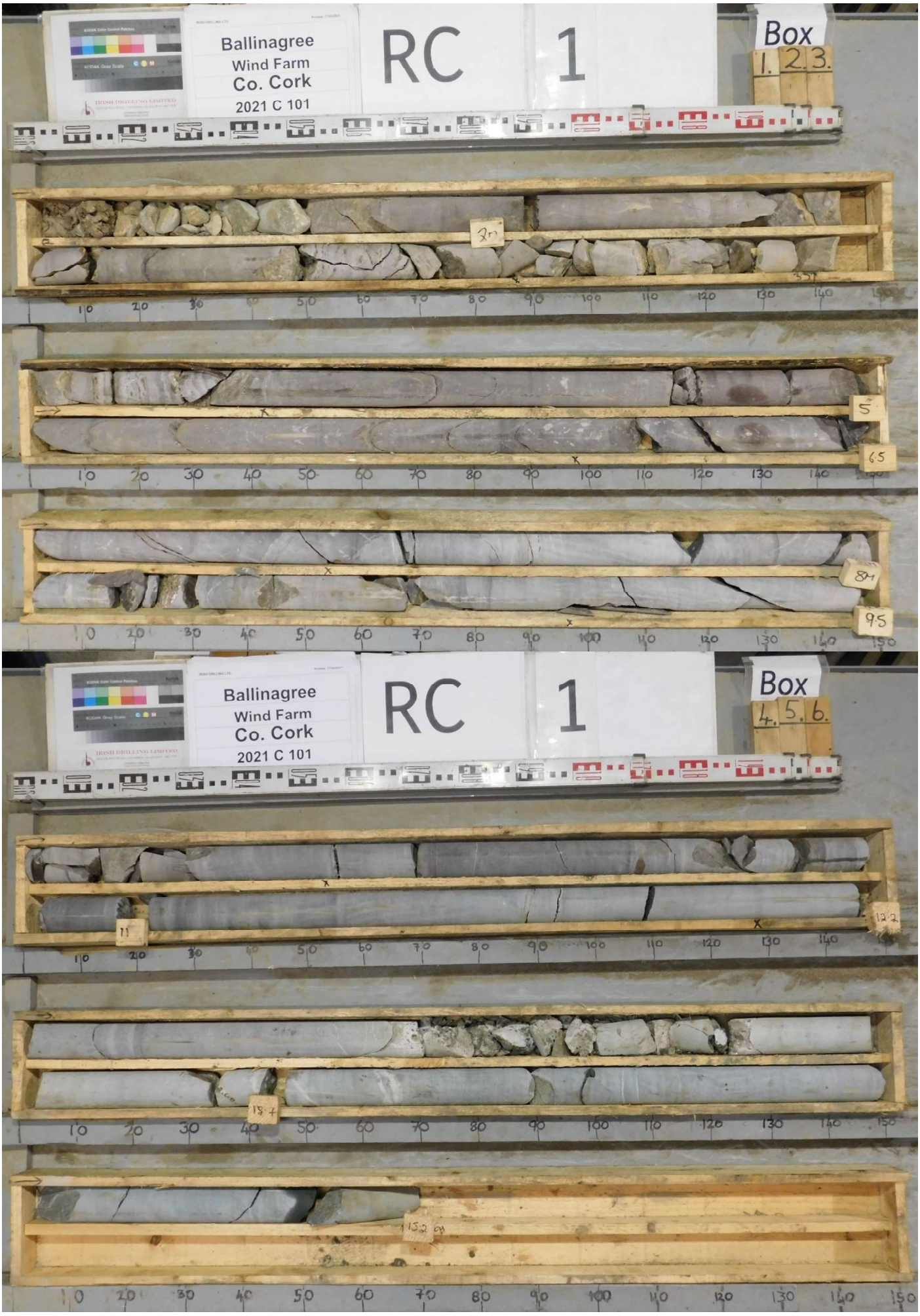
IRISH DRILLING LTD. Loughrea Co. Galway	Project: Client: Location:	Ballinagree Wind Farm Coillte Ballinagree, County Cork	
Tel: (091) 841274 Fax: (091) 880861	Date:	13.05.2021	Sheet No. 1 Checked: RK

Water Levels in Standpipes

Location	Date	Depth	Comments
BH 01	13.05.21	6.80m	50mm standpipe, Rotary Core Borehole
BH 02	13.05.21	DRY	50mm standpipe, Rotary Core Borehole
BH 03	13.05.21	0.56m	50mm standpipe, Rotary Core Borehole
BH 04	13.05.21	7.95m	50mm standpipe, Rotary Core Borehole
BH 05	13.05.21		Borehole not completed on this date.

Remarks:
All readings record depth from ground level to top of water level.

Appendix 04
Photographs (Rotary Core)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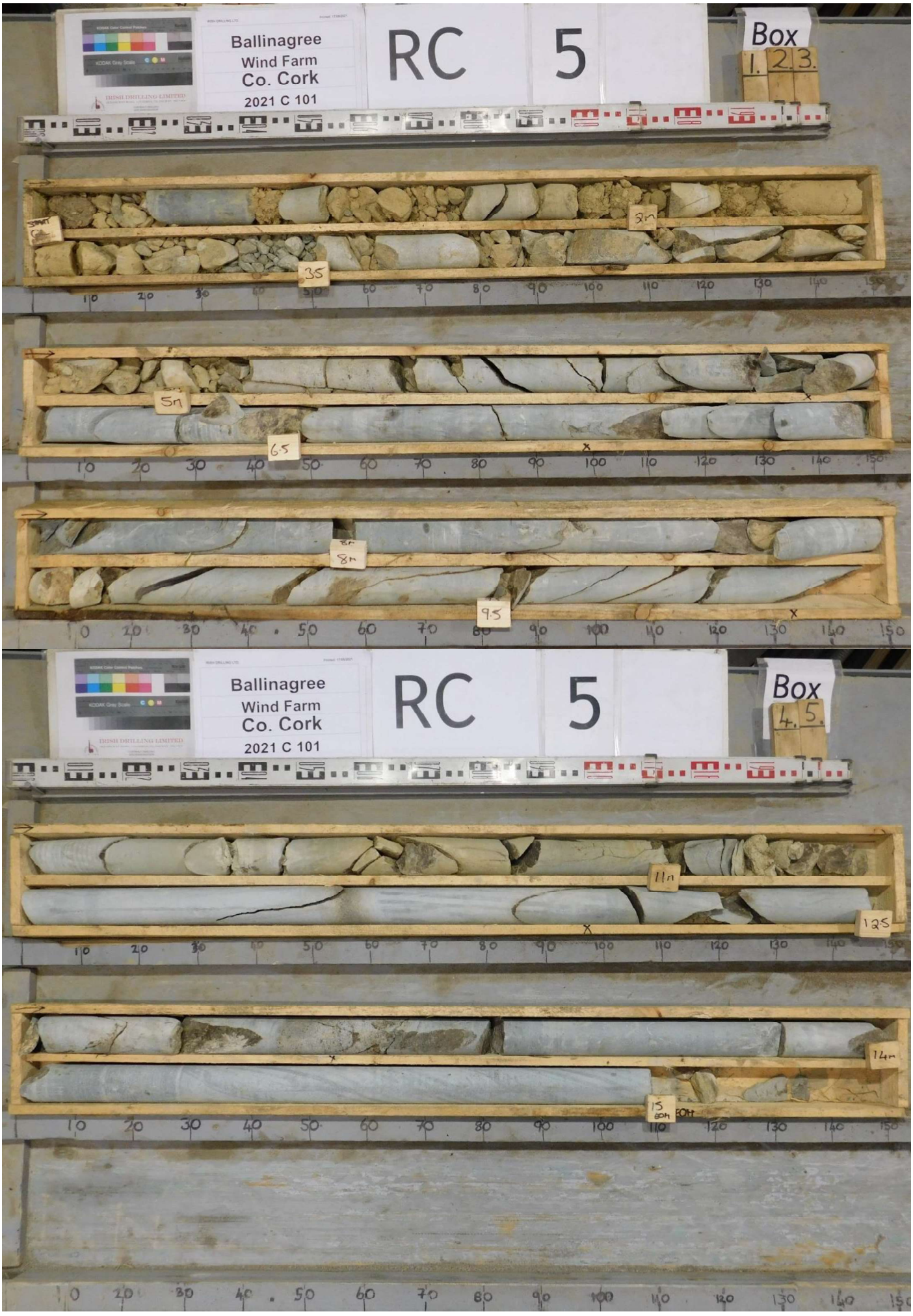
Wind Farm
Co. Cork
2021 C 101
RC 1
Box
1. 2. 3.
Ballinagree
Wind Farm
Co. Cork
2021 C 101
RC 1
Box
4. 5. 6.


