APPENDIX 8-2

Ground Investigation Report

DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

KILLOSHULAN WIND FARM

Ground Investigation Report

Prepared for:
MKO

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GROUND INVESTIGATION REPORT

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Abstract: Fehily Timoney and Company is pleased to submit this Ground Investigation Report to MKO for Killoshulan Wind Farm.

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1. INTRODUCTION

1.1 Scope and Objective of the Report

The objectives of this report are to present the interpretation of the available ground investigations and the site specific ground model. The report will provide anticipated relevant geotechnical parameters and provide groundwater information. The report summarises the methodology for deriving characteristic values of geotechnical parameters for the project.

This GIR incorporates the most recent ground investigation data, carried out by Ground Investigations Ireland (GII) between May and July 2026.

This GIR has been prepared for the exclusive use of MKO and should not be used in whole or in part by any third parties without the express permission of FT in writing.

1.2 Description of Project

1.2.1 Site Location

The Proposed Wind Farm site is located approx. 5.5km east of Urlingford, Co. Kilkenny.

The Proposed Wind Farm site comprises an area of approximately 5.7km^2. The surrounding landscape comprises low hills with land-use comprising forestry and agricultural land.

1.2.2 Project Description

The Proposed Project will comprise 10 no. wind turbines and associated hardstanding areas, 1 no. borrow pit, 2 no. temporary construction compounds, an on-site 110kV substation, upgrade of existing roads, construction of new site access roads, underground electrical connection cabling, road widening and accommodation works along the turbine delivery route, 1 no. meteorological mast, biodiversity enhancement measures, site drainage and all associated work as described in Chapter 4 of the EIAR. This will include the clear felling of trees around a number of the turbines.

2. EXISTING INFORMATION

The initial assessment of geology and hydrogeology involved a review of available background documentation for the Proposed Wind Farm site. The primary source of information is the Geological Survey Ireland (GSI), accessed online.
The sources of information used in the preparation of this report are listed below:

- GSI Public Data Viewer (Quaternary Geology, Bedrock Geology) (GSI, 2026)
- GSI Datasets Public Viewer (Groundwater Aquifer, Groundwater Vulnerability, Geological Heritage) (GSI, 2026)
- Ecological Designations (National Parks and Wildlife Service (NPWS)) (experience.arcgis.com, 2026)
- Online historic aerial photographs (Ordnance Survey of Ireland (OSI)) (Arcgis.com, 2026)

2.1 Topographical Maps (old and recent)

Review of Historical Tailte Eireann maps show little change over time between the mid-19th and early-20th centuries, with the Proposed Wind Farm site comprising agricultural lands. A lime kiln is noted in the southeast of the Proposed Wind Farm site on the 1913 map.

2.2 Geological Maps and Memoirs

General geological information for the Proposed Wind Farm site is provided by Geological Survey Ireland (GSI) and can be accessed online (https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx)

2.2.1 Superficial Geology

The superficial geology (Figure 1), within the Proposed Wind Farm site, is predominantly composed of till derived from Namurian Sandstones and Shales, Bedrock outcrop or subcrop and Karstified bedrock outcrop or subcrop.

The TEAGASC soils classification (Figure 2) classifies most of the Proposed Wind Farm site as consisting of Bedrock outcrop or subcrop, and Karstified bedrock outcrop or subcrop. Till derived from Namurian sandstones and shales is present in limited extents.

2.2.2 Bedrock Geology

The bedrock (Figure 3) under the study area consists of three separate formations:

- Killeshin Siltstone Formation: Muddy siltstone and silty mudstone
- Clogrenan Formation: Cherty, muddy calcarenitic Limestone
- Ballyadams formation: Crinoidal wackestone/packstone limestone

The aggregate potential maps show where it might be possible to find suitable rocks for building purposes as per the GSI. Most of the Proposed Wind Farm site is classified as having high crushed aggregate potential (Figure 4).

2.2.3 Structural Geology

Structural mapping indicates the presence of a single northeast-southwest trending regional fault. Total vertical displacements along these faults are unknown. An unconformity (gap in the geological record) forms the boundary between the Killeshin Siltstone and the Clogrenan Formations.

There are no GSI regional cross-sections available for the Proposed Wind Farm site. The closest cross-section is the Moneygall-Owning section, located approximately 13km to the southwest.

Structural measurements of bedding taken from outcrop locations by the GSI, indicate bedding dips range from 5 to 16°. Dip directions are varied.

2.2.4 Geological Heritage

Geological Survey Ireland (GSI) and the Irish Geological Heritage programme (IGH) are in partnership with the NPWS of the Department of Culture, Heritage and the Gaeltacht (DCHG) to identify and select important geological and geomorphological sites throughout the country for designation as NHAs (Natural Heritage Areas). The GSI database for the Site was searched for evidence of geological heritage sites, and this indicates that there are no Geological Heritage sites located within the Site. There are no Geological Heritage sites recorded within 2km of the Proposed Wind Farm site.

2.2.5 Karst Features

Karst describes the origin of a number of features that form in areas where the rock present is readily dissolved by water. Distinctive karstic features examples include sink holes, turloughs, springs and voids with fast flowing water in them. Often these features form along preferential groundwater flow paths such as fractures, fissures, or joints. In these, groundwater flow is dominated by fissure flow, leading to potentially high yields and the aquifers can extend over large areas.

Both the Ballyadams and Clogrenan Formations are susceptible to the formation of karst. The GSI mapping indicates a large number of karst features across the Proposed Wind Farm site. In the northwest of the Proposed Wind Farm site, a series of springs are recorded which mark the boundary between the limestone of the Clogrenan Formation and the Siltstone of the Killeshin Formation. In the southeast of the Proposed Wind Farm site a series of enclosed depressions and swallow holes are recorded (Figure 4).

2.3 Hydrogeology

The limestones that underlie the Proposed Wind Farm site are categorised as a Regionally Important Aquifer - Karstified (diffuse). The Siltstone of the Killeshin formation is categorised as a Poor Aquifer – bedrock which is generally unproductive except for local zones.

The GSI has not identified any gravel aquifers within or in the vicinity of the Proposed Wind Farm site.

Groundwater vulnerability across the Proposed Wind Farm site is generally categorised as 'X' – rock at or near surface or karst.

2.3.1 Groundwater Wells and Source Protection Zones

A summary of the wells located within 2km of the Proposed Wind Farm site is contained in the table below. Based on the available data the well yields are moderate. The distance (in the table) of the well from the Proposed Wind Farm site was taken as the shortest distance between the well and nearest Proposed Wind Farm site boundary. The southern portion of the Proposed Wind Farm site is within the Balief group water scheme preliminary source protection area zone of contribution.

Table 2.1: Summary of Groundwater wells and springs immediately outside study area

Location ID	Easting	Northing	Type	Total Depth (m bgl)	Current Use	Yield Class (yield m^3/day)	GSI Location Accuracy (m)	Approx. Distance to Nearest Infrastructure Element (m) Note 1
2315NWW010	235590	167680	Borehole	17.7	Unknown	Poor (21.8)	1000	500
2315NWW011	233840	164820	Dug well	4.3	Agricultural and domestic use	Poor (31.1)	1000	800
2315NWW023	232440	166400	Borehole	122.4	Agricultural and domestic use	Poor	50	900
2315NWW025	235740	168550	Borehole	26.5	Domestic use	Moderate	50	1000
2315NWW028	236240	167890	Borehole	20	Agricultural and domestic use	Poor (10.9)	50	1200
2315NWW029	236230	167890	Borehole	12	Agricultural and domestic use	Null	20	1200
2315NWW030	235620	165380	Borehole	156.0	Agricultural use	Failure	20	260
2315NWW063	236440	164000	Borehole	12.2	Unknown	Null	20	1000
2315NWW064	236080	163700	Borehole	3.1	Unknown	Null	50	1000
2315NWW065	236150	163840	Borehole	23.4	Unknown	Null	50	260
2315NWW089	232680	166670	Borehole	40	Agricultural and domestic use	Poor	20	800
2315NWW095	235510	168510	Borehole	13.7	Unknown	Null	20	1000
2315NWW100	235610	168530	Dug well	5.0	Agricultural and domestic use	Null	20	1000
2315NWW105	236710	167950	Borehole	14.0	Domestic use	Poor	20	1100
2315NWW106	236220	167750	Borehole	13.0	Agricultural and domestic use	Null	20	1100
2315NWW144	235140	164510	Dug well	6.1	Agricultural and domestic use	Null	20	700
2315NWW146	236150	164300	Dug well	-	Agricultural and domestic use	Null	20	650
2315NWW147	236710	164360	Dug well	6.2	Domestic use	Null	20	1000
2315NWW148	235960	163710	Dug well	-	Unknown		20	1000
2315NWW158	235200	166220	Borehole	54.9	-	Failure	20	510
2315NWW184	237000	166070	Borehole	35.1	-	Failure	500	1400
2315NWW186	234440	168330	Borehole	62.4	Domestic use	Moderate (43.6)	1000	1200

Location ID	Easting	Northing	Type	Total Depth (m bgl)	Current Use	Yield Class (yield m^3/day)	GSI Location Accuracy (m)	Approx. Distance to Nearest Infrastructure Element (m) Note 1
2315NWW191	233820	164780	Dug well	0.9	Domestic use	Poor (24.0)	1000	800
2315NWW195	232890	166760	Borehole	-	Agricultural and domestic use	Null	20	800
2315NWW203	236280	163580	Borehole	73.2	Domestic use	Poor (16.4)	20	1000

2.3.2 Summary of Aquifer Classification and Characteristics

According to the GSI, the Proposed Wind Farm site almost exclusively lies on an aquifer classified as being Regionally Important Aquifer - Karstified (diffuse) (Figure 5). The Groundwater Body (GWB) is the management unit under the Water Framework Directive (WFD), the GWB identified for the Proposed Wind Farm site was Lisdowney for the northern half of the Proposed Wind Farm site and Durrow for the southern half. Durrow GWB is classed as a karstic system with transmissivity of between 5 and 3,000m^2/day.

2.3.3 Groundwater Vulnerability and Subsoil Permeability

Groundwater vulnerability, as defined by the GSI, is the term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater could be contaminated by human activities. The vulnerability of an aquifer to contamination is influenced by the leaching characteristics of the topsoil, the permeability and thickness of the subsoil, the presence of an unsaturated zone, the type of aquifer, and the amount and form of recharge (the hydraulic process where water moved downward from surface to groundwater).

Groundwater vulnerability is determined mainly according to the thickness and permeability of the subsoil that underlies the topsoil, as both properties strongly influence the travel times and attenuation process of contaminants that could be released into the subsurface from below the topsoil.

The GSI classifies most the Proposed Wind Farm site as having vulnerability in the range of extreme to 'X' (rock at surface or karst).

Table 2.2: GSI Guidelines – Aquifer Vulnerability Mapping

Vulnerability Rating	High Permeability (e.g., Sand/Gravel)	Moderate Permeability (e.g., Sandy soil)	Low permeability (e.g., Clayey subsoil, clay, peat)
Extreme (X)	0 – 3.0m	0 – 3.0m	0 – 3.0m
High (H)	>3.0m	3.0 – 10.0m	3.0 – 5.0m
Moderate (M)	N/A	>10.0m	5.0 – 10.0m
Low (L)	N/A	N/A	>10.0m

2.4 Records of Mines and Mineral Deposits

No mineral deposits, based on published GSI information, were found to be located within 2km of the Proposed Wind Farm site.

2.5 Existing Ground Investigations

According to GSI's online Geotechnical viewer there are no recorded ground investigations in the vicinity of the Proposed Wind Farm site.

2.6 Contaminated Land

EPA maps have not identified any contaminated ground or source of contamination in the study area. Contamination is highly related to site history and previous land use which can leave contaminants in the ground depending on historic site activities. The Tailte Éireann historic maps were assessed to determine land uses within the scheme study area. No definite areas of contaminated land are currently known.

2.7 Ecological Designation

Special Areas of Conservation (SAC) are prime wildlife conservation areas in the country, considered to be important on a European as well as an Irish level. Potential National Heritage Area (pNHA) are those sites that have not been statutorily proposed or designated

No pNHA and SAC sites were identified within the Proposed Wind Farm site, however the Spahill and Clomanagh Hill SAC/NHA is located directly southwest of the Proposed Wind Farm site, with the main habitat described as an orchid rich calcareous grassland.

2.8 Other Relevant Information

None.

3. FIELD AND LABORATORY STUDIES

3.1 Geomorphological/Geological Mapping

No Geomorphological mapping or geological mapping has been carried out.

Site visits were undertaken by GDG (2022, 2026) and FT (2026) to inspect the Proposed Wind Farm site and to confirm the presence of karst features as indicated on the GSI mapping.

3.2 Ground Investigations

3.2.1 Description of Fieldwork

The ground investigation was carried out by Ground Investigations Ireland (GII) during May and July 2026, with laboratory testing being carried out over the following months. The Factual Report was issued on the 14th of September 2026. In addition, trial pitting (13 no.) was undertaken by GDG in 2022. A further 5 no. open-holed boreholes were undertaken at T01 and T02 on 2nd October 2026 based on the recommendations of Apex Geophysics.

In total, the intrusive ground investigation comprised 13 trial pits, 13 rotary core holes (Figure 5) and associated laboratory testing.

Table 3.1: Summary of GI Exploratory Holes

Exploratory Hole Type	Quantity	Depth Range (m)	Comments
Trial Pits (2022)	13	0.6-2.9	
Rotary Core Holes (2026)	13	5.0-30.0	

In situ testing, soil and rock sampling was also carried out as part of this Ground Investigation, with subsequent geotechnical, chemical and environmental laboratory testing.

3.2.2 Factual Report

The factual report supplied by GII, along with the trial pits logs from GDG are within Appendix-B of this report.

3.2.3 In-Situ Testing

The following in-situ testing was carried out during the GI:

- Standard Penetration Tests (SPTs) – used to provide indication of density and compressibility of granular soils and consistency of cohesive soils.

3.3 Geophysical Surveys

A geophysical survey was undertaken by Apex Geophysics to identify and delineate potential sub-surface karst features at all turbine locations that were being considered for the Proposed Wind Farm site. The investigation was undertaken between the 30th of April and 24th July 2026 and comprised the following survey methods:

- 26 no. Electrical Resistivity Tomography (ERT) profiles (two orthogonal ERT profiles at each of the turbine locations under original consideration (11 no.), plus at the T04 and T05 Alt locations).
- 64 no. Seismic refraction profiles (two orthogonal sets of two or three profiles each at each of the turbine locations under original consideration (11 no.), plus at the T04 and T05 Alt locations).
- 160 no. Microgravity survey readings across Turbine Iteration No. 2 T04 location (subsequently descoped)

The objectives of the survey were to:

- assess the depth to bedrock
- identify the type of bedrock
- identify any potential karst features faults/fissure zones within the bedrock and Quaternary deposits.

3.4 Other Field Work

As part of the ground investigation 50mm diameter standpipe piezometers were installed in each of the boreholes listed below to allow for groundwater sampling and monitoring. Slotted pipe was installed with gravel along the response zone as described in Table 3.2.

Table 3.2: Details of standpipes installed

Location	Depth Top (mbgl)	Depth Base (mbgl)	Diameter (mm)	Sealed zone / Response zone
BH01	0.0	10.0	50	Sealed zone
	10.0	22.0	50	Response zone
BH04A	0.0	10.0	50	Sealed zone
	10.0	30.0	50	Response zone
BH-ALT-T04	0.0	24	50	Sealed zone
	24.0	30.0	50	Response zone

3.5 Groundwater

Groundwater was encountered in a number of the exploratory holes during the ground investigation (trial pits).

Groundwater installations from the ground investigations consisted of three no. 50mm diameter HDPE groundwater monitoring standpipes.

Table 3.3 below shows groundwater levels encountered during the GI.

Table 3.3: Groundwater Strike Records

Location	Level (m bgl)	Level (m AOD)
TP03	2.0	190.5

TP06	2.7	287.8
TP13	1.5	207.74
TP16	2.6	226.9

3.6 Summary of Results of Laboratory Investigation

3.6.1 Description of Tests

Laboratory testing was undertaken to determine the classification, engineering properties and geo-chemistry of the soil encountered during the investigation. The testing was scheduled by GDG and carried out by GII in accordance with BS 1377:1990 Methods of test for soils for civil engineering purposes, unless otherwise stated.

Specialist chemical testing was undertaken by Element Materials Technology Ltd on behalf of GII.

Samples were subject to a range of test methods to determine geotechnical parameters in accordance with BS1377:1990 and ISRM suggested methods for soil and rock respectively.

Test type and number of tests carried out are summarised in Table 3.3.

Table 3.4: Summary of Type and Number of Tests Performed

Determinant / Test Type	No. of Tests
Natural Moisture content	10
Atterberg Limits	9
Particle Size Distribution	11
CBR	4
pH	3
Sulphate	3
Rock Testing	
Point Loads $I_s(50)$	27
Uniaxial Compressive Strength (UCS)	7

3.6.2 Copies of the Test Results

Laboratory test results have been provided in the Factual Report included in Appendix B.

3.6.3 AGS Data

AGS data has been provided by GII for the ground investigation information.

4. GROUND SUMMARY

This section presents an interpretation of the available information discussed in Section 3 of this report. It is an assessment of the available ground investigation data.

Ground Investigation results have been interpreted considering the information listed in EC7-2, 6.3 (Evaluation of geotechnical information).

4.1 Geology

Detailed descriptions of geological strata encountered in the ground investigations are provided within Section 5. (Ground Conditions and Material Properties). For full descriptions, this report should be read in conjunction with the exploratory hole logs provided in the Ground Investigation Factual Report included in Appendix B.

In summary, the Proposed Wind Farm site comprises predominantly Glacial Till deposits and Bedrock. The Glacial Till is composed of cohesive and granular material. The granular material varies between loose to dense. The cohesive material ranges in strength of soft to firm. Granular deposits are composed predominantly, of sandy gravel with varying degrees of cobbles and boulder also present. Cohesive deposits mainly consist of silt/ clay with varying degrees of sand, gravel and cobbles also present.

The bedrock in the northern half of the Proposed Wind Farm site is composed of extremely weak to weak thinly to thickly bedded Mudstone/Siltstone with occasional clay lenses. In the southern half of the Proposed Wind Farm site Limestone is recorded as very weak to strong, grey and dark grey, thinly to thickly bedded to massive, slightly fossiliferous. Three fracture sets are typically present, dipping 0-20 degrees, 40-55 degrees and 80-90 degrees. Values for SCR (solid core recovery) and RQD (rock quality designation) vary from 30 to 100%. Several of the boreholes recorded that the rock reacted to a HCL solution, indicating the presence of calcium carbonate that would be susceptible to the formation of karst. This is discussed further in the FT Karst Risk Assessment (Ref. P26112-FT-EGT-XX-RP-GE-0002) BH04 recorded a clay filled void from 10.0 to 24.1m BGL. SPT's undertaken in this clay indicate that it is stiff to very stiff.

Data on groundwater is presented in Table 3.3. The depth of the recorded water strikes in the trial pits varied from 1.5m to 2.7m below ground level. No groundwater strikes were recorded in the rotary cored boreholes.

5. GROUND CONDITIONS AND MATERIAL PROPERTIES

5.1 Introduction

This section describes the ground conditions and the material properties of the various materials encountered at the Proposed Wind Farm site and provides justification for the recommended design parameters to be adopted for the geotechnical design. The ground conditions and geotechnical parameters have been derived from the results of the recent ground investigation carried out by GII between May and July 2026.

5.1.1 Limitations of the Ground Investigation Data

No limitations encountered based on existing ground investigation data.

5.2 Site Geology

Table 5.1 contains a summary of the ground conditions encountered in the study area.

Table 5.1: Summary of Geological Sequence

Stratum	Depth Range (m bgl)	General Description
Topsoil	0.1 to 0.6	Mainly composed of firm slightly gravelly clay with rootlets.
Fine-grained Till	0.3 to 11.5	Composed of mainly CLAY but SILT was also encountered, ranging from soft to firm with varying contents of sand and gravel with sand being medium to coarse, angular to subangular and gravel being subrounded to subangular fine to medium.
Granular Till	0.2 to 0.75	Grey sandy Gravel and very gravelly Sand. Gravel is fine to coarse.
Bedrock	0.0 to 11.5 mbgl	The bedrock is composed of the following: Very weak to strong fine to medium grained thinly bedded to massive Limestone. Occasionally karstified. Extremely weak to weak grey thinly to thickly bedded fine grained Mudstone.

5.3 Methodology for the Derivation of Characteristic Values

Characteristic values have been derived in accordance with the requirements of Eurocode 7 (BS EN 1997-1) and in line with best practice laid out in the complementary British Standards and other guidance documents.

If several methods are proposed for deriving the value for a particular parameter, all the results are evaluated considering the constraints, variability, suitability and reliability of each method.

The below section outlines the methodology for derivation of characteristic values for each geotechnical parameter. The derivation of characteristic values for geotechnical parameters is described for the soils and rock that are encountered at the Proposed Wind Farm site. Where direct measurement of parameters has not been carried out, established correlations with measured properties have been used to derive values for design.

Characteristic values are defined as a cautious estimate of the value affecting the occurrence of a limit state based on Clause 2.4.5.2, from BS EN 1997-1: 2004 (Eurocode 7). Characteristic values should be used with appropriate partial factors to achieve appropriate factors of safety, as required for detailed geotechnical design.

5.3.1 SPT Correction Factors

The N values obtained from the Standard Penetration Tests (SPT) across the Proposed Wind Farm site are corrected and used for the derivation of the characteristic values for geotechnical parameters. Correlations and methods use different N values, as shown in Table 5.2 below. The table is extracted from CIRIA 134: The Standard Penetration Test (SPT): Methods and Use.

Table 5.2: Determination of parameters from SPT results (CIRIA 134)

Parameter	Material Type		Required Input
	Granular Soil	Cohesive Soil	
Angle of Internal Friction (ϕ')	Applicable	-	$(N_1)_{60}$
Undrained Shear Strength (c_u)	-	Applicable	N_{60}
Constrained or Oedometer Modulus (E_u)	-	Applicable	N_{60}
Elastic Young's Modulus (E')	Applicable	Applicable	N_{60}
Coefficient of Compressibility (m_v)	-	Applicable	N_{60}

Where:

- N: Reported SPT resistance value, number of blows required to achieve a penetration of 300 mm in the soil, after an initial seating drive of 150 mm.
- N1: SPT N value corrected to 100 kPa effective overburden pressure.
- N60: SPT N value corrected to 60% of theoretical free-fall hammer energy and length of the rods.
- (N1)60: SPT N value corrected for both vertical effective stress, length of the rods and input energy.
- Corrections are applied following BS EN ISO 22476-3:2005+A1:2011 – Annex A (Geotechnical Investigation and Testing – Field testing. Part 3: Standard Penetration Test).

5.3.2 Energy Correction

Energy losses are induced by the SPT hammer assembly due to frictional and other parasitic effects, which cause the hammer velocity at impact to be less than the free fall velocity. The type of machine, skill of the operator and other factors can also influence the energy delivered to the drive rods. Therefore, SPT results should be corrected to give values equivalent to some standard energy input.

For general design purposes, the N values are adjusted to a reference energy ratio of 60%, by the following equation:

$N60 = (E_r/60) * N$

Where:

- N is the blow count
- E_r is the energy ratio of the specific test equipment (provided by GI contractor)

Where the E_r is not reported a value of 60 is used to provide N60 values, hence no correction made. The uncorrected value is the same as the 'corrected' value.

5.3.3 Weight Density of Soils

The characteristic weight density of soils has been derived from laboratory testing and the typical density values given in Figure 1 and Figure 2 of BS8002 (2015), the latter based on material descriptions.

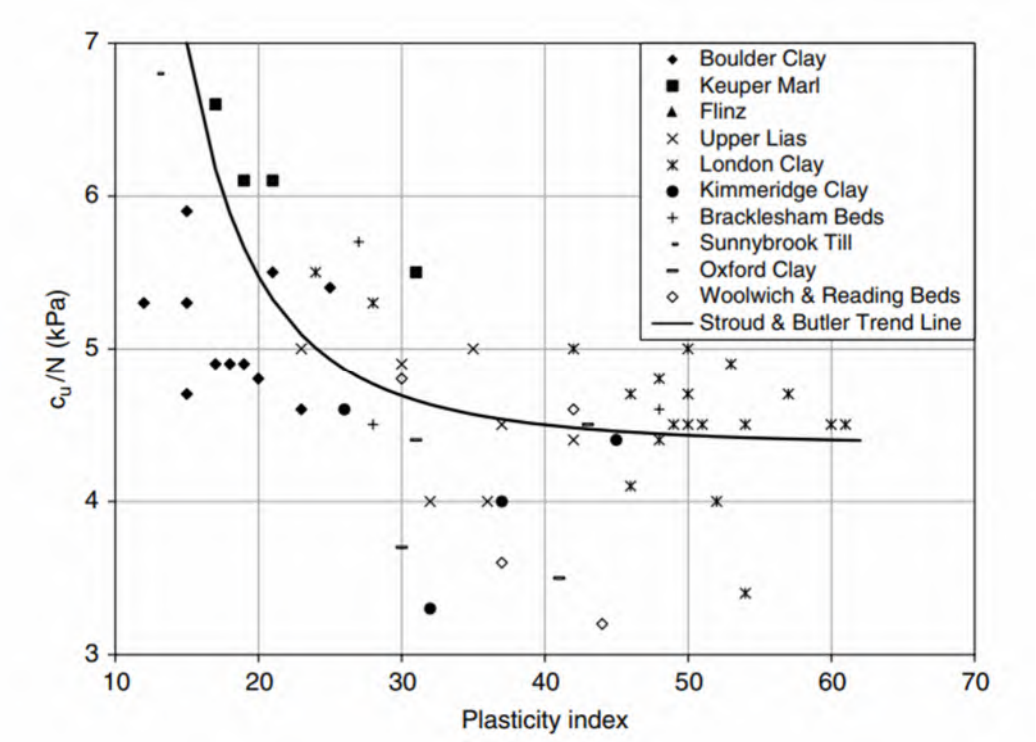
Upper and lower bound values may be locally defined to consider the effect of the weight density on actions and resistances. The present report defines globally conservative values.

5.3.4 Undrained Shear Strength

Undrained shear strength was estimated using the following correlation by Carter & Bentley (2016) (citing the work of Stroud & Butler, 1975). The correlation considers the SPT-N values and the value for the Plasticity Index (PI).

$$\frac{c_u}{N} = \frac{8910}{PI^3} + 4.36$$

Figure 5.1 Correlation between undrained shear strength, SPT N-value and PI (Carter & Bentley, 2016 adapted from Stroud & Butler, 1975).



Where, one or both of the required parameters are not available, the material descriptions will be used to derive conservative estimates for undrained shear strength. These will be discussed in the relevant section(s), where applicable.

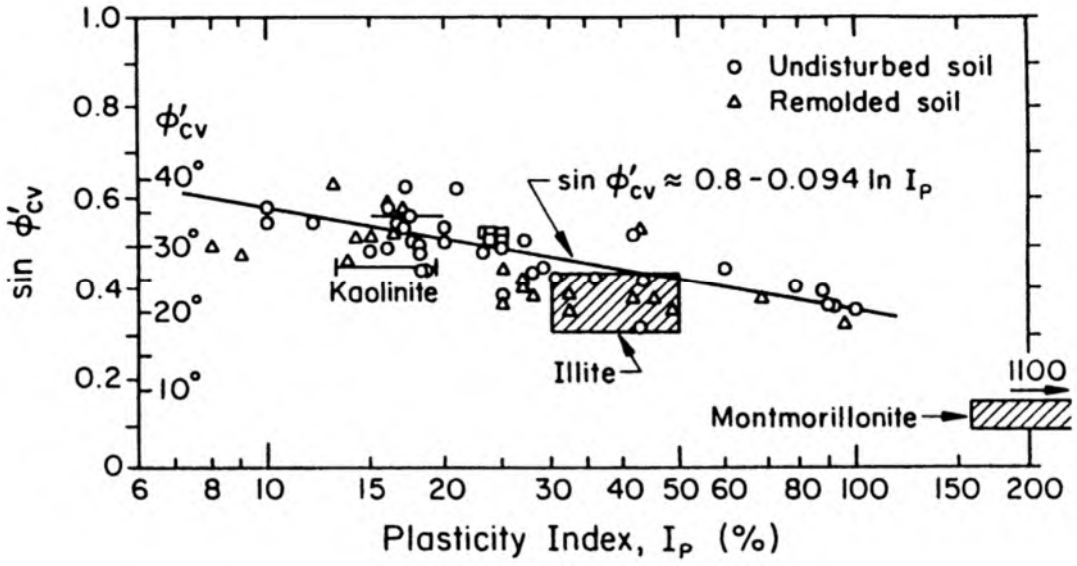
5.3.5 Effective Strength Parameters

5.3.5.1 Cohesive Materials

For cohesive materials, the effective critical strength parameters can be derived from the relationship between the constant volume angle of shearing resistance ($\phi'_{(cv,k)}$) and plasticity index (I_P) as cited by Rowe (2001) (adapted from the works of Kulhawy & Mayne 1990) and seen in Figure 5.2:

$$\text{Sin } \phi'_{(cv,k)} = 0.8\text{-}0.094 \ln(I_P)$$

Figure 5.2 Correlations between effective friction angle and plasticity index for fine-grained soils (Rowe, 2001 modified from Kulhawy & Mayne 1990).



Where, one or both of the required parameters are not available, the material descriptions will be used to derive conservative estimates for effective strength parameters. These will be discussed in the relevant section(s), where applicable.

5.3.5.2 Granular Materials

Peck, Hanson and Thorburn's chart (Peck, Hanson, & Thornburn, 1974) which relates SPT N value to the angle of friction, is shown Figure 5.3.

Figure 5.3 Relationship between SPT N and ϕ ' for glacial tills from CIRIA report C504 – Engineering in glacial tills

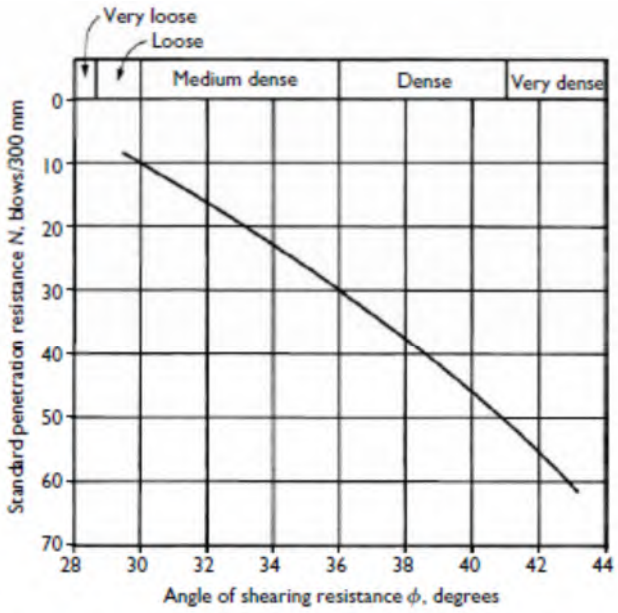


Figure 4.10 Relationship between standard penetration test *N*-values and angle of shearing resistance (after Peck *et al.*[4.18]).

Where the calculated angle of internal friction is expressed in degrees and the N value must be appropriately corrected, as described in Section 5.3.2 (SPT Correction Factors).

The angle of internal friction for soils described as sands/gravels may also be estimated using the method proposed in BS 8004:2015 (Code of Practice for Foundations) (Section 4.3.1.3.5) as follows:

$\phi'_{(cv,k)} = 30° + \phi'_{(ang)} + \phi'_{(PSD)}$

Where:

- $\phi'_{(ang)}$ is contribution to $\phi'_{(cv,k)}$ from the angularity of the particles
- $\phi'_{(PSD)}$ is contribution to $\phi'_{(cv,k)}$ from the soil's particle size distribution

Table 5.3: 'Table 1' from BS8004:2015

ϕ'(ang)	Parameter (degrees)
Rounded to well-rounded	0
Sub-angular to sub-rounded	2
Very angular to angular	4
ϕ'(PSD)	**Parameter (degrees)**
Cu (Uniformity Coefficient) < 2	0
2 ≤ Cu < 6	2
Cu ≥ 6	4
ϕ'(dil) as SPT N Value (modified from BS EN 1997-2)	**Parameter (degrees)**
< 3	0
3 - 8	0
8 - 25	3
25 - 42	6
> 42	9

5.3.6 Stiffness

5.3.6.1 Granular Deposits

CIRIA 143 (Clayton, 1995) Section 8.1.2 suggests that for normally consolidated granular deposits a reasonable approximation can be made to estimate the drained Young's Modulus (E') from N60 values using the relationship f = E'/N60. A relationship of E'/N60 = 1.0 (MPa) has been used conservatively for all granular deposits on site as they have been assumed to be normally consolidated.

5.3.6.2 Cohesive Deposits

CIRIA 143 provides a range of correlation factors and discusses how these vary with the degree of loading. CIRIA 143 shows relation for E'/N = 0.9 MPa (Stroud, 1989) and E'/N = 0.6-0.7 MPa (Butler, 1975) and Eu/N = 1.0-1.2 MPa (Butler, 1975).

In deriving the characteristic E' value, a suitable E'/Eu ratio has been selected based on the material type, degree of consolidation and variance of the correlated E' results with depth. Based on the guidance referenced above, an E'/Eu ratio of 0.8 is considered appropriate.

5.3.6.3 Consolidation Parameters

As oedometer test results are not available, the following equation from Carter & Bentley (2016) (from Stroud & Butler, 1975) is used to estimate consolidation settlement based on SPT-N and Plasticity Index (PI) values.

$$\frac{1}{m_v N} = \frac{56000}{PI^{2.07}} + 435$$

For the detailed design stage, location specific values for the consolidation parameters will be selected based on in situ effective stress and the actual increase in stress. Site wide data will be used if location specific data is not available.

Where, one or both of the required parameters are not available, the material descriptions will be used to derive conservative estimates for undrained shear strength. These will be discussed in the relevant section(s), where applicable.

5.4 Site Wide Assessment

This section describes the ground conditions, and the material properties of the various materials encountered at the Proposed Wind Farm site and provides justification for the recommended design parameters to be adopted for the detailed design.

The objective of this section is to determine site wide characteristic values of geotechnical parameters for design. These parameters will be reviewed during the detailed design on a location-by-location basis and, if the design values vary, justification will be given in the GDR.

For design purposes the ground materials have been divided/grouped into:

- Glacial Till (Cohesive)
- Glacial Till (Granular)
- Bedrock

5.4.1 Topsoil

5.4.1.1 General Description and Extent

Topsoil was encountered in every borehole, except BH06, and in all trial pits, except TP02 and TP17, with a thickness ranging between 0.1 to 0.7m with an average thickness of 0.6m in the boreholes and an average of 0.4m in the trial pits. It was mainly composed of firm sandy clay with rootlets. Sand and gravel content varied and gravel was described as subangular to subrounded fine to medium.

5.4.2 Cohesive Glacial Till

5.4.2.1 General Description and Extent

Cohesive Glacial Till was encountered in nine of the thirteen trial pits. The thickness of these deposits ranged from 0.15m to 2.5m with the average thickness being 1.8m. The cohesive till is mainly composed of soft to firm slightly sandy and slightly gravelly CLAY with some sections of the Proposed Wind Farm site containing SILT as well. Sand is medium to coarse, angular to subangular. Gravel is subrounded to subangular, fine to coarse.

5.4.2.2 In Situ and Laboratory Test Results

Moisture Content

Moisture Content values vary between 8.3% and 19.1% with an average of 13.6% and are summarised in Table 5.5.

Plasticity Index

Plasticity Index values vary between 18% and 36% with an average of 23.4%. The cohesive till can be described as a intermediate to high plasticity clay with a characteristic value of 23%.

SPT N

No SPT's were carried out in the Cohesive Glacial Till layer.

Undrained Shear Strength

Based on the discussion above and considering a PI=20%, from Section 5.3.4:

c_u = 30 kPa

Stiffness

Stiffness parameters are determined using the SPT values and correlation factors mentioned in Section 5.3.6.2.

E_u = 6 MPa

E' = 5 MPa

5.4.3 Granular Glacial Till

5.4.3.1 General Description and Extent

Granular Glacial Till was encountered within three trial pits (TP01, TP02, TP07) and two boreholes (BH01, BH02) in the ground investigation. It is present from ground level with a thickness range from 0.2 to 2.3m and an average thickness of 0.5m. This material is comprised of clayey slightly sandy Gravel with gravel being described as angular to subangular fine to coarse, and very gravelly Sand with high cobble and boulder content.

5.4.3.2 In Situ and Laboratory Test Results

Shear Strength Parameters

The value for Φ for granular till, based on the discussion in Section 5.3.5 and based on material descriptions, for various depths is computed as follows:

Φ = 34°

Stiffness

Stiffness parameters are determined using the SPT values and correlation factors mentioned in Section 5.3.6.2.

E' = 10 MPa

5.4.4 Bedrock

From a geotechnical point of view, the rock will be defined based on lithology. Different weathering levels are also defined as well as other necessary parameters for an appropriate geo-mechanical classification.

5.4.4.1 Rock Encountered and Geology Codes

The bedrock is composed of two rock types:

- Very weak to strong fine to medium grained thinly bedded to massive Limestone.
- Extremely weak to weak grey thinly to thickly bedded fine grained Mudstone

For the Limestone, discontinuities are closely to widely spaced, undulose, rough with occasional infill and staining. Dip angles vary from 0 to 90 degrees in three sets. For the Mudstone, discontinuities are very closely to widely spaced, smooth to rough with frequent clay infill and smearing. Two discontinuity sets are indicated, one 0-20 degrees and the other 80-90 degrees.

5.4.4.2 Laboratory test results

The following tests were undertaken on rock samples:

- Point load tests (I(50)): A total of 27 Point Load tests were undertaken (20 on Limestone and 7 on Siltstone), with results ranging from 0.41 to 4.8 MPa ($I_S(50)$) for the Limestone and 0.28 to 2.99 MPa for the Mudstone.
- Uniaxial Compressive Strength (UCS): A total of 7 samples (all Limestone) were tested giving a range of 85.3 to 124 MPa.

5.4.5 Groundwater Conditions

The GI recorded groundwater strike level ranges between 1.5 mbgl and 2.7 mbgl across the Proposed Wind Farm site. Groundwater readings from standpipes taken following completion of the GI are recorded below.

Table 5.4: Groundwater Level Summary measured in standpipes

Information Required	Depth & Level		
	mbgl	mOD	Hole ID
Highest groundwater level recorded	13.5	255.8	BH04
Lowest groundwater level recorded	22.65	268.35	BH5-ALT-T5

The recorded groundwater levels from installation readings and water strikes are summarised in the GII factual report in Appendix-B. Based on all available data, the proposed groundwater level for design is 1.0 mbgl for the Proposed Wind Farm site, based on groundwater strikes in the trial pits.

5.4.6 DSC and ACEC classifications

The Design Sulphate Class (DSC) and Aggressive Chemical Environment for Concrete (ACEC) classification for the different strata are summarised below based on the data from the Factual Report. The classification is assuming natural ground conditions as the Proposed Wind Farm site has had no history of industrial activity.

Table 5.5: DSC and ACEC classifications based on strata

Strata	Design Sulfate Class (DSC)	Aggressive Chemical Environment for Concrete (ACEC)
Cohesive Glacial Till	DS-1	AC-1
Granular Glacial Till	DS-1	AC-1

5.5 Ground Model – Site Wide

Topsoil overlies Glacial Till which is composed of cohesive and granular material with particle size ranging from clay to boulders. The profile is very non-homogenous with alternating layers of granular and cohesive material deposited across the Proposed Wind Farm site. Due to the variability in layer thickness and soil type, depending on location, no characteristic layer thickness can be recommended. Overburden is relatively shallow and is underlain by two rock types – Mudstone and Limestone. The presence of karst is noted within the Limestone and this is discussed further in the Karst Assessment Report (P26112-FT-EGT-XX-RP-GE-0002), FT, 2026.