Ballinagree
Wind Farm
Co. Cork
2021 C 101
RC 2
Box
1. 2. 3.
0M
2.0 m
3.5 m
5.0 m
6.5 m
8.0 m
11.0 m
14.0 m
15.0 m
EOH


Ballinagree
Wind Farm
Co. Cork
2021 C 101
RC 3
Box
1. 2. 3.
START
1-6
2-3
39
5
5M
65
8M


Ballinagree
Wind Farm
Co. Cork
2021 C 101
RC 3
Box
4. 5. 6.
9.5
11
12.5
14
EOH
15M


Ballinagree
Wind Farm
Co. Cork
2021 C 101
RC 4
Box
1. 2. 3.
7.0
3.5
6.5
8.0
9.5m
Ballinagree
Wind Farm
Co. Cork
2021 C 101
RC 4
Box
4. 5.
11.0
12.5
14.0
15.0
EOH


Ballinagree
Wind Farm
Co. Cork
2021 C 101
RC 5
Box
1. 2. 3.
3m
3.5
5m
6.5
8m
9.5
Ballinagree
Wind Farm
Co. Cork
2021 C 101
RC 5
Box
4. 5.
11m
12.5
14m
15

Appendix 05
Photographs (Trial Pit)

Figure 1 H:\21C101_Ballinagree TP Photos\Photos\T1\DSCF4037.JPG

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Appendix 06
Site Plans

Autodesk AutoCAD LT 2021 p2114_site layout 05.11.20.dwg

Type a keyword or phrase

maurice3SPLY

Home Insert Annotate Parametric View Manage Output Collaborate Geolocation

Edit Location | Reorient Marker | Remove Location | Locate Me | Mark Position | Map Aerial | Capture Area

Location Tools Online Map

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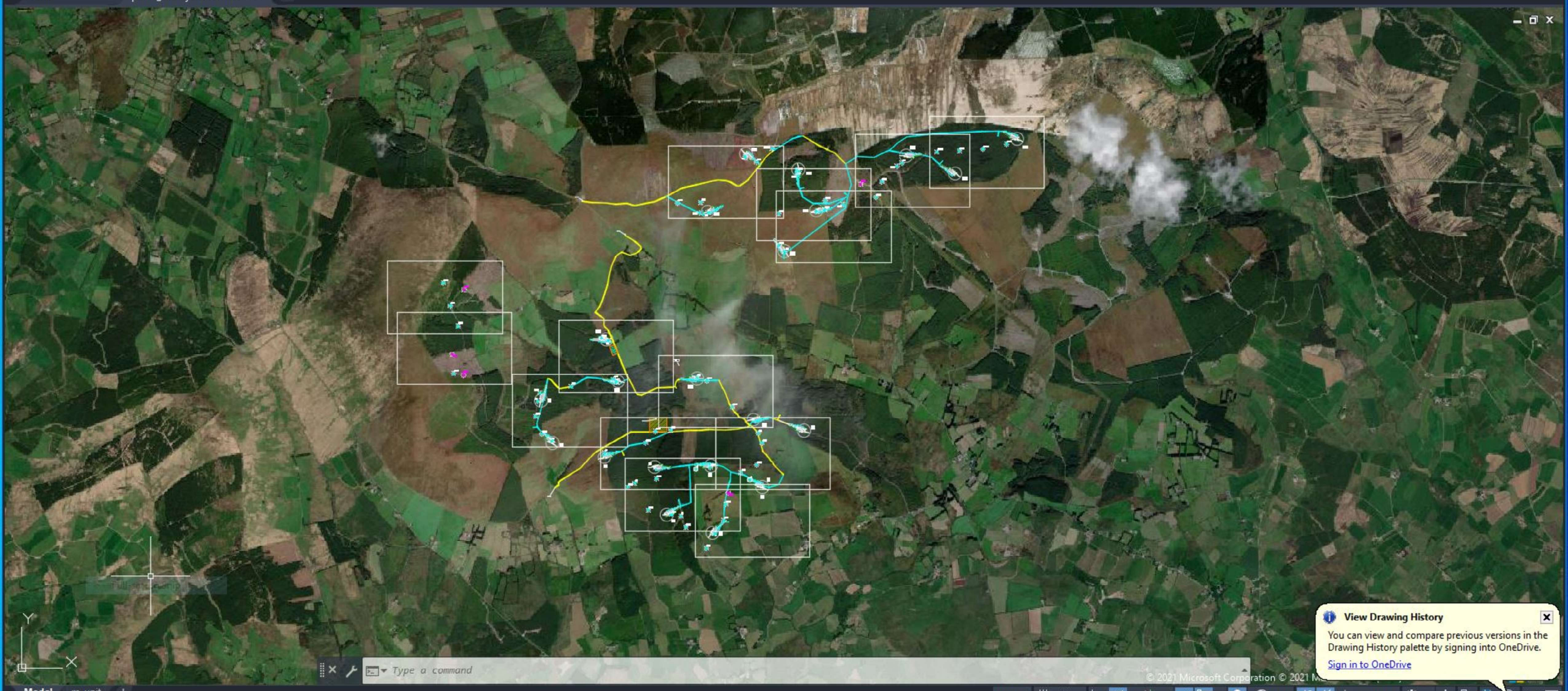