5.5.1 Material Properties and Summary Table – Site Wide

Table 5.6 provides the site wide selected characteristic values for material properties. Unit weight is selected based on Figure-2 in BS 8002:2015 based on the following considerations but remaining conservative:

- Cohesive Glacial Till: Soft to Firm clay/ silt
- Granular Glacial Till: Loose to medium dense

Table 5.6: Site wide characteristic values

Design unit	c_u (kPa)	c' (kPa)	ϕ' (°)	E_u (MPa)	E' (MPa)	ϒ (MN/m3)	m_v (m2/MN)
Cohesive Glacial Till	30	1	30	6	5	20	0.15
Granular Glacial Till	-	-	34	-	10	20	-
Bedrock (Limestone)	-	250	30	-	-	24	-
Bedrock (Mudstone)	-	150	25	-	-	24	-

6. REFERENCES

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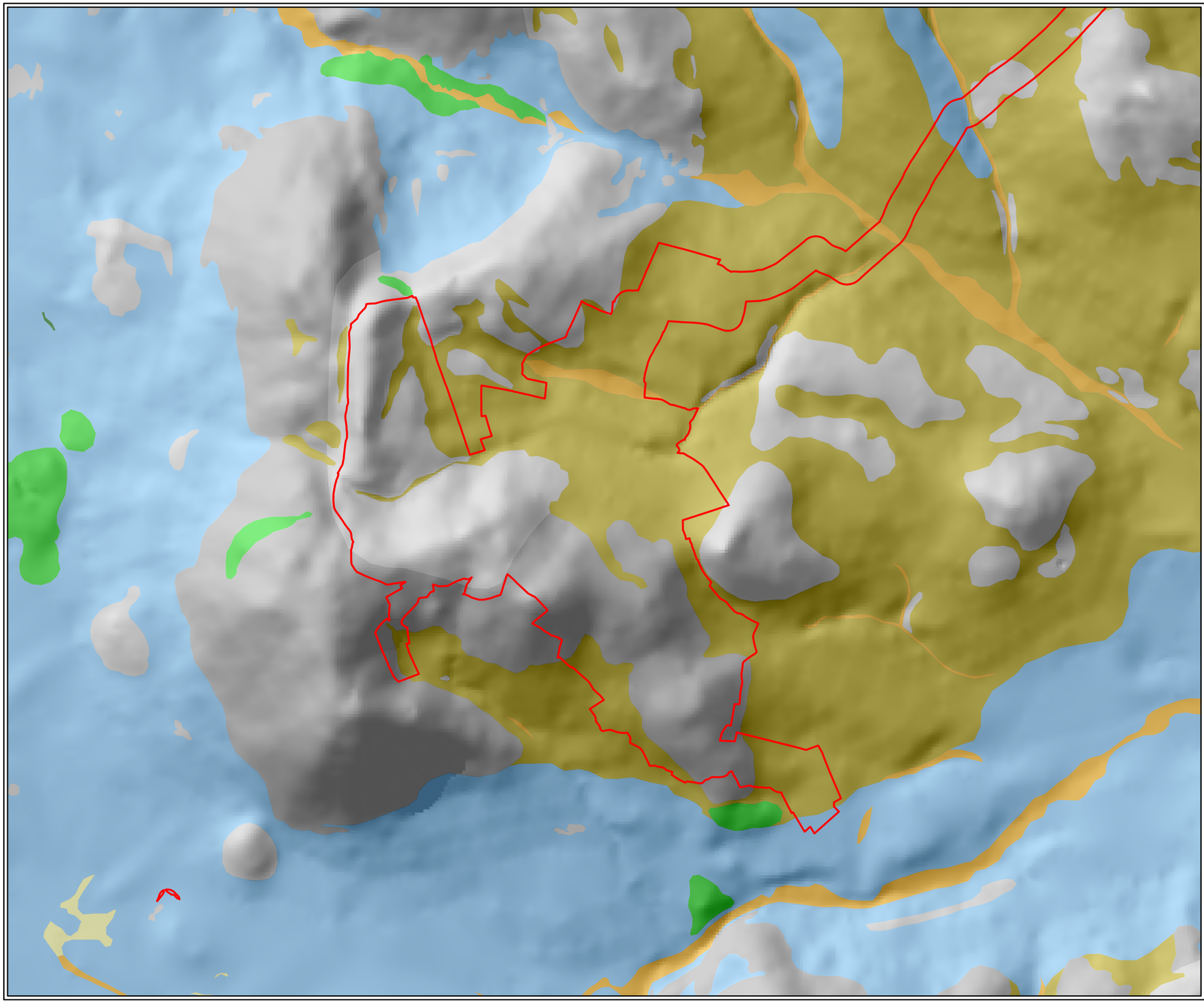
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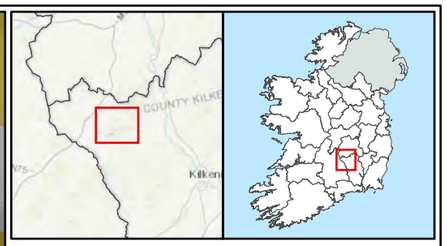
APPENDIX A

Figures

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Legend

- Site Boundary
- A, Alluvium
- BasEsk, Eskers comprised of gravels of basic reaction
- GLs, Gravels derived from Limestones
- KaRck, Kartsified bedrock outcrop or subcrop
- L, Lacustrine sediments
- Rck, Bedrock outcrop or subcrop
- TLs, Till derived from limestones
- TNSSs, Till derived from Namurian sandstones and shales

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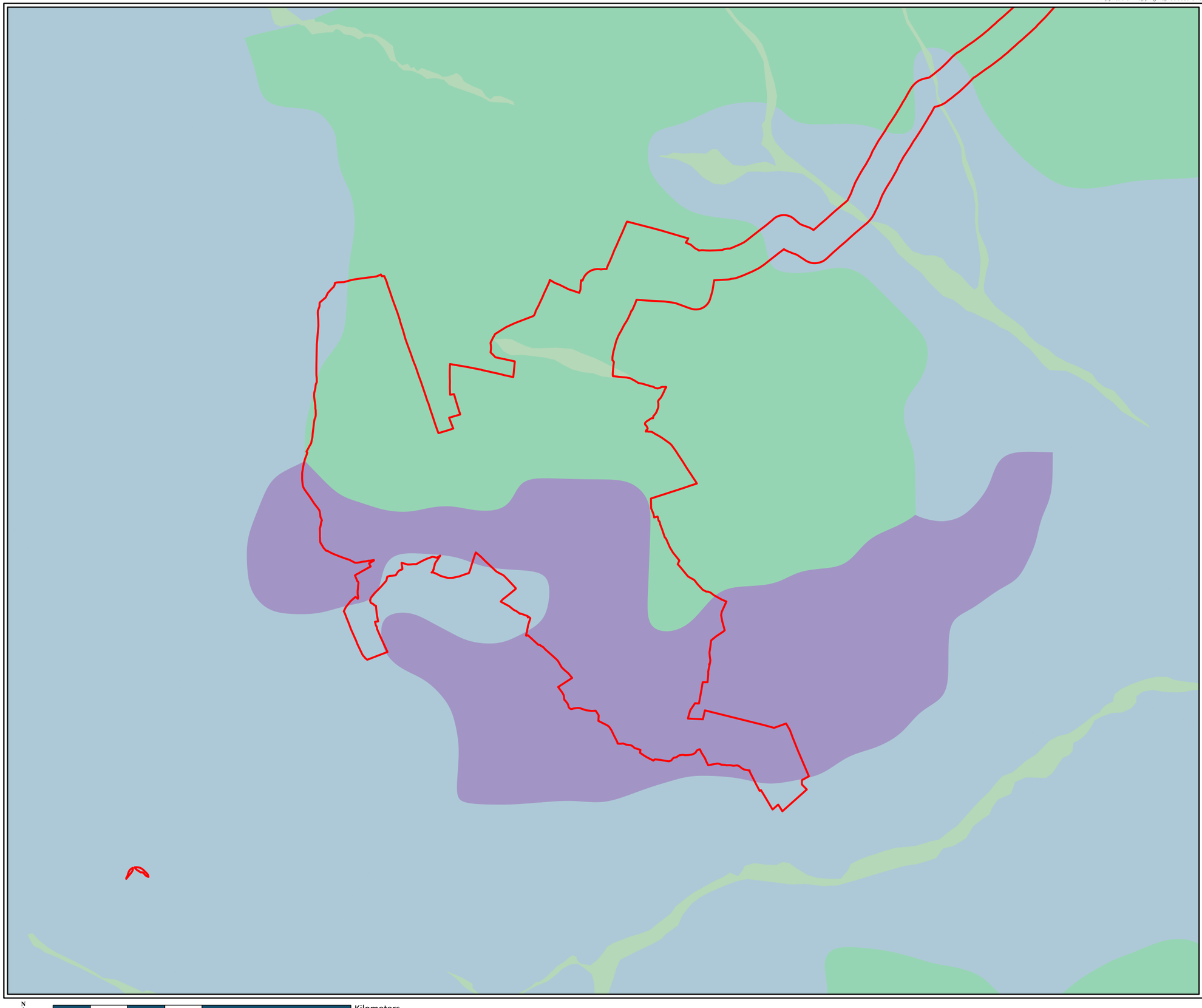
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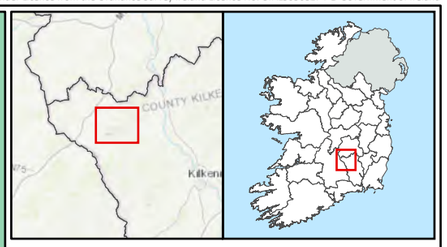
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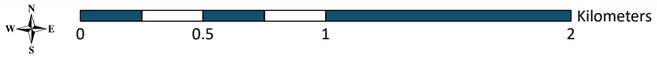
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Legend

- Site Boundary
- Fine loamy drift with limestones
- Fine loamy drift with silIceous stones
- Fine loamy drift with siliceous stones
- River alluvium

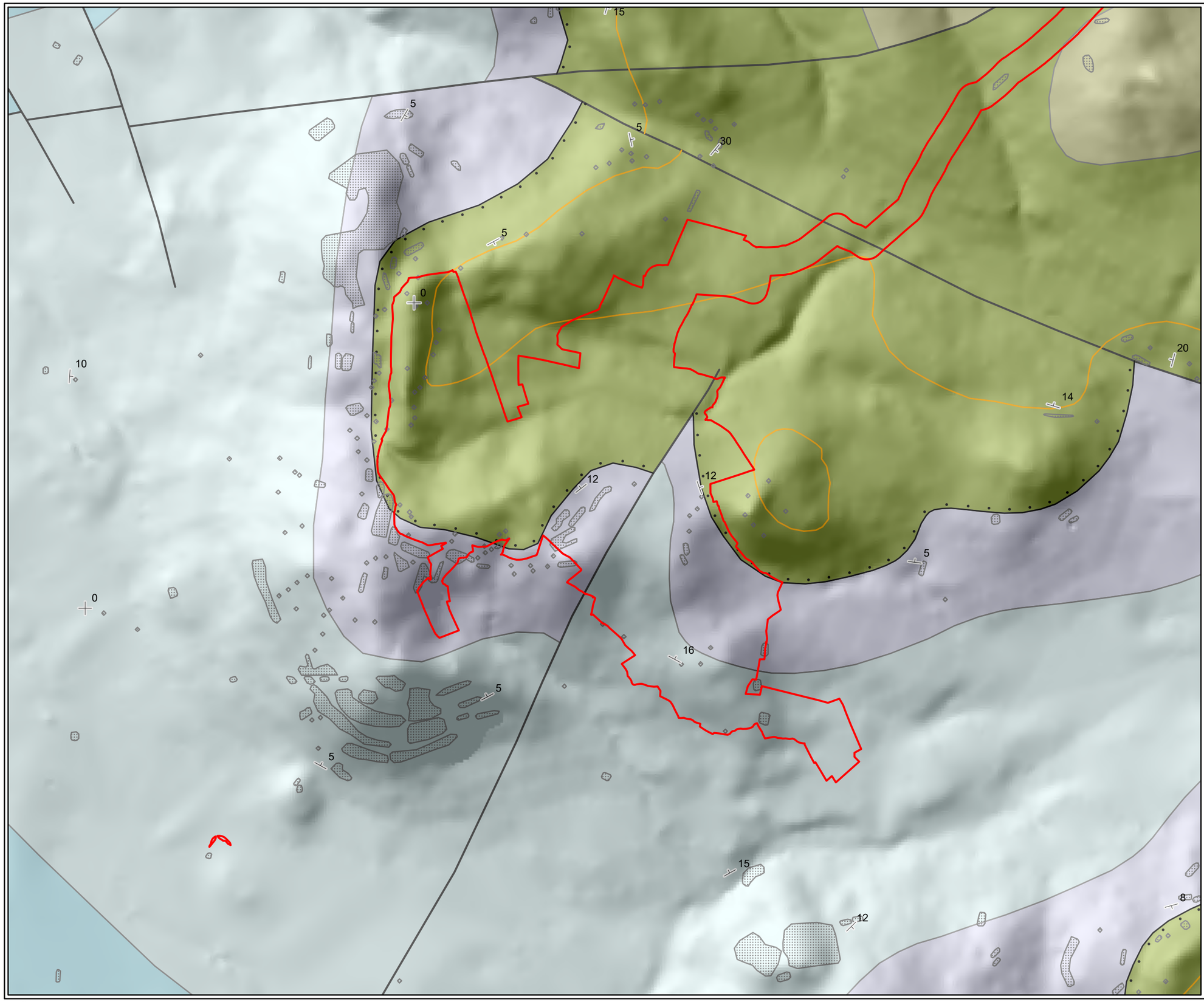


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Legend

- Site Boundary
- Ballyadams Formation
- Clogrenan Formation
- Durrow Formation
- Bregaun Flagstone Formation
- Killeshin Siltstone Formation
- Bedrock Outcrops
- Horizontal Bedding
- Strike and dip of bedding, way up unknown
- Fault
- Thin stratigraphical unit, diagrammatic
- Unconformity, dots on younger side

N W E S

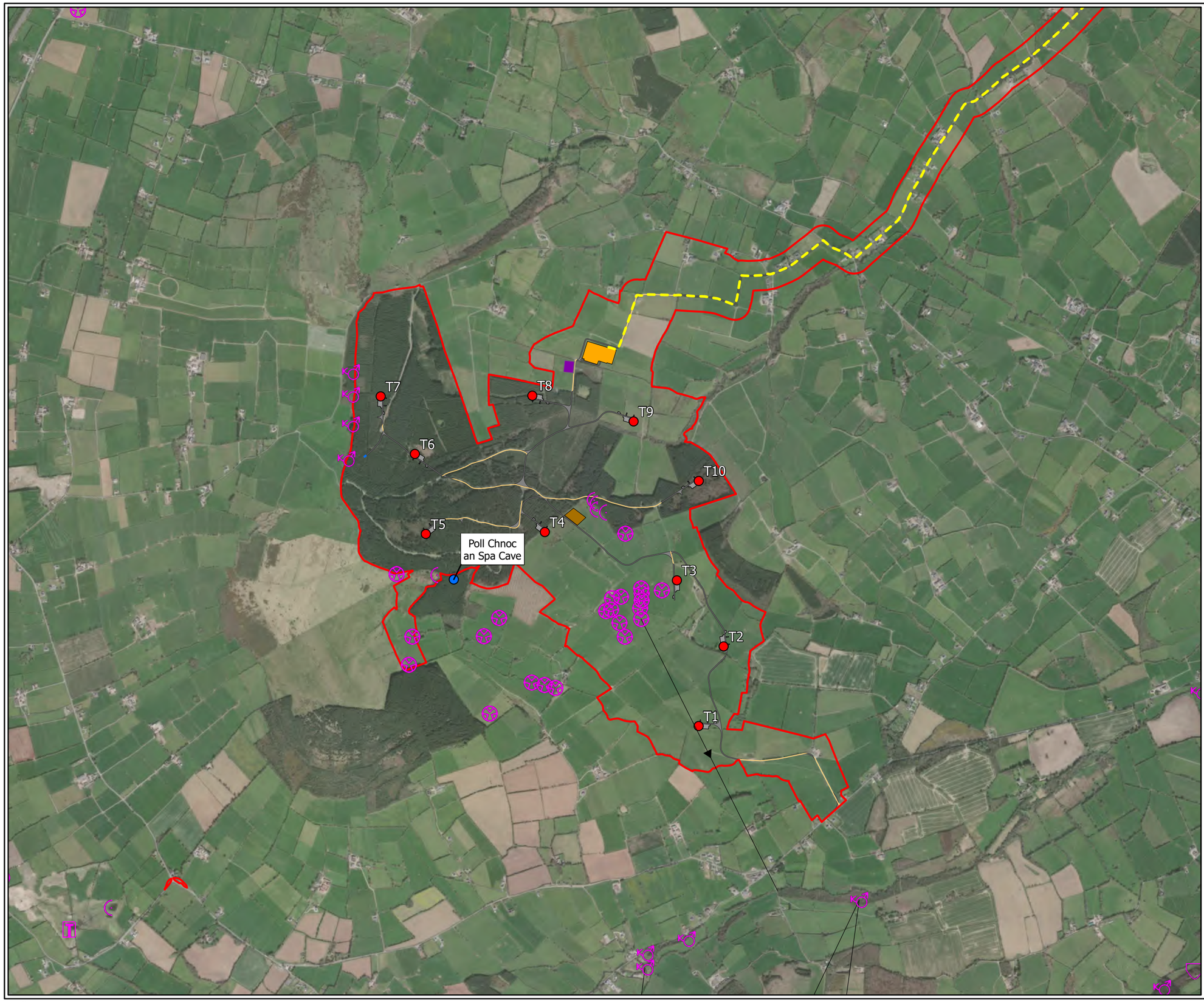
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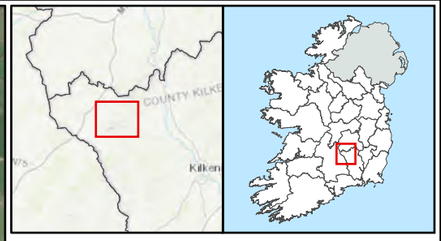
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Legend

- Site Boundary
- Hardstandings
- Proposed New Access Tracks
- Existing Tracks to be Upgraded
- Spoil Management Area
- Proposed 110kV Substation Compound
- Met Mast Area
- Construction Compound
- Grid Connection Route
- Traced Underground Connections
- Cave
- Enclosed Depression
- Spring
- Swallow Hole
- Turlough
- Poll Cnoc an Spa Cave
- Turbine Location

TITLE:	GSI Karst Distribution		
PROJECT:	Killoshulan Wind Farm		
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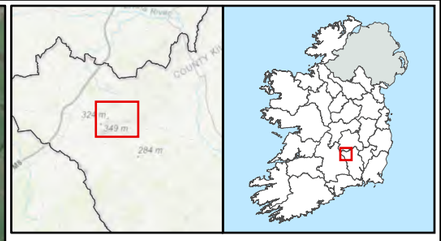
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Legend

- Site Boundary
- Borehole
- Trial Pit

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APPENDIX B

Factual Report (GII, 2026)

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Ground Investigations Ireland

Killoshulan Wind Farm

MKO

Ground Investigation Report

September 2026

Directors:
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Project Title	Killoshulan Wind Farm Initial
Client	MKO
Project No	15495-04-26
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
C	Final	E Byrne	E Byrne	M Sutton	Dublin	11 September 2026

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APPENDICES

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Appendix 2 Rotary Core Records
Appendix 3 Laboratory Testing
Appendix 4 Geophysics Survey

1.0 Preamble

On the instructions of MKO, a site investigation was carried out by Ground Investigations Ireland Ltd., between May and June 2026 at the site of the proposed wind farm in Killoshulan, Co. Kilkenny.

2.0 Overview

2.1. Background

It is proposed to construct a proposed wind farm, access roads and associated infrastructure at the proposed site. The site is currently greenfield and is situated to the east of Urlingford Town. The proposed construction is envisaged to consist of piled foundations and pavement make up with some local excavations for services and plant.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 13 No. Rotary Core Boreholes to a maximum depth of 30.50m BGL
- Installation of 3 No. Groundwater monitoring wells
- Carry out 28 No. ERT survey lines
- Carry out 1 No. Microgravity Survey
- Geotechnical & Chemical Laboratory testing
- Factual Report

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Rotary Boreholes

The rotary coring was carried out by a track mounted T44 Beretta rig at the locations shown on the location plan in Appendix 1. The rotary boreholes were completed from the surface.

The T44 Beretta is equipped with rubber tracks which allow for short travel on pavement surfaces avoiding any damage to the surface. The T44 Beretta utilises a triple tube core barrel system operated using a wireline drilling process. The outer barrel is rotated by the drill rods and at its lower end, carries the coring bit. The inner barrel is mounted on a swivel so that it does not rotate during the process. The third barrel or liner is placed within the second one to retain the core intact and to preserve as much as possible the fabric of the drilling stratum. The core is cut by the coring bit and passes to the inner liner. The core is brought up to the surface within the inner barrel on a small diameter wire rope or line attached to the "overshoot" recovery tool which is then placed into a core box in order of recovery. A drilling fluid, typically air mist or water flush is passed from the surface through hollow drill rods to the drill bit and is used to cool the drill bit. Temporary casing is used in some situations to support unstable ground or to seal off fissures or voids. It should be noted that the rotary coring can only achieve limited recovery in overburden, particularly granular or weakly cemented strata due to the flushing medium washing away the cohesive fraction during coring. The recovery achieved, where required is noted on the borehole logs and core photographs are provided to allow assessment of the core recovered. The rotary borehole logs are provided in Appendix 2 of this Report.

3.3. Surveying

The exploratory hole locations have been recorded using a KQ GEO Technologies KQ-M8 System which records the coordinates and elevation of the locations to ITM as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.4. Groundwater Monitoring Installations

Groundwater Monitoring Installations were installed upon the completion of selected boreholes to enable sampling and the determination of the equilibrium groundwater level. The typical groundwater monitoring installation consists of a 50mm uPVC/HDPE slotted pipe with a pea gravel response zone and bentonite seal installed to the Engineers specification. Where required the standpipe is sealed with a gas tap and finished with a durable steel cover fixed in place with a concrete surround. The installation details are provided on the exploratory hole logs in the appendices of this Report.

3.5. Electrical Resistivity Tomography (ERT) Survey

Two ERT lines were carried out at the proposed location of each wind turbine. The survey is a non-invasive geophysical method used to determine the distribution of electrical resistivity in the subsurface. It works by injecting an electrical current into the ground through current electrodes and measuring the resulting voltage differences with potential electrodes. These measurements are then processed to generate 2D resistivity maps, which reflect variations in subsurface materials and structures based on their electrical properties. The results of this survey are provided in Appendix 4 of this Report.

3.6. Microgravity Survey

A microgravity survey was carried out in the vicinity of T4. The survey is a non-invasive geophysical method used to determine the subtle variations in the Earth's gravitational field to map subsurface density differences, revealing voids, faults, and other underground features.

3.7. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.
Chemical testing as required by the specification, including pH and sulphate testing was carried out by Element Materials Technology Laboratory in the UK.
Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD) and hydrometer tests were carried out in NMTL's Geotechnical Laboratory in Carlow.
Rock strength testing including Point Load (Is_{50}) and Unconfined Compressive Strength (UCS) testing was carried out in Prosoil's Geotechnical Laboratory
The results of the laboratory testing are included in Appendix 3 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were variable across the site and generally comprised;

- Topsoil
- Granular Deposits
- Cohesive Deposits
- Bedrock

TOPSOIL: Topsoil was encountered in most of the exploratory holes and was present to a maximum depth of 0.25m BGL.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Topsoil and were described typically as *brown sandy gravelly CLAY with low boulder content*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the cohesive matrix. The strength of the cohesive deposits typically increased with depth and was firm to stiff or stiff below 2.50m BGL in the majority of the exploratory holes. These deposits had low (<5%), medium (5%-20%) or high (20%-50%) cobble and boulder content, where noted on the exploratory hole logs.

GRANULAR DEPOSITS: Granular deposits were encountered below the base of the cohesive deposits and were typically described as *grey clayey sandy sub rounded to angular fine to coarse GRAVEL with low cobble content.* The secondary sand/gravel and silt/clay constituents varied across the site with cohesive or coarse lenses occasionally present in the granular matrix. These deposits had low (<5%), medium (5%-20%) or high (20%-50%) cobble and boulder content, where noted on the exploratory hole logs.

BEDROCK: The rotary core boreholes recovered Medium strong to very strong grey fine to medium grained massive/thinly bedded LIMESTONE. This is typical of the Waulsortian Formation, which is noted on the geological mapping below the proposed site. Karstification is associated with this formation and dolines can be seen on the surface of the site in places. Extensive infilled cavities were logged in BH04 from 9.90m BGL to 24.10m BGL and BH-T4-NW from 7.00m BGL to 15.80m BGL. Namurian Siltstones and Mudstones were also present on the site.
The depth to rock varies from surface in BH07 and BH08 in the western portion of the site to a maximum of 11.50m BGL in BH06 in the central portion of the site. The total core recovery is good, typically 100% with some of the uppermost runs dropping to 80 or 90%. The SCR and RQD both are relatively poor in the upper weathered zone, often recovered as non-intact, however both indices show an increase with depth in each of the boreholes.

4.2. Groundwater

No groundwater was noted during the investigation however we would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the time of year, rainfall, nearby construction and other factors. For this reason, standpipes were installed in BH01 and BH04A to allow the equilibrium groundwater level to be determined.

4.3. Laboratory Testing

4.3.1. Geotechnical Laboratory Testing

The geotechnical testing carried out on soil samples recovered generally confirm the descriptions on the logs with the primary constituent of the cohesive deposits found to be a CLAY of intermediate to high plasticity. The Particle Size Distribution tests confirm that generally the cohesive deposits are well-graded with percentages of sands and gravels ranging between 13.50% and 49.00% generally with fines contents of 36.00 to 57.60%.
The CBR testing on remoulded samples gave results ranging between 11.3% and 50.0% for the cohesive deposits.

4.3.2. Chemical Laboratory Testing

The chemical testing completed as part of the scope of works, pH and sulphate testing indicate that the pH results are near neutral and that the water soluble sulphate results are low when compared to the guideline values in Table C1 (Greenfield) of the from BRE Special Digest 1:2005. The samples tested are below the threshold for Design Sulphate Class of DS-1.

4.3.3. Rock Laboratory Testing

The rock testing carried out on samples recovered from the boreholes reported Unconfined Compressive Strength (UCS) values ranging between 85.3 and 124 MPa while the point load testing gave Is50 values ranging between 0.28 to 4.80 MPa. The Is_{50} results correlate to the UCS values using a factor of approximately 20, giving values of 5.6 MPa and 96 MPa. These results correlate to the strength descriptions ranging between of Weak to Very Strong and confirming the variability of this stratum and the descriptions on the logs.

The results from the completed laboratory testing are included in Appendix 3 of this report.

APPENDIX 1 - Site Location Plan



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

Client:

MKO

Project Title:
Killoshulan Wind Farm

Drawing Title:
Figure 1 SI Locations

GII Project Reference:
15495-04-26

0 100 200 300 m

Drawn By:
EB

Date:
30/06/2026

Legend

Rotary Borehole

APPENDIX 2 – Rotary Core Records

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 14/05/2026 - 29/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635675.86 N664858.26
Project No. : 15495-04-26	Crew Name: BE	Drilling Equipment: Beretta T44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH01	RC	205.70m AoD	EK	1:50	Sheet 1 of 3

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
0.00							205.45	0.25	Brown clayey slightly sandy gravelly TOPSOIL with grass and rootlets. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
1.10		80	24	10	14		204.60	1.10	Dark grey clayey slightly sandy subangular to subrounded fine to coarse GRAVEL of Limestone with low subangular to subrounded cobble content.		
2.50									Medium strong thinly bedded dark grey fine grained fossiliferous argillaceous LIMESTONE. Moderately weathered with clay staining.		
2.50											
2.82	C	99	69	50	13						
3.50											
4.00					13						
4.50							201.50	4.20	Strong thinly bedded dark grey fine grained fossiliferous argillaceous LIMESTONE with occasional calcite veins. Slightly to moderately weathered with occasional clay smearing.		
4.86	C	99	73	58	9				*(1.10 - 13.00m BGL) 3 Fracture sets. FS1: 0 - 15 degrees, very close to closely spaced, rough planar, clean. FS2: 45 - 70 degrees, very close to closely spaced, rough planar, with clay staining and occasional clay infill. FS3: 75 - 90 degrees, close to medium spaced, rough planar, with clay staining and smearing.*		
5.50											
5.66					NI						
5.88											
5.97	C	91	67	62	5						
6.50											
6.52	C				7						
7.00											
7.50											
7.90	C	85	80	75	6						
8.50											
8.50					6						
9.50		91	63	49							
10.00											

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		13.00	96									0.00	13.00	Water			
		22.00	100									13.00	22.00				

Remarks

Rotary core to 13.00m BGL. Down the hole hammer to 22.00m BGL.
No flush return from 0.00 to 6.00m BGL.
Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 14/05/2026 - 29/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635675.86 N664858.26
Project No. : 15495-04-26	Crew Name: BE	Drilling Equipment: Beretta T44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH01	RC	205.70m AoD	EK	1:50	Sheet 2 of 3

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
					11						
10.50		100	67	63	10			11			
11.50											
11.50											
11.74	C				7			12			
		100	93	93							
12.50					6				*7mm wide calcite vein.*		
13.00							192.70	13	13.00		
13.00									No Solid Recovery, recovery consists of calcareous dust and fine Gravel.		
		0	0	0	NI			14			
								15			
								16			
								17			
								18			
								19			
								20			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		13.00	96									0.00	13.00	Water			
		22.00	100									13.00	22.00				

Remarks

Rotary core to 13.00m BGL. Down the hole hammer to 22.00m BGL.
No flush return from 0.00 to 6.00m BGL.
Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 14/05/2026 - 29/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635675.86 N664858.26
Project No. : 15495-04-26	Crew Name: BE	Drilling Equipment: Beretta T44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH01	RC	205.70m AoD	EK	1:50	Sheet 3 of 3

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
							183.70	21 22 22.00 23 24 25 26 27 28 29 30			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		13.00 22.00	96 100									0.00 13.00	13.00 22.00	Water			

Remarks

Rotary core to 13.00m BGL. Down the hole hammer to 22.00m BGL.
No flush return from 0.00 to 6.00m BGL.
Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 25/05/2026 - 26/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635865.21 N665394.10
Project No. : 15495-04-26	Crew Name: BC + BE	Drilling Equipment: Beretta T47

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH02	RC	194.28m AoD	EM	1:50	Sheet 1 of 2

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
0.00							194.08	0.20	Brown slightly sandy slightly gravelly TOPSOIL with frequent grass and rootlets.		
		60							Brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse.		
							192.58	1.70	Grey clayey slightly sandy angular to subrounded fine to coarse GRAVEL with low subangular cobble content.		
2.50		100									
4.00							190.28	4.00			
4.00									Strong grey thinly bedded fine grained LIMESTONE with occasional clay smearing, stylolites and fossils. Fresh to slightly weathered.		
4.60	C	100	90	38							
5.10	C										
5.50									*Clay lense.*		
		100	73	45							
7.00					4				*3 Fracture Sets* *FS1: 0-20 degrees, closely to widely spaced, undulose, rough with occasional clay infill and rare hematite staining.* *FS2: 40-55 degrees, close to very widely spaced, undulose, rough with occasional clay infill and hematite staining.* *FS3: 80-90 degrees, undulose, rough with occasional clay infill and rare hematite staining.*		
		100	85	64							
8.37	C										
8.50											
		100	93	55							
10.00											

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
15.00	96	15.00	96														

Remarks

Borehole complete at 15.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 25/05/2026 - 26/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635865.21 N665394.10
Project No. : 15495-04-26	Crew Name: BC + BE	Drilling Equipment: Beretta T47

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH02	RC	194.28m AoD	EM	1:50	Sheet 2 of 2

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
10.18	C	100	87	51				11			
11.50		100	83	57				12			
13.00		100	93	70				13			
13.90	C							14			
14.05	C										
14.50		100	100	100			179.28	15	15.00		
								16			
								17			
								18			
								19			
								20			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
15.00	96	15.00	96														

Remarks

Borehole complete at 15.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 21/05/2026 - 22/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635519.72 N665820.56
Project No. : 15495-04-26	Crew Name: BE	Drilling Equipment: Beretta T44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH03	RC	243.77m AoD	EK	1:50	Sheet 1 of 2

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
0.00									Brown slightly sandy slightly gravelly CLAY with grass and rootlets. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
							242.97	0.80			
		80	0	0				1	Weak dark grey to black fine grained thinly laminated MUDSTONE. Distinctly weathered		
								2			
2.50							241.09	2.68			
		95	0	0				3	Medium strong thinly to thickly bedded dark grey fine grained fossiliferous argillaceous LIMESTONE. Distinctly weathered.		
4.00							239.89	3.88			
		97	51	51	8			4	Very weak dark grey fine to medium grained thinly laminated fossiliferous argillaceous LIMESTONE. Distinctly weathered *16 cm Mudstone band.*		
4.63							239.14	4.63			
5.00								5	Medium strong to strong thinly to thickly bedded dark grey fine grained fossiliferous argillaceous LIMESTONE. Slightly weathered. Chert nodules/ beds present within rock mass *2 Fracture sets. FS1: 0 - 15 degrees, close to medium spaced, rough planar, with occasional clay staining. FS2: 20 - 45 degrees, close to medium spaced, rough planar, clean.*		
5.50					5						
6.00								6			
6.16	C	100	97	97	4						
6.64	C										
7.00								7			
7.00											
7.16	C				3						
		100	99	93							
8.00								8			
8.50					4						
9.00								9			
		100	95	95	3						
10.00								10			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		15.00	96									0.00	15.00	Water			

Remarks

Borehole complete at 15.00m BGL.
Tungsten bit employed from 7.00m BGL
Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 21/05/2026 - 22/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635519.72 N665820.56
Project No. : 15495-04-26	Crew Name: BE	Drilling Equipment: Beretta T44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH03	RC	243.77m AoD	EK	1:50	Sheet 2 of 2

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
10.00		100	100	95	4						
11.00					4			11			
11.50		100	100	100							
12.00					2			12			
13.00		100	93	93	3			13			
13.00											
14.00					5			14			
14.50		100	100	84							
							228.77	15	15.00		
								16			
								17			
								18			
								19			
								20			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		15.00	96									0.00	15.00	Water			

Remarks

Borehole complete at 15.00m BGL.
Tungsten bit employed from 7.00m BGL
Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 05/05/2026 - 07/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635061.52 N666041.32
Project No. : 15495-04-26	Crew Name: BC BE	Drilling Equipment: Beretta T47

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH04	RC	269.27m AoD	EB	1:50	Sheet 1 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
0.00							269.02	0.25	Dark brown slightly gravelly TOPSOIL		
		28						1	Poor recovery - recovery consists of: Light brown sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of Limestone		
2.50								2			
3.10		60	30	27	8		266.17	3	Medium strong fine to medium grained massive grey slightly fossiliferous LIMESTONE with frequent reddish brown Clay smearing and frequent stylolites. Moderately weathered. (Strong effervescence)		
4.00							265.62	3.65	Strong fine to medium grained massive grey slightly fossiliferous LIMESTONE with occasional brown Clay smearing and frequent stylolites. Fresh to slightly weathered. (Strong effervescence)		
4.00		94	82	82	3			4	*Clay band*		
5.50								5	*2 Fracture Sets: Fracture set 1: 0 - 10 degrees, closely to moderately spaced, rough, planar with occasional staining. Fracture set 2: 70 - 90 degrees, moderately spaced, rough, undulose*		
6.00		100	60	60	12			6	*Clay band*		
7.00								7			
7.00		100	100	100	1			8			
8.00											
8.50					2			9	Medium strong fine to medium grained thickly laminated dark grey LIMESTONE. Moderately weathered. (Strong effervescence)		
9.00		100	62	62	1				*Brown Clay band*		
9.50							259.77	9.50	*White Clay band*		
10.00	SPT						259.37	9.90	Firm brown slightly gravelly CLAY with 3 coarse Limestone Gravel. (Clay cavity) (Slight effervescence)		

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
30.50	98	30.50	98									0.00	30.50	Water			

Remarks

Borehole complete at 30.50m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 05/05/2026 - 07/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635061.52 N666041.32
Project No. : 15495-04-26	Crew Name: BC BE	Drilling Equipment: Beretta T47

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH04	RC	269.27m AoD	EB	1:50	Sheet 2 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
10.00						N=16 (2,3/3,4,4,5)					
							258.77	10.50	Stiff brown mottled yellow and red sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse of mixed lithologies. (Clay cavity) (No effervescence)		
		100						11			
11.50	SPT					N=23 (4,4/5,5,6,7)					
11.50								12			
		46									
							256.42	12.85			
13.00	SPT					N=35 (6,7/7,9,9,10)		13	Stiff dark brown mottled yellow and red sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse of mixed lithologies. (Clay cavity) (No effervescence)		
13.00											
		100									
							255.27	14 14.00	Grey/brown clayey imbricated angular fine to coarse GRAVEL (No effervescence)		
							255.02	14.25	Very stiff dark grey/black slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mixed lithologies. (Clay cavity) (No effervescence)		
14.50	SPT					N=44 (8,8/10,10,12,12)					
14.50					-			15			
		51									
16.00	SPT					50 (10,12/50 for 150mm)		16			
16.00											
		25									
								17			
17.50	SPT					50 (10,10/50 for 225mm)	251.77	17.50	Very stiff grey mottled orange SILT (No effervescence)		
17.50									Very stiff grey SILT (No effervescence)		
							251.32	18 17.95	Dark brown mottled orange slightly gravelly CLAY. Gravel is subrounded fine to coarse of mixed lithologies (No effervescence)		
		100					251.07	18.20			
							250.87	18.40	Very stiff grey mottled orange SILT (No effervescence)		
									Very stiff light reddish brown slightly sandy gravelly CLAY with low cobble fragments of mixed lithologies. Gravel is angular fine to coarse. 1 low density vesicular coarse Gravel. (Clay cavity)) (No effervescence)		
19.00	SPT					N=50 (12,12/14,18,14,4)		19			
19.00							250.12	19.15			
		100							Very stiff light brown slightly sandy gravelly silty CLAY with low cobble fragments. Gravel is angular fine to coarse of mixed lithologies. (Slight effervescence)		
							249.47	19.80			
								20			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
30.50	98	30.50	98									0.00	30.50	Water			

Remarks

Borehole complete at 30.50m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 05/05/2026 - 07/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635061.52 N666041.32
Project No. : 15495-04-26	Crew Name: BC BE	Drilling Equipment: Beretta T47

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH04	RC	269.27m AoD	EB	1:50	Sheet 3 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
20.50	SPT					50 (11,11/50 for 225mm)					
20.50		77									
							247.52	21.75	Poor recovery - recovery consists of: Grey/brown very clayey sandy angular to subrounded fine to coarse GRAVEL of Limestone, Mudstone (Slight effervescence) (Dense)		
22.00	SPT					50 (15,25/50 for 75mm)		22			
22.00		44									
							246.37	22.90	Multicoloured slightly sandy slightly gravelly CLAY with low cobble content of Limestone. Gravel is subrounded fine to coarse (Clay cavity)		
								23			
23.50											
24.10		82	54	35	4		245.17	24.10	Very strong fine to medium grained massive grey LIMESTONE. with occasional stylolites and calcite veins. Fresh		
								24			
25.00											
25.00		100	100	100	0			25			
26.00								26	*2 Fracture Sets: Fracture set 1: 0 - 10 degrees, closely to moderately spaced, rough, planar with occasional staining.*		
26.50		100	98	95	3				*Fracture set 2: 70 - 90 degrees, widely spaced, rough, planar to undulose with occasional staining*		
								27			
28.00		94	94	90				28			
29.00					7			29			
29.50											
30.00								30			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
30.50	98	30.50	98									0.00	30.50	Water			

Remarks

Borehole complete at 30.50m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 05/05/2026 - 07/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635061.52 N666041.32
Project No. : 15495-04-26	Crew Name: BC BE	Drilling Equipment: Beretta T47

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH04	RC	269.27m AoD	EB	1:50	Sheet 4 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
		100	100	81	0		238.77	30.50			
								31			
								32			
								33			
								34			
								35			
								36			
								37			
								38			
								39			
								40			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
30.50	98	30.50	98									0.00	30.50	Water			

Remarks

Borehole complete at 30.50m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 13/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635095.30 N666026.93
Project No. : 15495-04-26	Crew Name: BC + BE	Drilling Equipment: Beretta T-47

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH04A	RC	266.68m AoD	EM	1:50	Sheet 1 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
0.00							266.61	0.07	Brown slightly sandy slightly gravelly TOPSOIL with occasional rootlets.		
							266.50	0.18	Dark brown slightly sandy slightly gravelly CLAY. Poor recovery. Recovery consists of brown slightly sandy gravelly CLAY.		
		64	28	14							
1.55	C						265.13	1.55	Strong grey thinly to thickly bedded fine grained LIMESTONE with occasional stylolites and fossils and rare calcite veins. Fresh to slightly weathered.		
1.55									*3 Fracture Sets*		
									FS1: 10-25 degrees, close to widely spaced, undulose, rough with occasional infill and hematite staining.		
2.50									*FS2: 30-45 degrees, wide to very widely spaced, undulose, rough with occasional hematite staining.*		
2.70	C								*FS3: 60-75 degrees, very widely spaced, undulose, rough with rare hematite staining and clay infill.*		
		100	94	86							
4.00											
		100	97	77							
5.50											
		100	97	85	3						
7.00									*Surface dissolution*		
									Red Clay band		
7.79	C	100	91	66							
8.50											
		100	95	89							
10.00											

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
30.00	96	30.00	96														

Remarks

Borehole complete at 30.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 13/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635095.30 N666026.93
Project No. : 15495-04-26	Crew Name: BC + BE	Drilling Equipment: Beretta T-47

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH04A	RC	266.68m AoD	EM	1:50	Sheet 2 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
		100	97	78				11			
11.50											
		100	95	71				12			
13.00								13			
		100	99	73			253.18	13.50	Strong grey thinly to thickly laminated fine grained LIMESTONE with occasional fossils and calcite veins and rare stylolites. Fresh.		
14.50								14			
14.50		100	87	63				15	*3 Fracture Sets* *FS1: 10-25 degrees, close to widely spaced, undulose, rough with occasional hematite staining and rare clay infill.* *FS2: 40-55 degrees, close to very widely spaced, undulose, rough with occasional hematite staining and rare clay infill.* *FS3: 75-85 degrees, medium to very widely spaced, planar to undulose, rough with rare clay infill.*		
16.00								16			
		100	97	42				17			
17.14	C				2						
17.50											
		100	93	77				18			
19.00								19			
		100	97	89				20			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
30.00	96	30.00	96														

Remarks

Borehole complete at 30.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 13/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635095.30 N666026.93
Project No. : 15495-04-26	Crew Name: BC + BE	Drilling Equipment: Beretta T-47

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH04A	RC	266.68m AoD	EM	1:50	Sheet 3 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
20.50											
		100	93	83				21			
22.00											
		100	97	74				22			
23.50								23			
		100	97	71				24			
25.00											
25.00		100	97	92				25	2 Fracture Sets FS1: 5-20 degrees, very close to widely spaced, undulose, rough with occasional hematite staining. FS2: 45-60 degrees, close to very widely spaced, undulose, rough with rare hematite staining and clay infill.		
26.50								26			
		100	93	75	3			27			
28.00	C							28			
28.00		100	90	76				29			
29.18	C										
29.50		100	90	32							
							236.68	30			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
30.00	96	30.00	96														

Remarks

Borehole complete at 30.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 13/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635095.30 N666026.93
Project No. : 15495-04-26	Crew Name: BC + BE	Drilling Equipment: Beretta T-47

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH04A	RC	266.68m AoD	EM	1:50	Sheet 4 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
								30.00			
								31			
								32			
								33			
								34			
								35			
								36			
								37			
								38			
								39			
								40			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
30.00	96	30.00	96														

Remarks

Borehole complete at 30.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 08/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E634667.70 N666171.45
Project No. : 15495-04-26	Crew Name: BE	Drilling Equipment: Beretta T44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH05	RC	287.87m AoD	EK	1:50	Sheet 1 of 2

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
0.00									Firm brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse.		
							287.18	0.69	POSSIBLE WEATHERED ROCK: recovered as dense grey brown clayey sandy angular to subangular fine to coarse GRAVEL of Mudstone. Sand is fine to coarse.		
		75	12	0				1			
2.00					NI		285.87	2 2.00	Extremely weak dark grey thinly to thickly bedded fine grained MUDSTONE. Distinctly weathered with frequent clay smearing and orange staining.		
2.23					18				*(2.00m - 10.00m BGL) 2 Fracture sets. FS1: 0-10 degrees, very closely spaced, rough planar, with occasional orange staining and silty clay infill. FS2: 30-40 degrees, closely spaced, rough planar, with orange staining.*		
2.50											
2.56					NI			3			
		75	22	0							
3.32					66						
3.50											
4.00								4			
		85	10	0	NI						
								5			
5.50							282.37	5.50	Weak dark grey thinly to thickly bedded fine grained MUDSTONE with frequent clay lenses. Partially weathered with occasional clay smearing and rare orange staining.		
5.50									*3 cm dark grey Clay lens.*		
		100	75	0	56			6	*3 cm dark grey Clay lens.*		
6.50									*10 cm dark grey silty Clay lens.*		
7.00					58			7			
7.50											
		100	88	0	57			8			
8.50									*8 cm dark grey silty Clay lens.*		
8.50											
					47			9	*5 cm dark grey silty Clay lens.*		
		100	53	0					*5 cm dark grey silty Clay lens.*		
9.50											
					52						
							277.87	10	*5 cm dark grey silty Clay lens.*		

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		10.00	96									0.00	10.00	Water			

Remarks

Borehole complete at 10.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 08/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E634667.70 N666171.45
Project No. : 15495-04-26	Crew Name: BE	Drilling Equipment: Beretta T44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH05	RC	287.87m AoD	EK	1:50	Sheet 2 of 2

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
								10.00			
								11			
								12			
								13			
								14			
								15			
								16			
								17			
								18			
								19			
								20			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		10.00	96									0.00	10.00	Water			