View Drawing History

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Sign in to OneDrive

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Model m-unit

MODEL ITM 1:1000

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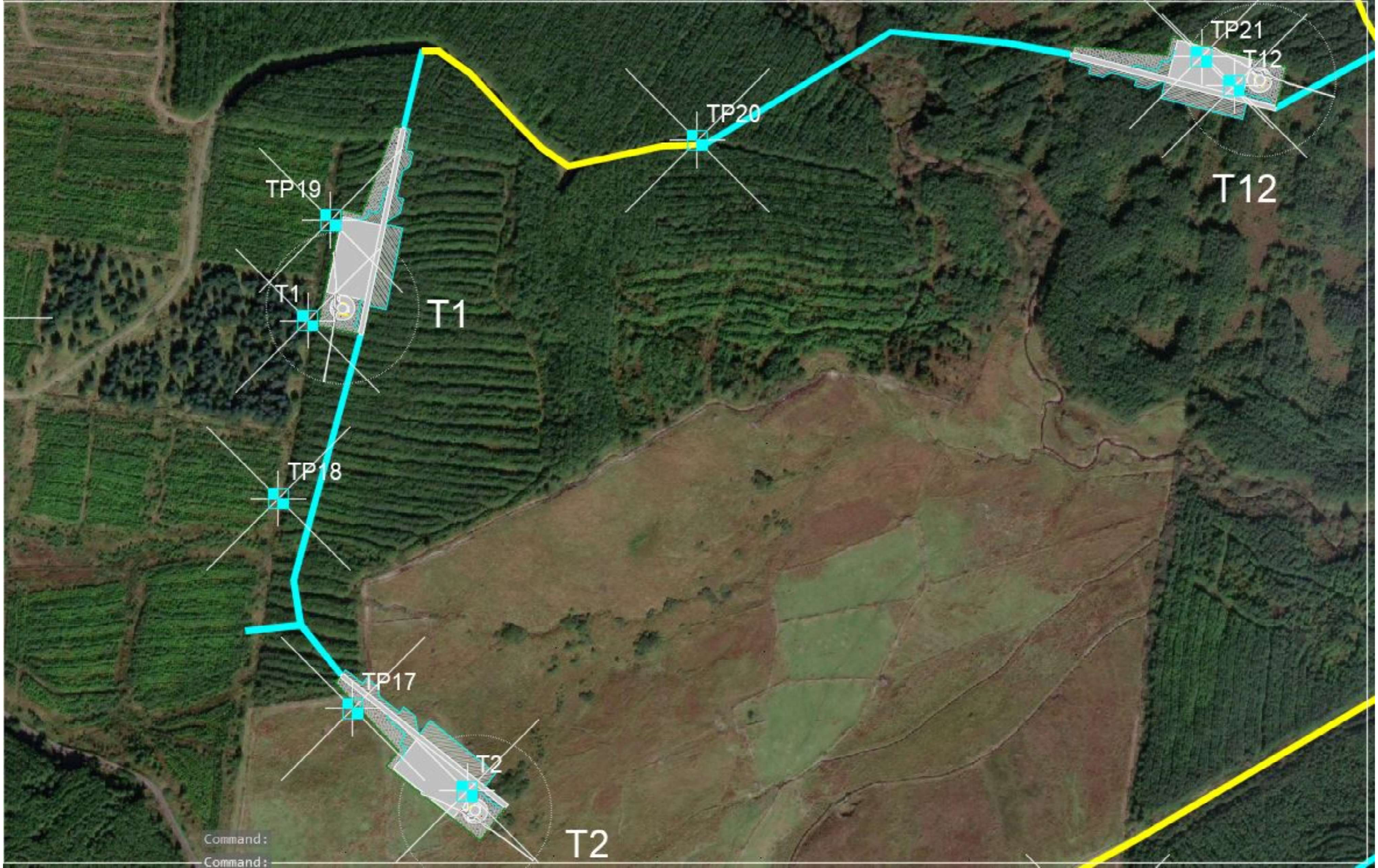