Remarks

Borehole complete at 10.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 11/05/2026 - 12/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E634672.09 N666152.01
Project No. : 15495-04-26	Crew Name: BE + BC	Drilling Equipment: Beretta T47

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH05B	RC	289.04m AoD	EM	1:50	Sheet 1 of 2

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
0.00		100							Brown slightly sandy gravelly CLAY.		
2.50							286.54	2.50			
2.50		100	10	0	NI				Very weak to weak dark grey thinly bedded fine grained MUDSTONE with rare pyrite lenses. Residually weathered.		
4.00									*2 Fracture Sets* *FS1: 0-20 degrees, very close to widely spaced, planar to undulose, smooth to rough with frequent clay infill and smearing and orange staining.* *FS2: 80-90 degrees, planar to undulose, smooth to rough with frequent infill and smearing and orange staining.*		
4.00					6				*Distinctly weathered to destructured.*		
4.25					NI						
4.55		100	30	0	6				*Distinctly weathered to destructured.*		
5.05					NI						
5.40									*Distinctly weathered to destructured.*		
5.50		100	37	0	6						
6.00					NI						
6.30					6				*Distinctly weathered.*		
6.60											
7.00		100	10	0	NI						
8.15					6				*Distinctly weathered.*		
8.25											
8.50		100	80	0	NI						
8.70									*Distinctly weathered.*		
10.00					6						

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
15.00	96	15.00	96														

Remarks

Borehole completed at 15.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 11/05/2026 - 12/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E634672.09 N666152.01
Project No. : 15495-04-26	Crew Name: BE + BC	Drilling Equipment: Beretta T47

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH05B	RC	289.04m AoD	EM	1:50	Sheet 2 of 2

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
10.00					NI						
10.35		100	33	0	6				*Distinctly weathered.*		
11.20					NI			11	*Destructured.*		
11.40									*Distinctly weathered.*		
11.50					6						
12.00		100	27	0				12			
13.00								13			
		100	0	0	NI			14			
14.50		100	0	0			274.04	15	15.00		
								16			
								17			
								18			
								19			
								20			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
15.00	96	15.00	96														

Remarks

Borehole completed at 15.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 20/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635248.11 N666906.59
Project No. : 15495-04-26	Crew Name:	Drilling Equipment:

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH06	RC	222.62m AoD		1:50	Sheet 1 of 2

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
0.00									Poor recovery recovery consists of brown slightly sandy slightly gravelly CLAY with low boulder content. Drillers Notes: Big boulder.		
		36						1			
								2			
2.50	SPT					N=31 (7,7/6,8,7,10)	220.12	2.50			
2.50									Poor recovery recovery consists of brown slightly sandy gravelly CLAY with low cobble content.		
		52						3			
4.00	SPT					N=50 (10,10/50 for 150mm)	218.62	4 4.00			
4.00									Poor recovery recovery consists of brown slightly sandy gravelly CLAY with low cobble content.		
		13						5			
5.50	SPT					N=50 (9,10/50 for 225mm)	217.12	5.50			
5.50									Poor recovery recovery consists of grey slightly sandy gravelly CLAY with low boulder content. Drillers notes: Boulder Clay.		
		48						6			
7.00	SPT					N=50 (15,10/50 for 0mm)	215.62	7 7.00			
7.00									Poor recovery recovery consists of grey slightly sandy gravelly CLAY.		
		41						8			
8.50	SPT					N=50 (12,16/50 for 0mm)	214.12	8.50			
8.50									Dark grey slightly sandy slightly gravelly CLAY.		
		100						9			
10.00	SPT						212.62	10			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)

Remarks

Borehole complete at 15.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 20/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635248.11 N666906.59
Project No. : 15495-04-26	Crew Name:	Drilling Equipment:

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH06	RC	222.62m AoD		1:50	Sheet 2 of 2

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
10.00		100				N=50 (11,15/50 for 225mm)		10.00	Dark grey slightly sandy gravelly CLAY.		
11.50	SPT					N=50 (25 for 0mm/50 for 0mm)	211.12	11.50	Weak grey thinly bedded fine grained MUDSTONE, partially to distinctly weathered. Drillers Notes: Rock.		
11.50		100	45						*3 Fracture sets, FS1: 0-15 degrees very close to closely spaced, undulose,rough. FS2: 25-40 degrees close to medium spaced, undulose,rough. FS3: 80-90 degrees close to widely spaced, undulose,rough.*		
11.50											
13.00		100	100		29		209.62	13.00	Weak grey thinly bedded fine grained MUDSTONE, partially to distinctly weathered.		
14.50		100	76				208.12	14.50	Weak dark grey thinly bedded fine grained MUDSTONE, partially to distinctly weathered.		
							207.62	15.00			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)

Remarks

Borehole complete at 15.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 22/05/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E634504.46 N666454.13
Project No. : 15495-04-26	Crew Name: BC BE	Drilling Equipment: Beretta T44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH07	RC	283.16m AoD	EB	1:50	Sheet 1 of 1

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
0.00									Very weak dark grey fine to medium grained thickly laminated SILTSTONE. Distinctly weathered with frequent haematite and Clay staining		
0.00		98	14	0	NI						
1.90							281.26	1.90	Weak dark grey fine to medium grained thickly laminated SILTSTONE. Distinctly weathered with frequent haematite and Clay staining *3 Fracture sets: FS1: 0 - 20 degrees, very closely to closely spaced, rough, planar* *FS2: 30 - 50 degrees, closely spaced, rough, stepped - undulose* *FS3: 65 - 85 degrees, moderately spaced, rough, undulose*		
2.50		100	51	7	25						
3.90							279.26	3.90	Very weak dark grey fine to medium grained thickly laminated SILTSTONE. Destructured with frequent haematite and Clay staining		
4.00		100	31	7	NI						
4.60							278.56	4.60	Weak dark grey fine to medium grained thickly laminated SILTSTONE. Distinctly weathered with frequent haematite and Clay staining *3 Fracture sets: FS1: 0 - 20 degrees, very closely to closely spaced, rough, planar* *FS2: 30 - 50 degrees, closely spaced, rough, stepped - undulose* *FS3: 65 - 85 degrees, moderately spaced, rough, undulose*		
5.50					22		277.66	5.50			
5.60		100	22	0	NI				Very weak dark grey fine to medium grained thickly laminated SILTSTONE. Destructured with frequent haematite and Clay staining		
							276.16	7.00			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
7.00	96	7.00	96									0.00	7.00	Water			

Remarks

Borehole complete at 7.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date:
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E634345.96 N665880.85
Project No. : 15495-04-26	Crew Name: BE	Drilling Equipment: Beretta T44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH08	RC	308.10m AoD	EK	1:50	Sheet 1 of 1

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
0.00 0.00		60	11	0	NI				Extremely weak to weak dark grey thinly to thickly bedded fine grained MUDSTONE with occasional silty clay lenses. Distinctly weathered with hematite staining and clay smearing.		
2.50 2.50		100	21	0	NI						
4.00 4.00		100	34	0	NI				*11 cm grey slightly sandy silty Clay lens. Sand is fine to coarse.*		
							303.10	5.00	*10 cm wide grey silty Clay lens.*		

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		5.00	96									0.00	5.00	Water			

Remarks

Borehole complete at 5.00m BGL. Borehole backfilled upon completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 27/07/2026 - 29/07/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635138.04 N665991.89
Project No. : 15495-04-26	Crew Name: SC + BJ	Drilling Equipment: Beretta T-44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH-ALT-T4	RC	264.80m AoD	EK	1:50	Sheet 1 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
0.00							264.64	0.16	Brown clayey TOPSOIL with grass and rootlets.		
									Poor recovery. Recovery consists of brown slightly sandy slightly gravelly CLAY. Drillers notes: Clay.		
0.60					NI		264.20	0.60			
0.90					4			1	Medium strong thinly to thickly bedded grey fine to coarse grained slightly fossiliferous LIMESTONE with occasional 2 -4 mm calcite veins and occasional stylolites. Moderately weathered with red and brown clay smearing and staining and occasional dissolution features on fracture faces.		
1.25		78	26	23							
					NI						
1.81								2	*3 Fracture sets. FS1: 0 - 20 degrees, very close to medium spaced, planar, rough, with brown clay smearing and staining. FS2: 45 - 65 degrees, medium spaced, planar to undulose, rough, with brown clay smearing and staining. FS3: 75 - 90 degrees, closely spaced, undulose, rough with brown clay smearing and staining.*		
2.50											
		82	63	60				3			
					9						
4.00								4			
		79	53	43							
								5			
5.50							259.30	5.50			
5.50									Strong thinly to thickly bedded grey fine to coarse grained slightly fossiliferous LIMESTONE with rare 2 - 4 mm calcite veins and occasional stylolites. Slightly weathered with red and brown smearing and staining.		
		99	92	91				6	*3 Fracture sets. FS1: 0 - 20 degrees, very close to medium spaced, planar, rough, with red clay smearing and staining and occasional calcite precipitation on fracture faces. FS2: 45 - 65 degrees, medium spaced, planar to undulose, rough, with brown and red clay smearing and staining. FS3: 75 - 90 degrees, medium spaced, undulose, rough with brown and red clay smearing and staining.*		
7.00								7			
		99	96	96	4						
								8			
8.50											
		100	99	93				9			
10.00								10			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		30.00	96									0.00	30.00	Water			

Remarks

Borehole complete at 30.00m BGL. Slotted standpipe installed from 30.00m BGL to 24.00m BGL with plain pipe from 24.00m BGL to GL. Gravel filter zone from 30.00m BGL to 24.00m BGL with bentonite sealed from 24.00m BGL to GL BGL. Finished with concrete and a raised cover.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 27/07/2026 - 29/07/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635138.04 N665991.89
Project No. : 15495-04-26	Crew Name: SC + BJ	Drilling Equipment: Beretta T-44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH-ALT-T4	RC	264.80m AoD	EK	1:50	Sheet 2 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
		96	95	93					*2 cm calcite vein with red clay staining.*		
11.50								11			
11.50		97	79	64			253.30	11.50	Strong thinly to thickly bedded grey fine to coarse grained slightly fossiliferous LIMESTONE with frequent 2 - 7 mm calcite veins and occasional stylolites. Slightly weathered with brown and red smearing and staining. *3 Fracture sets. FS1: 0 - 20 degrees, very close to medium spaced, planar, rough, with red clay smearing and staining and occasional calcite precipitation on fracture faces. FS2: 45 - 65 degrees, closely spaced, planar to undulose, rough, with brown and clay smearing and staining and frequent calcite precipitation on fracture faces. FS3: 75 - 90 degrees, closely spaced, undulose, rough with brown and red clay smearing and staining and occasional brown clay infill.* *3 cm calcite vein with red clay staining.* *5 cm calcite vein with red clay staining and red banding.*		
13.00		99	91	85	10			12			
14.50								13			
15.00		100	95	79			249.80	14			
16.00		100	97	97				15 15.00	Strong thinly to thickly bedded grey fine to coarse grained slightly fossiliferous LIMESTONE with occasional 2 - 8 mm calcite veins, occasional stylolites, and rare dissolution features. Slightly weathered with red and brown clay smearing and staining. *3 Fracture sets. FS1: 0 - 20 degrees, medium spaced, planar, rough, with red clay smearing and staining and calcite precipitation on fracture faces. FS2: 45 - 65 degrees, medium spaced, planar to undulose, rough, with brown and red clay smearing and staining. FS3: 75 - 90 degrees, medium spaced, undulose, rough with brown and red clay smearing and staining and occasional calcite precipitation on fracture faces. Dissolution texture.*		
17.50		93	91	91				16			
19.00		95	82	82				17			
								18			
								19			
								20			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		30.00	96									0.00	30.00	Water			

Remarks

Borehole complete at 30.00m BGL. Slotted standpipe installed from 30.00m BGL to 24.00m BGL with plain pipe from 24.00m BGL to GL. Gravel filter zone from 30.00m BGL to 24.00m BGL with bentonite sealed from 24.00m BGL to GL BGL. Finished with concrete and a raised cover.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 27/07/2026 - 29/07/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635138.04 N665991.89
Project No. : 15495-04-26	Crew Name: SC + BJ	Drilling Equipment: Beretta T-44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH-ALT-T4	RC	264.80m AoD	EK	1:50	Sheet 3 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
20.50											
		99	89	89				21			
22.00								22	*8 cm calcite vein with red clay staining and banding.* *12 cm white calcite band with red staining.*		
		100	100	97				23			
23.50					3						
		95	95	95				24			
25.00								25			
		99	98	98				26			
26.50							238.30	26.50			
26.50		100	89	86				27	Strong thinly to thickly bedded grey fine to coarse grained slightly fossiliferous LIMESTONE with rare 2 - 10 mm calcite veins and occasional stylolites. Slightly to moderately weathered with red and brown clay smearing and staining. *3 Fracture sets. FS1: 0 - 20 degrees, closely spaced, planar, rough, with red and brown clay smearing and staining and occasional calcite precipitation on fracture faces. FS2: 45 - 65 degrees, closely spaced, planar to undulose, rough, with brown and red clay smearing and staining. FS3: 75 - 90 degrees, closely spaced, undulose, rough with brown and red clay smearing and staining, brown clay infill and calcite precipitation on fracture faces.*		
28.00								28			
		94	85	71	6			29			
29.50											
		96	92	92							
							234.80	30			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		30.00	96									0.00	30.00	Water			

Remarks

Borehole complete at 30.00m BGL. Slotted standpipe installed from 30.00m BGL to 24.00m BGL with plain pipe from 24.00m BGL to GL. Gravel filter zone from 30.00m BGL to 24.00m BGL with bentonite sealed from 24.00m BGL to GL BGL. Finished with concrete and a raised cover.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 27/07/2026 - 29/07/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635138.04 N665991.89
Project No. : 15495-04-26	Crew Name: SC + BJ	Drilling Equipment: Beretta T-44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH-ALT-T4	RC	264.80m AoD	EK	1:50	Sheet 4 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
								30.00			
								31			
								32			
								33			
								34			
								35			
								36			
								37			
								38			
								39			
								40			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		30.00	96									0.00	30.00	Water			

Remarks

Borehole complete at 30.00m BGL. Slotted standpipe installed from 30.00m BGL to 24.00m BGL with plain pipe from 24.00m BGL to GL. Gravel filter zone from 30.00m BGL to 24.00m BGL with bentonite sealed from 24.00m BGL to GL BGL. Finished with concrete and a raised cover.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 25/07/2026 - 26/07/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635083.22 N666032.36
Project No. : 15495-04-26	Crew Name: SC + BJ	Drilling Equipment: Beretta T-44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH-T4-NW	RC		EK	1:50	Sheet 1 of 3

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)	Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results				
0.00								Brown clayey slightly sandy TOPSOIL with grass and rootlets. Sand is fine to coarse.		
							0.20	Firm to stiff brown slightly sandy gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
1.14					NI					
1.29		70	25	18						
					12					
							1.45	Medium strong to strong thinly to thickly bedded grey fine to coarse grained fossiliferous LIMESTONE with frequent brown slightly sandy slightly gravelly clay filled cavities, occasional 2 - 4 mm calcite veins and occasional stylolites. Moderately weathered with brown clay smearing and staining.		
2.50	SPT					50 (12,13/50 for 0mm)				
2.50								*3 Fracture sets. FS1: 0 - 20 degrees, very closely to closely spaced, planar, rough, with brown clay smearing and staining. FS2: 45 - 65 degrees, closely spaced, planar, rough, with brown clay smearing and staining. FS3: 75 - 90 degrees, medium spaced, planar to undulose, rough, with brown clay smearing and staining.*		
2.50		91	23	12				*(2.50m BGL - 3.34m BGL) Clay filled cavity*		
								(3.55m BGL - 3.60m BGL) Clay filled cavity		
4.00	SPT					50 (15,10/50 for 75mm)		*(3.95m BGL - 4.57m BGL) Clay filled cavity*		
4.00		85	45	31	6					
								(5.07m BGL - 5.16m BGL) Clay filled cavity		
5.50	SPT					50 (14,11/50 for 50mm)				
5.50								*(5.55m BGL - 6.10m BGL) Clay filled cavity*		
		85	34	29				*(6.20m BGL - 6.86m BGL) Clay filled cavity*		
7.00	SPT					50 (17,8/50 for 75mm)				
7.00							7.00	Stiff dark brown slightly sandy gravelly slightly silty CLAY with medium subangular to subrounded cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. [Presumed clay cavity.]		
		82	0	0						
8.50	SPT					50 (17,8/50 for 75mm)				
8.50										
		99	0	0						
10.00	SPT									

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		28.00	96									0.00	28.00	Water			

Remarks

Borehole complete at 28.00m BGL. Borehole backfilled on completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 25/07/2026 - 26/07/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635083.22 N666032.36
Project No. : 15495-04-26	Crew Name: SC + BJ	Drilling Equipment: Beretta T-44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH-T4-NW	RC		EK	1:50	Sheet 2 of 3

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
10.00		99	0	0		50 (17,8/50 for 0mm)		11			
11.50		95	0	0				12			
13.00		90	0	0				13			
14.50		73	9	9				14			
15.84								15			
16.00		99	92	79				16	15.84 Strong thinly to thickly bedded grey fine to coarse grained slightly fossiliferous LIMESTONE with rare 2 - 4 mm calcite vein and occasional stylolites. Slightly weathered with red and brown clay smearing and staining. *2 Fracture sets. FS1: 0 - 20 degrees, closely spaced, planar to undulose, rough, with red clay smearing and staining and occasional calcite precipitation on fracture faces. FS3: 75 - 90 degrees, medium spaced, planar to undulose, rough, with brown clay smearing and staining.*		
17.50		96	96	96	2			17			
19.00		100	75	75				18			
								19			
								20			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		28.00	96									0.00	28.00	Water			

Remarks

Borehole complete at 28.00m BGL. Borehole backfilled on completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 25/07/2026 - 26/07/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E635083.22 N666032.36
Project No. : 15495-04-26	Crew Name: SC + BJ	Drilling Equipment: Beretta T-44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH-T4-NW	RC		EK	1:50	Sheet 3 of 3

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
20.50								20.10	Stiff dark brown slightly sandy gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Clay filled cavity.		
		88	27	27				21			
21.54								21.54	Strong thinly to thickly bedded grey fine to coarse grained slightly fossiliferous LIMESTONE with occasional 2 - 4 mm calcite veins and rare stylolites. Slightly weathered with red and brown clay smearing and staining. *3 Fracture sets. FS1: 0 - 20 degrees, closely to medium spaced, planar to undulose, rough, with red and brown clay smearing and staining. FS2: 45 - 65 degrees, closely to medium spaced, planar, rough, with red clay smearing and staining. FS3: 75 - 90 degrees, medium spaced, planar, rough, with red clay smearing and staining.*		
22.00								22			
		98	93	87				23			
23.50											
		96	96	96	4			24			
25.00								25			
		97	81	70				26			
26.50											
		75	67	54				27			
								28	28.00		
								29			
								30			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		28.00	96									0.00	28.00	Water			

Remarks

Borehole complete at 28.00m BGL. Borehole backfilled on completion.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 22/07/2026 - 24/07/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E634653.90 N666158.89
Project No. : 15495-04-26	Crew Name: SC + BJ	Drilling Equipment: Beretta T-44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH-ALT-T5	RC		EK	1:50	Sheet 1 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)	Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results				
0.00								Brown clayey slightly sandy TOPSOIL with grass and rootlets. Sand is fine to coarse.		
0.20								Poor Recovery. Recovery consists of orangey brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
		28	0	0						
2.25								Very weak thinly bedded black fine grained MUDSTONE with rare clay lenses. Distinctly weathered with frequent brown oxidation and grey reduction. *(2.25m BGL - 5.70m BGL) 2 Fracture sets. FS1: 0 - 15 degrees, very closely spaced, planar, smooth to rough, with frequent brown oxidation. FS2: 75 - 90 degrees, closely spaced, planar, smooth to rough, with frequent brown oxidation. (3.45m BGL - 3.50m BGL) Stiff grey slightly sandy gravelly slightly silty Clay lens. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.*		
2.50		63	9	0	NI					
3.95										
4.00					53					
4.25					NI					
4.41		90	39	0	43					
5.50					NI					
5.50										
5.70					60			Weak thinly bedded black fine grained MUDSTONE. Distinctly weathered with frequent brown oxidation and grey reduction. *(5.70m BGL - 8.76m BGL) 2 Fracture sets. FS1: 0 - 20 degrees, very closely spaced, planar, smooth to rough, with frequent brown oxidation. FS2: 75 - 90 degrees, closely spaced, planar, smooth to rough, with frequent brown oxidation.*		
6.16		100	53	0	NI					
6.44										
7.00		98	85	0	41					
8.50										
8.75								Weak thinly bedded black slightly pyritic fine grained MUDSTONE with occasional Limestone bands and rare clay lenses. Partially weathered with rare brown oxidation. *(8.76m BGL - 20.25m BGL) 2 Fracture sets. FS1: 0 - 25 degrees, closely spaced, planar, smooth to rough, with occasional black clay smearing and staining. FS2: 75 - 90 degrees, closely spaced, planar, smooth to rough, with occasional black clay smearing and staining.*		
8.76		97	80	0						
10.00										

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		30.00	96									0.00	30.00	Water			

Remarks

Rotary core complete at 30.00m BGL.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 22/07/2026 - 24/07/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E634653.90 N666158.89
Project No. : 15495-04-26	Crew Name: SC + BJ	Drilling Equipment: Beretta T-44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH-ALT-T5	RC		EK	1:50	Sheet 2 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)	Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results				
		100	90	0			11			
11.50										
		100	71	0	36		12			
13.00							13			
		93	61	7				(13.38m BGL - 13.43m BGL) Stiff black slightly sandy gravelly Clay lens. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
14.22					NI		14			
14.38										
14.50										
		100	78	0			15			
16.00					32		16			
		100	68	13						
17.50							17			
17.72								(17.72m BGL - 18.45m BGL) Strong thinly to thickly bedded grey fossiliferous fine to coarse grained Limestone band. Slightly weathered with occasional black clay smearing and staining.		
		100	79	24	14		18			
18.45					32					
18.73					10			(18.73m BGL - 18.83m BGL) Strong thinly to thickly bedded grey fine to coarse grained Limestone band. Slightly weathered with occasional black clay smearing and staining.		
18.83										
19.00					35		19			
		93	57	9				(19.71m BGL - 19.86m BGL) Strong thinly to thickly bedded grey fine to coarse grained Limestone band. Slightly weathered with occasional black clay smearing and staining.		
19.71					7					
19.86							20			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		30.00	96									0.00	30.00	Water			

Remarks

Rotary core complete at 30.00m BGL.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 22/07/2026 - 24/07/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E634653.90 N666158.89
Project No. : 15495-04-26	Crew Name: SC + BJ	Drilling Equipment: Beretta T-44

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH-ALT-T5	RC		EK	1:50	Sheet 3 of 4

Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
20.25					50			20.25	Strong thinly to thickly bedded grey fossiliferous fine to coarse grained LIMESTONE with occasional 2 - 10mm calcite veins and frequent stylolites. Slightly weathered with rare brown staining.		
20.50		98	87	85				21	*(20.25m BGL - 30.00m BGL) 3 Fracture sets. FS1: 0 - 20 degrees, closely spaced, planar, rough, clean with rare brown staining. FS2: 45 - 60 degrees, medium spaced, planar, rough, clean. FS3: 75 - 90 degrees, medium spaced, planar, rough, clean with rare brown staining.*		
22.00		100	100	100				22			
23.50		100	97	91				23			
25.00		99	99	99	4			24			
26.50		98	95	95				25			
28.00		99	83	75				26			
29.50		100	94	80				27			
								28			
								29			
								30			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		30.00	96									0.00	30.00	Water			

Remarks

Rotary core complete at 30.00m BGL.

Rotary Core Log

Project Name: Killoshulan Wind Farm	Client:	Date: 22/07/2026 - 24/07/2026
Location: Killoshulan, Co. Kilkenny	Contractor: GII Ltd	Co-ords: E634653.90 N666158.89
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Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH-ALT-T5	RC		EK	1:50	Sheet 4 of 4

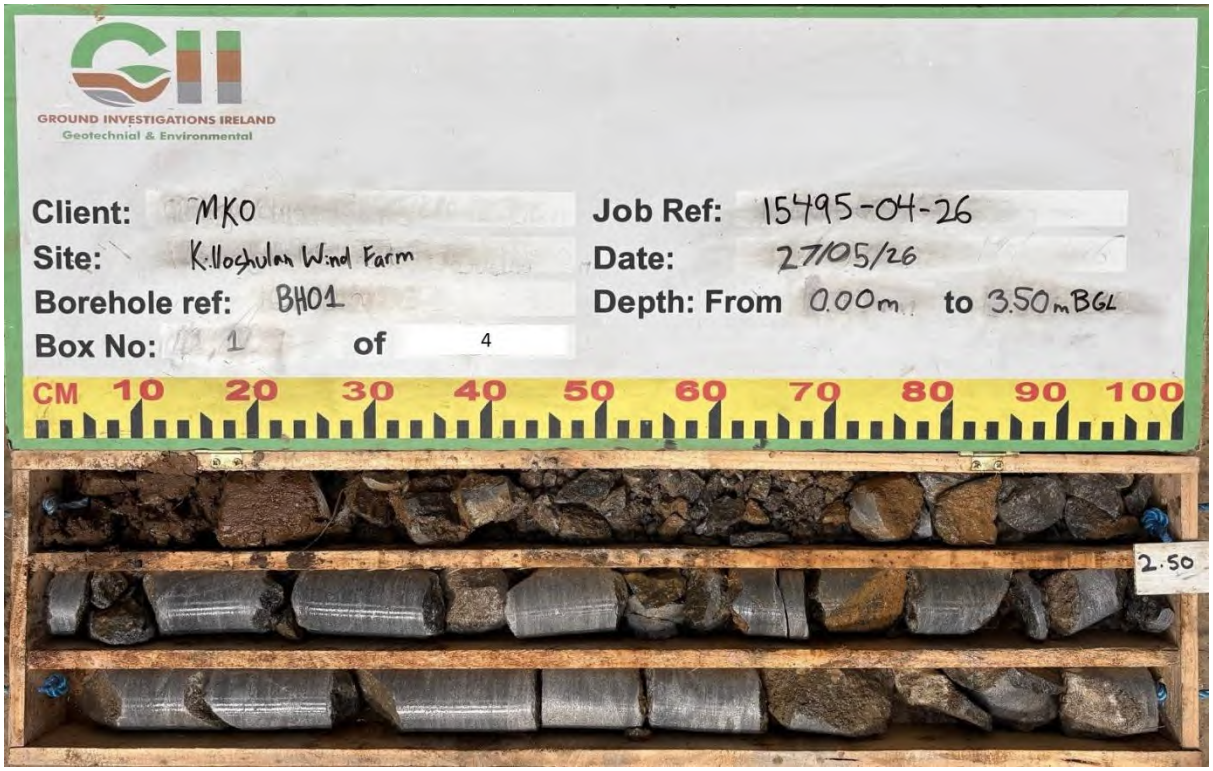
Sample Depth and Type		Coring			Type / FI	In Situ Testing	Level (m)		Stratum Description	Legend	Well
Depth (m)	Type	TCR	SCR	RQD		Results					
								30.00			
								31			
								32			
								33			
								34			
								35			
								36			
								37			
								38			
								39			
								40			

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
		30.00	96									0.00	30.00	Water			

Remarks

Rotary core complete at 30.00m BGL.

Killoshulan Wind Farm – Rotary Core Photographs

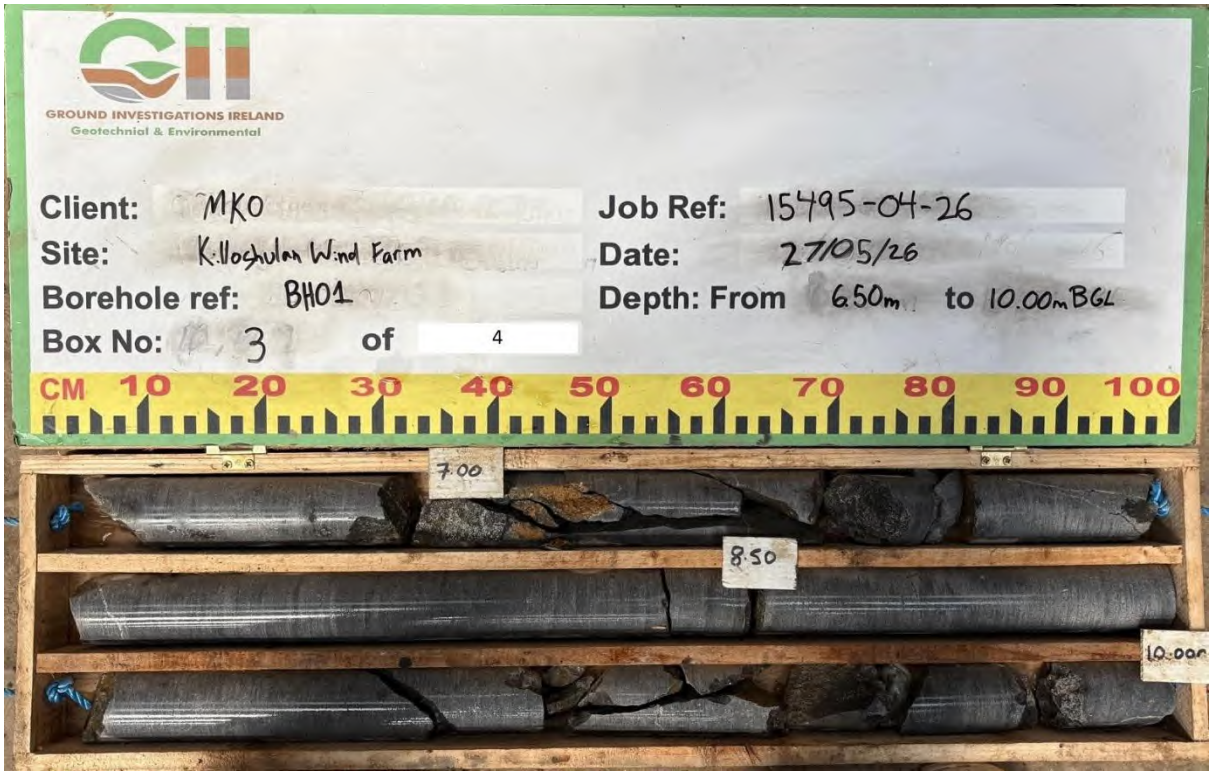


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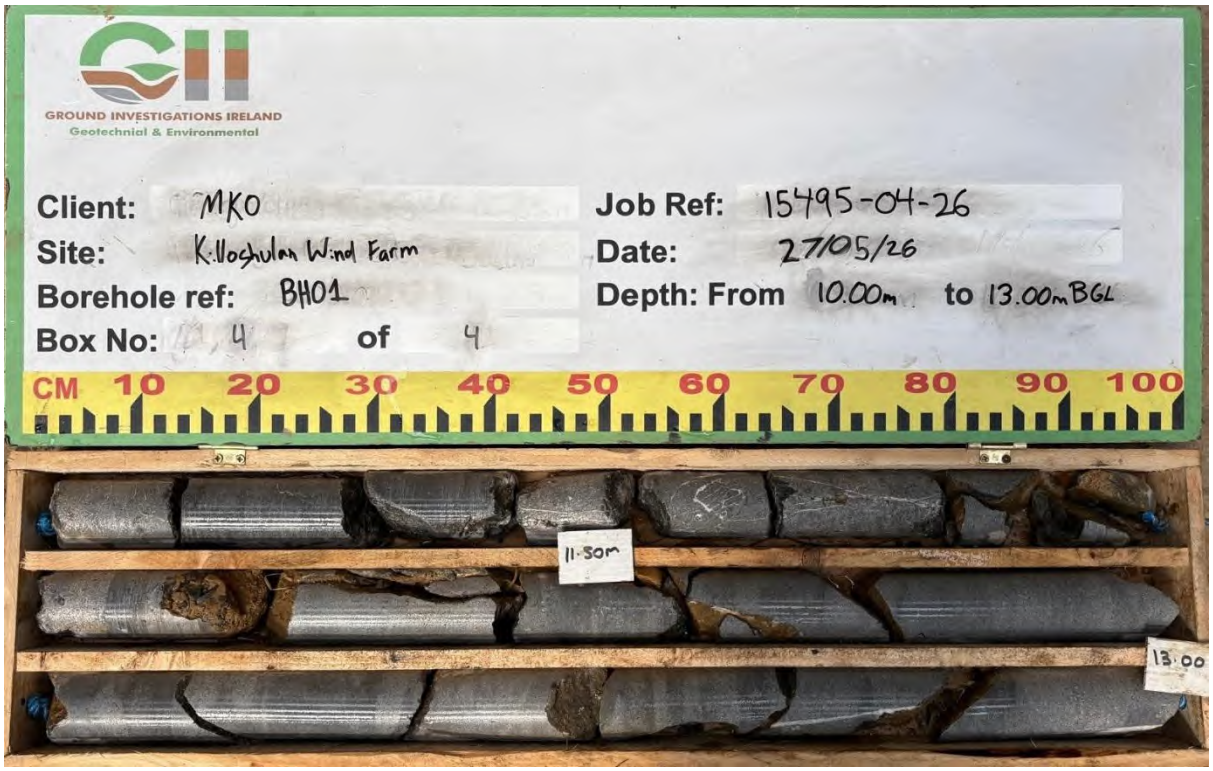


BH01

Killoshulan Wind Farm – Rotary Core Photographs



BH01

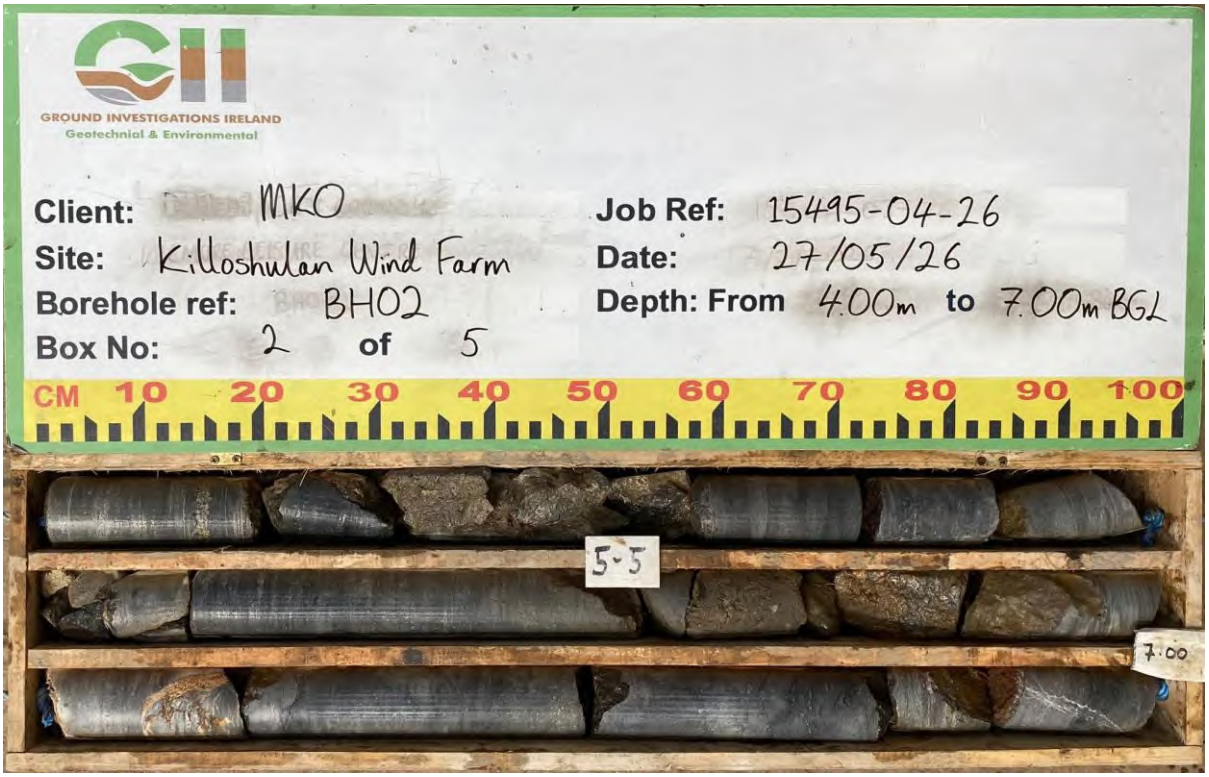


BH01

Killoshulan Wind Farm – Rotary Core Photographs

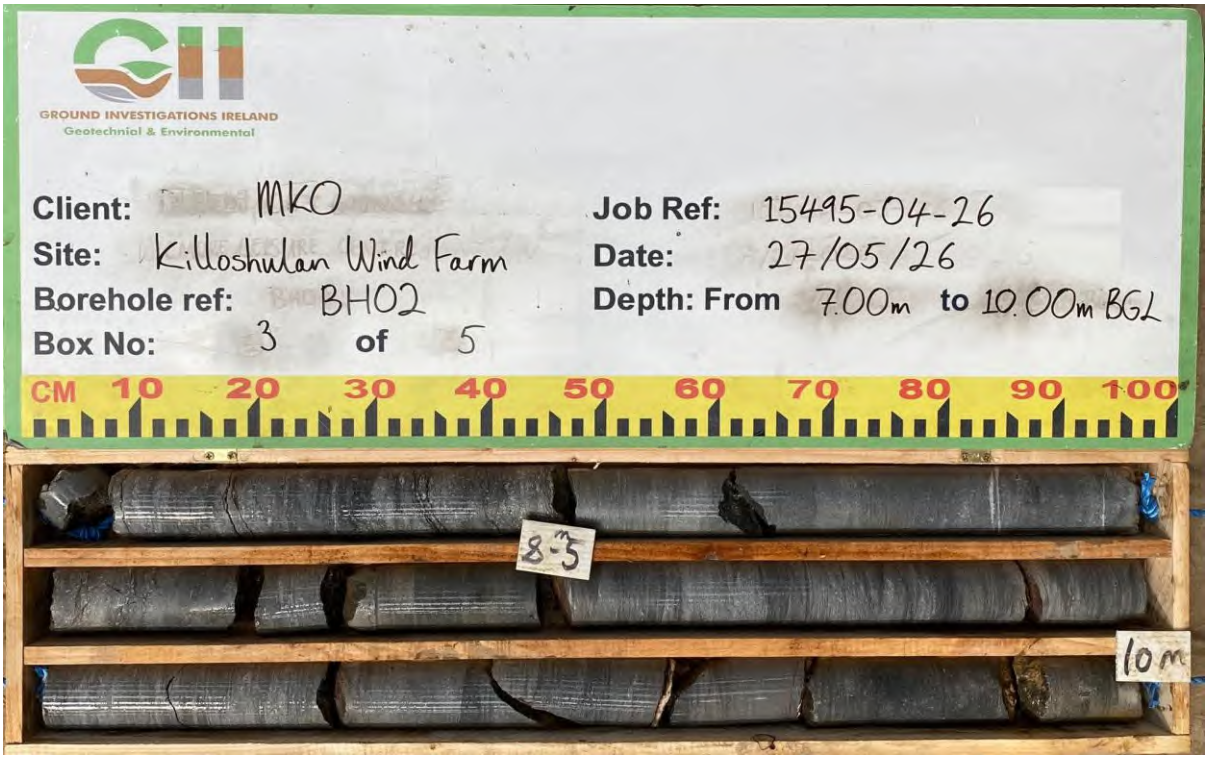


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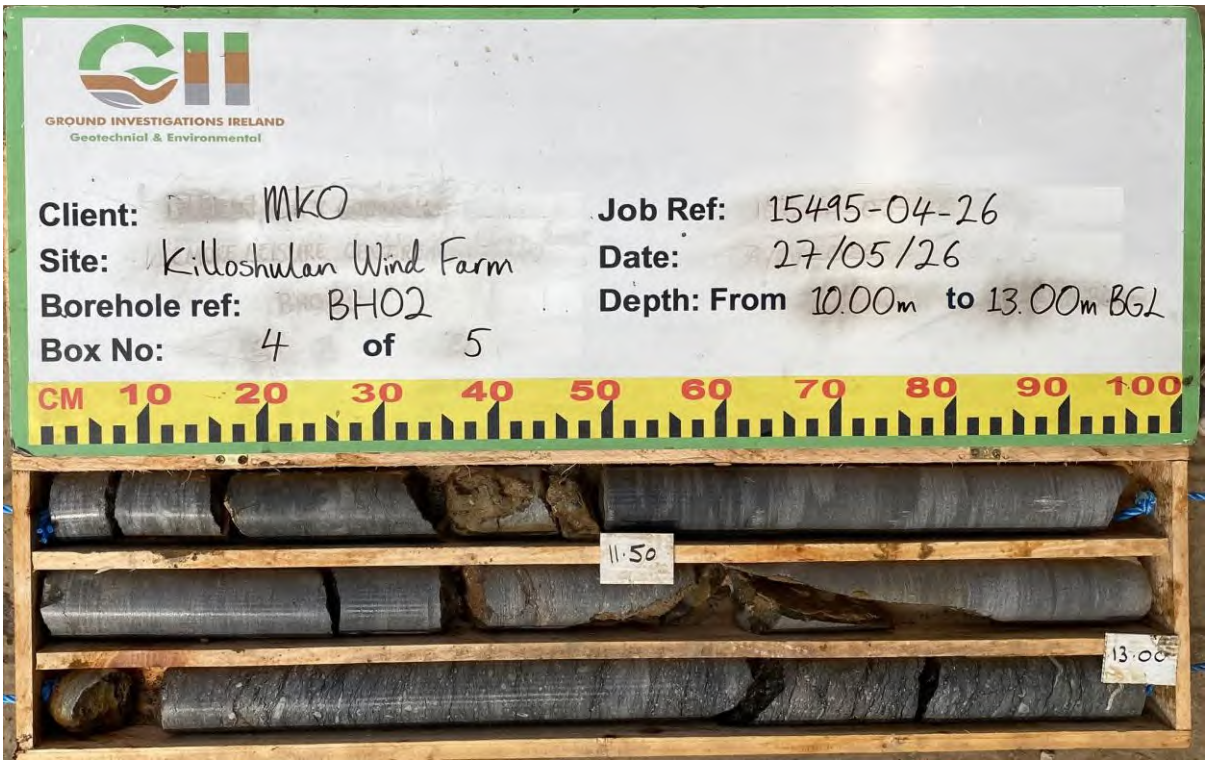


BH02

Killoshulan Wind Farm – Rotary Core Photographs

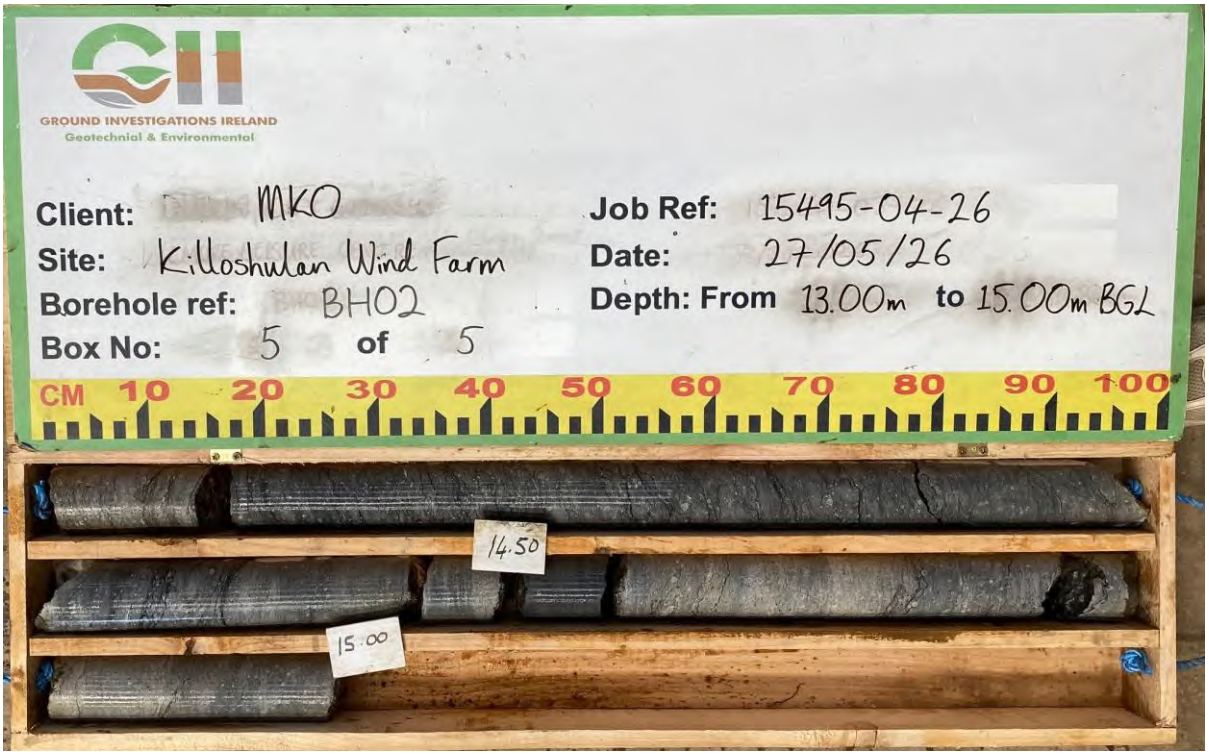


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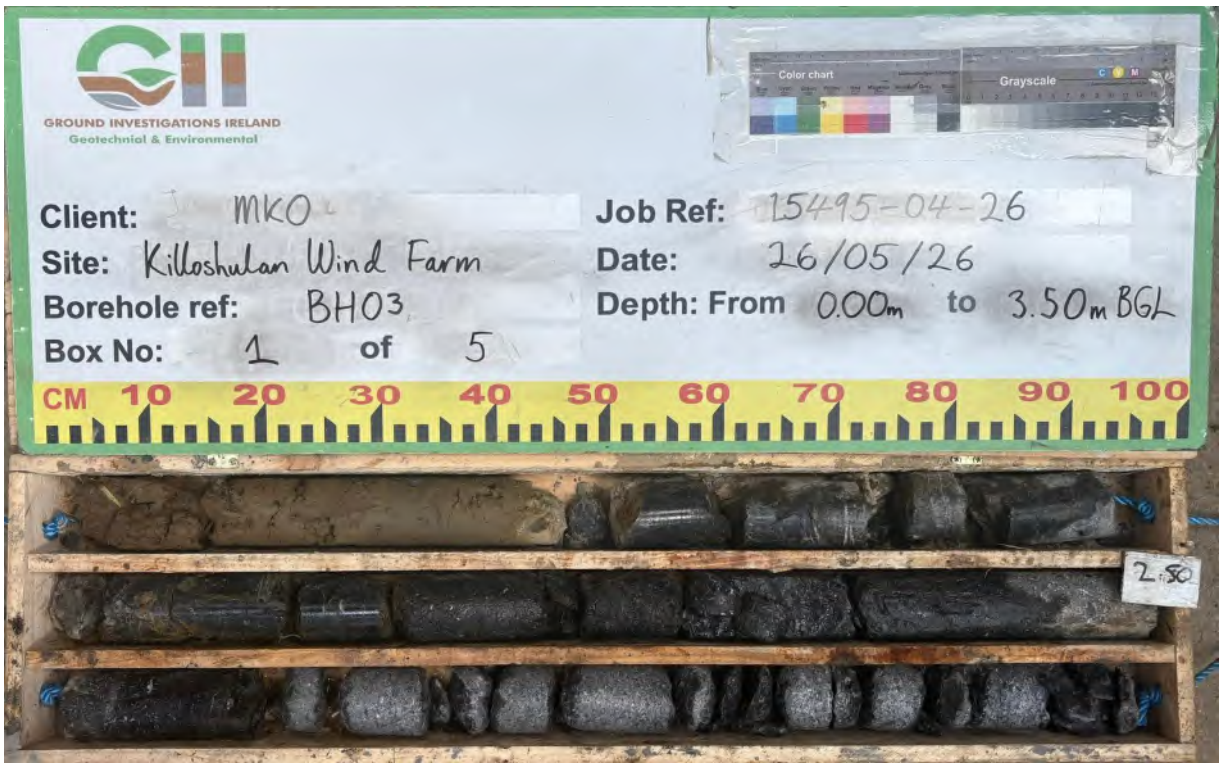


BH02

Killoshulan Wind Farm – Rotary Core Photographs



BH02



BH03

Killoshulan Wind Farm – Rotary Core Photographs



BH03



BH03

Killoshulan Wind Farm – Rotary Core Photographs



BH03



BH03

Killoshulan Wind Farm – Rotary Core Photographs



BH04



BH04

Killoshulan Wind Farm – Rotary Core Photographs

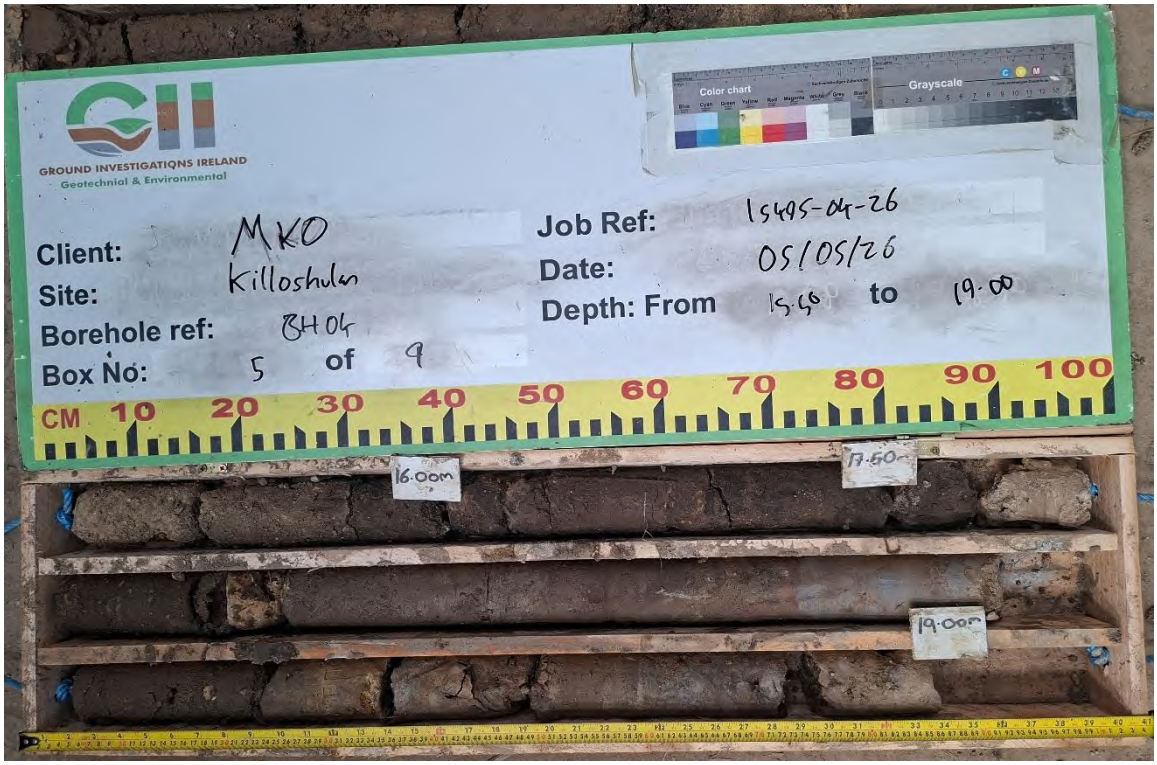


BH04



BH04

Killoshulan Wind Farm – Rotary Core Photographs



BH04



BH04

Killoshulan Wind Farm – Rotary Core Photographs



BH04



BH04

Killoshulan Wind Farm – Rotary Core Photographs



BH04



BH04A

Killoshulan Wind Farm – Rotary Core Photographs



BH04A



BH04A

Killoshulan Wind Farm – Rotary Core Photographs



BH04A



BH04A

Killoshulan Wind Farm – Rotary Core Photographs



BH04A



BH04A

Killoshulan Wind Farm – Rotary Core Photographs

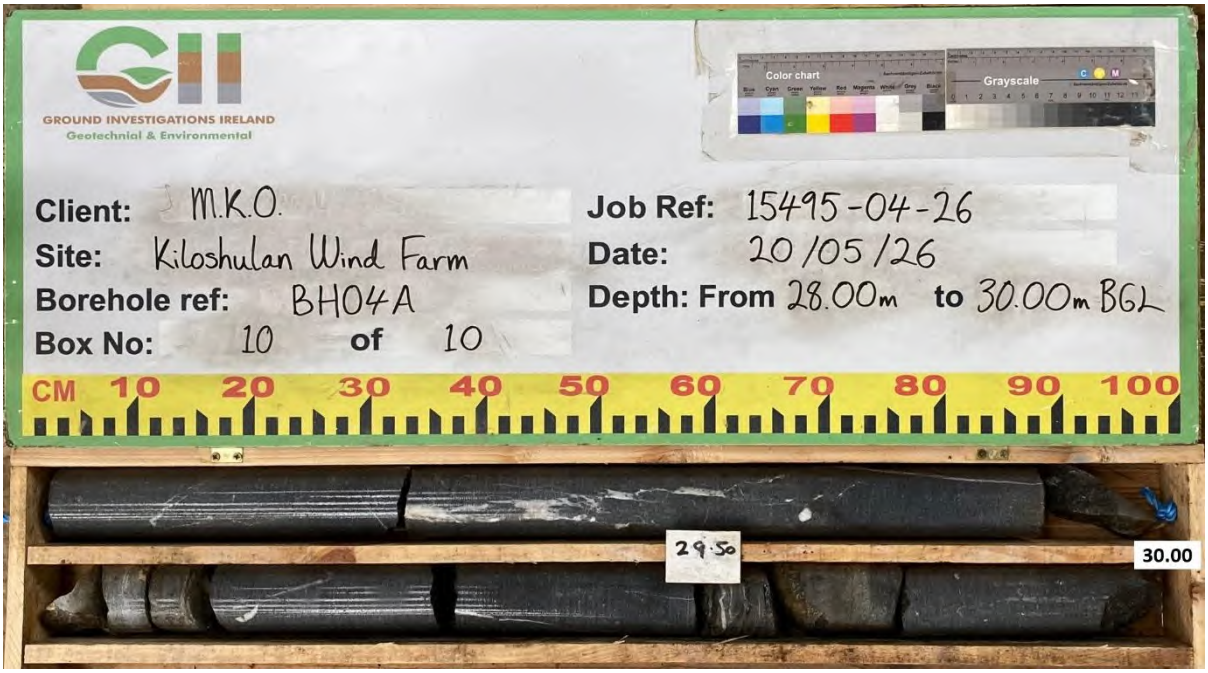


BH04A



BH04A

Killoshulan Wind Farm – Rotary Core Photographs

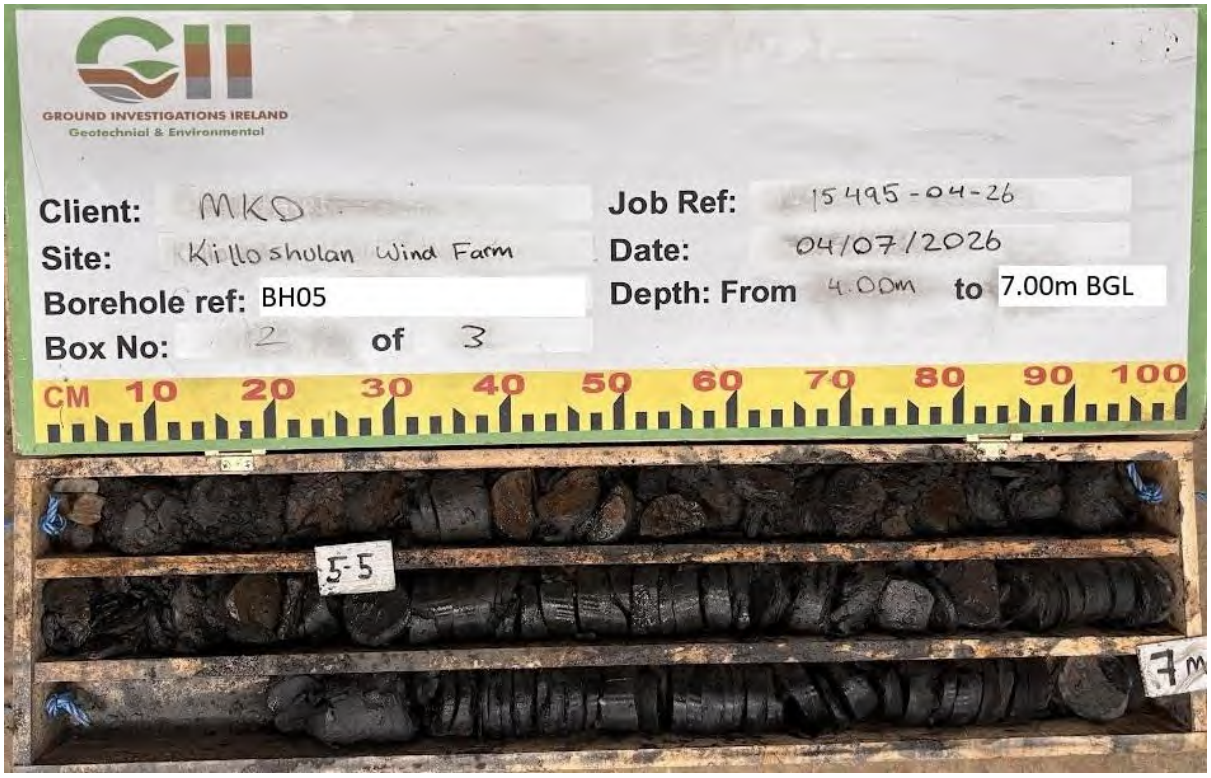


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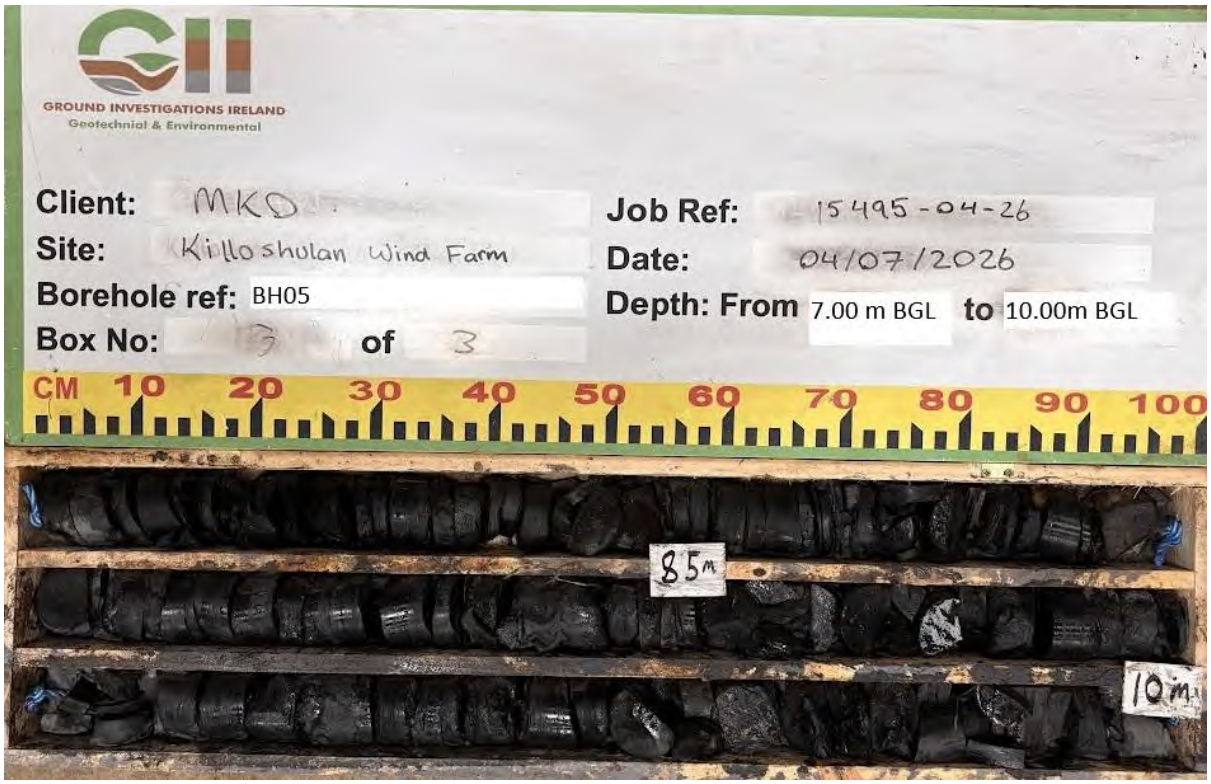


BH05

Killoshulan Wind Farm – Rotary Core Photographs



BH05

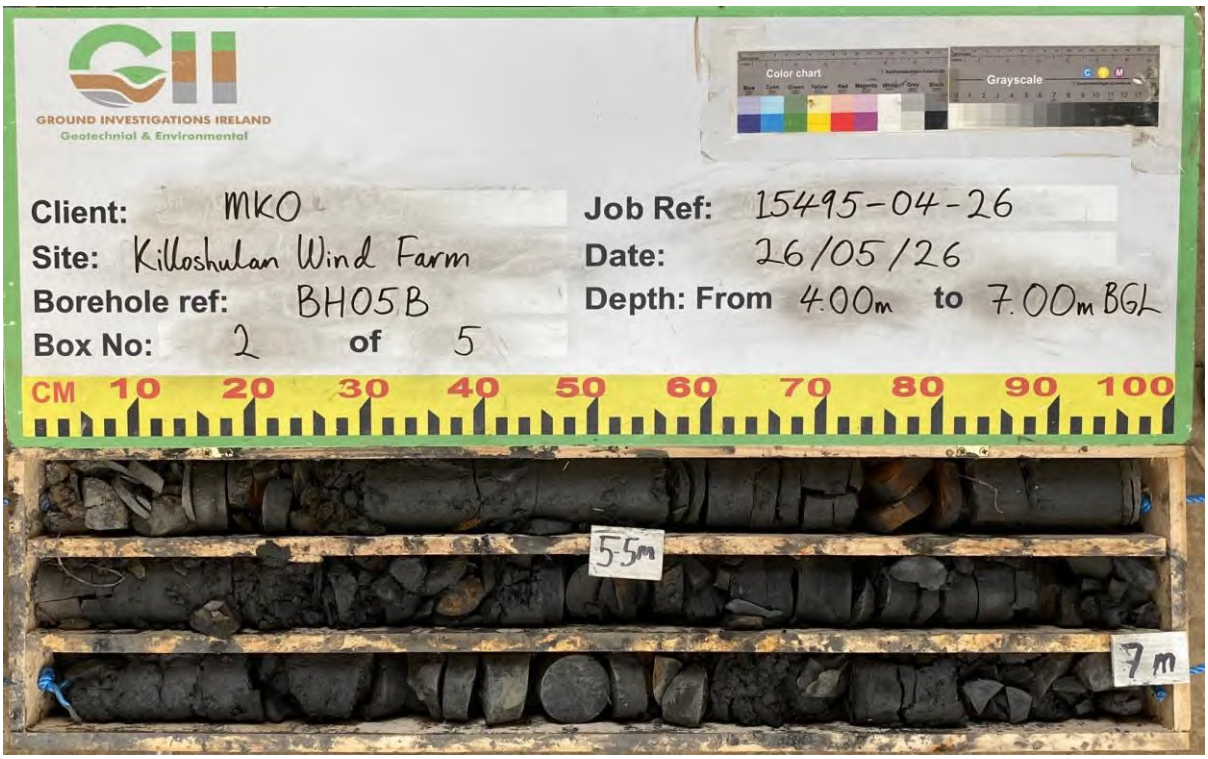


BH05

Killoshulan Wind Farm – Rotary Core Photographs



BH05B



BH05B

Killoshulan Wind Farm – Rotary Core Photographs

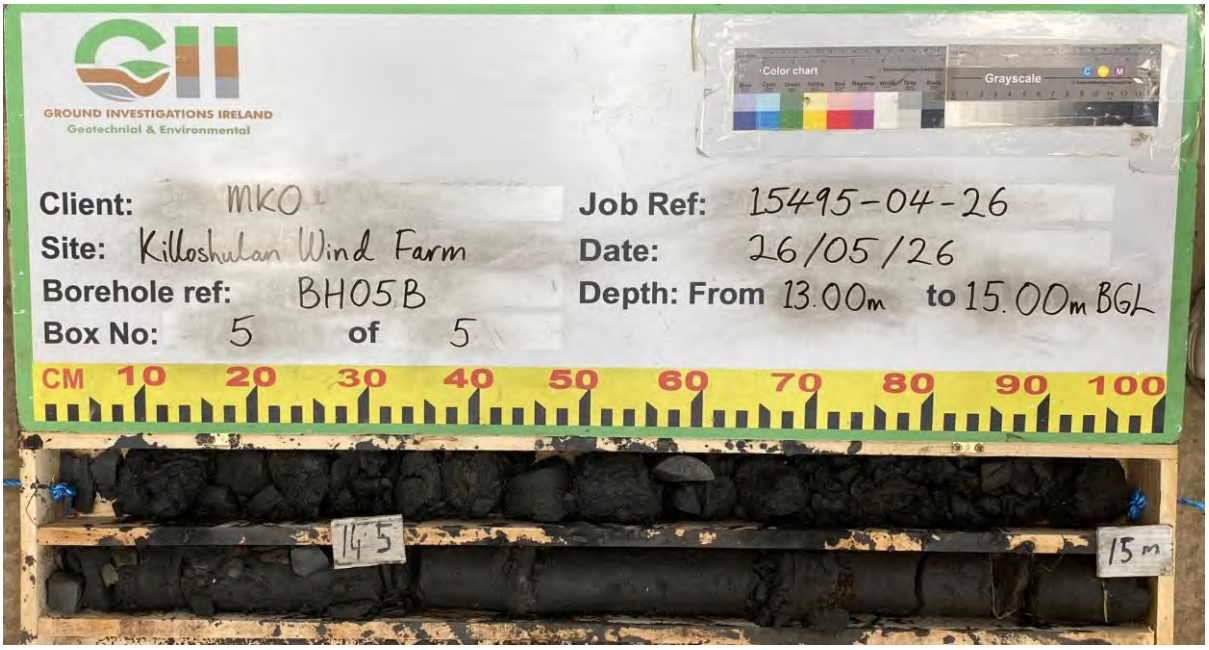


BH05B



BH05B

Killoshulan Wind Farm – Rotary Core Photographs

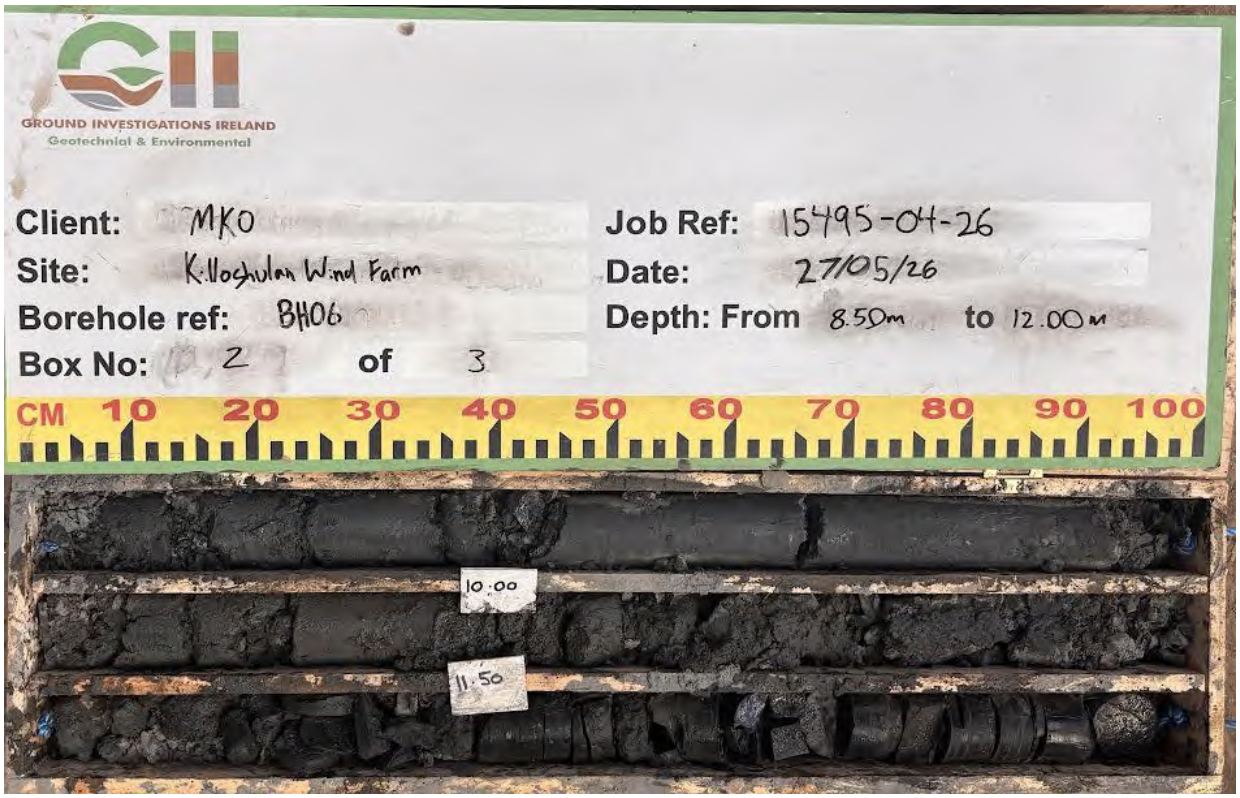


BH05B



BH06

Killoshulan Wind Farm – Rotary Core Photographs

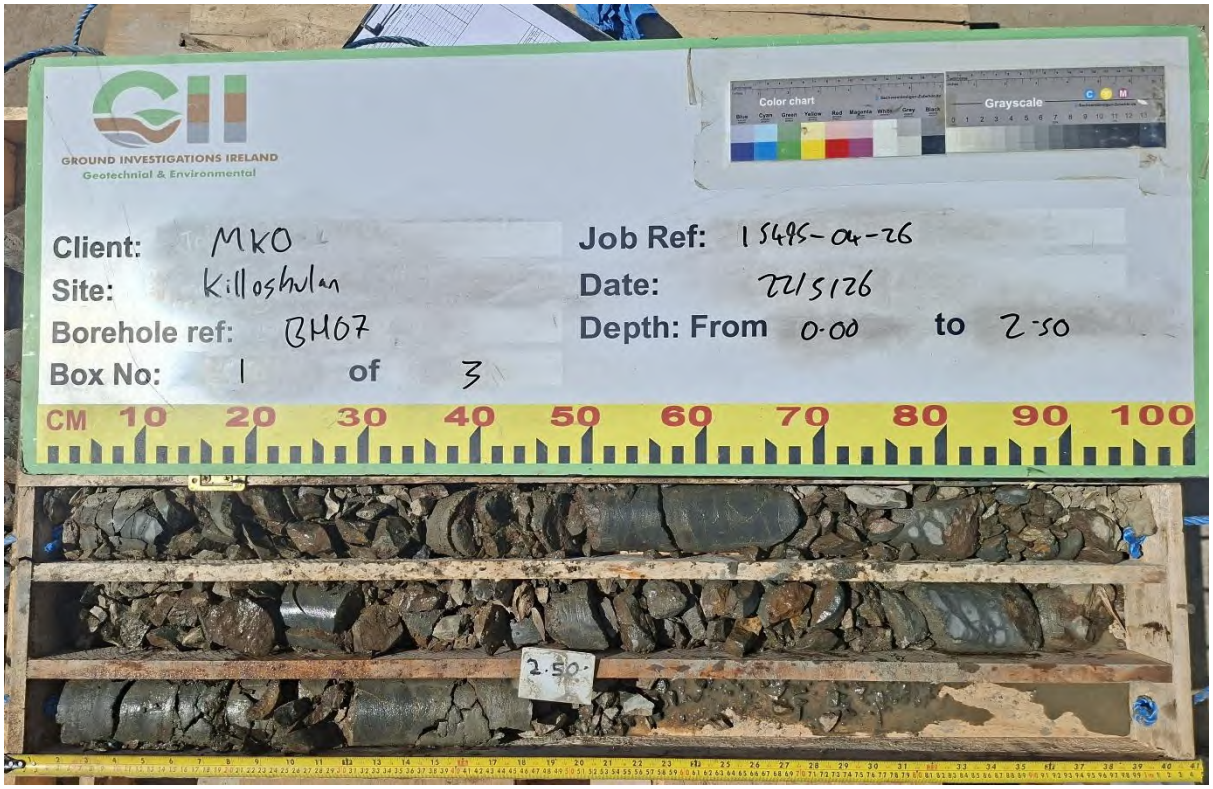


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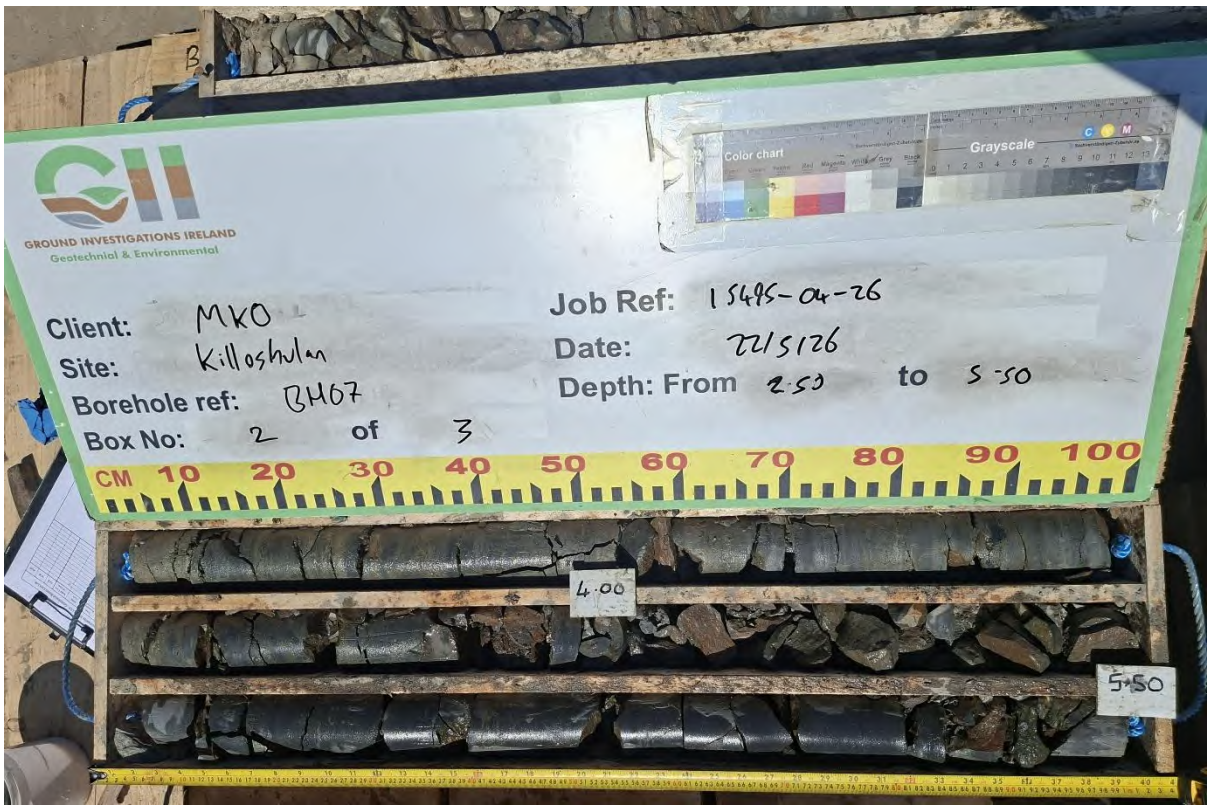


BH06

Killoshulan Wind Farm – Rotary Core Photographs



BH07



BH07

Killoshulan Wind Farm – Rotary Core Photographs



BH07



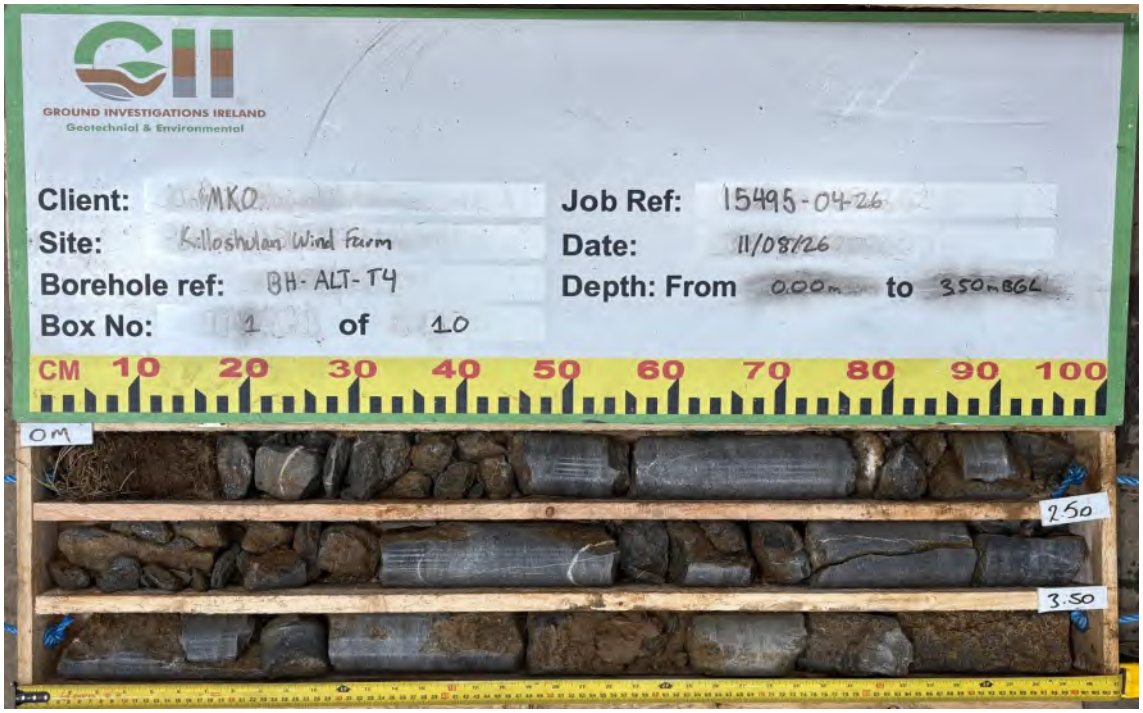
BH08

Killoshulan Wind Farm – Rotary Core Photographs



BH08

Killoshulan Wind Farm – Rotary Core Photographs



BH-ALT-T4



BH-ALT-T4

Killoshulan Wind Farm – Rotary Core Photographs



BH-ALT-T4



BH-ALT-T4

Killoshulan Wind Farm – Rotary Core Photographs



BH-ALT-T4



BH-ALT-T4

Killoshulan Wind Farm – Rotary Core Photographs



BH-ALT-T4



BH-ALT-T4

Killoshulan Wind Farm – Rotary Core Photographs



BH-ALT-T4



BH-ALT-T4

Killoshulan Wind Farm – Rotary Core Photographs



BH-T4-NW



BH-T4-NW

Killoshulan Wind Farm – Rotary Core Photographs



BH-T4-NW



BH-T4-NW

Killoshulan Wind Farm – Rotary Core Photographs

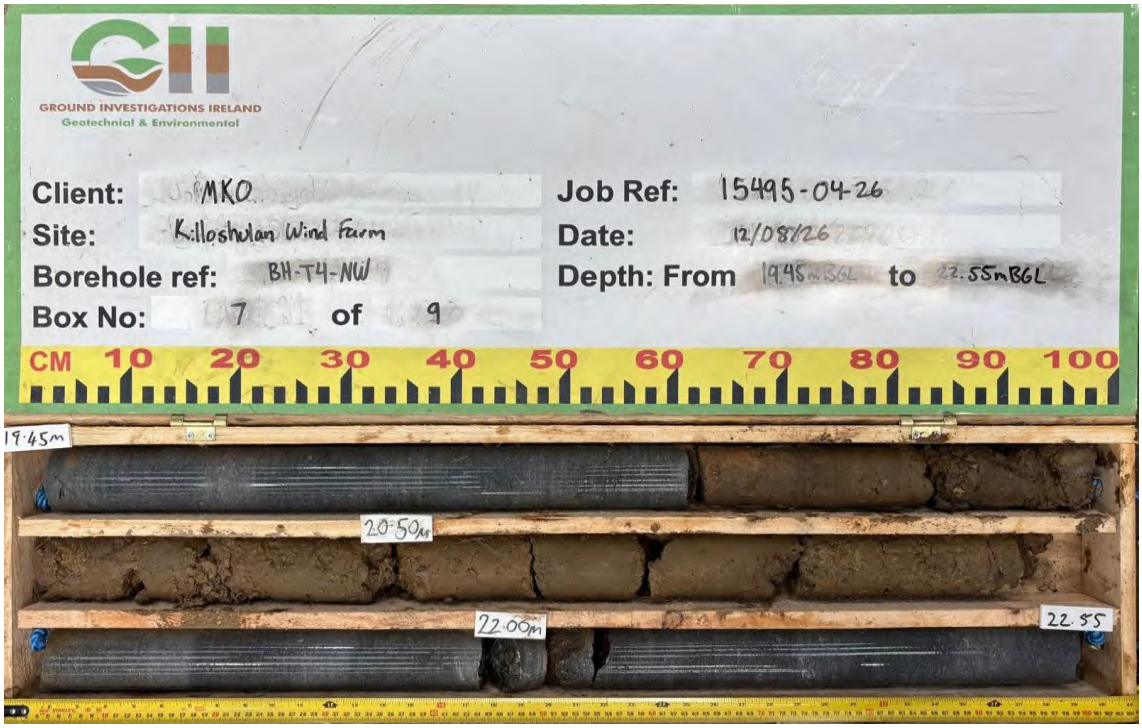


BH-T4-NW



BH-T4-NW

Killoshulan Wind Farm – Rotary Core Photographs



BH-T4-NW



BH-T4-NW

Killoshulan Wind Farm – Rotary Core Photographs



BH-T4-NW

Killoshulan Wind Farm – Rotary Core Photographs

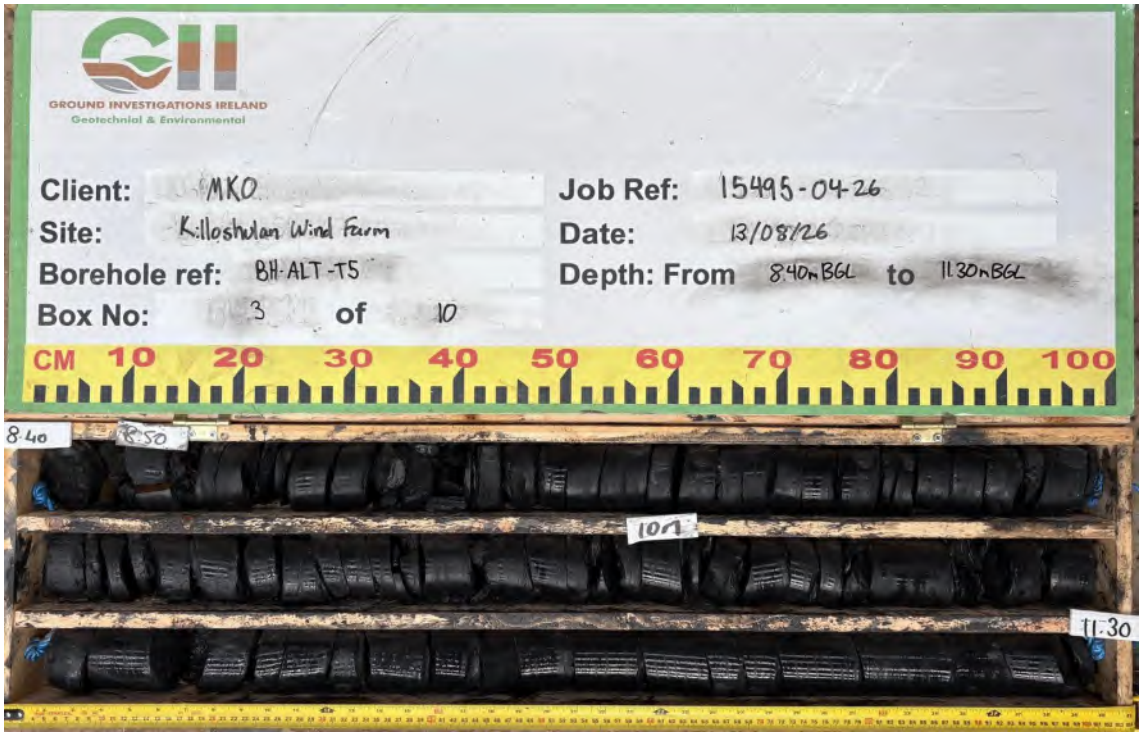


BH-ALT- T5

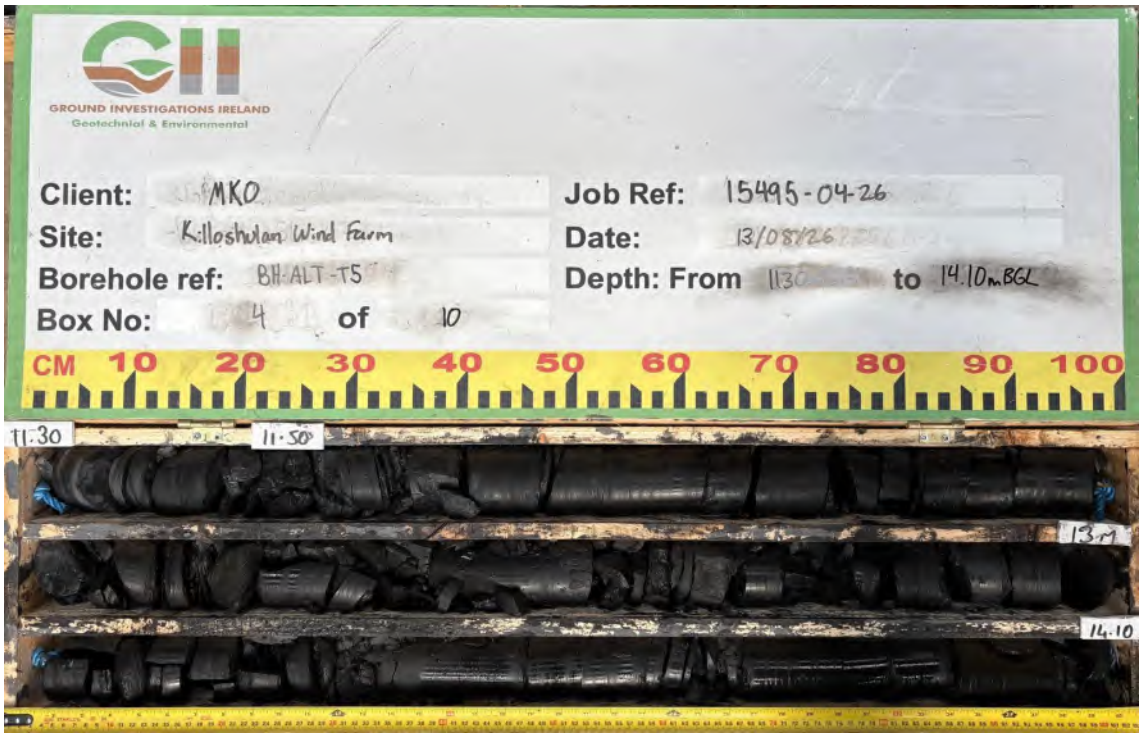


BH-ALT- T5

Killoshulan Wind Farm – Rotary Core Photographs

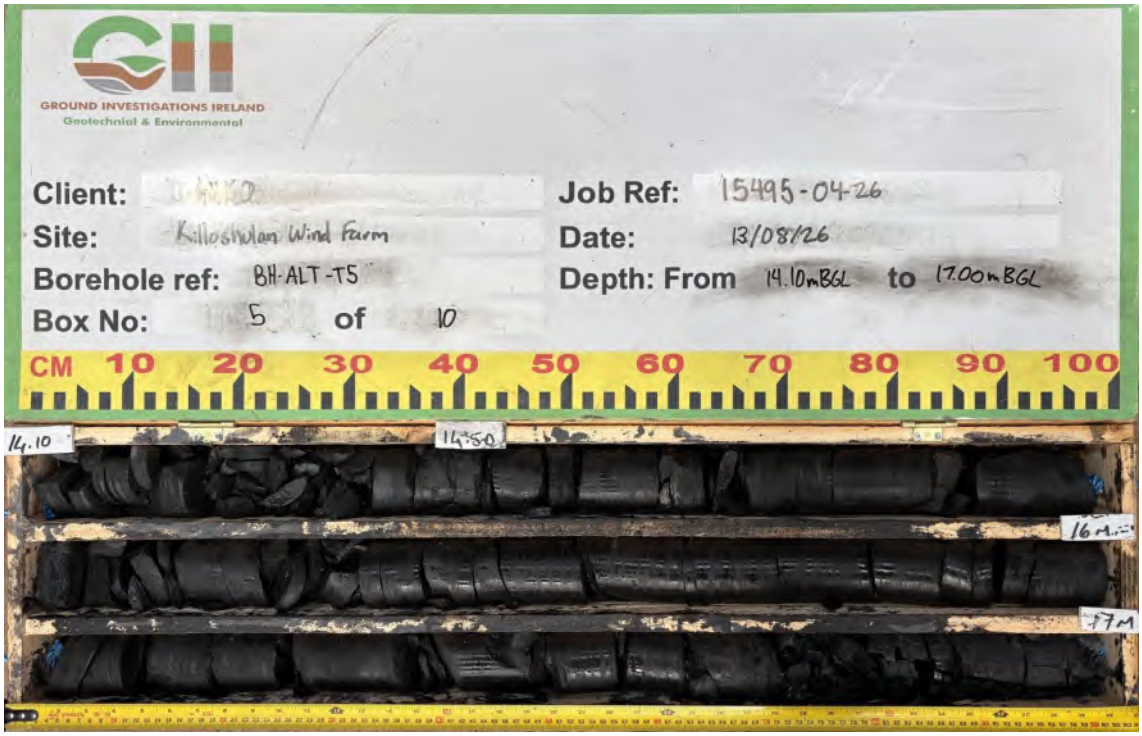


BH-ALT- T5



BH-ALT- T5

Killoshulan Wind Farm – Rotary Core Photographs



BH-ALT- T5



BH-ALT- T5

Killoshulan Wind Farm – Rotary Core Photographs



BH-ALT- T5



BH-ALT- T5

Killoshulan Wind Farm – Rotary Core Photographs



BH-ALT- T5



BH-ALT- T5

APPENDIX 3 – Laboratory Testing

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781
W: www.element.com

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland
D22 K5P8

Attention :	Eoin Bryne
Date :	23rd June, 2026
Your reference :	15495-04-26
Our reference :	Test Report 26/9252 Batch 1
Location :	Killoshulan Wind Farm
Date samples received :	12th June, 2026
Status :	Final Report
Issue :	202606231313