09:21
12/06/2021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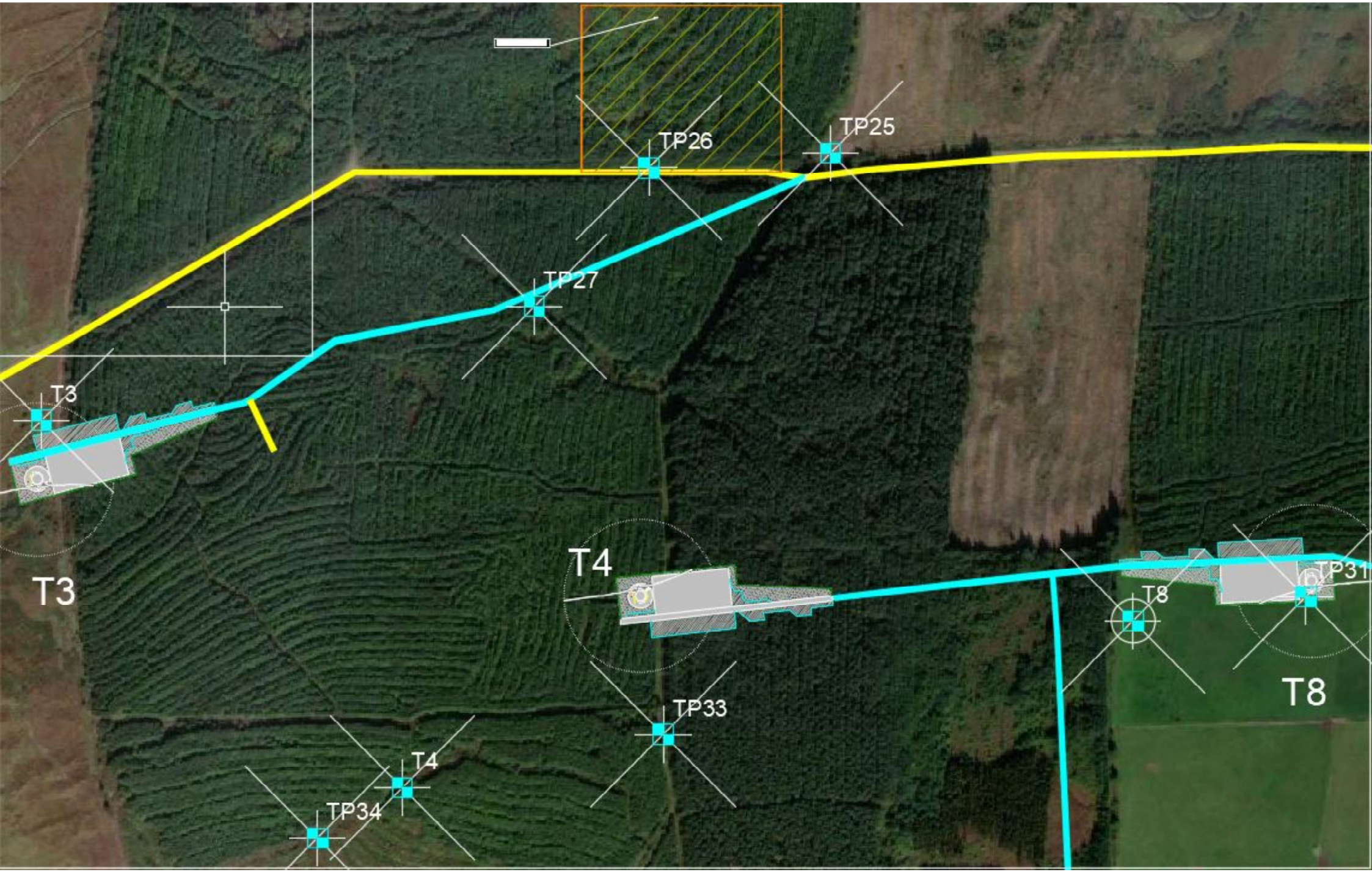
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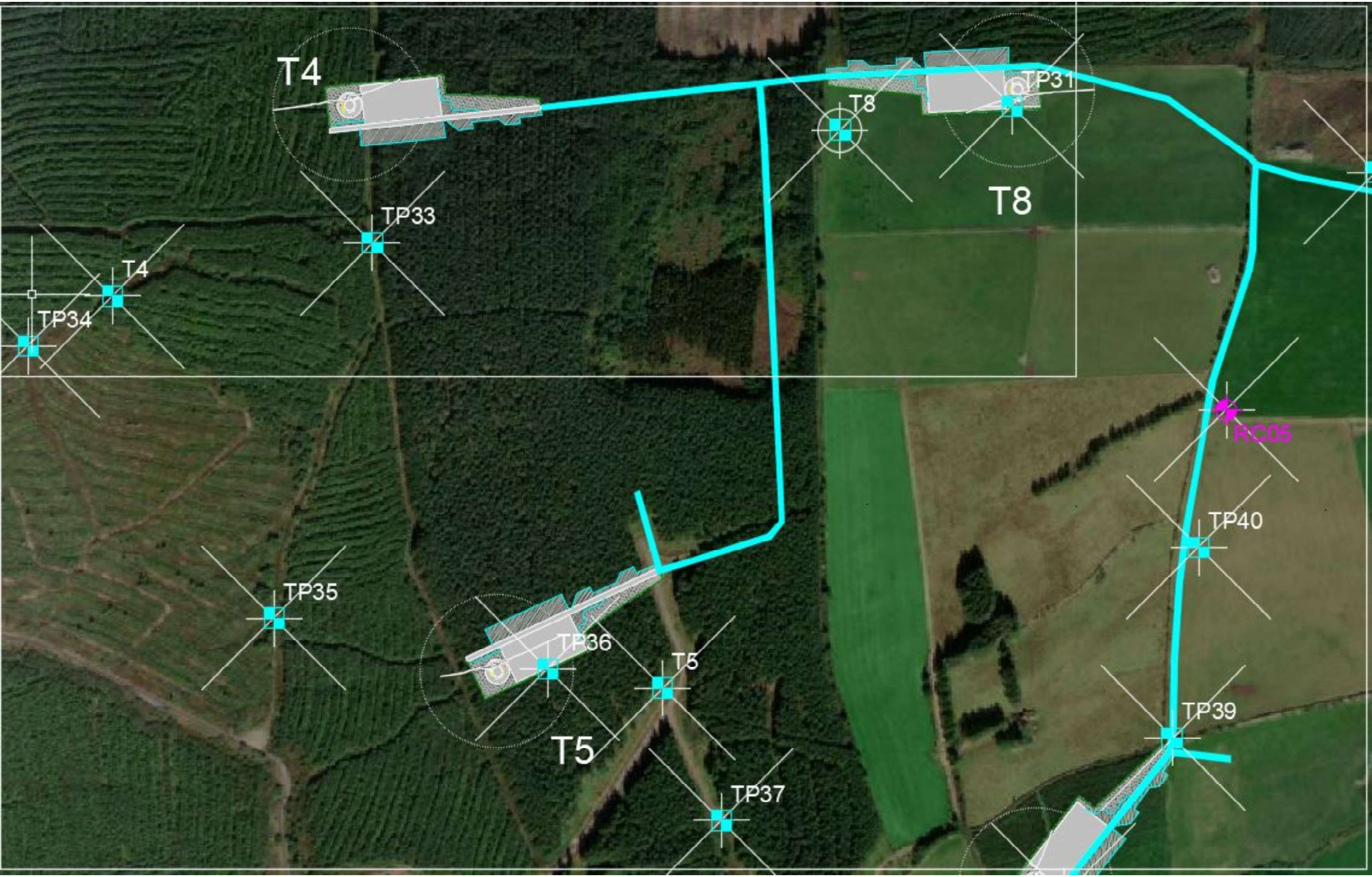