One sample was received for analysis on 12th June, 2026 and was scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 0.796 kg of CO2

Scope 1&2&3 emissions - 1.882 kg of CO2

Authorised By:



Bruce Leslie
Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 15495-04-26
Location: Killoshulan Wind Farm
Contact: Eoin Bryne
EMT Job No: 26/9252

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1										LOD/LOR	Units	Method No.
Sample ID	BH06												
Depth	1.00-1.50												
COC No / misc													
Containers	T												
Sample Date	10/06/2026												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	12/06/2026												
Sulphate as SO4 (2:1 Ext) #	0.0059										<0.0015	g/l	TM38/PM20
pH #	7.44										<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Notification of Deviating Samples

Client Name: Ground Investigations Ireland
Reference: 15495-04-26
Location: Killoshulan Wind Farm
Contact: Eoin Bryne

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 26/9252						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 26/9252

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

Date

The dates of the performance of laboratory activity are available on request.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 26/9252

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No

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Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland
D22 K5P8

Attention :	Eoin Bryne
Date :	1st July, 2026
Your reference :	15495-04-26
Our reference :	Test Report 26/9524 Batch 1
Location :	Killoshulan
Date samples received :	17th June, 2026
Status :	Final Report
Issue :	202607011433

Two samples were received for analysis on 17th June, 2026 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 1.593 kg of CO2

Scope 1&2&3 emissions - 3.764 kg of CO2

Authorised By:



Sean Anglish
Project Coordinator

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 15495-04-26
Location: Killoshulan
Contact: Eoin Bryne
EMT Job No: 26/9524

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1	2											
Sample ID	BH03	BH05B											
Depth	0.20-0.50	1.00-2.50											
COC No / misc													
Containers	T	T											
Sample Date	11/06/2026	12/06/2026											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	17/06/2026	17/06/2026											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Sulphate as SO4 (2:1 Ext) #	0.0168	0.0060									<0.0015	g/l	TM38/PM20
pH #	6.79	5.03									<0.01	pH units	TM73/PM11

Element Materials Technology

Notification of Deviating Samples

Client Name: Ground Investigations Ireland
Reference: 15495-04-26
Location: Killoshulan
Contact: Eoin Bryne

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 26/9524						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 26/9524

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

Date

The dates of the performance of laboratory activity are available on request.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 26/9524

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No

National Materials Testing Laboratory Ltd.

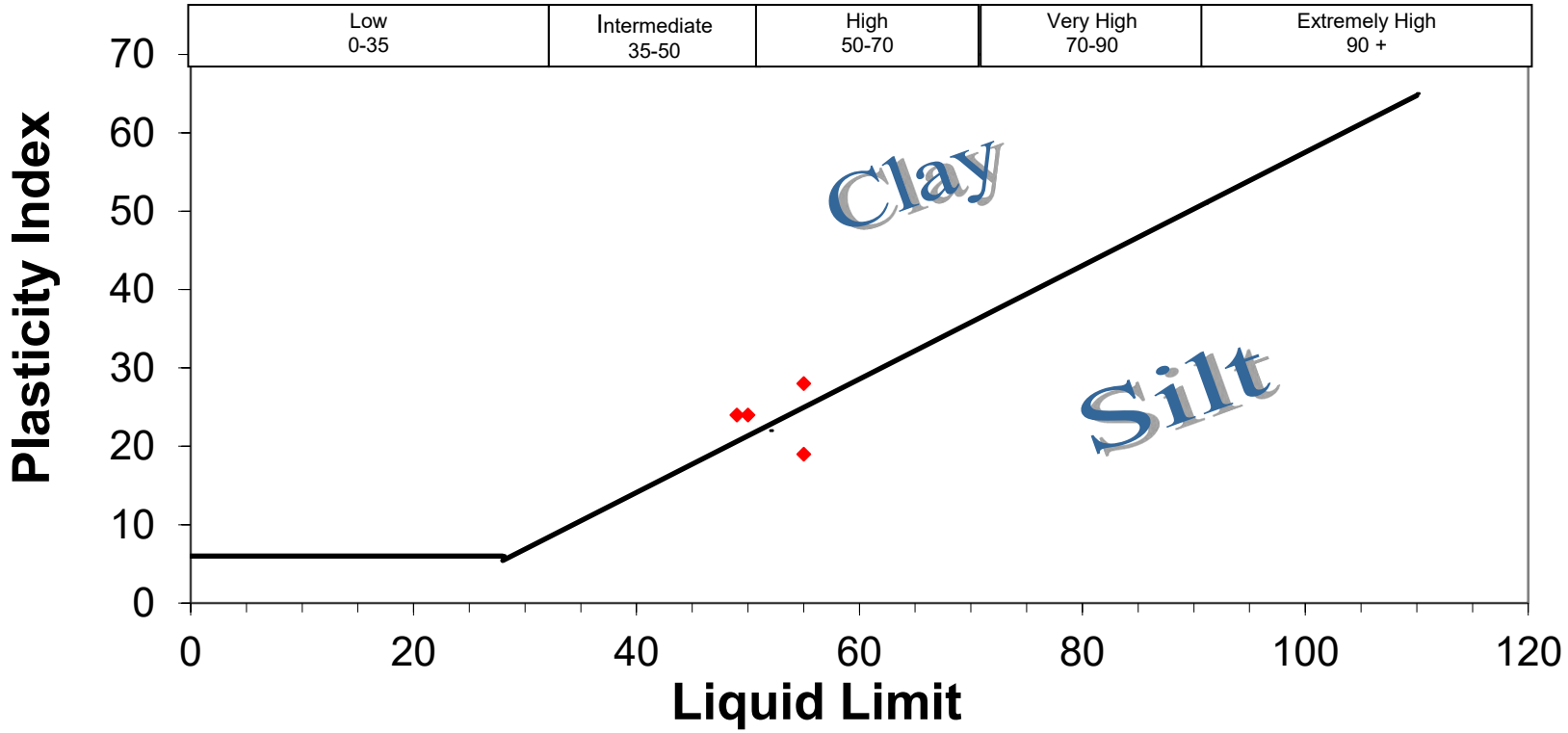
SUMMARY OF TEST RESULTS

				Particle			Index Properties		Bulk	Cell	Undrained Triaxial Tests		Lab	
BH/TP	Depth	Sample	Moisture	Density	<425um	LL	PL	PI	Density	Presssure	Compressive	Strain at	Vane	Remarks
No	m	No.	%	Mg/m3	%	%	%	%	Mg/m3	kPa	Stress kPa	Failure %	kPa	
BH04	9.9-12.80	B	19.1		62.3	55	27	28						
BH04	14.0-14.20	B	12.9		52.7	55	36	19						
BH04	17.5-19.10	B	10.0		68.8	49	25	24						
BH04	21.7-22.90	B	8.3		53.0	50	26	24						

NMTL	Notes :	Job ref No.	NMTL 3951	GII Project ID:	15495-04-26
	1. All BS tests carried out using preferred (definitive) method unless otherwise stated.	Location	Killoshuian Wind Farm		

NMTL LTD
Unit 18c, Tullow Industrial Estate
Tullow
County Carlow
Tel: 00353 59 9180822
Mob: 00353 872575508
billa@nmtl.ie

Contract:	**Killoshuian Wind Farm**		
Client:	**Ground Investigations Ireland ltd**		
Engineer:	**Eoin Byrne**		
GII Project ID	**15495-04-26**		
Date:	**26/06/2026**		
Tested By:	**Js**	**Checked:**	**Bc**
Job ref No.	**NMTL 3951**		



NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 2022: Part 2 : Clauses 10 & Part 4: BS EN ISO 17892-4-2016

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	87.9
28.000	84.5
20.000	81.8
14.000	80.5
10.000	80.0
6.300	78.5
5.000	77.0
3.350	75.6
2.000	72.2
1.180	68.5
0.600	64.4
0.425	62.3
0.300	60.1
0.212	58.3
0.150	56.6
0.063	53.92
0.052	52.96
0.037	50.39
0.019	44.93
0.010	39.48
0.007	36.27
0.005	33.06
0.004	28.24
0.002	18.94



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
18.9		35.0			18.2			27.8		0.0	0.0

Sample Description: Light brown slightly sandy slightly gravelly silty CLAY

Project: Killoshulan Wind Farm

GII Project ID: 15228-12-25

Operator	Js	Checked	Nc	Approved	Bc	Date sample tested	22/06/2026

Project No.	NMTL 3951
BH/TP No.	BH04
Sample No.	B
Depth	9.90-12.80m

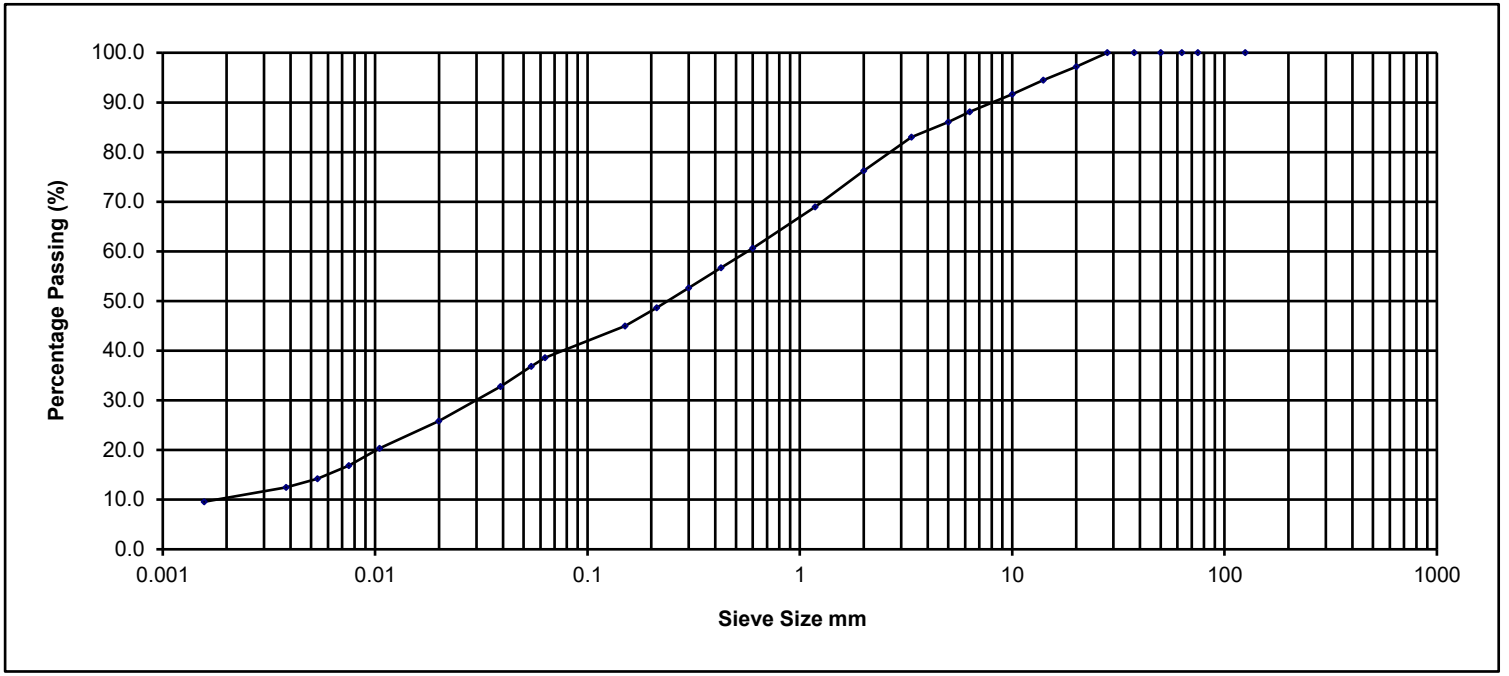
NM TL Ltd

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 2022: Part 2 : Clauses 10 & Part 4: BS EN ISO 17892-4-2016

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	97.2
14.000	94.5
10.000	91.7
6.300	88.1
5.000	86.1
3.350	83.0
2.000	76.2
1.180	68.9
0.600	60.6
0.425	56.7
0.300	52.6
0.212	48.6
0.150	45.0
0.063	38.60
0.054	36.86
0.039	32.79
0.020	25.83
0.011	20.31
0.008	16.83
0.005	14.22
0.004	12.48
0.002	9.58



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
9.6		29.0			37.6			23.8		0.0	0.0

Sample Description Brown creamish white slightly gravelly sandy silty CLAY.

Project No. NMTL 3951

BH/TP No. BH04

Project Killoshulan Wind Farm GII Project ID: 15228-12-25

Sample No. B

Operator	Js	Checked	Nc	Approved	Bc	Date sample tested	22/06/2026	Depth	14.20-17.50m

NM TL Ltd

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 2022: Part 2 : Clauses 10 & Part 4: BS EN ISO 17892-4-2016

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	99.1
14.000	99.1
10.000	98.9
6.300	96.0
5.000	94.5
3.350	92.1
2.000	86.5
1.180	80.1
0.600	72.4
0.425	68.8
0.300	65.5
0.212	62.6
0.150	60.3
0.063	57.60
0.051	56.02
0.037	53.82
0.019	49.73
0.010	45.95
0.007	42.49
0.005	38.71
0.004	33.05
0.002	22.66



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
22.7		34.9			28.9			13.5		0.0	0.0

Sample Description Brown /grey slightly gravelly slightly sandy silty CLAY.

Project No. NMTL 3951

BH/TP No. BH04

Project Killoshulan Wind Farm GII Project ID: 15228-12-25

Sample No. B

Operator	Js	Checked	Nc	Approved	Bc	Date sample tested	22/06/2026	Depth	17.50-19.10m

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 2022: Part 2 : Clauses 10 & Part 4: BS EN ISO 17892-4-2016

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	98.5
14.000	97.2
10.000	94.3
6.300	89.0
5.000	85.0
3.350	80.9
2.000	72.9
1.180	64.8
0.600	56.4
0.425	53.0
0.300	50.0
0.212	47.5
0.150	45.5
0.063	43.03
0.051	41.85
0.037	40.43
0.018	38.77
0.010	36.17
0.007	33.34
0.005	30.74
0.004	26.72
0.002	18.44



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
18.4		24.6			29.8			27.1		0.0	0.0

Sample Description: Light Brown slightly gravelly slightly sandy silty CLAY

Project: Killoshulan Wind Farm

GII Project ID: 15228-12-25

Operator	Js	Checked	Nc	Approved	Bc	Date sample tested	22/06/2026

Project No.	NMTL 3951
BH/TP No.	BH04
Sample No.	B
Depth	21.70-22.90m

NM TL Ltd

LABORATORY REPORT

Contract Number: PSL26/5132

Report Date:	23 July 2026
Client's Reference:	15495-04-26
Client Name:	Ground Investigations Ireland Ltd Catherinestown House Hazelhatch Road Newcastle Co Dublin D22 YD52
For the attention of:	**Eoin Byrne**
Contract Title:	Killoshulan Wind Farm
Date Received:	19/6/2026
Date Commenced:	19/6/2026
Date Completed:	23/7/2026
Notes:	**Opinions and Interpretations are outside the UKAS Accreditation**

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins (Managing Director)	R Berriman (Associate Director)	S Royle (Laboratory Manager)
L Knight (Assistant Laboratory Manager)	S Eyre (Senior Technical Coordinator)	T Watkins (Senior Technician)

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Doncaster,
DN4 0AR
Tel: 01302 768098
Email: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH02		B	1.40	1.80	Brown sandy slightly gravelly CLAY.
BH03		B	0.20	0.50	Brown sandy slightly gravelly CLAY with some organic material.
BH04		B	0.20	2.50	Brown slightly sandy slightly gravelly CLAY.
BH04		B	12.80	14.00	Brown slightly sandy slightly gravelly CLAY.
BH04		B	14.00	14.20	Brown sandy slightly gravelly CLAY.
BH04		B	19.00	19.50	Brown slightly sandy slightly gravelly CLAY.
BH05B		B	0.20	0.50	Brown sandy CLAY.
BH05B		B	1.00	2.50	Brown sandy slightly gravelly CLAY.

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

Contract No:
PSL26/5132
Client Ref:
15495-04-26

SUMMARY OF SOIL CLASSIFICATION TESTS

BS 1377 - Part 2 : 2022 in accordance with BS EN ISO 17892 (as below)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Water Content %	Linear Shrinkage	Particle Density Mg/m^3	Liquid Limit %	Plastic Limit %	Plasticity Index %	Passing 0.425mm %	Remarks
BH02		B	1.40	1.80	10.7			37	19	18	87	Medium Plasticity CIM
BH03		B	0.20	0.50	18.0			68	32	36	57	High Plasticity CIH
BH04		B	12.80	14.00	14.8							
BH04		B	14.00	14.20	15.3			39	21	18	60	Medium Plasticity CIM
BH04		B	19.00	19.50	10.4			46	22	24	69	Medium Plasticity CIM
BH05B		B	1.00	2.50	16.5			42	22	20	65	Medium Plasticity CIM

Water Content - BS 1377 - Part 2 : 2022 : Clause 4 in accordance with BS EN ISO 17892 - 1 : 2014 + A1 : 2022
Linear Shrinkage - BS 1377 - Part 2 : 2022 : Clause 7
Particle Density (Gas Jar method) - BS 1377 - Part 2 : 2022 : Clause 9
Liquid, Plastic Limit & Plasticity Index - BS 1377 - Part 2 : 2022 : Clause 5 & 6 in accordance with BS EN ISO 17892 - 12 : 2018 + A2 : 2022

SYMBOLS : NP = Non Plastic

UKAS TESTING 4043

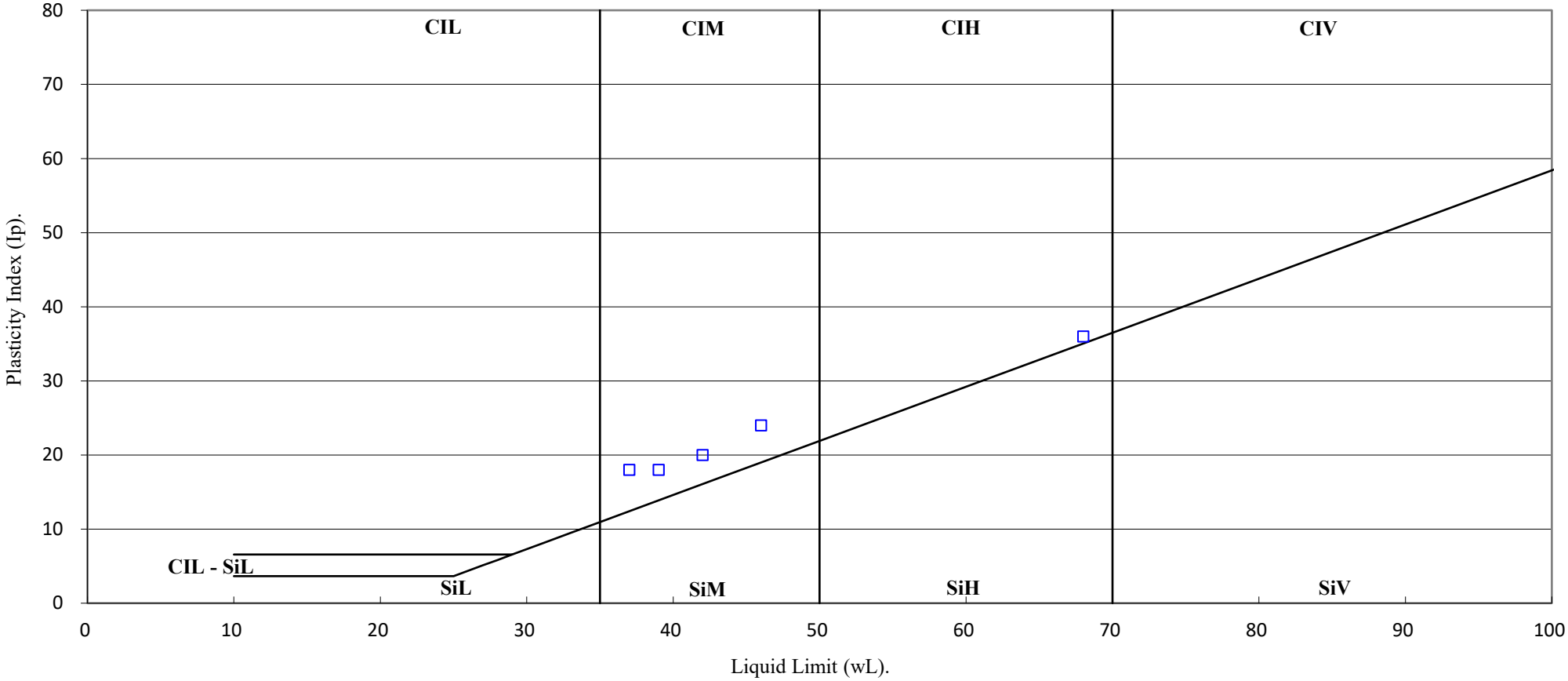
PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

Contract No:
PSL26/5132
Client Ref:
15495-04-26

PLASTICITY CHART

BS EN ISO 14688-2:2017 Clause 4.4



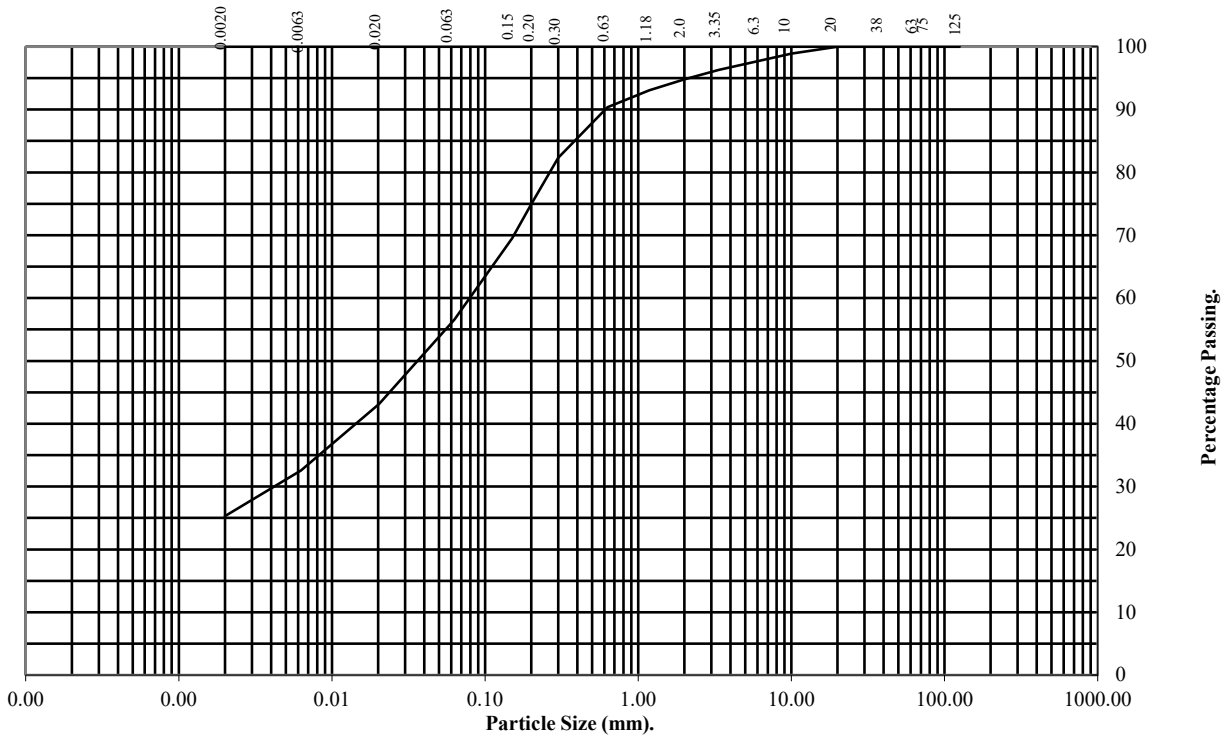
UKAS TESTING 4043 / PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY	**Killoshulan Wind Farm**	**Contract No:**
		PSL26/5132
		Client Ref:
		15495-04-26

PARTICLE SIZE DISTRIBUTION TEST

BS 1377 - Part 2 : 2022 : Clause 10 in accordance with BS EN ISO 17892 - 4 : 2016

Sieve Method, Clause 5.2 & Pipette Method, Clause 5.4

Hole Number:	**BH02**	**Top Depth (m):**	**1.40**
Sample Number:		**Base Depth (m):**	**1.80**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	98
3.35	96
2	95
1.18	93
0.63	90
0.3	82
0.2	75
0.15	70
0.063	57

Particle Diameter	Percentage Passing
0.020	43
0.0063	33
0.0020	25
Particle Density - 2.65 Mg/m3 assumed	

Soil Fraction	Total Percentage
Cobbles	0
Gravel	5
Sand	38
Silt	32
Clay	25

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

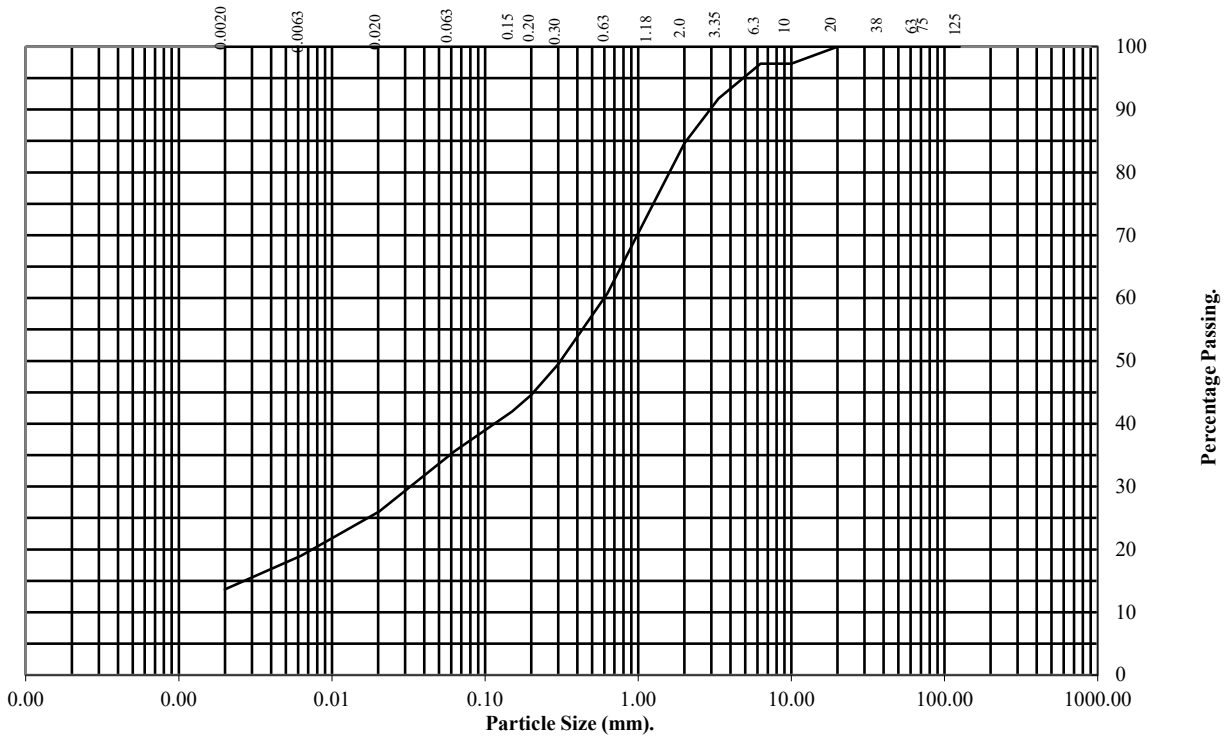
Contract No:
PSL26/5132
Client Ref:
15495-04-26

PARTICLE SIZE DISTRIBUTION TEST

BS 1377 - Part 2 : 2022 : Clause 10 in accordance with BS EN ISO 17892 - 4 : 2016

Sieve Method, Clause 5.2 & Pipette Method, Clause 5.4

Hole Number:	**BH03**	**Top Depth (m):**	**0.20**
Sample Number:		**Base Depth (m):**	**0.50**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	97
6.3	97
3.35	92
2	85
1.18	74
0.63	61
0.3	49
0.2	45
0.15	42
0.063	36

Particle Diameter	Percentage Passing
0.020	26
0.0063	19
0.0020	14
Particle Density - 2.65 Mg/m3 assumed	

Soil Fraction	Total Percentage
Cobbles	0
Gravel	15
Sand	49
Silt	22
Clay	14

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

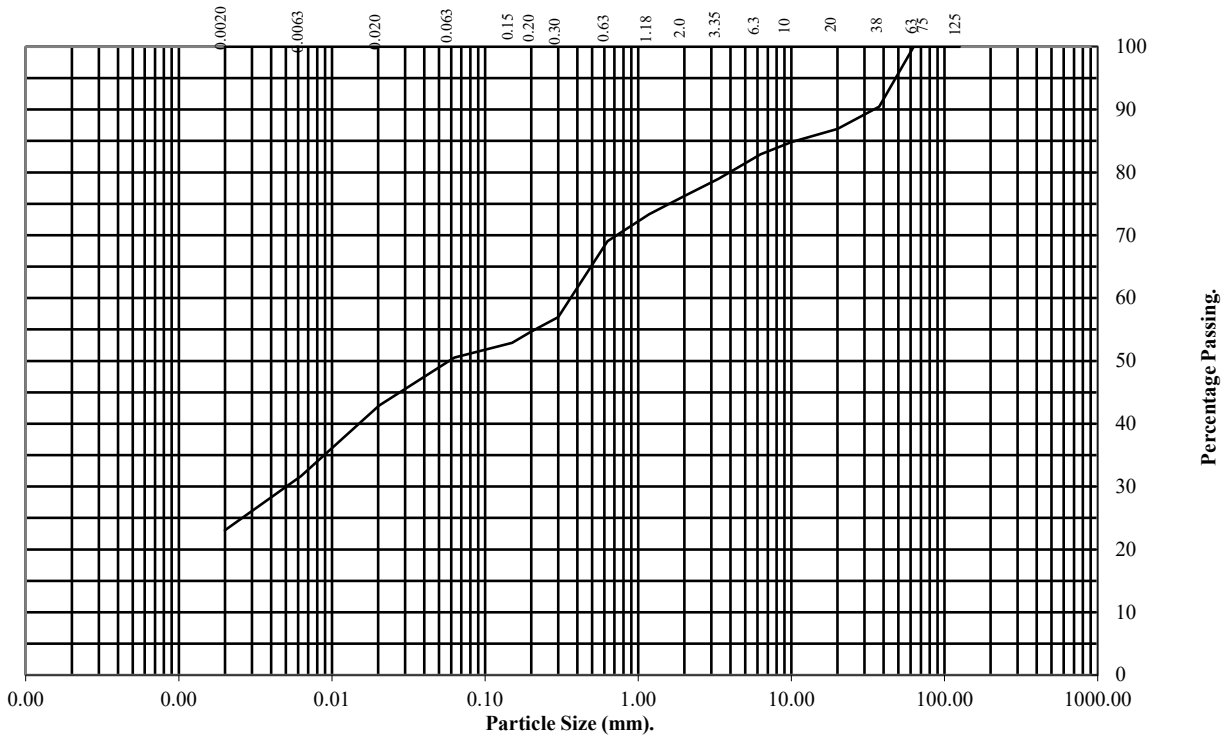
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PSL26/5132
Client Ref:
15495-04-26

PARTICLE SIZE DISTRIBUTION TEST

BS 1377 - Part 2 : 2022 : Clause 10 in accordance with BS EN ISO 17892 - 4 : 2016

Sieve Method, Clause 5.2 & Pipette Method, Clause 5.4

Hole Number:	**BH04**	**Top Depth (m):**	**0.20**
Sample Number:		**Base Depth (m):**	**2.50**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	90
20	87
10	85
6.3	83
3.35	79
2	76
1.18	73
0.63	69
0.3	57
0.2	55
0.15	53
0.063	51

Particle Diameter	Percentage Passing
0.020	43
0.0063	32
0.0020	23
Particle Density - 2.65 Mg/m3 assumed	

Soil Fraction	Total Percentage
Cobbles	0
Gravel	24
Sand	25
Silt	28
Clay	23

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

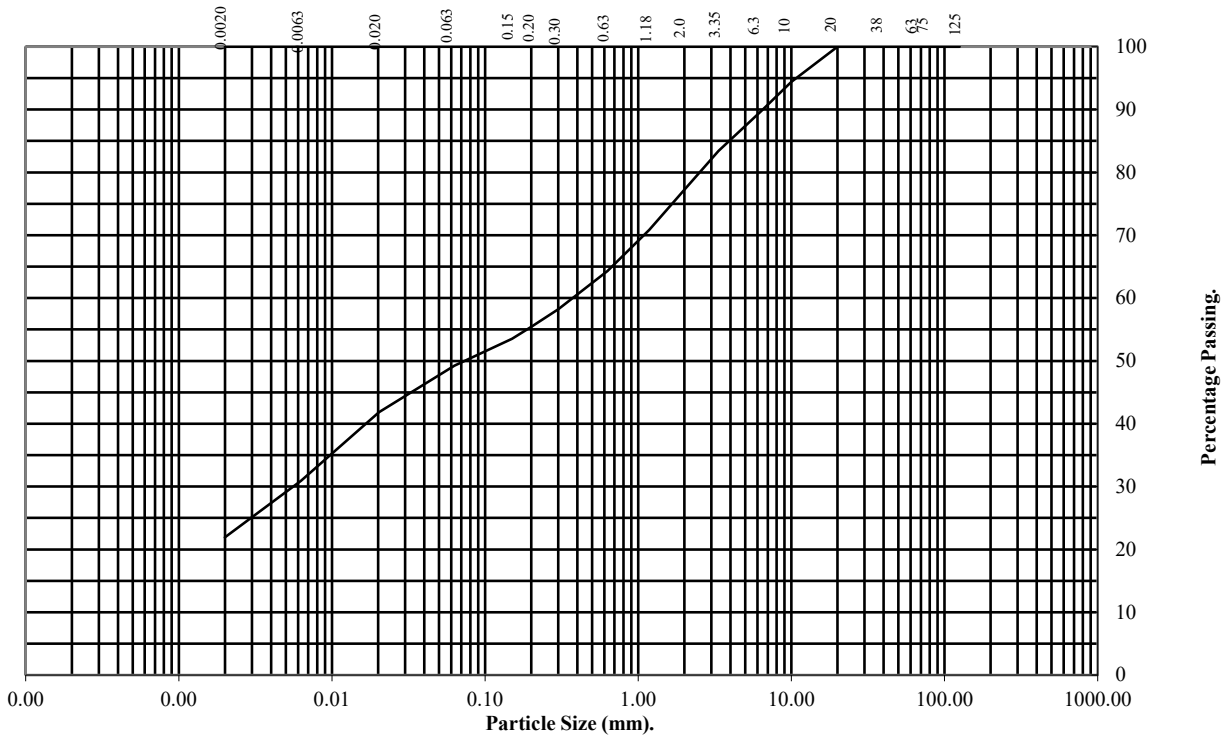
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PSL26/5132
Client Ref:
15495-04-26

PARTICLE SIZE DISTRIBUTION TEST

BS 1377 - Part 2 : 2022 : Clause 10 in accordance with BS EN ISO 17892 - 4 : 2016

Sieve Method, Clause 5.2 & Pipette Method, Clause 5.4

Hole Number:	**BH04**	**Top Depth (m):**	**12.80**
Sample Number:		**Base Depth (m):**	**14.00**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	94
6.3	90
3.35	83
2	77
1.18	71
0.63	64
0.3	58
0.2	55
0.15	54
0.063	49

Particle Diameter	Percentage Passing
0.020	42
0.0063	31
0.0020	22
Particle Density - 2.65 Mg/m3 assumed	

Soil Fraction	Total Percentage
Cobbles	0
Gravel	23
Sand	28
Silt	27
Clay	22

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

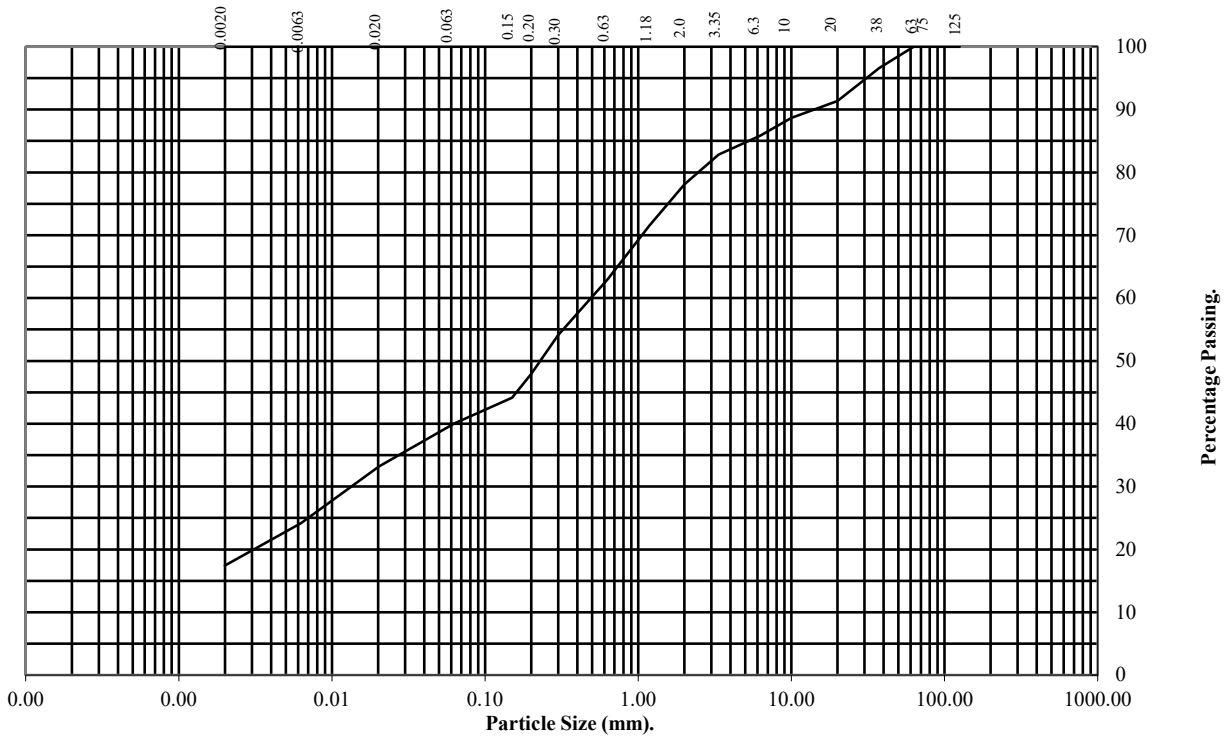
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PSL26/5132
Client Ref:
15495-04-26

PARTICLE SIZE DISTRIBUTION TEST

BS 1377 - Part 2 : 2022 : Clause 10 in accordance with BS EN ISO 17892 - 4 : 2016

Sieve Method, Clause 5.2 & Pipette Method, Clause 5.4

Hole Number:	**BH04**	**Top Depth (m):**	**14.00**
Sample Number:		**Base Depth (m):**	**14.20**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	97
20	91
10	89
6.3	86
3.35	83
2	78
1.18	71
0.63	63
0.3	54
0.2	48
0.15	44
0.063	40

Particle Diameter	Percentage Passing
0.020	33
0.0063	24
0.0020	17
Particle Density - 2.65 Mg/m3 assumed	

Soil Fraction	Total Percentage
Cobbles	0
Gravel	22
Sand	38
Silt	23
Clay	17

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

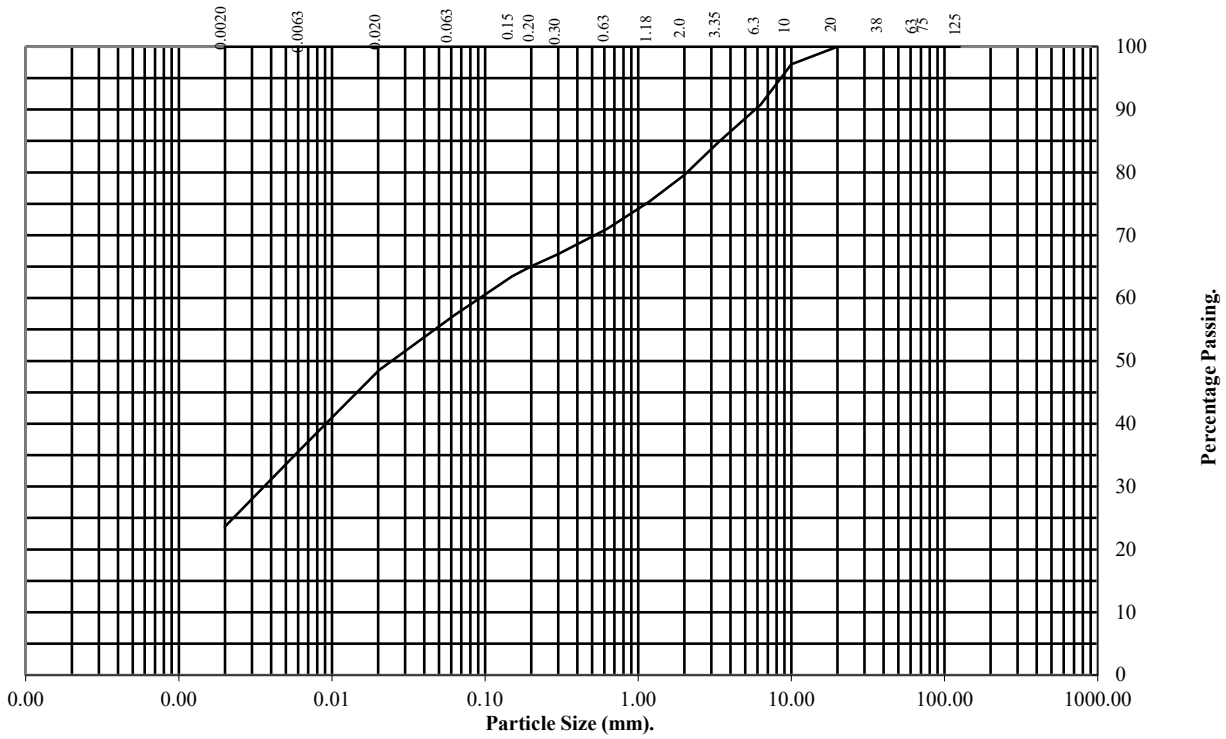
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PSL26/5132
Client Ref:
15495-04-26

PARTICLE SIZE DISTRIBUTION TEST

BS 1377 - Part 2 : 2022 : Clause 10 in accordance with BS EN ISO 17892 - 4 : 2016

Sieve Method, Clause 5.2 & Pipette Method, Clause 5.4

Hole Number:	**BH04**	**Top Depth (m):**	**19.00**
Sample Number:		**Base Depth (m):**	**19.50**
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	97
6.3	91
3.35	85
2	80
1.18	75
0.63	71
0.3	67
0.2	65
0.15	63
0.063	57

Particle Diameter	Percentage Passing
0.020	49
0.0063	36
0.0020	24
Particle Density - 2.65 Mg/m3 assumed	

Soil Fraction	Total Percentage
Cobbles	0
Gravel	20
Sand	23
Silt	33
Clay	24

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

Contract No:
PSL26/5132
Client Ref:
15495-04-26

PARTICLE SIZE DISTRIBUTION TEST

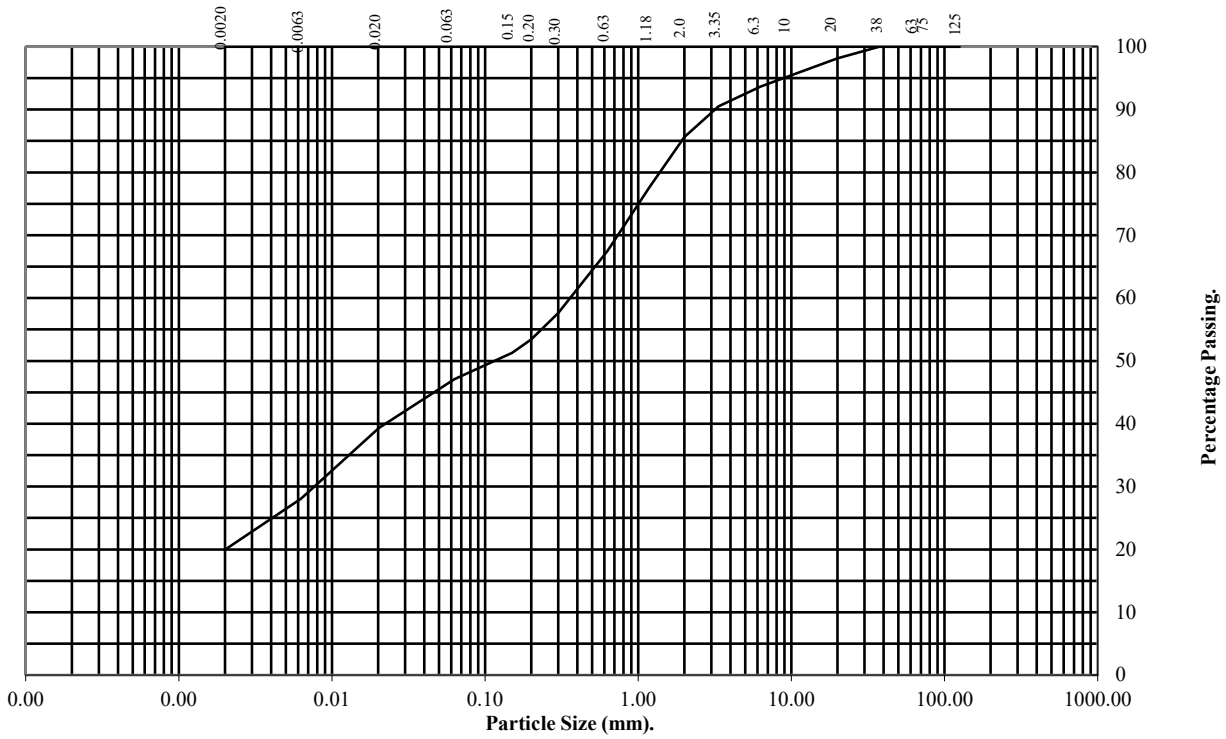
BS 1377 - Part 2 : 2022 : Clause 10 in accordance with BS EN ISO 17892 - 4 : 2016

Sieve Method, Clause 5.2 & Pipette Method, Clause 5.4

Hole Number: BH05B **Top Depth (m):** 1.00

Sample Number: **Base Depth (m):** 2.50

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	98
10	95
6.3	94
3.35	90
2	86
1.18	78
0.63	68
0.3	58
0.2	53
0.15	51
0.063	47

Particle Diameter	Percentage Passing
0.020	39
0.0063	28
0.0020	20
Particle Density - 2.65 Mg/m3 assumed	

Soil Fraction	Total Percentage
Cobbles	0
Gravel	14
Sand	39
Silt	27
Clay	20

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

Contract No: PSL26/5132

Client Ref: 15495-04-26

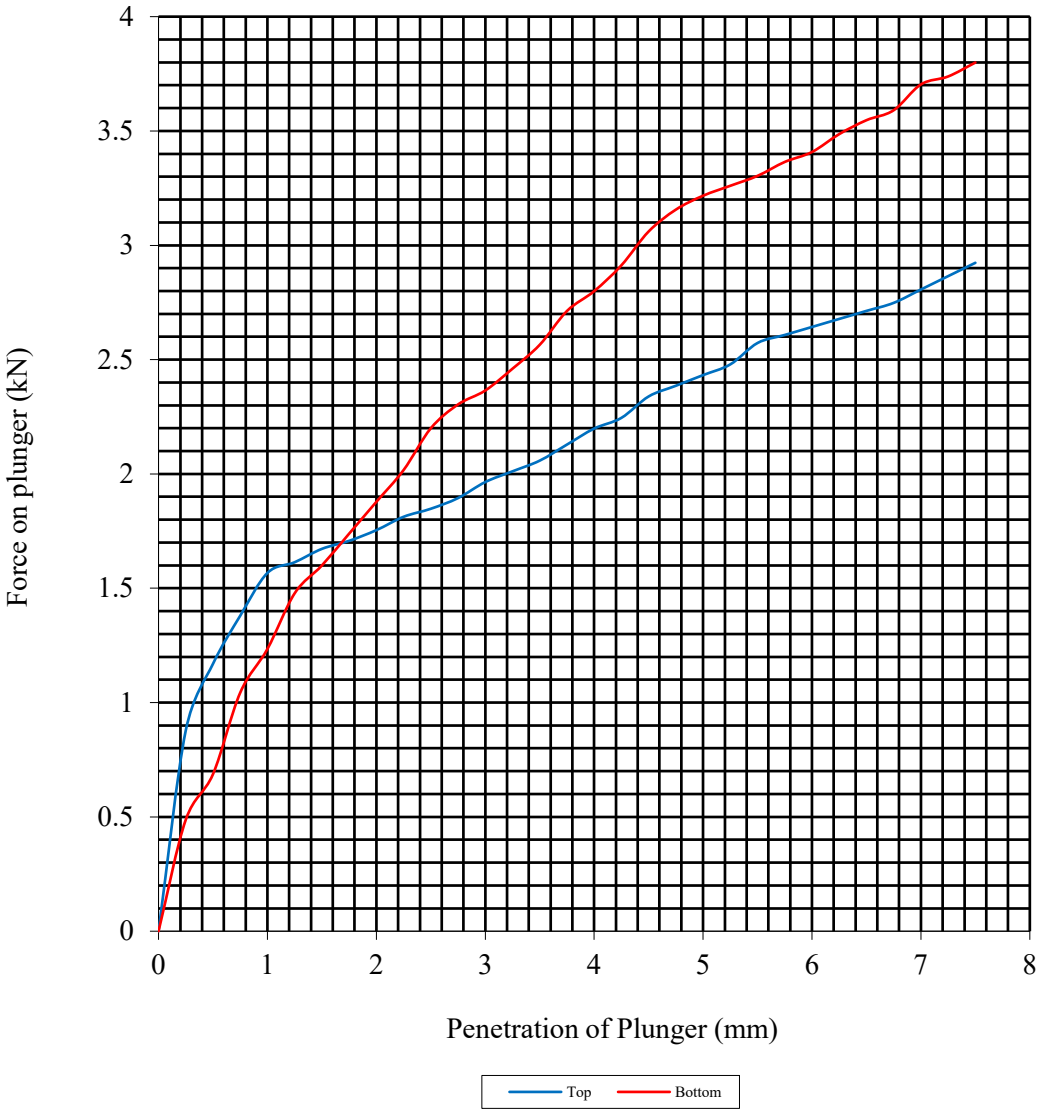
CALIFORNIA BEARING RATIO (CBR)

BS 1377 - Part 2 : Clause 15 : 2022

Hole Number: BH02 **Top Depth (m):** 1.40

Sample Number: **Base Depth (m):** 1.80

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Water Content %		C.B.R. Value %	
Water Content:	10.7	Surcharge Kg:	4.20	Sample Top	10.7	Sample Top	14.0
Bulk Density Mg/m3:	2.00	Soaking Time hrs	0	Sample Bottom	10.7	Sample Bottom	16.7
Dry Density Mg/m3:	1.81	Swelling mm:	0.00	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg					

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

Contract No: PSL26/5132

Client Ref: 15495-04-26

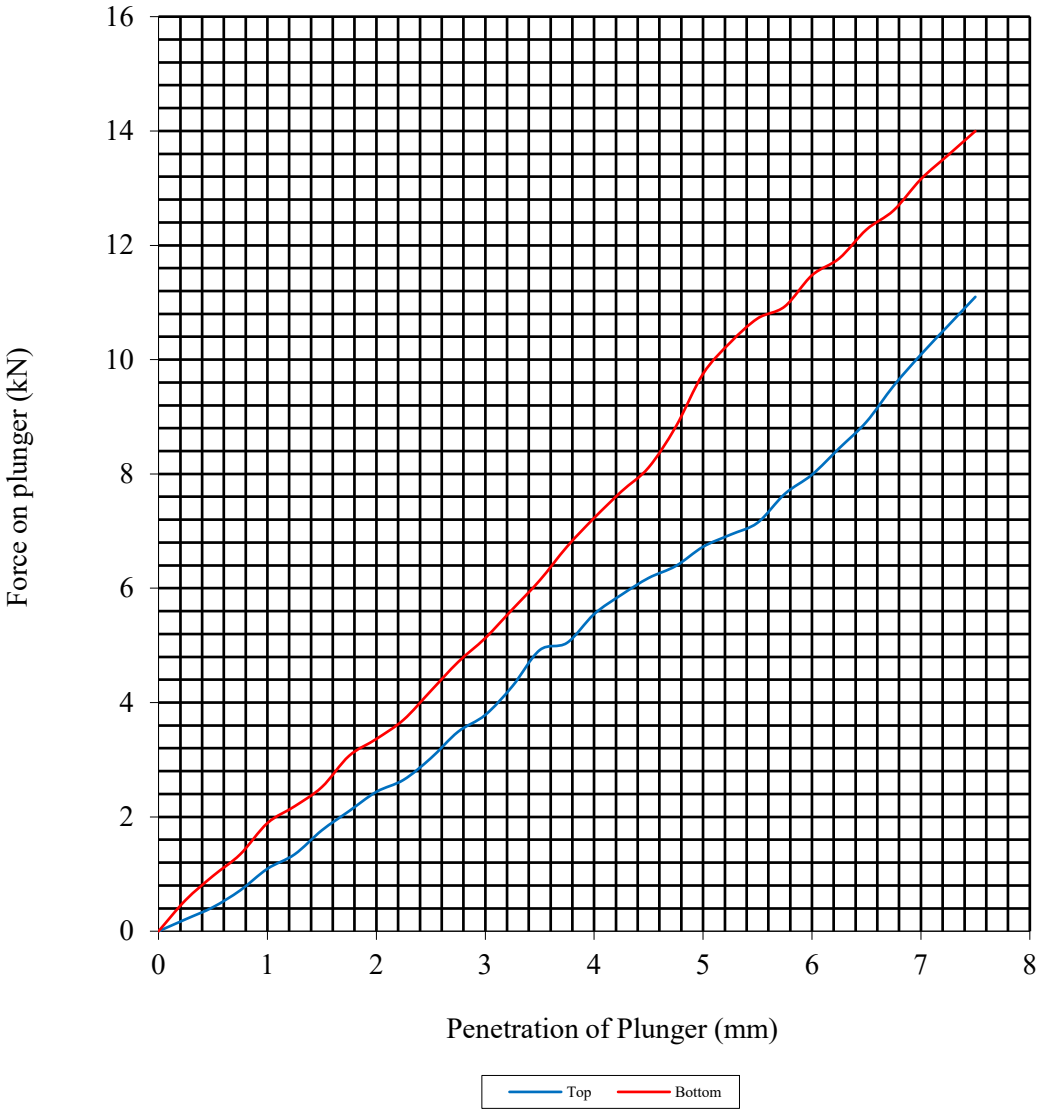
CALIFORNIA BEARING RATIO (CBR)

BS 1377 - Part 2 : Clause 15 : 2022

Hole Number: BH03 **Top Depth (m):** 0.20

Sample Number: **Base Depth (m):** 0.50

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Water Content %		C.B.R. Value %	
Water Content:	18.0	Surcharge Kg:	4.20	Sample Top	34.1	Sample Top	33.6
Bulk Density Mg/m3:	2.01	Soaking Time hrs	0	Sample Bottom	34.1	Sample Bottom	48.8
Dry Density Mg/m3:	1.70	Swelling mm:	0.00	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg					

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

Contract No: PSL26/5132

Client Ref: 15495-04-26

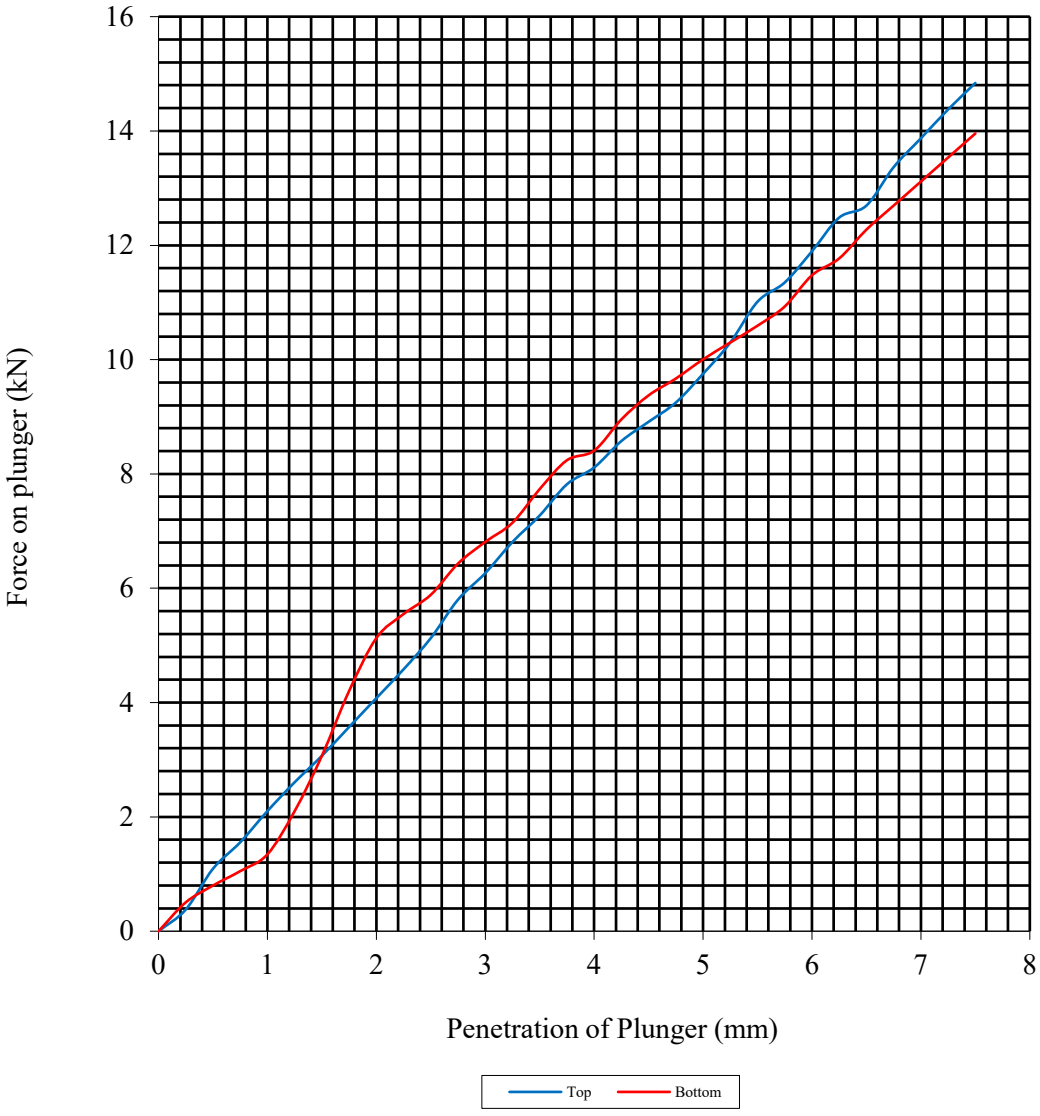
CALIFORNIA BEARING RATIO (CBR)

BS 1377 - Part 2 : Clause 15 : 2022

Hole Number: BH04 **Top Depth (m):** 0.20

Sample Number: **Base Depth (m):** 2.50

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Water Content %		C.B.R. Value %	
Water Content:	16.1	Surcharge Kg:	4.20	Sample Top	16.1	Sample Top	48.8
Bulk Density Mg/m3:	2.09	Soaking Time hrs	0	Sample Bottom	16.1	Sample Bottom	50.0
Dry Density Mg/m3:	1.80	Swelling mm:	0.00	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			13				
Compaction Conditions		2.5kg					

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

Contract No: PSL26/5132

Client Ref: 15495-04-26

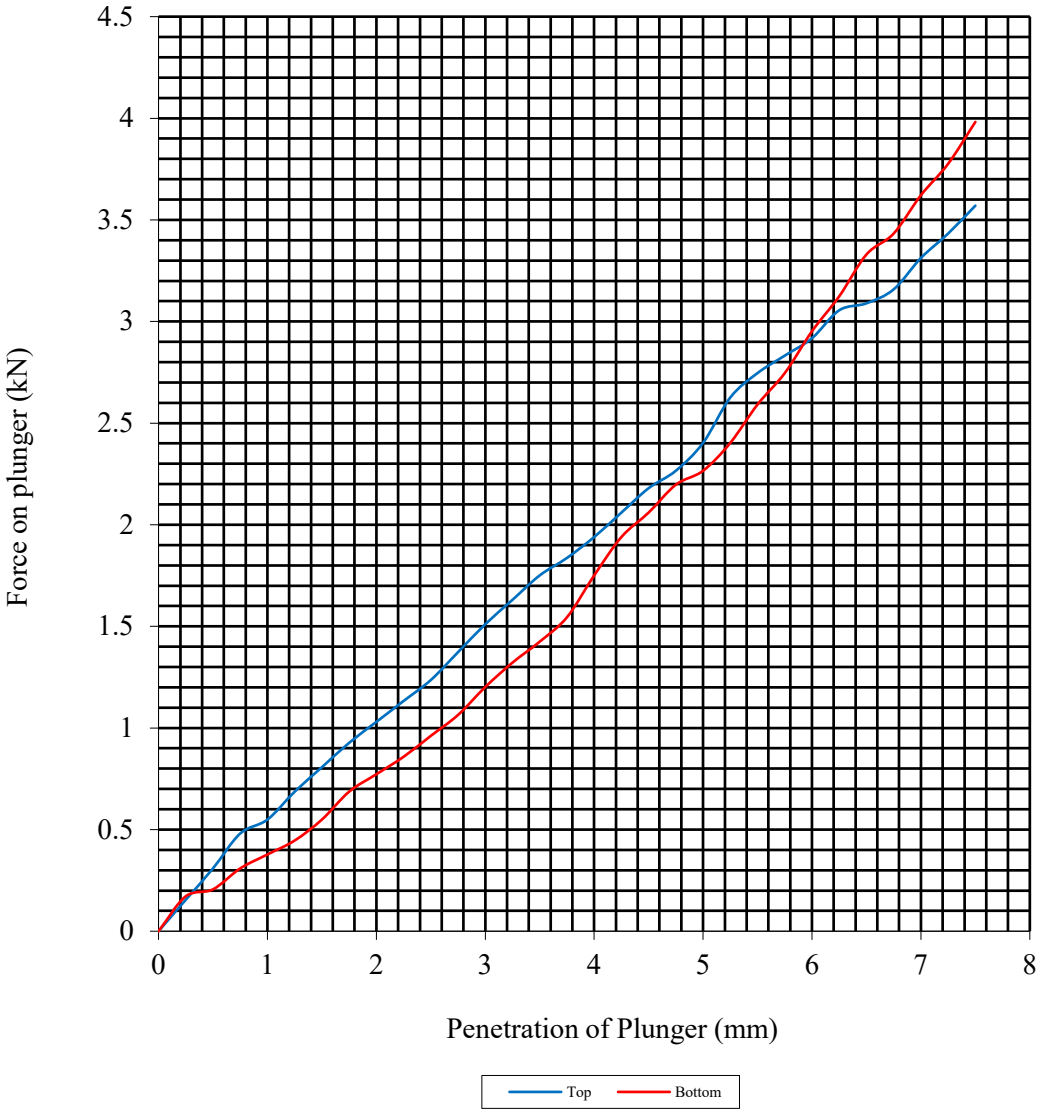
CALIFORNIA BEARING RATIO (CBR)

BS 1377 - Part 2 : Clause 15 : 2022

Hole Number: BH05B **Top Depth (m):** 0.20

Sample Number: **Base Depth (m):** 0.50

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Water Content %		C.B.R. Value %	
Water Content:	11.4	Surcharge Kg:	4.20	Sample Top	11.4	Sample Top	12.0
Bulk Density Mg/m3:	2.01	Soaking Time hrs	0	Sample Bottom	11.4	Sample Bottom	11.3
Dry Density Mg/m3:	1.80	Swelling mm:	0.00	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			0				
Compaction Conditions		2.5kg					

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

Contract No: PSL26/5132

Client Ref: 15495-04-26

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	W	D	(mm2)		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
BH01	10.12		A	Perp	63	47	2961	3770.06	61.40	-	17.10	4.38	1.097	4.80	Valid	
BH01	12.84		A	Perp	63	56	3528	4491.99	67.02	-	14.53	3.12	1.141	3.56	Valid	
BH02	9.33		A	Perp	63	42	2646	3368.99	58.04	-	12.22	3.50	1.069	3.74	Valid	
BH03	1.00		A	Perp	63	39	2457	3128.35	55.93	-	8.69	2.68	1.052	2.82	Valid	
BH03	5.35		A	Perp	63	44	2772	3529.42	59.41	-	13.08	3.58	1.081	3.86	Valid	
BH03	8.50		A	Perp	63	52	3276	4171.13	64.58	-	9.14	2.11	1.122	2.37	Valid	
BH03	10.00		A	Perp	63	44	2772	3529.42	59.41	-	7.27	1.99	1.081	2.15	Valid	
BH03	13.00		A	Perp	63	48	3024	3850.28	62.05	-	10.14	2.54	1.102	2.80	Valid	
BH04	4.00		A	Perp	63	44	2772	3529.42	59.41	-	7.77	2.12	1.081	2.30	Valid	
BH04	4.20		A	Perp	63	38	2394	3048.14	55.21	-	6.16	1.95	1.046	2.04	Valid	
BH04	8.50		A	Perp	63	47	2961	3770.06	61.40	-	9.13	2.34	1.097	2.56	Valid	
BH04	14.50		A	Perp	62	40	2480	3157.63	56.19	-	1.28	0.39	1.054	0.41	Valid	
BH04	25.00		A	Perp	63	48	3024	3850.28	62.05	-	14.17	3.55	1.102	3.91	Valid	
BH04	27.40		A	Perp	63	37	2331	2967.92	54.48	-	11.44	3.72	1.039	3.87	Valid	
BH04A	3.40		A	Perp	63	47	2961	3770.06	61.40	-	7.89	2.02	1.097	2.22	Valid	
BH04A	7.21		A	Perp	63	54	3402	4331.56	65.81	-	11.14	2.48	1.132	2.81	Valid	
BH04A	9.69		A	Perp	63	45	2835	3609.63	60.08	-	6.42	1.72	1.086	1.86	Valid	
BH04A	13.00		A	Perp	63	49	3087	3930.49	62.69	-	10.44	2.56	1.107	2.84	Valid	
BH04A	18.65		A	Perp	63	41	2583	3288.78	57.35	-	15.33	4.50	1.064	4.78	Valid	
BH04A	27.00		A	Perp	63	51	3213	4090.92	63.96	-	12.79	3.02	1.117	3.37	Valid	
BH05	2.30		A	Perp	63	31	1953	2486.64	49.87	-	2.44	0.95	0.999	0.95	Valid	
BH05	6.50		A	Perp	62	28	1736	2210.34	47.01	-	1.49	0.65	0.973	0.63	Valid	

Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

Contract No:
PSL26/5132
Client Ref:
15495-04-26

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	W	D	(mm2)		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
BH05	7.63		A	Perp	63	37	2331	2967.92	54.48	-	3.83	1.25	1.039	1.29	Valid	
BH05	9.16		A	Perp	63	43	2709	3449.21	58.73	-	9.94	2.78	1.075	2.99	Valid	
BH05B	6.40		A	Perp	63	41	2583	3288.78	57.35	-	3.08	0.90	1.064	0.96	Valid	
BH05B	11.70		I	Par	61	35	2135	2718.37	52.14	-	2.15	0.76	1.019	0.78	Valid	
BH05B	14.45		A	Perp	63	39	2457	3128.35	55.93	-	0.85	0.26	1.052	0.28	Valid	

Note All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Killoshulan Wind Farm

Contract No:

PSL26/5132

Client Ref:

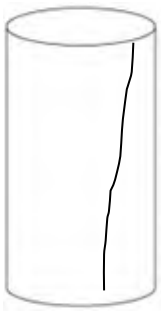
15495-04-26

UNIAXIAL COMPRESSIVE STRENGTH

ISRM Suggested Methods - Rock Characterization Testing and Monitoring 1974 - 2006

Borehole Number:	**BH02**	**Top Depth (m):**	**6.20**
Sample Number:	**-**	**Base Depth (m):**	**6.47**
Sample Type:	**C**	**Sample Date:**	**-**
Storage Condition:	**Sealed in plastic**	**Date of Receipt**	**19/06/2026**
Sample Description:	**Grey SILTSTONE.**		

Specimen Details/Conditions	
Diameter - mm:	63.12
Height - mm:	162.47
Water Content - %:	0.2
Sample Mass - g:	1355.5
Bulk Density - Mg/m^3:	2.67
Dry Density - Mg/m^3:	2.66
Height Ratio: * Sample complies with H:D ratio	2.6
Degree of Saturation - %:	8
Assumed Specific Gravity for Degree of Saturation:	2.90

Test Result		Failure Sketch
Load Frame/Machine:	CM1/Controls	
Date of test:	16/07/2026	
Test Duration - mins:	03:17	
Orientation:	Perpendicular	
Stress Rate - MPa/s:	0.60	
Strain at Failure - kN:	371.30	
Unconfined Compressive Strength - Mpa:	119	
Mode of Failure:	Vertical Shear	

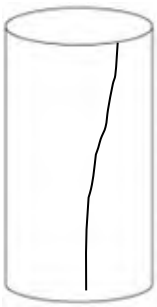
Remarks: -

UNIAXIAL COMPRESSIVE STRENGTH

ISRM Suggested Methods - Rock Characterization Testing and Monitoring 1974 - 2006

Borehole Number:	**BH02**	**Top Depth (m):**	**12.22**
Sample Number:	**-**	**Base Depth (m):**	**12.58**
Sample Type:	**C**	**Sample Date:**	**-**
Storage Condition:	**Sealed in plastic**	**Date of Receipt**	**19/06/2026**
Sample Description:	**Grey SILTSTONE.**		

Specimen Details/Conditions	
Diameter - mm:	63.35
Height - mm:	156.59
Water Content - %:	0.2
Sample Mass - g:	1323.4
Bulk Density - Mg/m^3:	2.68
Dry Density - Mg/m^3:	2.68
Height Ratio: * Sample does not comply with H:D ratio	2.5
Degree of Saturation - %:	5
Assumed Specific Gravity for Degree of Saturation:	2.90

Test Result		Failure Sketch
Load Frame/Machine:	CM1/Controls	
Date of test:	16/07/2026	
Test Duration - mins:	02:48	
Orientation:	Perpendicular	
Stress Rate - MPa/s:	0.57	
Strain at Failure - kN:	303.60	
Unconfined Compressive Strength - Mpa:	96.3	
Mode of Failure:	Vertical Shear	

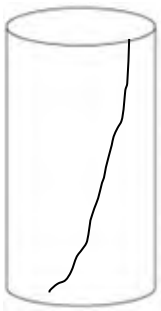
Remarks: -

UNIAXIAL COMPRESSIVE STRENGTH

ISRM Suggested Methods - Rock Characterization Testing and Monitoring 1974 - 2006

Borehole Number:	**BH03**	**Top Depth (m):**	**11.52**
Sample Number:	**-**	**Base Depth (m):**	**12.00**
Sample Type:	**C**	**Sample Date:**	**-**
Storage Condition:	**Sealed in plastic**	**Date of Receipt**	**19/06/2026**
Sample Description:	**Grey SILTSTONE**		

Specimen Details/Conditions	
Diameter - mm:	63.20
Height - mm:	172.41
Water Content - %:	0.2
Sample Mass - g:	1466.2
Bulk Density - Mg/m^3:	2.71
Dry Density - Mg/m^3:	2.70
Height Ratio: * Sample complies with H:D ratio	2.7
Degree of Saturation - %:	10
Assumed Specific Gravity for Degree of Saturation:	2.90

Test Result		Failure Sketch
Load Frame/Machine:	CM1/Controls	
Date of test:	16/07/2026	
Test Duration - mins:	02:37	
Orientation:	Perpendicular	
Stress Rate - MPa/s:	0.57	
Strain at Failure - kN:	282.30	
Unconfined Compressive Strength - Mpa:	90	
Mode of Failure:	Vertical Shear	

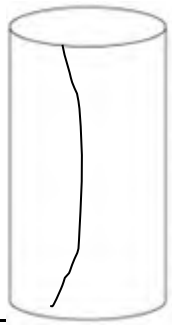
Remarks: -

UNIAXIAL COMPRESSIVE STRENGTH

ISRM Suggested Methods - Rock Characterization Testing and Monitoring 1974 - 2006

Borehole Number:	**BH04**	**Top Depth (m):**	**5.50**
Sample Number:	**-**	**Base Depth (m):**	**5.82**
Sample Type:	**C**	**Sample Date:**	**-**
Storage Condition:	**Sealed in plastic**	**Date of Receipt**	**19/06/2026**
Sample Description:	**Grey SILTSTONE**		

Specimen Details/Conditions	
Diameter - mm:	63.31
Height - mm:	171.48
Water Content - %:	0.9
Sample Mass - g:	1442.1
Bulk Density - Mg/m^3:	2.67
Dry Density - Mg/m^3:	2.65
Height Ratio: * Sample complies with H:D ratio	2.7
Degree of Saturation - %:	27
Assumed Specific Gravity for Degree of Saturation:	2.90

Test Result		Failure Sketch
Load Frame/Machine:	CM1/Controls	
Date of test:	16/07/2026	
Test Duration - mins:	02:23	
Orientation:	Perpendicular	
Stress Rate - MPa/s:	0.60	
Strain at Failure - kN:	268.40	
Unconfined Compressive Strength - Mpa:	85.3	
Mode of Failure:	Vertical Shear	

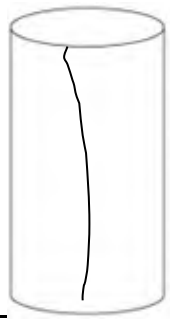
Remarks: -

UNIAXIAL COMPRESSIVE STRENGTH

ISRM Suggested Methods - Rock Characterization Testing and Monitoring 1974 - 2006

Borehole Number:	**BH04**	**Top Depth (m):**	**7.00**
Sample Number:	**-**	**Base Depth (m):**	**7.49**
Sample Type:	**C**	**Sample Date:**	**-**
Storage Condition:	**Sealed in plastic**	**Date of Receipt**	**19/06/2026**
Sample Description:	**Grey SILTSTONE**		

Specimen Details/Conditions		
Diameter - mm:		63.20
Height - mm:		154.64
Water Content - %:		0.1
Sample Mass - g:		1295.0
Bulk Density - Mg/m^3:		2.67
Dry Density - Mg/m^3:		2.67
Height Ratio:	* Sample does not comply with H:D ratio	2.4
Degree of Saturation - %:		4
Assumed Specific Gravity for Degree of Saturation:		2.90

Test Result		Failure Sketch
Load Frame/Machine:	CM1/Controls	
Date of test:	16/07/2026	
Test Duration - mins:	03:17	
Orientation:	Perpendicular	
Stress Rate - MPa/s:	0.60	
Strain at Failure - kN:	369.00	
Unconfined Compressive Strength - Mpa:	118	
Mode of Failure:	Vertical Shear	

Remarks: -

UNIAXIAL COMPRESSIVE STRENGTH

ISRM Suggested Methods - Rock Characterization Testing and Monitoring 1974 - 2006

Borehole Number:	**BH04**	**Top Depth (m):**	**26.64**
Sample Number:	**-**	**Base Depth (m):**	**27.00**
Sample Type:	**C**	**Sample Date:**	**-**
Storage Condition:	**Sealed in plastic**	**Date of Receipt**	**19/06/2026**
Sample Description:	**Grey SILTSTONE.**		

Specimen Details/Conditions	
Diameter - mm:	63.21
Height - mm:	164.55
Water Content - %:	0.3
Sample Mass - g:	1398.4
Bulk Density - Mg/m^3:	2.71
Dry Density - Mg/m^3:	2.70
Height Ratio: * Sample complies with H:D ratio	2.6
Degree of Saturation - %:	12
Assumed Specific Gravity for Degree of Saturation:	2.90

Test Result		Failure Sketch
Load Frame/Machine:	CM1/Controls	
Date of test:	16/07/2026	
Test Duration - mins:	02:55	
Orientation:	Perpendicular	
Stress Rate - MPa/s:	0.58	
Strain at Failure - kN:	321.20	
Unconfined Compressive Strength - Mpa:	102	
Mode of Failure:	Vertical Shear	

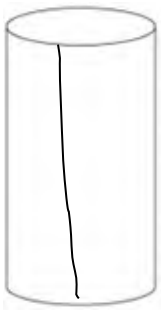
Remarks: -

UNIAXIAL COMPRESSIVE STRENGTH

ISRM Suggested Methods - Rock Characterization Testing and Monitoring 1974 - 2006

Borehole Number:	**BH04A**	**Top Depth (m):**	**20.27**
Sample Number:	**-**	**Base Depth (m):**	**20.49**
Sample Type:	**C**	**Sample Date:**	**-**
Storage Condition:	**Sealed in plastic**	**Date of Receipt**	**19/06/2026**
Sample Description:	**Grey SILTSTONE**		

Specimen Details/Conditions	
Diameter - mm:	63.27
Height - mm:	166.31
Water Content - %:	0.3
Sample Mass - g:	1424.4
Bulk Density - Mg/m^3:	2.72
Dry Density - Mg/m^3:	2.72
Height Ratio: * Sample complies with H:D ratio	2.6
Degree of Saturation - %:	14
Assumed Specific Gravity for Degree of Saturation:	2.90

Test Result		Failure Sketch
Load Frame/Machine:	CM1/Controls	
Date of test:	16/07/2026	
Test Duration - mins:	03:29	
Orientation:	Perpendicular	
Stress Rate - MPa/s:	0.59	
Strain at Failure - kN:	389.20	
Unconfined Compressive Strength - Mpa:	124	
Mode of Failure:	Vertical Shear	

Remarks: -

APPENDIX 4 – Geophysics Survey

AGP26012_02

Report
on the
Geophysical Investigation
For
Killoshulan Wind Farm
Co. Kilkenny
For
Ground Investigations Ireland Limited

12TH October 2026

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PRIVATE AND CONFIDENTIAL

THE FINDINGS OF THIS REPORT ARE THE RESULT OF A GEOPHYSICAL SURVEY USING NON-INVASIVE SURVEY TECHNIQUES CARRIED OUT AT THE GROUND SURFACE. INTERPRETATIONS CONTAINED IN THIS REPORT ARE DERIVED FROM A KNOWLEDGE OF THE GROUND CONDITIONS, THE GEOPHYSICAL RESPONSES OF GROUND MATERIALS AND THE EXPERIENCE OF THE AUTHOR. APEX GEOPHYSICS LTD. HAS PREPARED THIS REPORT IN LINE WITH BEST CURRENT PRACTICE AND WITH ALL REASONABLE SKILL, CARE AND DILIGENCE IN CONSIDERATION OF THE LIMITS IMPOSED BY THE SURVEY TECHNIQUES USED AND THE RESOURCES DEVOTED TO IT BY AGREEMENT WITH THE CLIENT. THE INTERPRETATIVE BASIS OF THE CONCLUSIONS CONTAINED IN THIS REPORT SHOULD BE TAKEN INTO ACCOUNT IN ANY FUTURE USE OF THIS REPORT.

PROJECT NUMBER	AGP26012		
AUTHOR	**CHECKED**	**REPORT STATUS**	**DATE**
TONY LOMBARD M.SC (GEOPHYSICS)	IAN SHARKEY (DIP. MIN. ENG.)	V.01	12TH SEPTEMBER 2026
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1. EXECUTIVE SUMMARY

APEX Geophysics Limited was requested by Ground Investigations Ireland Limited to carry out a geophysical investigation at Killoshulan Wind Farm, Co. Kilkenny. There was a requirement for a geophysical survey to assess ground conditions at thirteen proposed turbine bases (T01 to T04, Alt_T04, T05, Alt_T05 and T06 to T11).

The objectives of the investigation were to provide information on soil type and thickness, soil stiffness, depth to bedrock and type of bedrock, excavatability of the bedrock and potential karst features/faults/fracture zones within the bedrock.

The Killoshulan Wind Farm is located approximately 18 km northwest of Kilkenny. The site comprises of open agricultural land and forested areas with topography ranging from approximately 194 to 318 m OD.

The Geological Survey of Ireland (GSI) Quaternary Sediments map for the area indicates that the proposed turbine bases are in till derived from Namurian sandstones and shales, karstified bedrock outcrop or subcrop and in bedrock outcrop or subcrop. The GSI Bedrock map indicates that turbine bases T06-T11 are underlain by muddy siltstone & silty mudstone of the Killeshin Siltstone Formation. Bases T02, T03, T05 and Alt T05 are underlain by cherty, muddy, calcarenitic limestone of the Clogrenan Formation and T01, T04 and Alt T04 are underlain by crinoidal wackestone/packstone limestone of the Ballyadams Formation. The GSI karst database shows karst features across the wind farm. These are mainly classified as swallow holes, enclosed depressions and springs.