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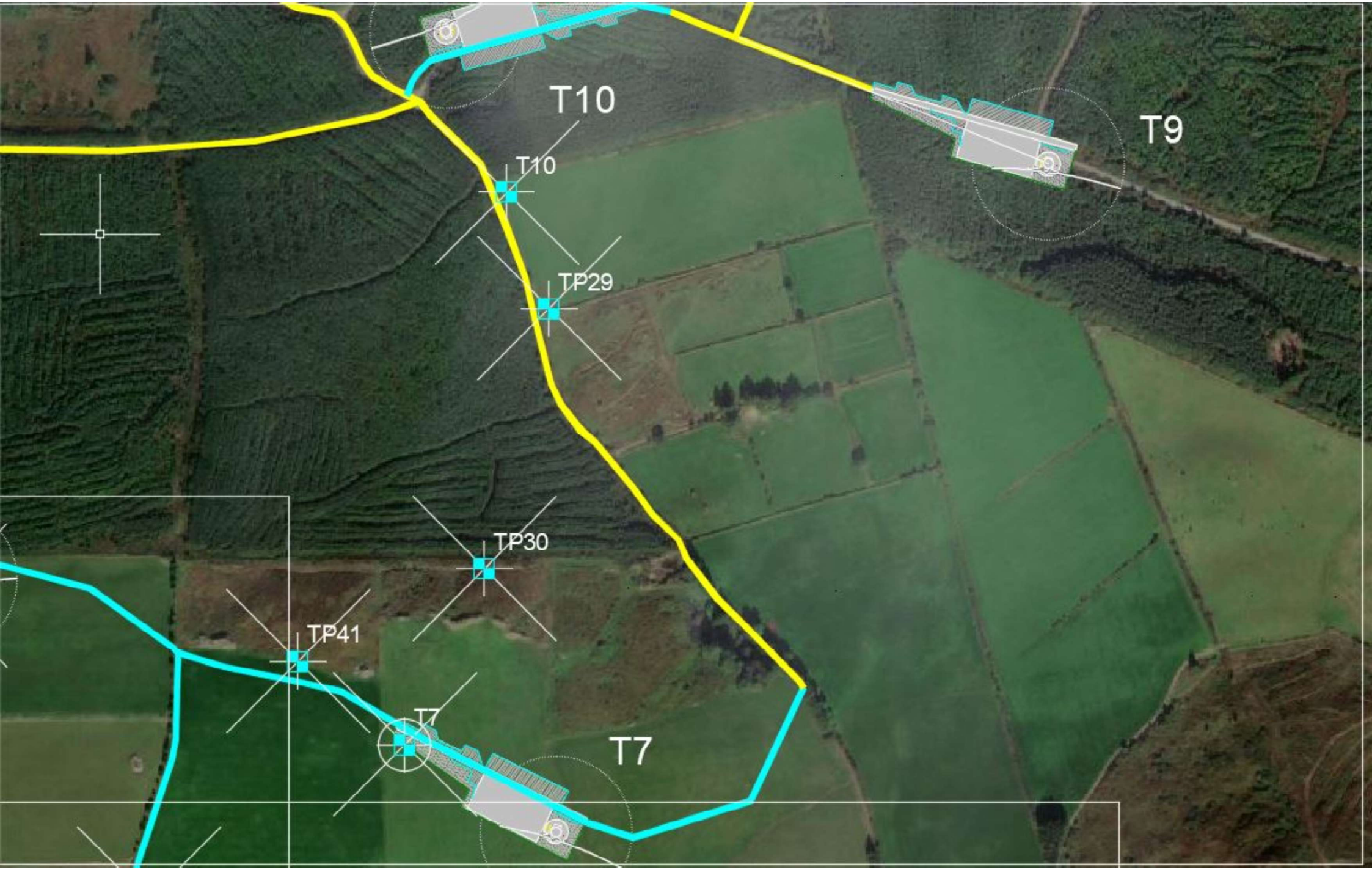
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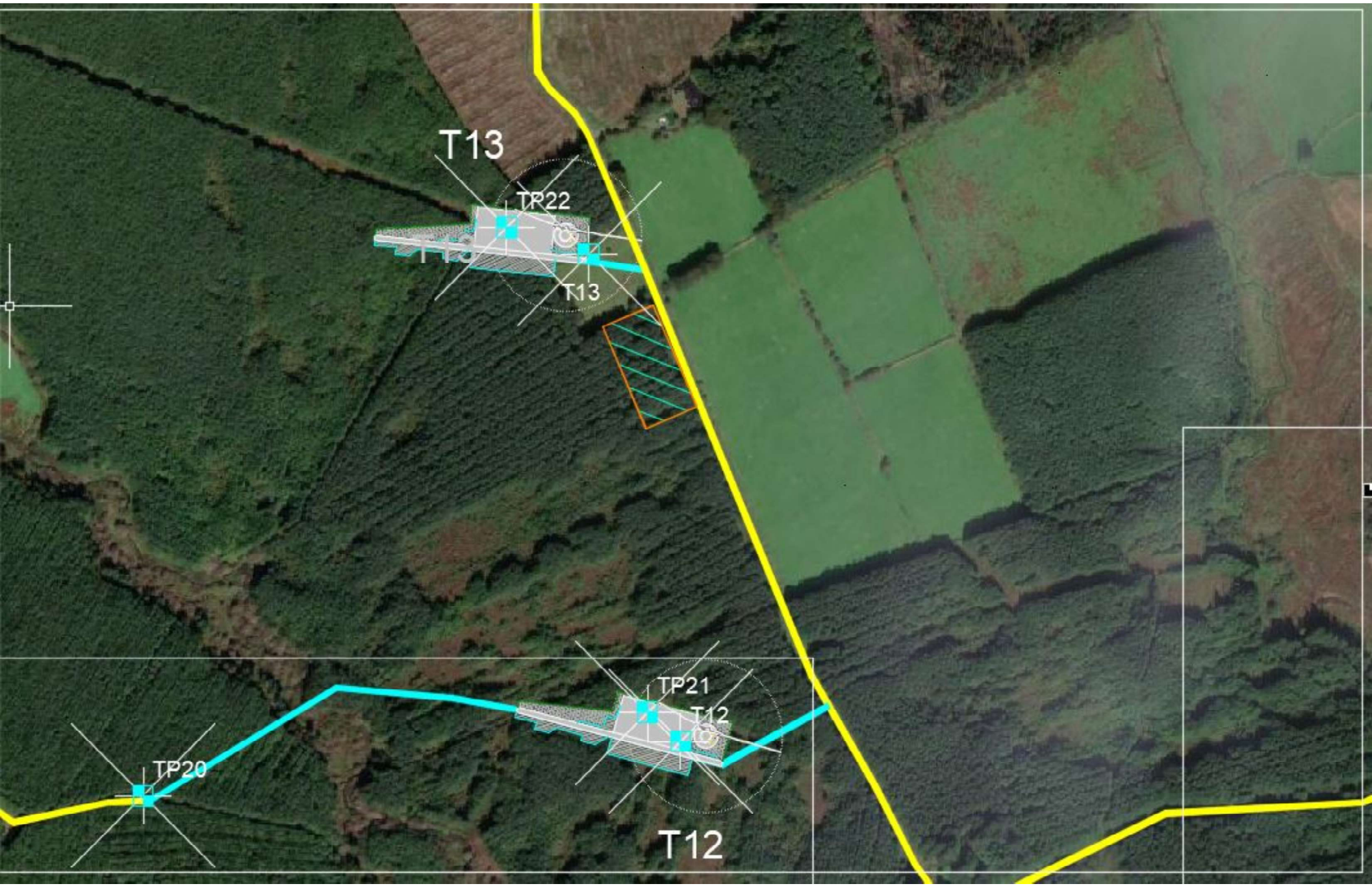
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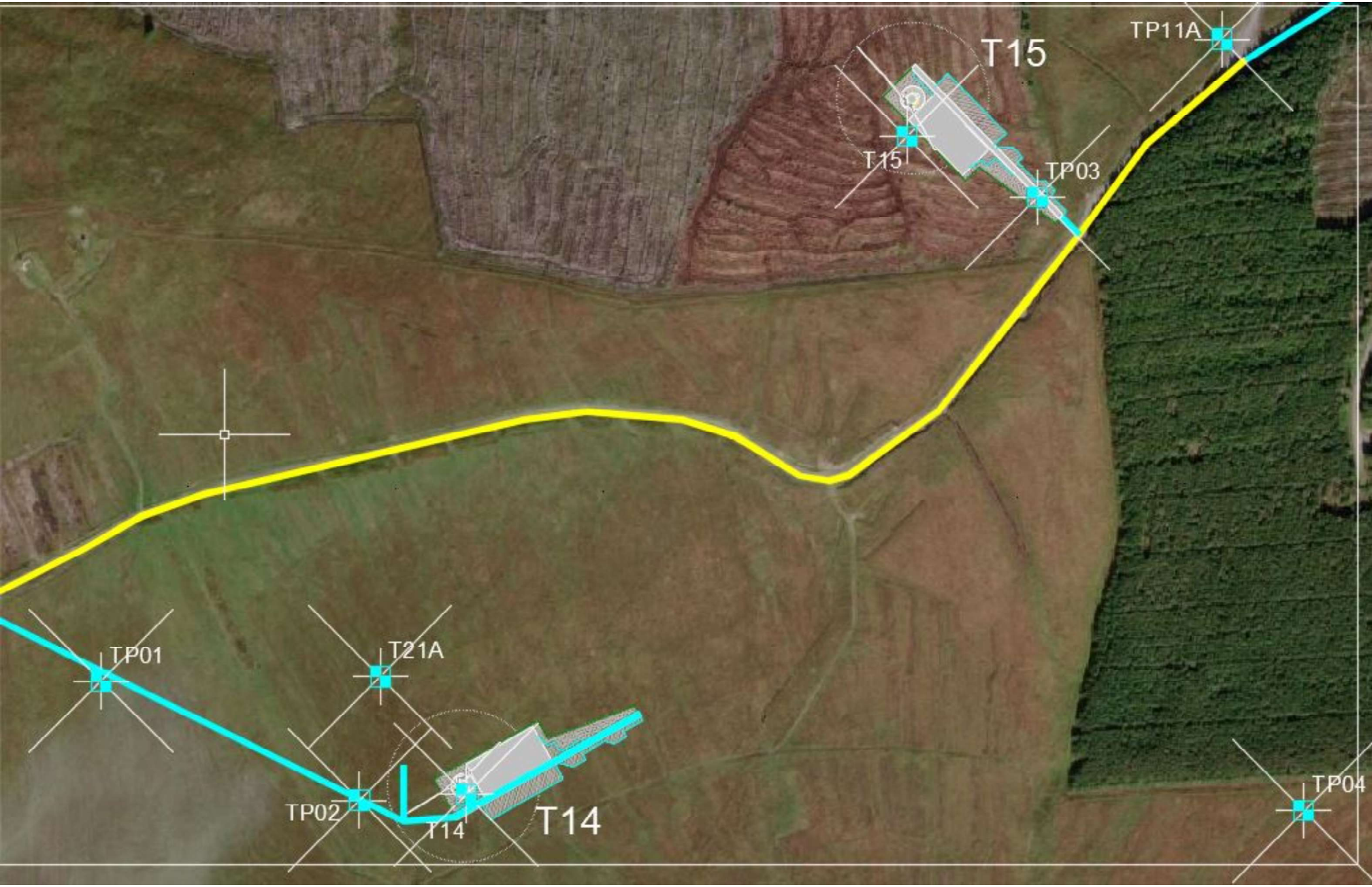