The survey was carried out between the 30th of April and 24th of July 2026 and involved the collection of 2D Electrical Resistivity Tomography (ERT), Seismic Refraction profiling and Microgravity mapping. The results of the investigation are shown on maps, sections, tables and discussion sections for each turbine base.

The geophysical datasets in conjunction with client direct investigation data indicate the main soil types are;

- Some SILT/CLAY
- Sandy gravelly CLAY;
- Clayey silty SAND/GRAVEL
- SAND/GRAVEL

At the proposed turbine bases in a limestone setting the soils are generally thin and overlie:

- Increased weathering/fracturing/karstified LIMESTONE with clay/water infill/ and/or possible DOLOMITE
- Moderately - Slightly weathered/fractured/some karstified LIMESTONE
- Slightly weathered/fractured to fresh LIMESTONE
- Minor mudstone is also interpreted in places

At the proposed turbine bases in a mudstone setting soils are generally thick, up to 11 to 20 m, and overlie moderately to slightly weathered to fresh mudstone. Minor limestone is also interpreted in places.

Recommendations for additional direct investigation consisting of boreholes, along with recommendations for detailed assessment of excavatability and developments in a karst setting are made.

The results of the geophysical investigation should be reviewed based on the findings of any further direct investigation.

2. INTRODUCTION

APEX Geophysics Limited was requested by Ground Investigations Ireland Limited to carry out a geophysical investigation at Killoshulan Wind Farm, Co. Kilkenny. There was a requirement for a geophysical survey to assess ground conditions at thirteen proposed turbine bases (T01 to T04, Alt_T04, T05, Alt_T05 and T06 to T11).

2.1 Survey Objectives

The objectives of the investigation were to provide information on:

- Soil type and thickness
- Soil stiffness
- Depth to bedrock and type of bedrock
- Excavatability of the bedrock
- Potential karst features/faults/fissure zones within the bedrock

2.2 Site Background

The Killoshulan Wind Farm is located approximately 7 km northeast of Urlingford and 18 km northwest of Kilkenny. The site comprises of a mixture of open agricultural land and forested areas with topography ranging from approximately 194 to 318 m OD. The proposed turbine locations are shown in Fig. 2.1.



Fig 2.1: Location map.

2.2.1 Soils

The Geological Survey of Ireland (GSI) Quaternary Sediments map for the area (GSIc, 2025) indicates that the proposed turbine bases are in till derived from Namurian sandstones and shales, karstified bedrock outcrop or subcrop and in bedrock outcrop or subcrop (Fig. 2.2). Till derived from limestones, alluvium and gravels derived from limestones are present in the surrounding areas.



Fig 2.2: Quaternary sediments map.

2.2.2 Geology

The (GSI) 1:100k Bedrock Geology map for the area (GSIa, 2025) indicates that turbine bases T06-T11 are underlain by muddy siltstone & silty mudstone of the Killeshin Siltstone Formation. Bases T02, T03, T05 and Alt T05 are underlain by cherty, muddy, calcarenitic limestone of the Clogrenan Formation and T01, T04 and Alt T04 are underlain by crinoidal wackestone/packstone limestone of the Ballyadams Formation (Fig. 2.3). A geological fault is shown running through the central part of the survey area – northeast of turbine base T04. The GSI karst database shows karst features across the wind farm. These are mainly classified as swallow holes, enclosed depressions and springs.

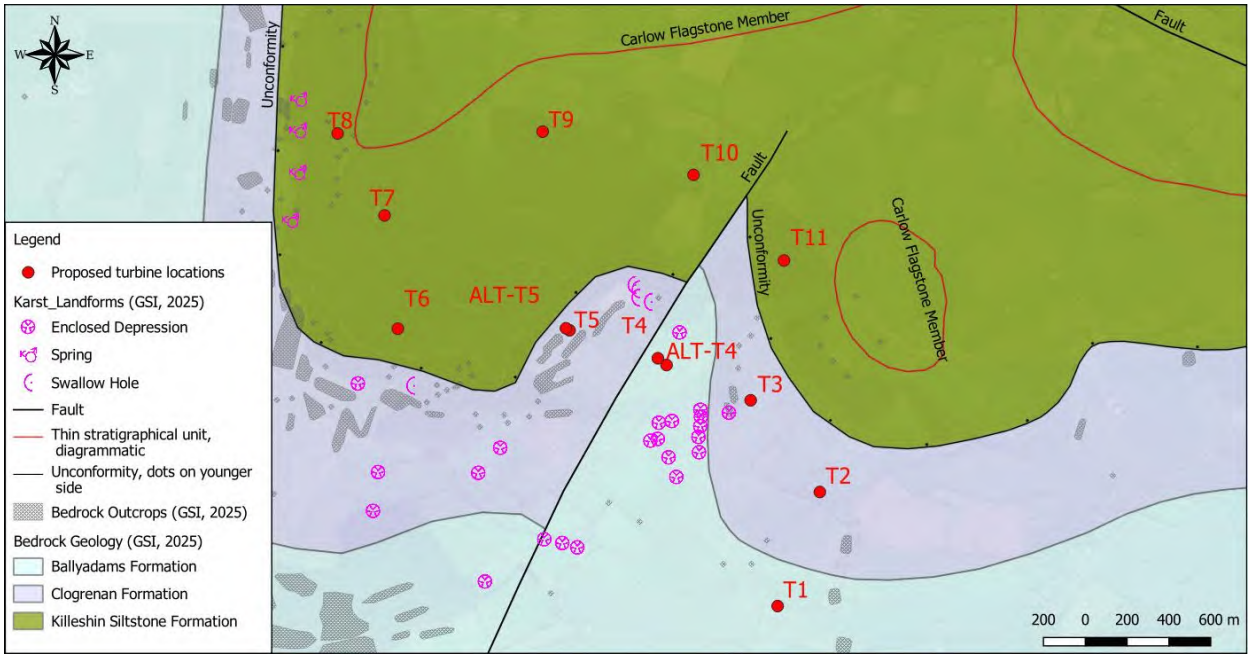


Fig 2.3: Bedrock geology map.

2.2.3 Groundwater

The groundwater vulnerability rating (GSIb, 2025) is classified as 'high' to 'extreme' to "rock at or near surface or karst" across the wind farm (Fig. 2.4). The bedrock is classified as 'Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones' for the Killeshin Siltstone Formation and as 'Regionally Important Aquifer - Karstified (diffuse)' for the Clogrenan and Ballyadams Formations (GSIa, 2025), (Fig. 2.5).

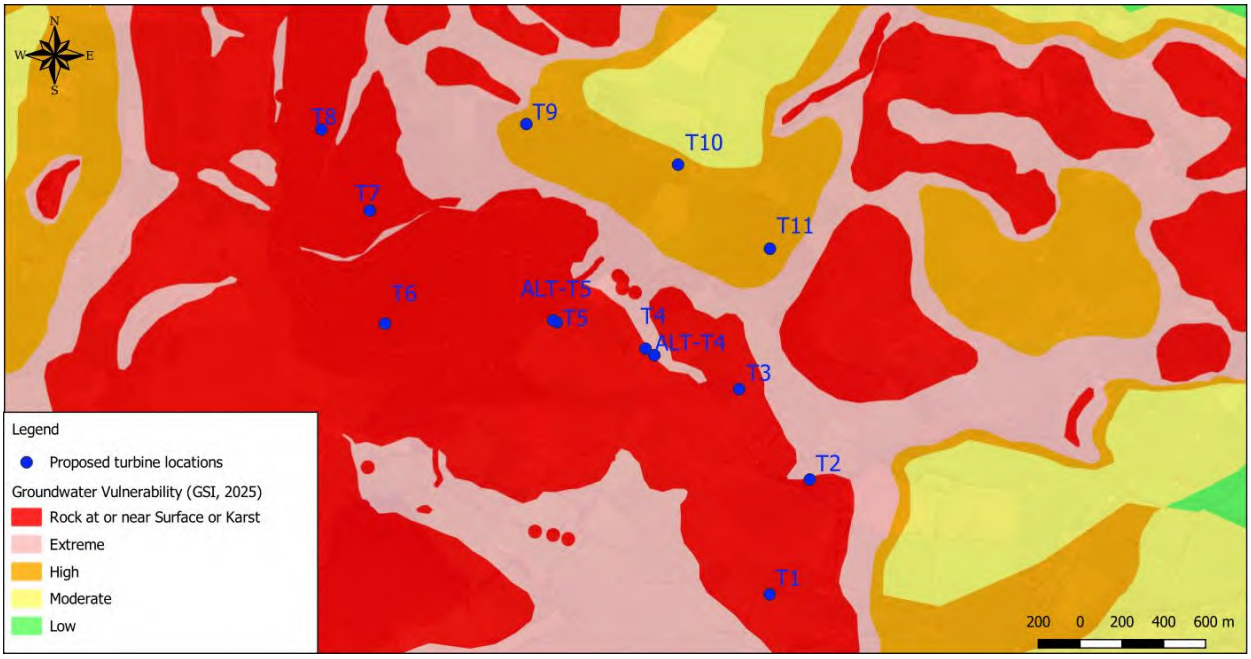


Fig 2.4: The GSI groundwater vulnerability classification map.

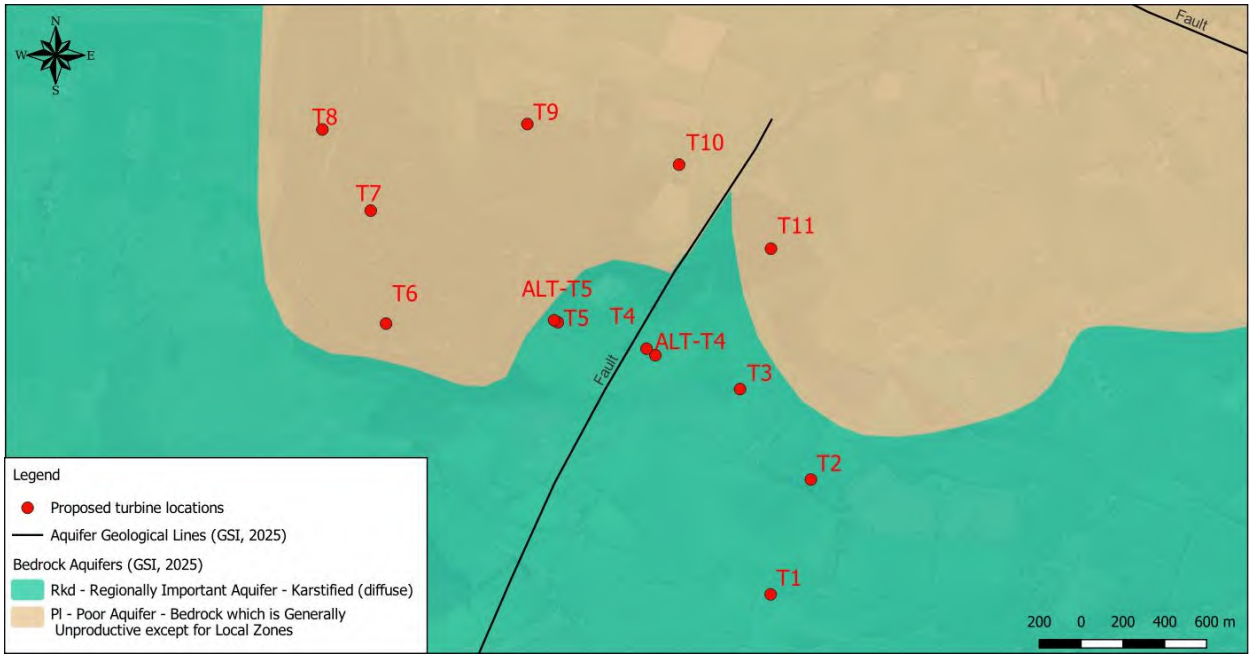


Fig 2.5: The GSI bedrock aquifer classification map.

2.2.4 Historical Data

The historical 6 inch sheet for the area indicates thin bedded dark grey crystalline, flaggy and cherty limestone within approximately 50 to 500 m of turbine bases T01 to T05 and dark grey and black shales as well as flags and grit within approximately 50 to 500 m of turbine bases T05, Alt_T05, T06 to T08, T10 and T11. Variable dips to the east, southeast and west are also noted as well as limestone drift, a drift boundary and rock boundary (Fig. 2.6).

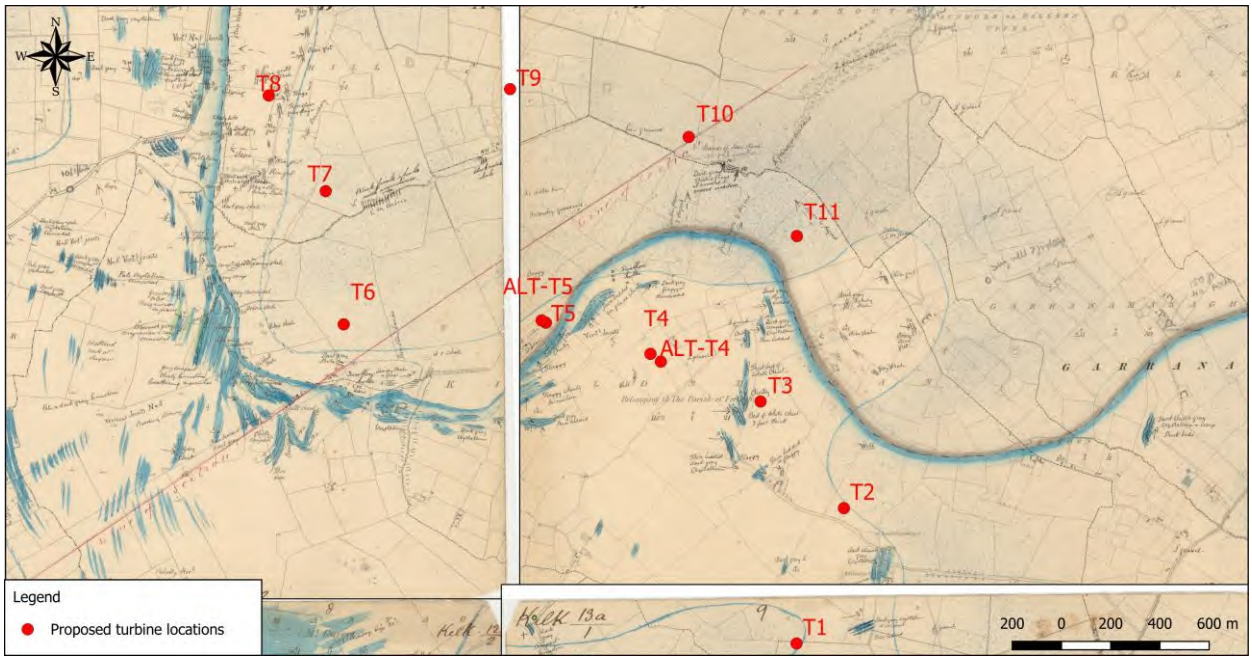


Fig 2.6: The GSI historical 6-inch map.

2.2.5 Direct Investigation Data

Logs for thirteen rotary cores drilled across the proposed wind farm development were provided to support the interpretation of the geophysical data. Ten of these rotary cores (BH01 to BH04, BH04A, BH05, BH05A and BH06 to BH08) are relevant for the proposed turbine bases covered in this report.

Encountered soil comprises of thin topsoil 0.1 to 0.25m thick over sandy gravelly clay 0.7 to 11.5 m thick, clayey sandy gravel 0.85 to 2.3 m thick and possible weathered rock recovered as 1.3 m of clayey sandy gravel.

Bedrock was encountered from ground level (BH07) to a depth of 11.5 m bgl (BH06). Encountered bedrock comprises destructed to distinctly weathered very weak to weak siltstone, residually to partially weathered extremely weak to weak mudstone and distinctly weathered to fresh medium strong to very strong limestone. The rotary cores terminated in rock at depths of 5.0 to 30.5 m bgl.

Localised intervals of no solid recovery, recorded as calcareous dust and fine gravel, were noted in BH01 from a depth of 13 to 22.0 m. In BH04, limestone was encountered between 3.1 m and 9.9 m bgl over firm to very stiff gravelly clay, clayey gravel and clay/silt to 24.1 m bgl over limestone to termination depth of 30.5 m bgl.

The direct investigation locations are shown on Drawing AGP26012_01 (Appendix D).

2.3 Survey Rationale

The investigation consisted of 2D Electrical Resistivity Tomography (ERT), Seismic Refraction profiling and Microgravity mapping.

Electrical resistivity Tomography (ERT) images the resistivity of the materials in the subsurface along a profile to produce a cross-section showing the variation in resistivity with depth, depending on the length of the profile. Each cross-section is interpreted to determine the material type along the profile at increasing depth, based on the typical resistivities returned for ground materials.

Seismic Refraction profiling measures the velocity (Vp) of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fissured materials have lower velocities.

Microgravity surveying measures small variations in the earth's gravity field that are associated with changes in subsurface density. Air, water or soil filled voids would typically exhibit lower densities than the surrounding material and give rise to decreases in the measured gravity field.

As with all geophysical methods the results are based on indirect readings of the subsurface properties. The effectiveness of the proposed approach will be affected by variations in the ground properties. By combining a number of techniques it is possible to provide a higher quality interpretation and reduce any ambiguities which may otherwise exist. Further information on the detailed methodology of each geophysical method employed in this investigation is given in **APPENDIX A: DETAILED METHODOLOGY**.

3. RESULTS

The survey was carried out over a number of sessions between the 30th of April and 24th of July 2026. The geophysical survey locations are shown on Drawing AGP26012_01 (Appendix D).

3.1 ERT

Two perpendicular ERT profiles were acquired at each proposed turbine base, where access allowed (R1 to R26). The data have been broadly interpreted in conjunction with seismic refraction data and the direct investigation data as follows:

Resistivity (Ohm-m)	Interpretation
<50	SILT/CLAY
50-250	Sandy gravelly CLAY
250-1000	Clayey Silty SAND/GRAVEL
>1000	SAND/GRAVEL
50-350	MUDSTONE
50-250	Increased weathering/fracturing/karstified LIMESTONE with clay/water infill/ and/or possible DOLOMITE
250-1,000	Moderately - Slightly weathered/fractured/karstified LIMESTONE
1,000-10,000	Slightly weathered/fractured to fresh LIMESTONE

3.2 Seismic Refraction P-wave Velocity Profiling

Sixty four seismic refraction profiles (S1 to S64) were acquired across the turbine bases. The datasets were acquired on perpendicular profiles at each proposed turbine base. The seismic refraction P-wave data was processed to produce a series of tomographic images which are presented in Appendix C. The data was then converted to layered models for interpretation. The layered model P-wave velocities (Vp) have been interpreted in conjunction with the ERT and direct investigation data as follows:

Layer	Vp Seismic Velocity (m/s)*	Average Seismic Velocity (m/s)	Interpretation	Stiffness/Rock Quality	Estimated Excavatibility**
1	195-405	278	Soil	Soft/Loose	Diggable
			Possible Completely Weathered Rock	Very Poor	
2	547-1,085	710	Soil	Firm/Medium Dense	
			Possible Highly Weathered Rock	Poor	Rippable
3A	1,167-2,265	1,810	Soil	Stiff-Very Stiff/Dense-Very Dense	Diggable
			Moderately to Slightly Weathered/Fractured Rock	Fair	Marginally Rippable to Break/Blast
3B	1,447-2,188	1,858	Soil	Stiff-Very Stiff/Dense-Very Dense	Diggable
			Moderately to Slightly Weathered/Fractured Rock	Fair	Marginally Rippable to Break/Blast
4A	2,006-3,722	3,042	Slightly Weathered/Fractured-Fresh Rock	Good	Break/Blast
4B	2,286-4,891	3,738	Slightly Weathered/Fractured-Fresh Rock	Good	Break/Blast

**Layer 3A and 4A velocities primarily derived at bases T05, Alt_T05 and T06 to T11. Layer 3B and 4B velocities primarily derived at bases T01 to T04, Alt_T04.*
***It should be noted that the cut-off Vp velocity for excavatability will be lower if excavating in trenches.*

Note: Due to seismic anisotropy caused by the soil and rock fabric in the ground there may be small differences in depth to layer boundaries and velocities along profiles acquired in different directions. These differences are taken account of in the interpreted data.

3.3 Microgravity

The microgravity survey was employed to identify low density zones within the ground potentially indicative of karst voiding. Karst may be defined as the whole or partial dissolution of limestone bedrock by the action of water and the subsequent whole or partial infill with overburden material. The degree of karstification depends on the quantity of limestone which has been dissolved and subsequently infilled. Lower relative microgravity values may be indicative of the presence of increased soil thickness, increased weathered/karstified rock thickness and/or the presence of cavities and fissures within the limestone.

A hundred and sixty microgravity readings were recorded across one proposed turbine base, Alt_T04, and extended from the base to encompass low resistivity zones noted on ERT profiles R23 and R24 and their locations are plotted on Drawing AGP26012_Alt_T04b. Corrections were applied to the microgravity data to eliminate effects of local and regional factors including topography, elevation, tidal effects and latitude which have varying influences on measured microgravity values. The quality of the microgravity data was very good, with an average reproducibility of <10 microGals and repeatability of 4 microGals. The residual microgravity data (indicating local variations in gravity) are plotted on Drawing AGP26012_Alt_T04b (Appendix D).

3.4 Integrated Interpretation of Bases in Limestone Setting

3.4.1 Turbine Base T01

The results at turbine base T01 are shown on Drawing AGP26012_T01 and have been interpreted in conjunction with the direct investigation data as thin clayey silty sand/gravel and sand/gravel over shallow bedrock as follows:

- **Layer 1**: consists of loose material 0.2 to 1.6 m thick (average 1.0 m and 0.5 m at the turbine centre).
- **Layer 2**: consists of medium dense soil material which is 0.5 to 3.0 m thick (average 1.8 m and 0.5 m at the turbine centre).
- High resistivity values (>300 Ohm) and seismic velocities of 219 to 385 m/s and 569 to 838 m/s respectively indicate layers 1 and 2 may also contain some completely to highly weathered rock.
- **Layer 3:** consists of moderately to slightly weathered/fractured/karstified limestone and possible dolomite/mudstone at a depth of 2.0 to 3.1 m bgl (average 2.7 m bgl and 2.5 m bgl at the turbine centre). This layer is approximately 1.9 to 10.0 m thick and overlies:
- **Layer 4:** which consists of high resistivity (>1,000 Ohm-m) slightly weathered/fractured to fresh limestone at the turbine centre with low resistivity (50-250 Ohm-m) possible dolomite/mudstone. Interpreted depth to the top of this layer varies from 2.3 m bgl to 11.8 m bgl (average 7.3 m bgl and 6.3 m bgl at the turbine centre).
- Within **layer 4** the low resistivity material is interpreted over distance 100 to 130 m on profile R5 and distance 120 to 187 on profile R6 (Drawings AGP26012_T01). While these zones are interpreted as likely rock based on relatively high seismic velocity of 2,780 m/s the possibility sandy gravelly clay is present cannot be excluded and this low resistivity material should be targeted with additional direct investigation.
- The contact between the high resistivity limestone and low resistivity possible dolomite/mudstone may be faulted/fractured. This may be supported by borehole BH01 which encountered moderately weathered limestone at a depth of 1.1 m over moderately to slightly weathered limestone over dust and fine gravel at 13.0 m bgl.

3.4.2 Turbine Base T02

The results at turbine base T02 are shown on Drawing AGP26012_T02 and have been interpreted in conjunction with the direct investigation as predominantly sandy gravelly clay with some clayey silty sand/gravel over bedrock as follows:

- **Layer 1**: consists of soft/loose material 0.2 to 1.3 m thick (average 0.7 m and 1.0 m at the turbine centre).
- **Layer 2**: consists of firm/medium dense soil material, and possible highly weathered rock towards the base, which is 0.2 to 3.3 m thick (average 2.8 m and 3.8 m at the turbine centre).
- **Layer 3:** consists of stiff to very stiff soil and some moderately to slightly weathered/fractured/karstified limestone at a depth of 1.1 to 4.6 m bgl (average 2.3 m bgl and 1.7 m bgl at the turbine centre).
- **Layer 4:** consists of low resistivity (250-1,000 Ohm-m) moderately to slightly weathered/fractured/karstified limestone at the turbine centre with high resistivity (>1,000 Ohm-m) slightly weathered to fresh limestone approximately 15 m south of the base on ERT profile R11 and

20m north of the base on R12. Interpreted depth to the top of this layer varies from 1.7 m bgl to 8.1 m bgl (average depth is 5.3 m bgl and 5.0 m bgl at the turbine centre).

- Within **layer 4** a zone of very low resistivity (50-250 Ohm) at a distance of 68 to 86 m on ERT profile R12 and a distance of 68 m to the end of profile R11 is a possible zone of dolomite/mudstone or very stiff sandy gravelly clay. The GSI historical 6-inch map (Fig. 2.5) notes 'dark bluish grey crystalline outcrop, magnesian in places', which supports a possible dolomite interpretation, approximately 200m southeast of profile R11. This zone should be further targeted with direct investigation to confirm the material type.

Borehole BH02, which is offset by approximately 10 to 11 m from the geophysical profiles, encountered slightly weathered to fresh limestone at a depth of 4 m bgl.

3.4.3 Turbine Base T03

The results at turbine base T03 are shown on Drawing AGP26012_T03 and have been interpreted in conjunction with the direct investigation as thin sandy gravelly clay, clayey silty sand/gravel and minor sand/gravel over shallow bedrock as follows:

- **Layer 1**: consists of soft/loose material 0.1 to 0.8 m thick (average 0.7 m and 0.7 m at the turbine centre).
- **Layer 2**: consists of medium dense soil material and/or highly weathered mudstone 0.5 to 2.6 m thick (average 1.7 m and 1.0 m at the turbine centre). BH03 encountered this material as distinctly weathered mudstone.
- **Layer 3:** consists of moderately to slightly weathered/fractured limestone at a depth of 1.1 to 3.2 m bgl (average 2.3 m bgl and 1.7 m bgl at the turbine centre). This layer ranges in thickness from 1.9 m to 3.8 m (average 2.3 m and 1.9 m at the turbine centre). BH03 encountered this material as distinctly weathered limestone from a depth of 2.68 to 4.63 m bgl.
- **Layer 4:** consists of slightly weathered to fresh limestone. Interpreted depth to the top of this layer varies from 2.8 m to 5.9 m bgl (average 4.6 m bgl and 3.6 m bgl at the turbine centre). BH03 encountered this material as slightly weathered limestone.

3.4.4 Turbine Base T04

The results at turbine base T04 are shown on Drawing AGP26012_T04 and have been interpreted in conjunction with the direct investigation as thin sandy gravelly clay and clayey silty sand/gravel over shallow bedrock as follows:

- **Layer 1**: consists of soft/loose material 0.2 to 1.3 m thick (average 0.8 m and 0.7 m at the turbine centre).
- **Layer 2**: consists of firm/medium dense material 0.5 to 2.4 m thick (average 1.5 m and 0.7 m at the turbine centre).
- **Layer 3:** is interpreted at a depth of 0.2 to 3.0 m (average 2.5 and 1.3 m at the turbine centre). This material consists of a number of near surface zones of low resistivity (50-250 Ohm-m) interpreted as areas of increased weathering/fracturing/karstification of the LIMESTONE with clay/water infill. This is confirmed by borehole BH-T4-NW which encountered sandy gravelly clay beneath limestone at a depth of 7.0 m to 15.8 m bgl. Where interpreted from the geophysics this material is up to 10.8 m thick.

- Within Layer 3, on both ERT profiles, R3 and R4, mid resistivity values (250-1,000 Ohm-m) are interpreted as moderately - slightly weathered/fractured/karstified LIMESTONE. This is typically 3 to 20 m thick.
- Also, within bedrock the high resistivity material (>1,000 Ohm-m) is interpreted as slightly weathered/fractured to fresh limestone and this is confirmed at depth by boreholes BH04, BH04A and BH-T4-NW which encountered slightly weathered to fresh limestone at depth.

Note: Due to anisotropy caused by the soil and rock fabric in the ground, which is increased by the karstic environment, there will be differences in depth to interpreted rock layer boundaries along the profiles acquired in different directions.

3.4.5 Turbine Base Alt_T04

The results at turbine base Alt_T04 are shown on Drawing AGP26012_Alt_T04 and have been interpreted in conjunction with the direct investigation as thin predominantly clayey silty sand/gravel and some sandy gravelly clay over shallow bedrock as follows:

- **Layer 1**: consists of soft/loose material 0.2 to 0.8 m thick (average 0.4 m and 0.2 m at the turbine centre).
- **Layer 2**: consists of firm/medium dense material 0.7 to 1.4 m thick (average 1.1 m and 0.9 m at the turbine centre). The data indicates the soils of layers 1 and 2 may also comprise some completely to highly weathered rock
- **Layer 3:** consists predominantly of high resistivity (>1,000 Ohm-m) slightly weathered/fractured to fresh limestone at a depth of 1.3 to 2.5 m bgl (average 1.6 m and 1.2 m at the turbine centre). Close to the proposed turbine base borehole BH-Alt-T4 encountered this layer as slightly weathered limestone at a depth of 5.5 to 26.5 m over moderately to slightly weathered limestone.
- Within bedrock layer 3 zones of mid range resistivity (250-1,000 Ohm-m) are interpreted as moderately - slightly weathered/fractured/karstified LIMESTONE.
- Also, within bedrock layer 3 a number of low resistivity (50-250 Ohm-m) zones are also present on ERT profiles R23 and R24. These are interpreted as areas of increased weathering/fracturing/karstification of the LIMESTONE with clay/water infill and/or possible DOLOMITE. The largest zone is at distance 22 to 62 m on profile R23 and coincides with an area of reduced gravity values of < 20 microGals which could result from an increase in the soil thickness or from a change in the bedrock e.g. increased weathering/fracturing/karstification, or the presence of a karst feature within the rock. This area should be further investigated with direct investigation as the nearest borehole BH04A is offset from the geophysical profiles and encountered slightly weathered to fresh limestone, indicating this zone may have limited extent.

- Where microgravity surveying was conducted on a 2m x 2m station spacing close to the proposed turbine base gravity values, shown on Drawing AGP26012_Alt_T04b, range from 80 to 130 microGals and coincide with thin moderately - slightly weathered/fractured/karstified LIMESTONE over slightly weathered/fractured to fresh limestone. This area covers distance 79 to 107 m on ERT profile R23 and 76 to 103 m on profile R24 (see Drawing AGP26012_Alt_T04a). In this area borehole BH_ALT_T4 encountered moderately weathered limestone at a depth of 0.6m over slightly weathered limestone at a depth of 5.5 m. No significantly low gravity anomalies were recorded at the proposed base.

Note: Due to anisotropy caused by the soil and rock fabric in the ground, which is increased by the karstic environment, there will be differences in depth to interpreted rock layer boundaries along the profiles acquired in different directions.

3.5 Integrated Interpretation of Bases in Mudstone Setting

3.5.1 Turbine Base T05

The results at turbine base T05 are shown on Drawing AGP26012_T05 and have been interpreted in conjunction with the direct investigation as clayey silty sand/gravel with some sandy gravelly clay southeast and northeast of the turbine centre over bedrock as follows:

- **Layer 1**: consists of soft/loose material 0.3 to 1.2 m thick (average 0.7 m and 0.6 m at the turbine centre).
- **Layer 2**: consists of firm/medium dense material 1.0 to 2.8 m thick (average 1.6 m and 2.4 m at the turbine centre).
- **Layer 3:** consists of moderately weathered mudstone at a depth of 1.3 to 3.5 m bgl (average 3.1 m bgl and 3.0 m bgl at the turbine centre). This layer ranges in thickness from 0.8 m to 5.0 m (average 4.0 m and 3.9 m at the turbine centre).
- **Layer 4:** consists predominantly of slightly weathered mudstone with a small area of limestone interpreted southeast of the turbine centre at distance 102 to 110 m on profile R1. Interpreted depth to the top of this layer varies from 2.1 m to 7.5 m bgl at distance 35 m on ERT profile R2 southwest of the turbine centre (average 5.7 m bgl and 6.7 m bgl at the turbine centre).

In the interpreted soil, areas of increased resistivity (>250 Ohm-m) and seismic velocity (547 to 589 m/s) indicate some completely to highly weathered rock may be present towards the base of the soils, as encountered in borehole BH05 from 0.7 to 2.0 m bgl.

Within the bedrock relatively low seismic velocity of 2,006 to 2,524 in conjunction with reduced resistivity (<~70 Ohm-m) may indicate some localised increase in weathering within the rock. These areas are seen at distance 32 to 48 m and 102 to 110 m on profile R1 and distance 57 to 82 m on R2 and are shown on Drawing AGP26012_T5. This interpretation is supported by the borehole data which encountered the rock as destructed to partially weathered (boreholes BH05 and BH05B).

3.5.2 Turbine Base Alt_T05

The results at turbine base Alt_T05 are shown on Drawing AGP26012_Alt_T05 and have been interpreted in conjunction with the direct investigation as thin predominantly clayey silty sand/gravel and sand/gravel with some sandy gravelly clay over bedrock as follows:

- **Layer 1**: consists of soft/loose material 0.2 to 1.4 m thick (average 0.9 m and 0.4 m at the turbine centre).
- **Layer 2**: consists of firm/medium dense material 0.9 to 4.8 m thick (average 2.1 m and 1.4 m at the turbine centre).
- **Layer 3:** consists of moderately weathered mudstone at a depth of 0.9 to 5.2 m bgl (average 2.9 m bgl and 2.3 m bgl at the turbine centre). This layer ranges in thickness from 1.6 m to 6.4 m (average 4.5 m and 4.0 m at the turbine centre).
- **Layer 4:** consists of predominantly low resistivity (50-250 Ohm-m) slightly weathered to fresh mudstone and higher resistivity (>250 Ohm-m) slightly weathered/fractured to fresh limestone, with a possible

faulted contact between the rock types. Interpreted depth to the top of this layer varies from 2.3 m to 11.3 m bgl at distance 140 m on ERT profile R26 southeast of the turbine centre (average 6.8 m bgl and 6.5 m bgl at the turbine centre).

In the interpreted soils areas of increased resistivity (>250 Ohm-m) and seismic velocity (559 to 786 m/s) indicate highly weathered rock may be present in this layer, as also indicated in BH05 where possible weathered rock encountered as gravel of mudstone was noted from 0.7 to 2.0 m bgl.

Within the bedrock areas of lower resistivity (< 150 Ohm-m) and relatively low seismic velocity of 2,455 to 2,683 m/s may indicate some localised increase in weathering within the rock. These areas are shown on profile R26 on Drawing AGP26012_Alt_T05. This interpretation is supported by the borehole data which encountered the rock as destructed to partially weathered (boreholes BH05, BH05B and BH-ALT-T5).

While the direct investigation data (boreholes BH05, BH05B and BH-ALT-T5) all encountered mudstone bedrock, one borehole (BH-ALT-T5) also encountered slightly weathered limestone at a depth of 20.2 m bgl. This borehole is offset from an area of limestone interpreted from the geophysics.

3.5.3 Turbine Base T06

The results at turbine base T06 are shown on Drawing AGP26012_T06. The data have been interpreted as a sequence of predominantly sandy gravelly clay with small 'pockets' of silt/clay and an area of clayey silty sand/gravel, approximately 30 m NE of the base, over bedrock as follows:

- **Layer 1**: consists of soft/loose material 0.2 to 1.5 m thick (average 0.9 m and 0.4 m at the turbine centre).
- **Layer 2**: consists of firm/medium dense material 0.4 to 3.4 m thick (average 2.0 m and 1.2 m at the turbine centre).
- **Layer 3:** consists of stiff to very stiff/dense to very dense material 1.9 to 7.1 m thick (average 4.4 m and 2.7 m at the turbine centre).
- **Layer 4:** consists of slightly weathered to fresh mudstone. Interpreted depth to the top of this layer varies from 3.7 m to 9.6 m at distance 100 m on ERT profile R21 and 100 m on R22, southeast and northeast of the turbine centre (average 6.5 m bgl and 4.3 m bgl at the turbine centre).

In the interpreted soil layers seismic velocity of 563 to 687 m/s and 1,665 to 1,888 m/s indicate some weathered rock may also be present in layers 2 and 3.

3.5.4 Turbine Base T07

The results at turbine base T07 are shown on Drawing AGP26012_T07 and have been interpreted as a sequence of predominantly sandy gravelly clay with some minor 'pockets' of silt/clay over bedrock as follows:

- **Layer 1**: consists of soft material 0.2 to 1.4 m thick (average 0.7 m and 0.6 m at the turbine centre).
- **Layer 2**: consists of firm material 0.9 to 3.2 m thick (average 2.5 m and 1.8 m at the turbine centre).
- **Layer 3:** consists of stiff to very stiff material 1.8 to 4.5 m thick (average 3.7 m and 3.7 m at the turbine centre).

- **Layer 4:** consists of slightly weathered to fresh mudstone. Interpreted depth to the top of this layer varies from 4.7 m to 7.0m at distance 105 m on ERT profile R18 northeast of the turbine centre (average 6.5 m bgl and 6.6 m bgl at the turbine centre).

In the interpreted soil layers seismic velocity of 617 to 768 m/s and 1,453 to 1,970 m/s indicate some weathered rock may also be present in layers 2 and 3.

3.5.5 Turbine Base T08

The results at turbine base T08 are shown on Drawing AGP26012_T08 and have been interpreted as predominantly sand/gravel and clayey silty sand/gravel over shallow bedrock as follows:

- **Layer 1**: consists of loose material 0.2 to 0.9 m thick (average 0.5 m and 0.8 m at the turbine centre).
- **Layer 2**: consists of medium dense material 0.9 to 3.4 m thick (average 2.2 m and 2.1 m at the turbine centre). Seismic velocities of 715 to 1002 m/s and high resistivity values (>350 Ohm-m), in conjunction with BH05, which encounter extremely weak mudstone in a similar geophysical setting at T5, indicate this layer may also comprise of and/or highly weathered mudstone.
- **Layer 3:** consists of moderately to slightly weathered mudstone at a depth of 1.4 to 4.2 m bgl (average 2.9 m bgl and 2.5 m bgl at the turbine centre). This layer ranges in thickness from 1.3 m to 4.6 m (average 3.4 m and 2.0 m at the turbine centre).
- **Layer 4:** consists of slightly weathered to fresh mudstone. Interpreted depth to the top of this layer varies from 3.7 m to 8.0 m bgl (average 5.4 m bgl and 4.4 m bgl at the turbine centre).

3.5.6 Turbine Base T09

The results at turbine base T09 are shown on Drawing AGP26012_T09 and have been interpreted as a sequence of sandy gravelly clay over bedrock as follows:

- **Layer 1**: consists of soft material 0.2 to 0.9 m thick (average 0.7 m and 0.4 m at the turbine centre).
- **Layer 2**: consists of firm material 0.9 to 3.4 m thick (average 1.7 m and 1.5 m at the turbine centre).
- **Layer 3:** consists of very stiff material 2.2 to 5.2 m thick (average 3.1 m and 2.7 m at the turbine centre).
- **Layer 4:** consists of slightly weathered to fresh mudstone. Interpreted depth to the top of this layer varies from 4.7 m to 7.5m at distance 22m on ERT profile R14 northwest of the turbine centre (average 9.2 m bgl and 12.2 m bgl at the turbine centre).

In the interpreted soil layers seismic velocity of 548 to 638 m/s and 2,045 to 2,265 m/s indicate weathered rock may also be present in layers 2 and 3.

3.5.7 Turbine Base T10

The results at turbine base T10 are shown on Drawing AGP26012_T10 and have been interpreted in conjunction with the direct investigation as a thick sequence of sandy gravelly clay over bedrock as follows:

- **Layer 1**: consists of soft material 0.2 to 1.0 m thick (average 0.7 m and 0.6 m at the turbine centre).
- **Layer 2**: consists of predominantly firm material 1.6 to 3.6 m thick (average 2.0 m and 2.2 m at the turbine centre).
- **Layer 3:** consists of very stiff material 6.1 to 9.3 m thick (average 8.5 m and 9.0 m at the turbine centre).

- **Layer 4:** consists of slightly weathered to fresh mudstone. Interpreted depth to the top of this layer varies from 9.2 m to 12.2 m bgl (average 9.2 m bgl and 12.2 m bgl at the turbine centre).

3.5.8 Turbine Base T11

The results at turbine base T11 are shown on Drawing AGP26012_T11 and have been interpreted as a thick sequence of predominantly sandy gravelly clay with some silt/clay at depth as follows:

- **Layer 1**: is an intermittent layer of soft material which is up to 1.2 m thick (average 0.4 m and 0.5 m at the turbine centre).
- **Layer 2**: consists of firm material 1.1 to 2.8 m thick (average 1.9 m and 1.8 m at the turbine centre).
- **Layer 3:** consists predominantly of a thick sequence of very stiff material with some silt/clay interpreted in addition to predominant sandy gravelly clay at an average depth of 6 m bgl. The interpreted depth to the top of this layer varies from 1.5 to 3.6 m bgl (average 2.2 m and 2.3 m bgl at the turbine centre).

While no bedrock is interpreted across T11 a slight increase in resistivity values and seismic velocity of 2,028 to 2,117 m/s may indicate possible weak mudstone at approximate elevation of 208 m OD across the turbine base. This would indicate there is little contrast in resistivity and seismic velocities between the thick soils and possible bedrock.

Across turbine bases T05 to T11 the possibility that weathered rock may be present towards the base of the interpreted soils cannot be excluded.

If any rock excavation is planned across proposed turbine bases T01 to T11, any completely to highly weathered rock will be diggable, the moderately to slightly weathered/fractured rock should be marginally rippable to requiring breaking/blasting and the slightly weathered/fractured to fresh rock would require breaking or blasting. A more detailed discussion of velocity and excavatability is contained in Appendix B.

While the broad correlation between the geophysical data acquired across the proposed turbine locations and the direct investigation data available to date is good there are some discrepancies between the datasets which may relate to offset distance between the geophysical profile and ground investigation surveyed locations.

RECOMENDATIONS

Recommendations for additional direct investigation consisting of boreholes at a number of turbine locations are made to confirm the nature of the soil, depth to and type of possible bedrock to 20 m bgl as follows:

No.	Easting	Northing	Target
T01_PBH1	635685	664899	Nature of bedrock, possible sandy gravelly clay
T02_PBH1	635876	665424	Possible sandy gravelly clay channel or mudstone/dolomite
T02_PBH2	635894	665404	Possible sandy gravelly clay channel or mudstone/dolomite
ALT_T04_PBH1	635106	666031	Possible increased weathering/fracturing/karstification of the LIMESTONE with clay/water infill
T06_PBH1	633854	666143	Confirm rock depth
T07_PBH1	633783	666684	Confirm rock depth
T08_PBH1	633552	667074	Confirm soil/possible weathered rock
T09_PBH1	634524	667095	Confirm rock depth
T11_PBH1	635685	666506	Depth to possible rock

Karst features have been interpreted from the geophysical data, therefore foundation design for any structures should take into account the presence of possible open fissures/cavities in the rock and overburden and foundations capable of spanning voids that may migrate to the surface, should be incorporated into the design. Any cavities exposed during stripping of soil or excavation of rock should be backfilled in the appropriate manner for karstified limestone areas as advised by a competent geotechnical engineer.