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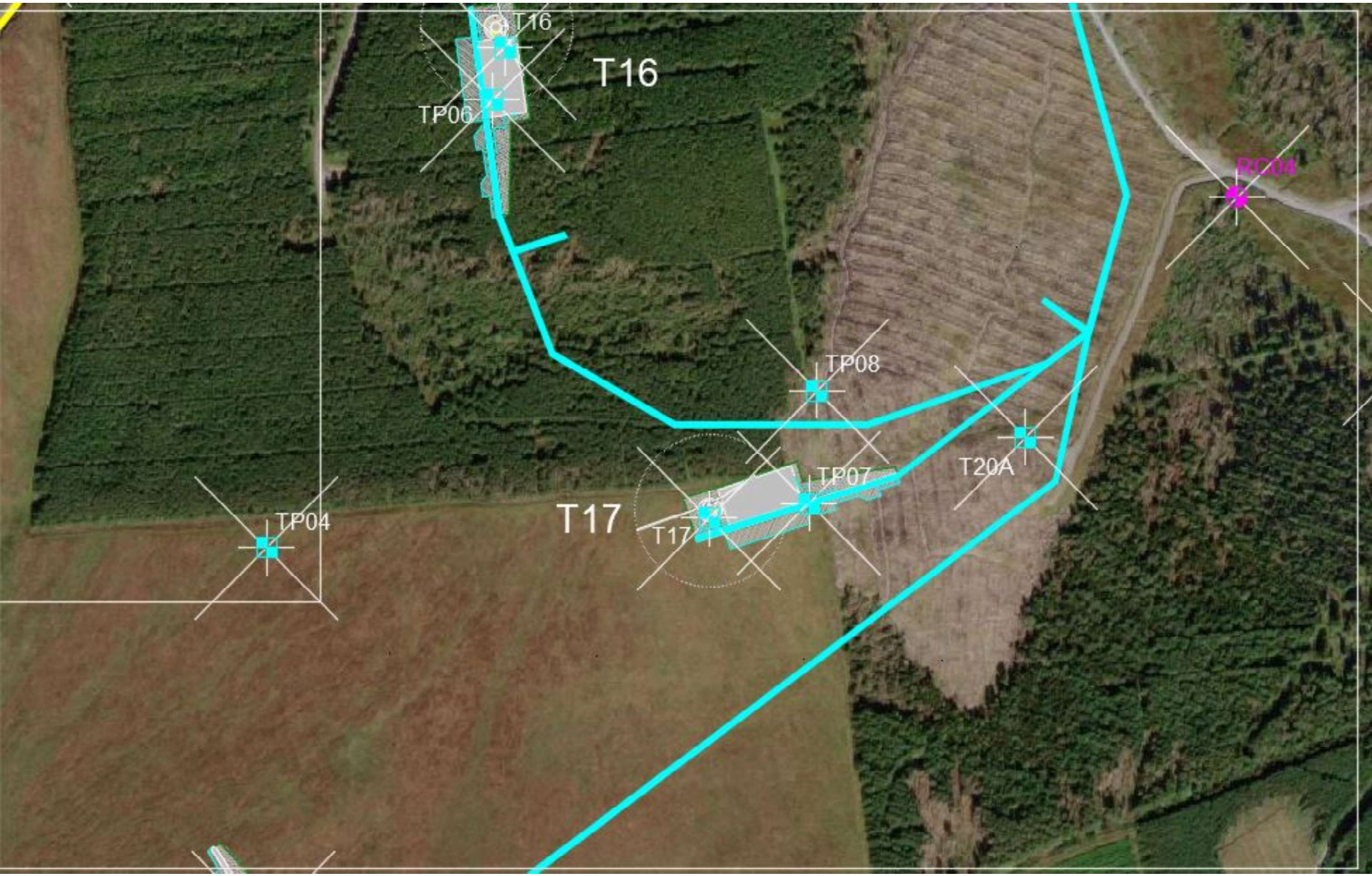
TP04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TP07
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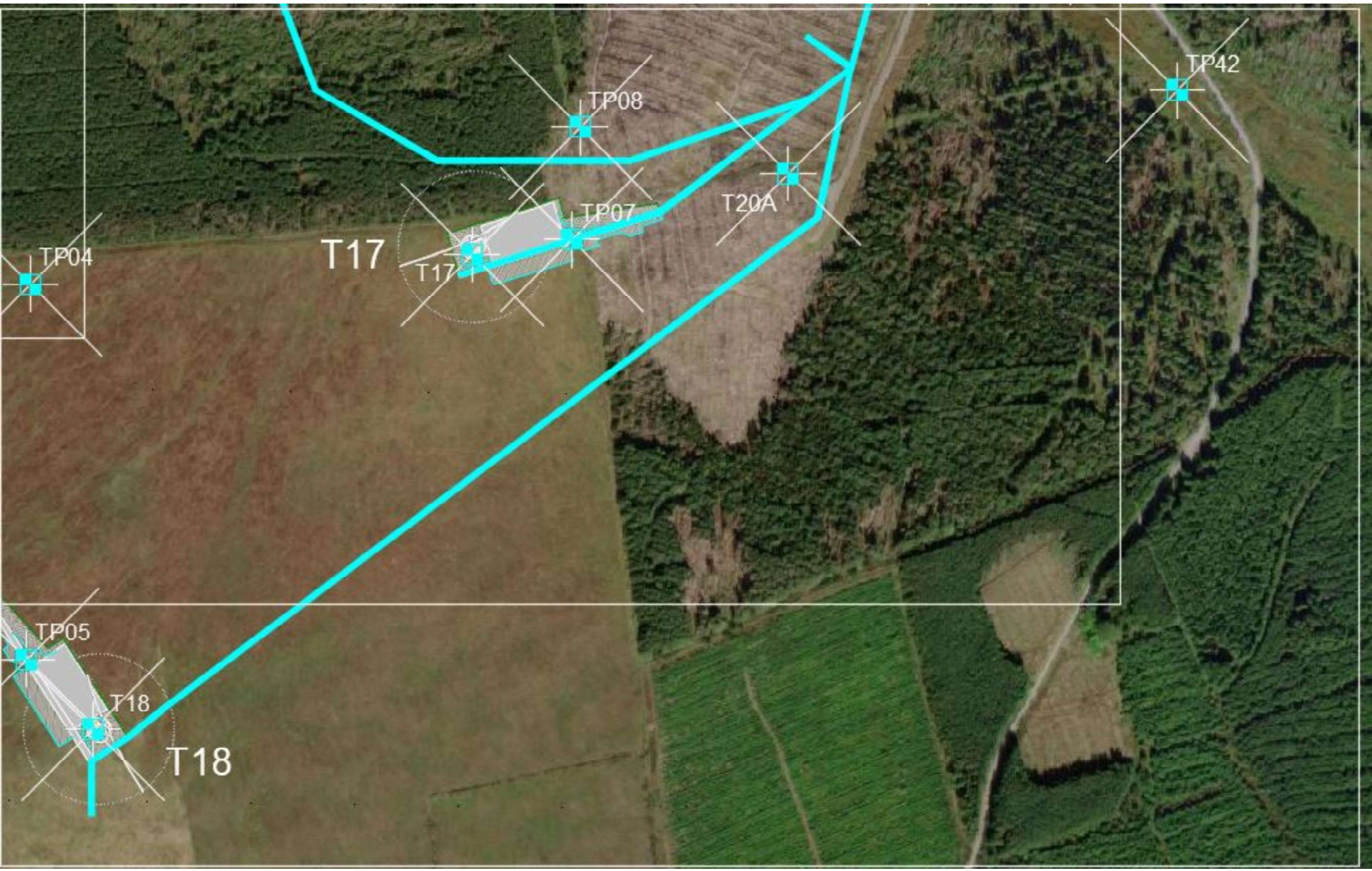
T17
TP04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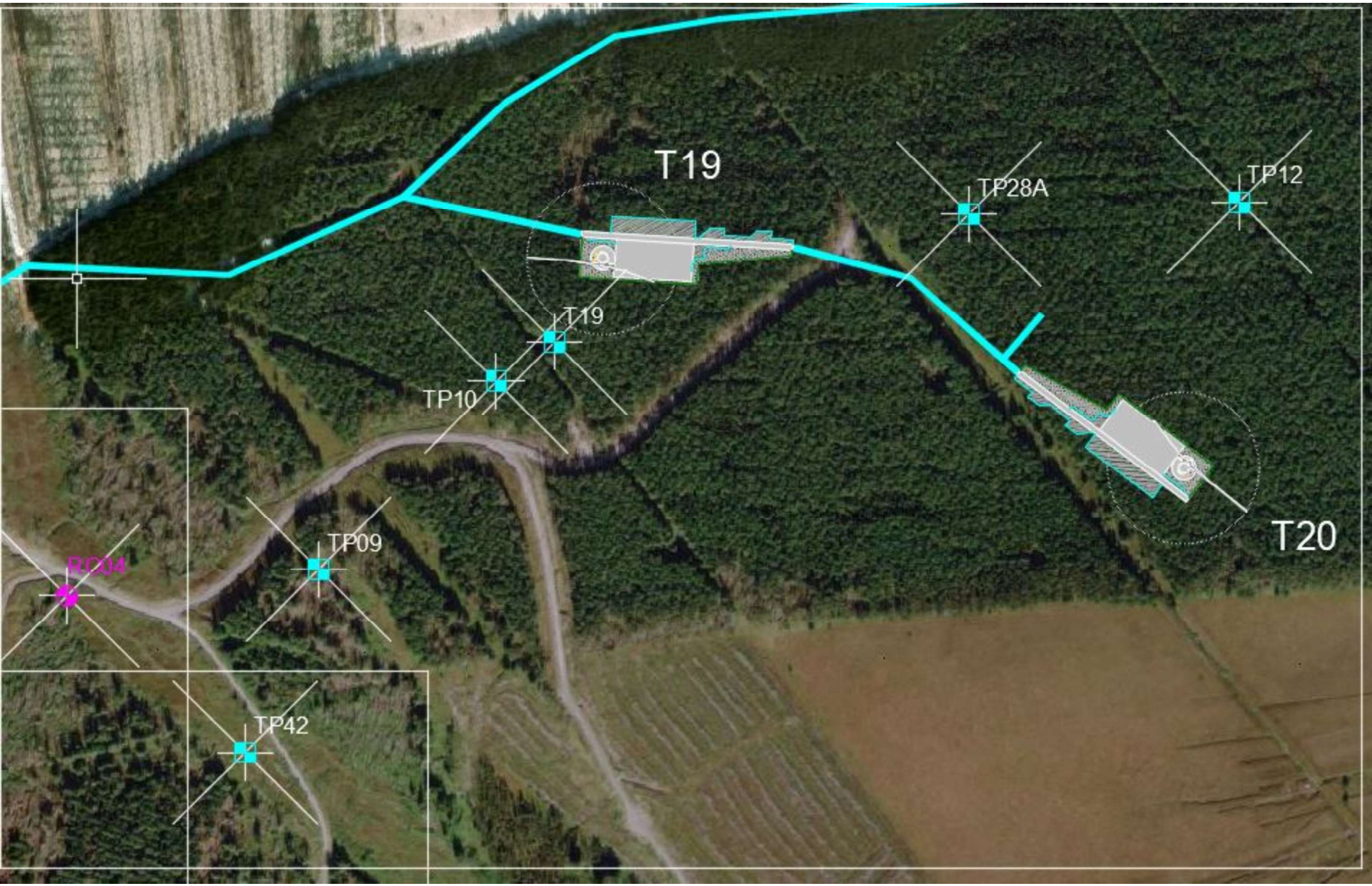
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TP10
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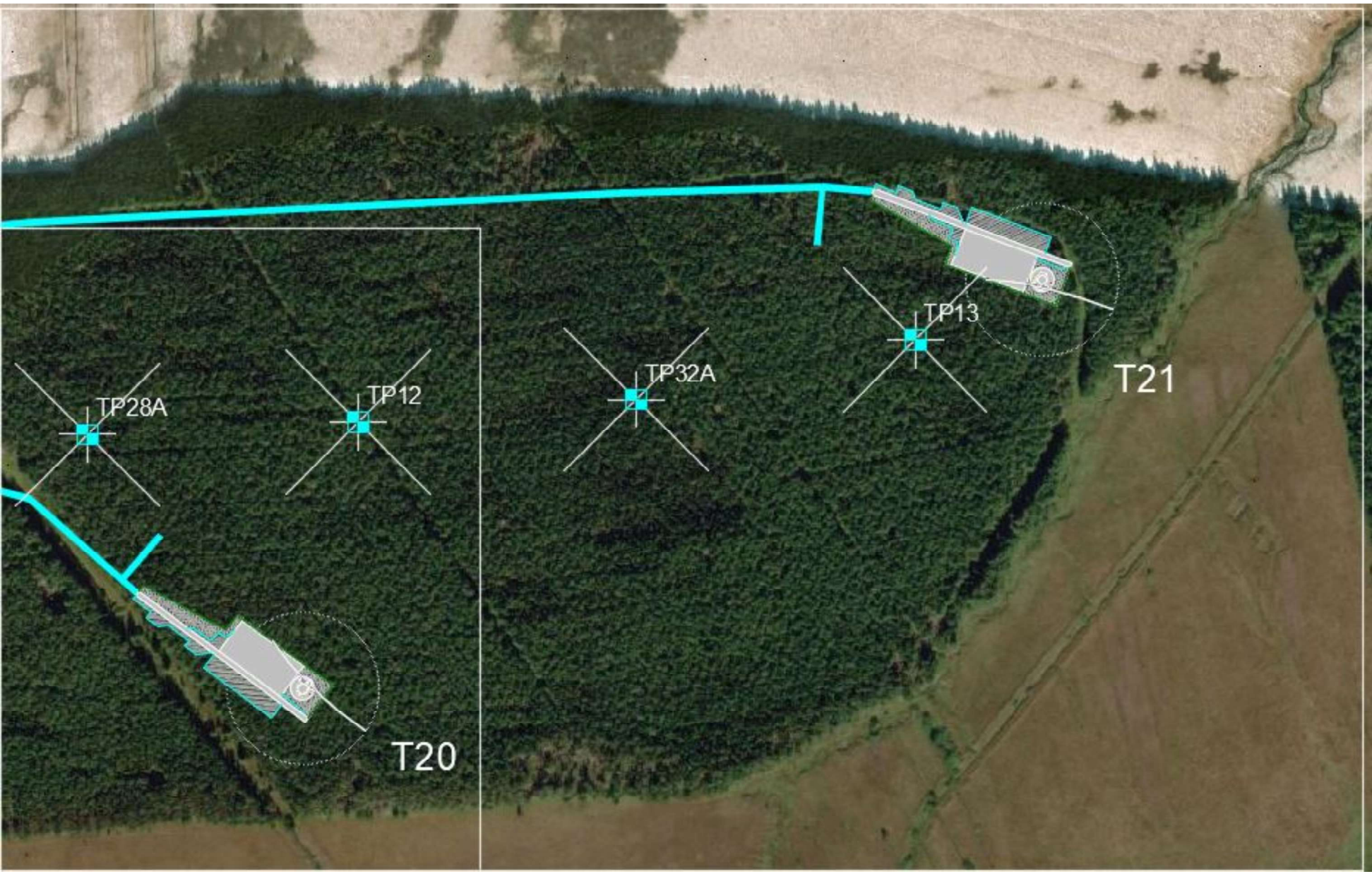
T20
TP42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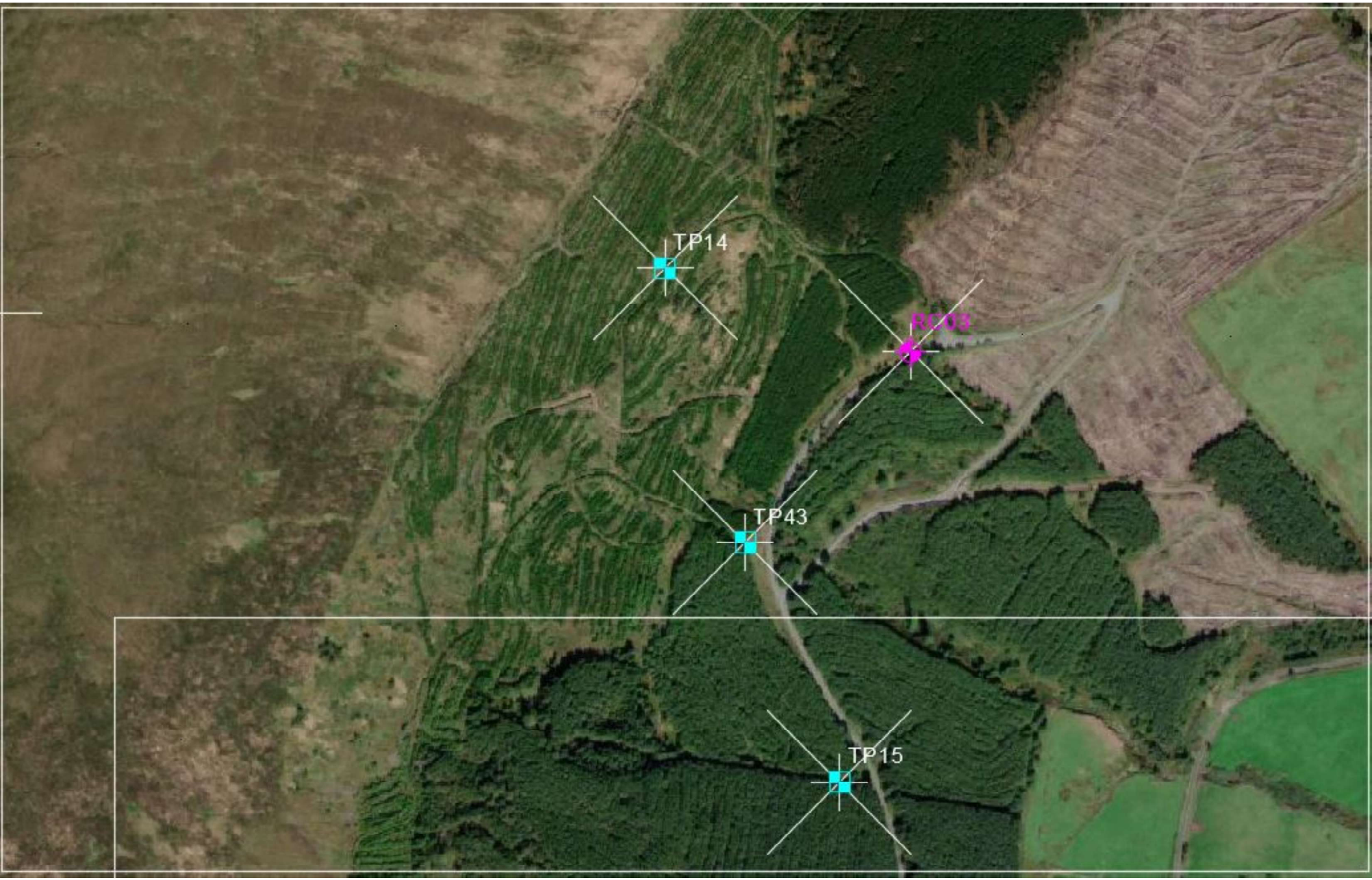
T20


TP15
RC02
TP16
RC01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Appendix 07
AGS Data