To minimise the risk of subsidence in areas where any karstified limestone is near surface, drains should be sealed, and surface water disposed of away from these areas. Prior to construction a surface water management plan is advised to avoid re-activation of any karst features due to changes in the surface water flow.

If any bedrock excavation is proposed, a detailed assessment of excavatability should be carried out combining the results of the geophysical survey, rotary core drilling, strength testing, and trial excavation pits down to formation level using a high-powered excavator of similar rating to that to be used during construction.

The results of the geophysical investigation should be reviewed based on the findings of any further direct investigation.

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APPENDIX A: DETAILED METHODOLOGY

A combination of geophysical techniques was used to provide a high quality interpretation and reduce any ambiguities, which may otherwise exist.

Electrical Resistivity Tomography (ERT)

2D Electrical Resistivity Tomography (ERT) was carried out to provide information on lateral variations in the overburden material as well as on the underlying overburden and bedrock.

Principles
This surveying technique makes use of the Gradient array. The electrical resistivity profiling method records a large number of resistivity readings in order to map lateral and vertical changes in material types. This method involves the use of electrodes connected to a resistivity meter, using computer software to control the process of data collection and storage.

Data Collection
Profiles were recorded using an ABEM resistivity meter, imaging software, multicore cables and stainless steel electrodes. Saline solution was used at the electrode/ground interface in order to gain a good electrical contact required for the technique to work effectively. The recorded data were processed and viewed immediately after surveying.

Data Processing
The field readings were stored in computer files and inverted using the RES2DINV package (Geotomo Software, 2006) with up to 5 iterations of the measured data carried out for each profile to obtain a 2D-depth model of the resistivities.

The inverted 2D resistivity models and corresponding interpreted geology are displayed on the accompanying drawings alongside the processed seismic sections. Profiles have been contoured using the same contour intervals and colour codes. Distance is indicated along the horizontal axis of the profiles.

P-wave Seismic Refraction Profiling

Principles
This method measures the velocity of refracted seismic P-waves (compression waves) through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fissured materials have lower velocities. Readings are taken using geophones connected via multi-core cable to a seismograph.

Data Collection
A Geode high resolution 24 channel digital seismograph, 24 x 10HZ vertical geophones and a 10 kg hammer were used to provide first break information, with a 24 take-out cable (2m spacing). Equipment was operated by a two-person crew.

Readings are taken using geophones connected via multi-core cable to a seismograph. The depth of resolution of soil/bedrock boundaries is determined by the length of the seismic spread, typically the depth of resolution

is about one third the length of the profile (e.g. 46m profile ~16m depth). Shots from seven different positions were taken (2 x off-end, 2 x end, 3 x middle) to ensure optimum coverage of all refractors.

Data Processing

First break picking in digital format was carried out using the SeisImager/2D PICKWIN software program from Geometrics to construct p-wave (Vp) traveltime plots for each spread. The processing and interpretation uses the ray-tracing and tomographic inversion methods, to acquire depths to boundaries and the P-wave velocities of these layers, using the SeisImager/2D PLOTREFA program.

SeisImager/2D interprets seismic refraction data as a laterally varying layered earth structure. The program includes three methods for data analysis, time-term inversion, the reciprocal method and tomography.

The tomography method creates an initial velocity model, then traces rays through the model, comparing the calculated and measured traveltimes. The model is then modified and the process repeated to minimise the difference between the calculated and measured times. The data was processed using this method and was then converted to a layer model for display and interpretation.

Approximate errors for Vp velocities are estimated to be +/- 10%. Errors for the calculated layer thicknesses are of the order of +/-20%. Possible errors due to the "hidden layer" and "velocity inversion" effects could also occur (Soske, 1959).

Microgravity

Equipment

The survey was carried out using a Scrintrex Autograv CG-6 Gravity Meter. This meter is sensitive to small changes in gravity and single readings can be obtained with a precision of .001 mGals. The CG-6 Gravity Meter has built-in software for automatic tidal corrections, digital recording, with time stamp and self-levelling or rapid levelling functions. Functional checks were carried out to check the meter was operating correctly and to assess the repeatability and reproducibility of the survey.

The gravity station locations were levelled using a Trimble TSC5 with a Trimble R580 receiver high-accuracy GNSS handheld system. This system allows collection of GPS data with +/- 20 mm vertical accuracy.

Data Collection

The data was acquired across a grid. A local gravity base station was established for the duration of the survey which was occupied during data acquisition to measure meter drift. At least two gravity readings were taken at each station. If the readings differed by more than 0.010 mGal they were repeated until this level of consistency was achieved. All gravity station data including time, gravity readings and instrument height were recorded digitally and manually.

A selection of 5% of the stations were re-recorded for QC purposes. These stations were processed using the same procedure as for the main survey. Repeatability ranged from 0.0 mGal to 0.010 mGal.

Data Processing

The following corrections were applied to the recorded microgravity data in order to obtain the Bouguer Anomaly, as follows:

- The observed gravity reading (G_{obs}) was corrected for instrumental drift.

- The effects of latitude on the gravity values were calculated using the IGSN 1967 Theoretical Gravity Formula:
  $G\theta = 9780318.5(1+0.005278895 \sin^2\theta - 0.000023462 \sin^4\theta)$ (gu)
  where θ = the latitude at each station.
- The free air correction was calculated as follows:
  FAC= 0.3086 * (Elevation above Ordnance Datum)
- The Bouguer correction was calculated as follows:
  BC= 0.04191 * 2.67 * (Elevation above Ordnance Datum)
- The Free Air Anomaly (FAA) was calculated using the following equation:
  $FAA = G_{obs} - G\theta + FC$
- The Simple Bouguer Anomaly (BA) was calculated using the following equation:
  $BA = G_{obs} - G\theta + FC - BC$

A density of 2.67 kg/cm^3 was applied to examine gravity variations. All corrections were calculated in microGals when distances and elevations were entered in metres.

Spatial Relocation

All the geophysical investigation locations were acquired using a Trimble TSC5 with a Trimble R580 receiver high-accuracy GNSS handheld system using the settings listed below. This system allows collecting GPS data with c.20mm accuracy.

Projection:	Irish Transverse Mercator (ITM)
Datum:	IRENET95
Coordinate units:	Metres
Altitude units:	Metres
Survey altitude reference:	MSL
Geoid model:	OSGM15_Malin

APPENDIX B: EXCAVATABILITY

The seismic velocity of a rock formation is related to characteristics of the rock mass which include rock hardness and strength, degree of weathering and discontinuities. Usually, the velocity is just one of several parameters used in the assessment of excavatability. The excavatability of a rock formation is favoured by the following factors:

- Open fractures, faults and other planes of weakness of any kind
- Weathering
- Brittleness and crystalline nature
- High degree of stratification or lamination
- Large grain size
- Low compressive strength

Weaver (1975) presented a comprehensive rippability rating chart (Fig.1) in which the p-wave velocity value and the relevant geological factors could be entered and assigned appropriate weightings. The total weighted index was found to correlate very well with actual rippability.

Fig.1 Rippability Rating Chart

Rock class	I	II	III	IV	V
Description	Very good rock	Good rock	Fair rock	Poor rock	Very poor rock
Seismic velocity (m/s) Rating	>2150 26	2150-1850 24	1850-1500 20	1500-1200 12	1200-450 5
Rock hardness Rating	Extremely hard rock 10	Very hard rock 5	Hard rock 2	Soft rock 1	Very soft rock 0
Rock weathering Rating	Unweathered 9	Slightly weathered 7	Weathered 5	Highly weathered 3	Completely weathered 1
Joint spacing (mm) Rating	>3000 30	3000-1000 25	1000-300 20	300-50 10	<50 5
Joint continuity Rating	Non continuous 5	Slightly continuous 5	Continuous-no gouge 3	Continuous-some gouge 0	Continuous-with gouge 0
Joint gouge Rating	No separation 5	Slight separation 5	Separation <1mm 4	Gouge <5mm 3	Gouge >5mm 1
Strike and dip orientation Rating	Very unfavourable 15	Unfavourable 13	Slightly unfavourable 10	Favourable 5	Very favourable 3
Total rating	100-90	90-70*	70-50	50-25	<25
Rippability assessment Tractor horsepower Tractor kilowatts	Blasting	Extremely hard ripping and blasting 770/385 575/290	Very hard ripping 385/270 290/200	Hard ripping 270/180 200/135	Easy ripping 180 135

APPENDIX C: SEISMIC REFRACTION TOMOGRAPHIC DATA

The tomographic inversions of the seismic refraction datasets acquired at each turbine base are shown below.

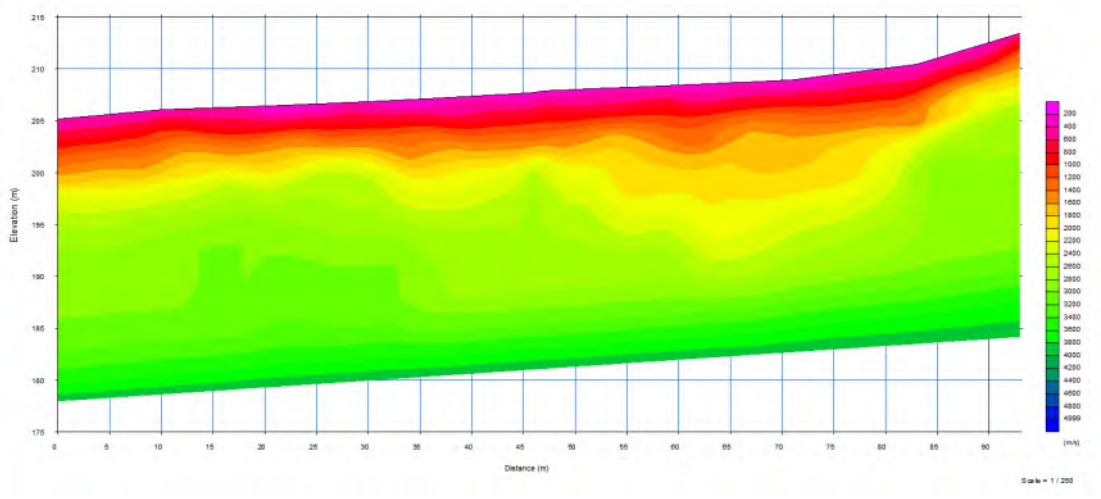


Fig C.1: Turbine Base T01 Seismic Refraction S6 & S5 Tomographic Inversion, plotted S-N.

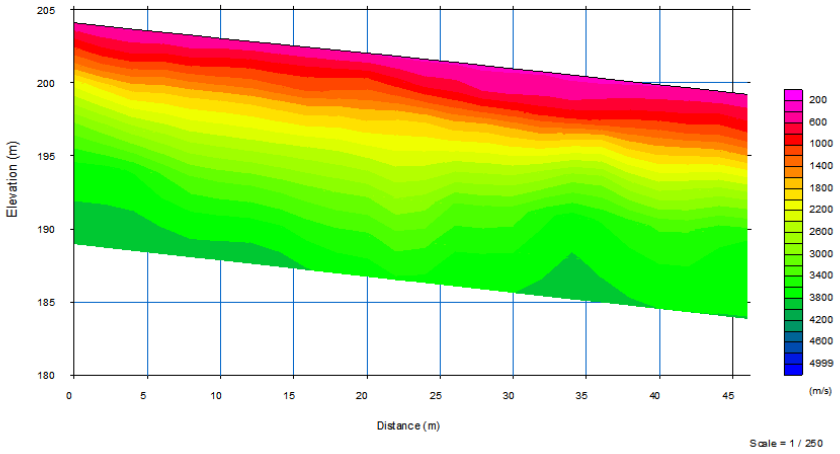


Fig C.2: Turbine Base T01 Seismic Refraction S7 Tomographic Inversion, plotted N-S.

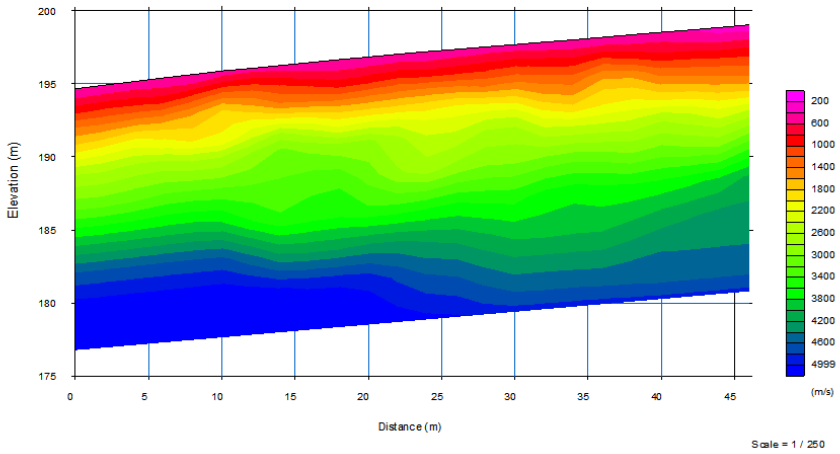


Fig C.3: Turbine Base T01 Seismic Refraction S8 Tomographic Inversion, plotted S-N.

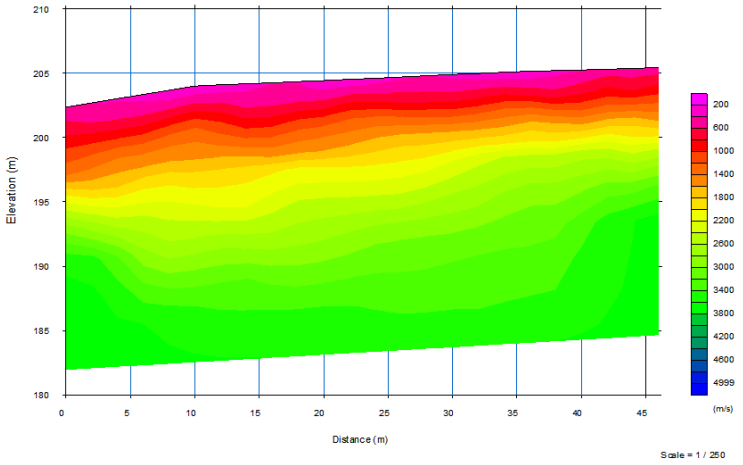


Fig C.4: Turbine Base T01 Seismic Refraction S9 Tomographic Inversion, plotted E-W.

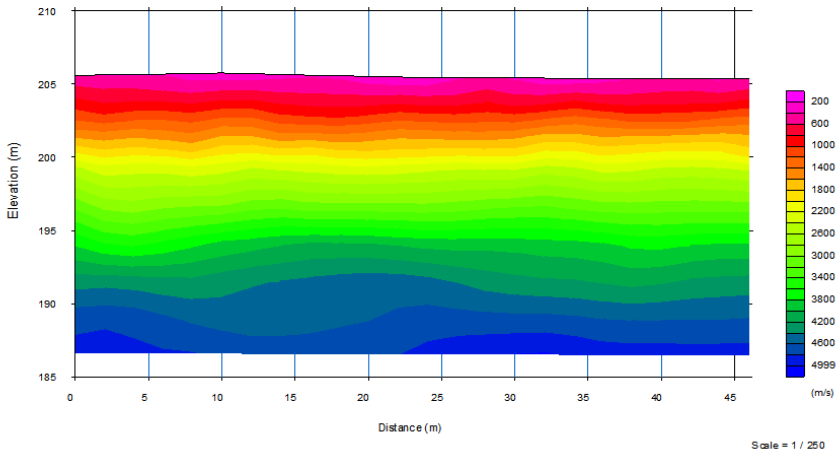


Fig C.5: Turbine Base T01 Seismic Refraction S10Tomographic Inversion, plotted W-E.

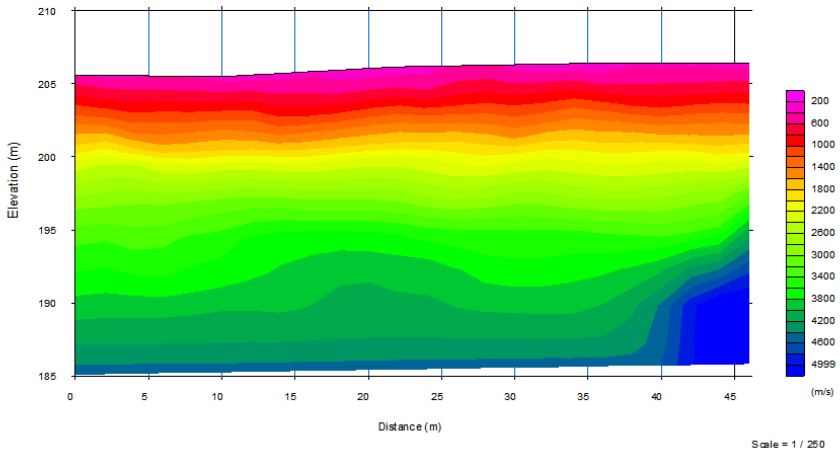


Fig C.6: Turbine Base T01 Seismic Refraction S11 Tomographic Inversion, plotted E-W.

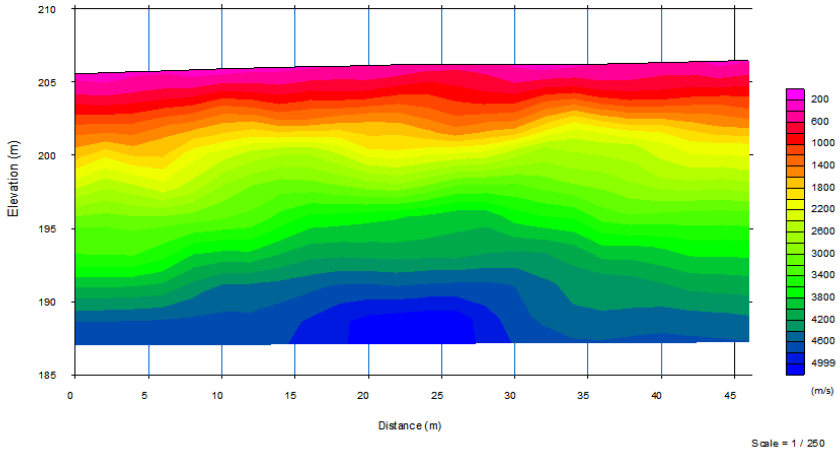


Fig C.7: Turbine Base T01 Seismic Refraction S12 Tomographic Inversion, plotted W-E.

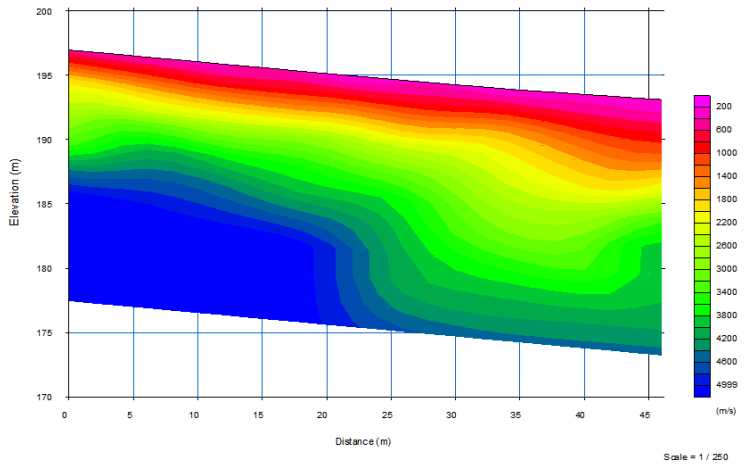


Fig C.8: Turbine Base T02 Seismic Refraction S21 Tomographic Inversion, plotted S-N.

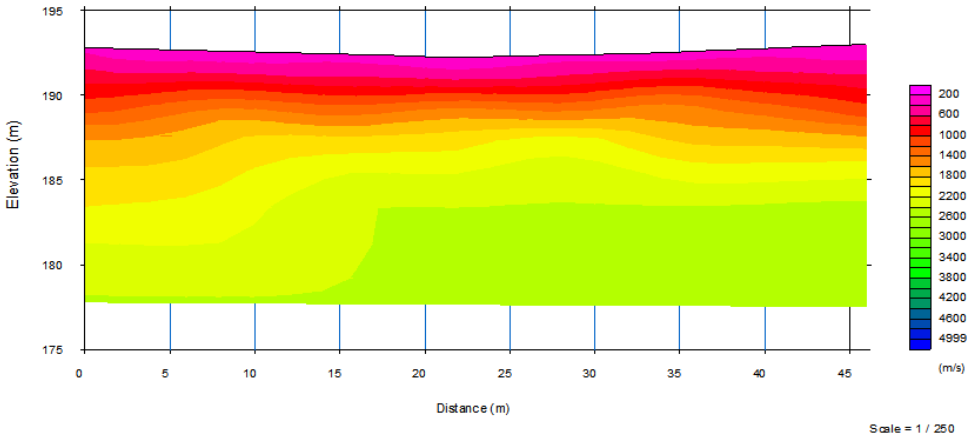


Fig C.9: Turbine Base T02 Seismic Refraction S22 Tomographic Inversion, plotted N-S.

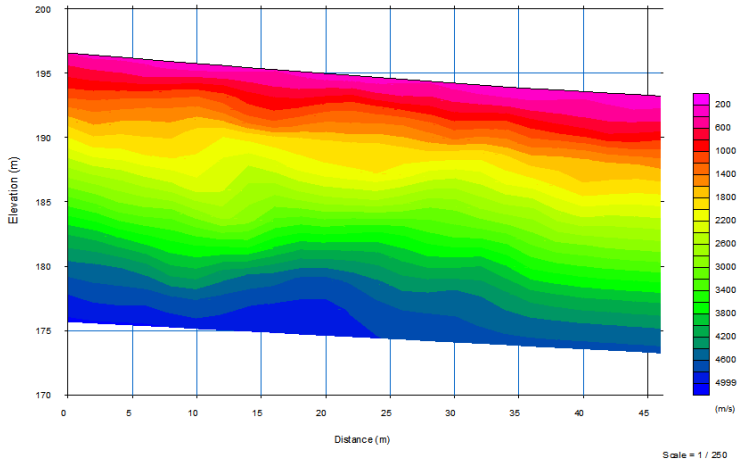


Fig C.10: Turbine Base T02 Seismic Refraction S23 Tomographic Inversion, plotted W-E.

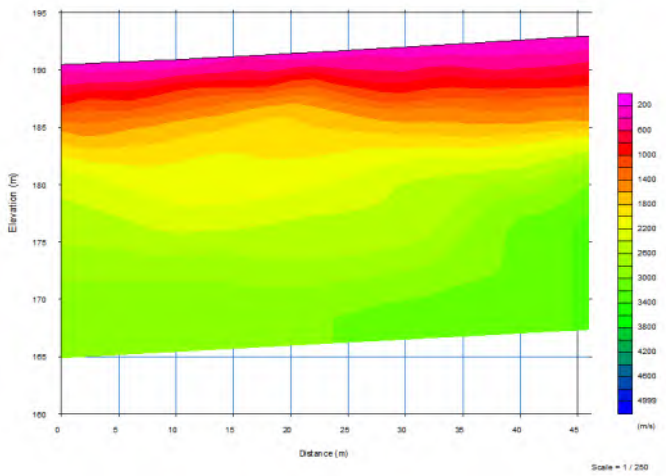


Fig C.11: Turbine Base T02 Seismic Refraction S24 Tomographic Inversion, plotted E-W.

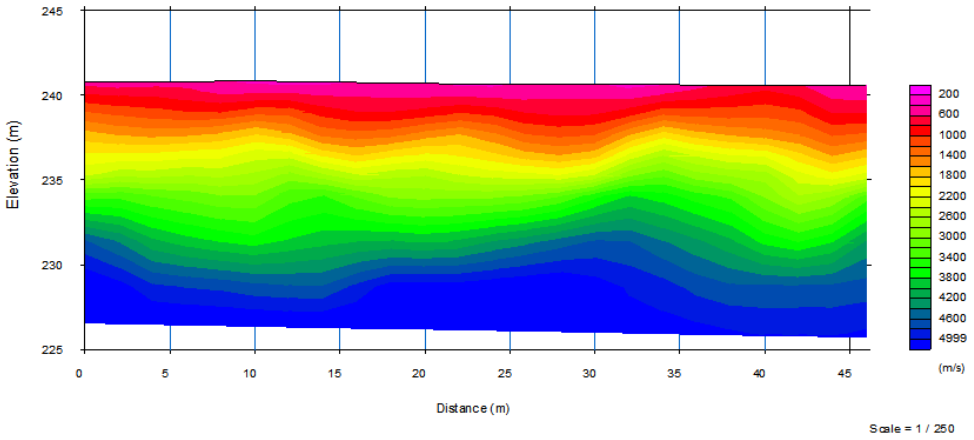


Fig C.12: Turbine Base T03 Seismic Refraction S17 Tomographic Inversion, plotted NW-SE.

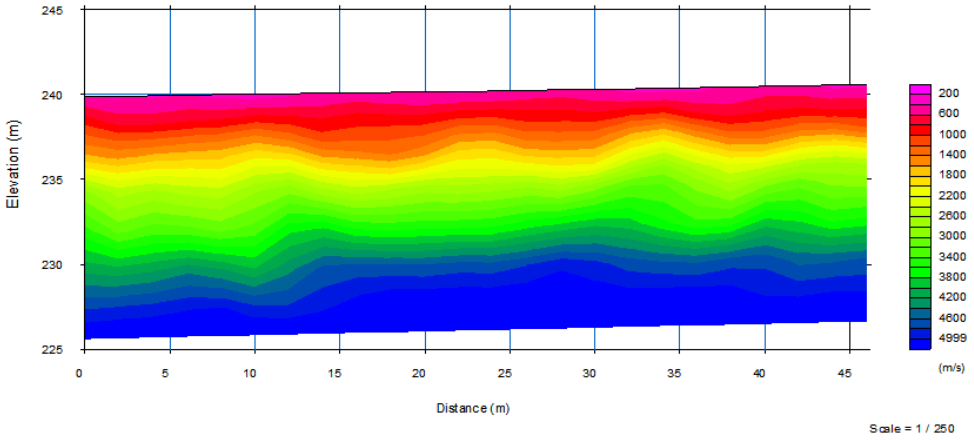


Fig C.13: Turbine Base T03 Seismic Refraction S18 Tomographic Inversion, plotted SE-NW.

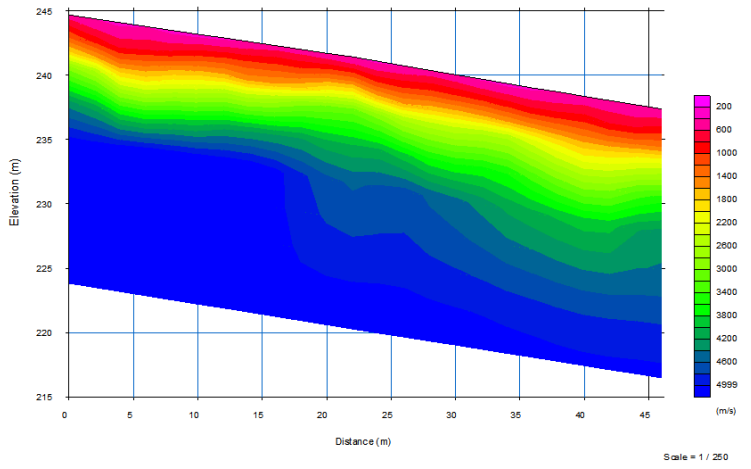


Fig C.14: Turbine Base T03 Seismic Refraction S19 Tomographic Inversion, plotted SW-NE.

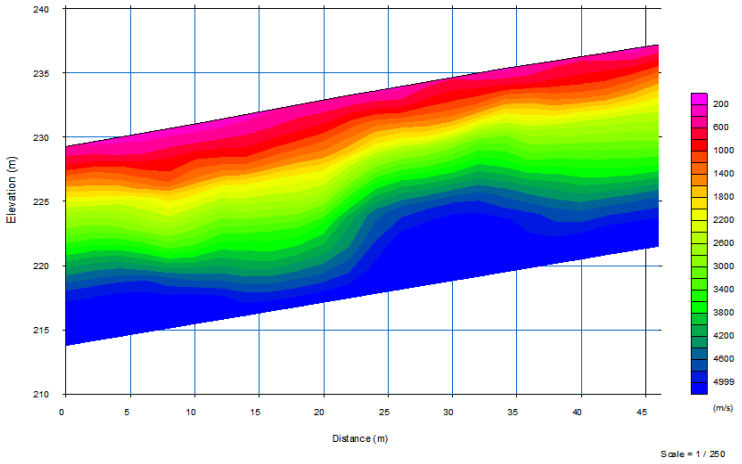


Fig C.15: Turbine Base T03 Seismic Refraction S20 Tomographic Inversion, plotted NE-SW.

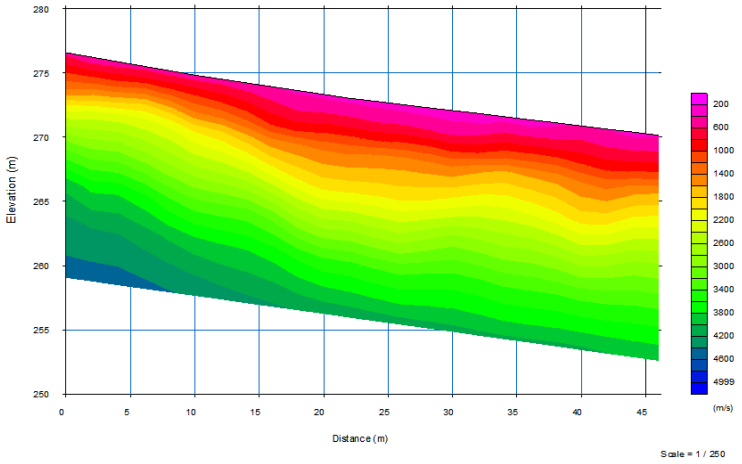


Fig C.16: Turbine Base T04 Seismic Refraction S37 Tomographic Inversion, plotted SW-NE.

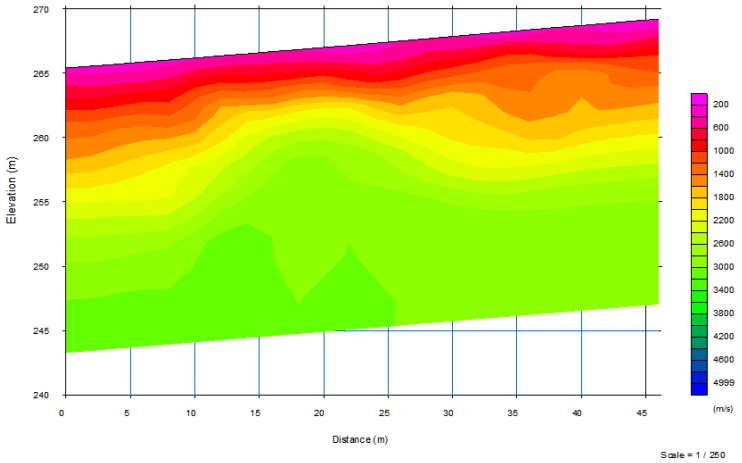


Fig C.17: Turbine Base T04 Seismic Refraction S38 Tomographic Inversion, plotted SW-NE.

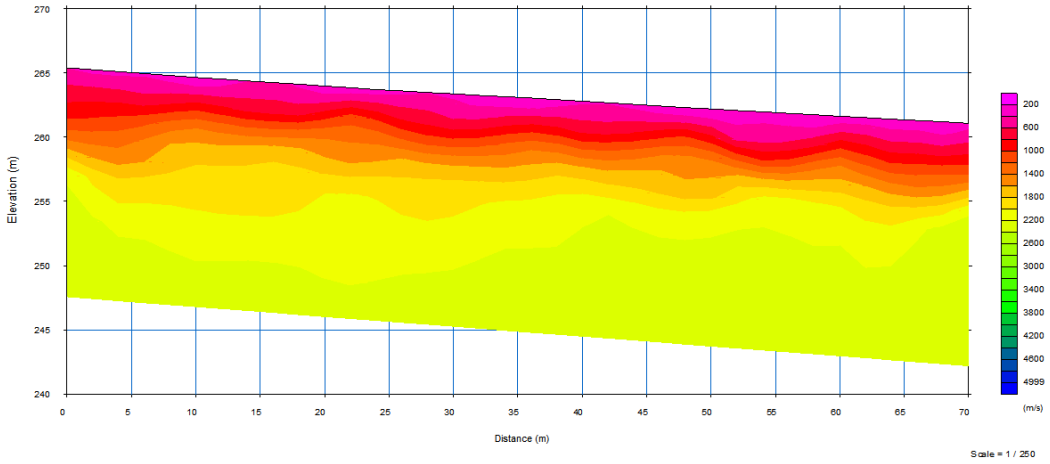


Fig C.18: Turbine Base T04 Seismic Refraction S39 & S40 Tomographic Inversion, plotted SW-NE.

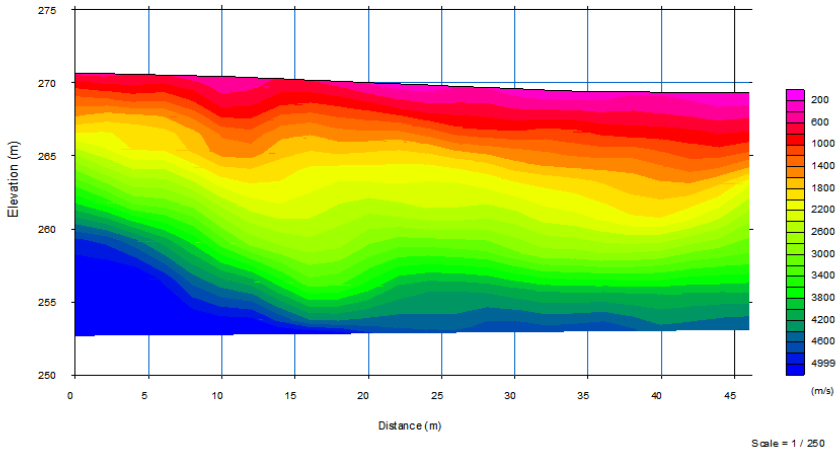


Fig C.19: Turbine Base T04 Seismic Refraction S41 Tomographic Inversion, plotted NW-SE.

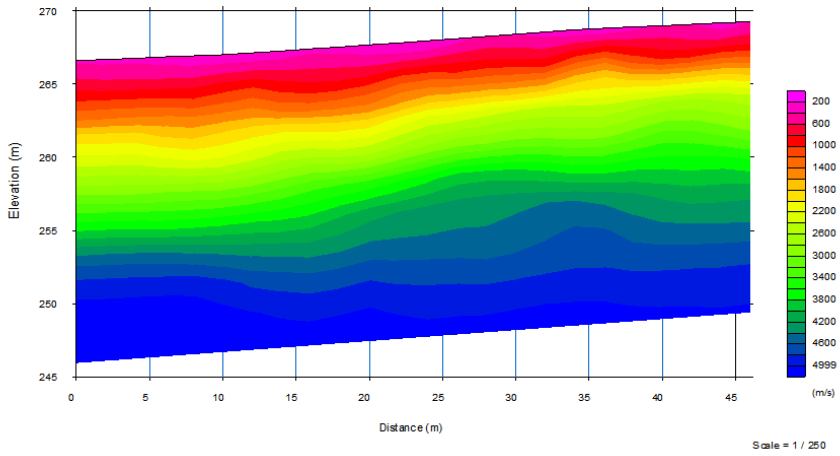


Fig C.20: Turbine Base T04 Seismic Refraction S42 Tomographic Inversion, plotted NW-SE.

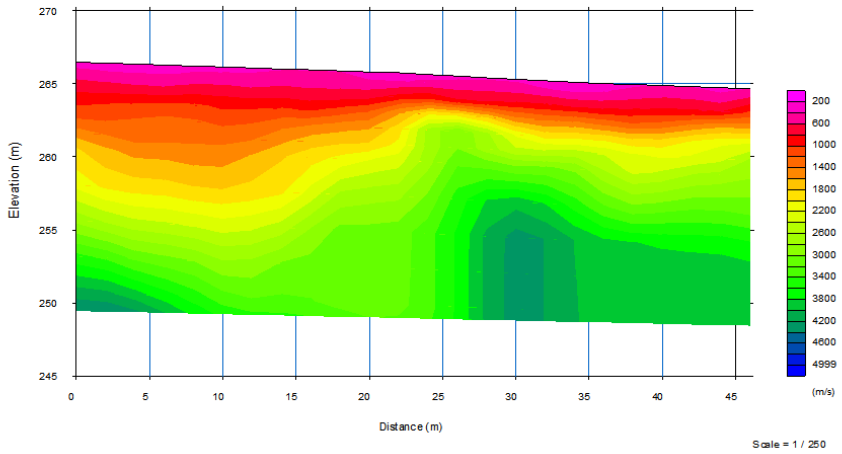


Fig C.21: Turbine Base T04 Seismic Refraction S43 Tomographic Inversion, plotted NW-SE.

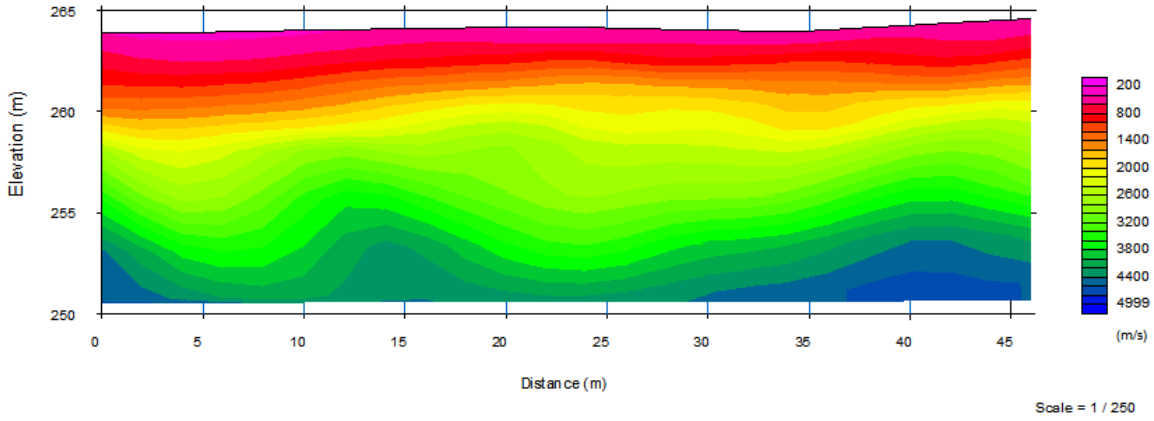


Fig C.22: Turbine Base T04 Seismic Refraction S44 Tomographic Inversion, plotted SE-NW.

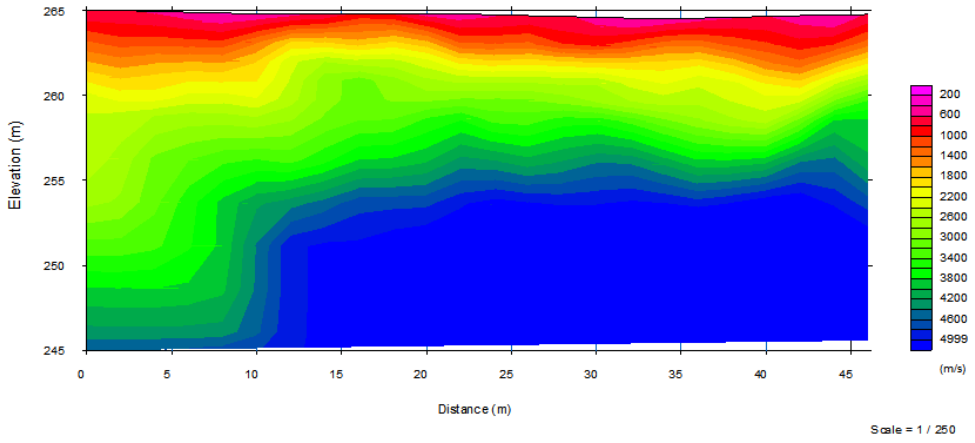


Fig C.23: Turbine Base ALT T04 Seismic Refraction S53 Tomographic Inversion, plotted NW-SE.

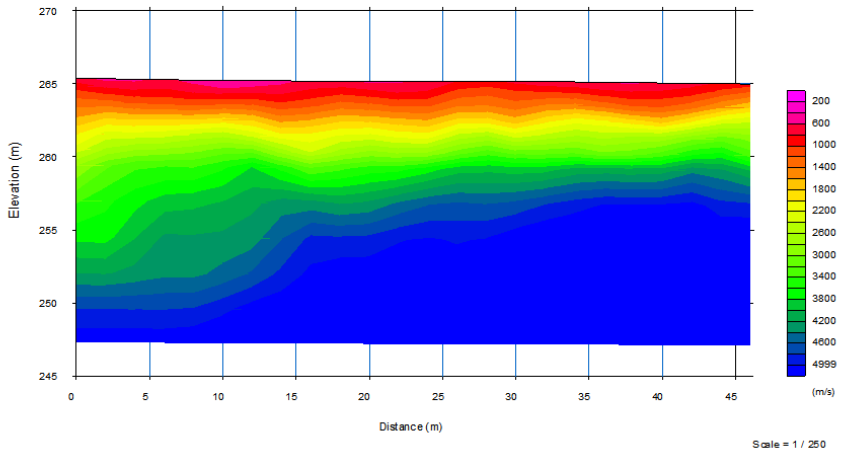


Fig C.24: Turbine Base ALT T04 Seismic Refraction S54 Tomographic Inversion, plotted SE-NW.

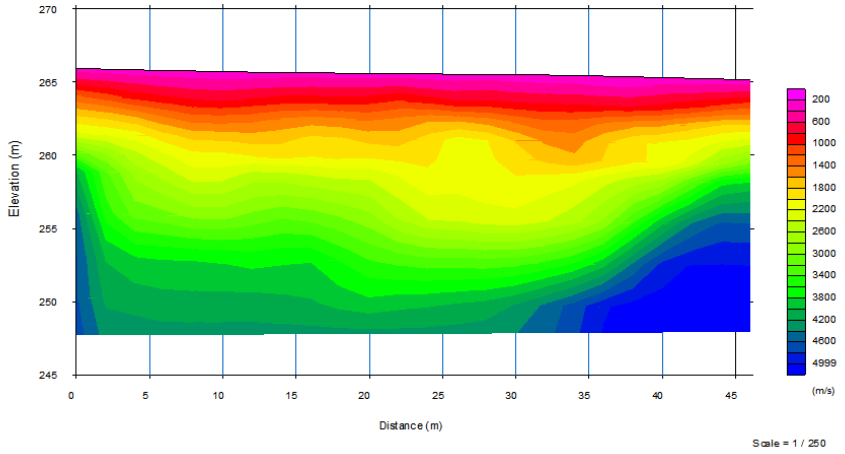


Fig C.25: Turbine Base ALT T04 Seismic Refraction S55 Tomographic Inversion, plotted NW-SE.

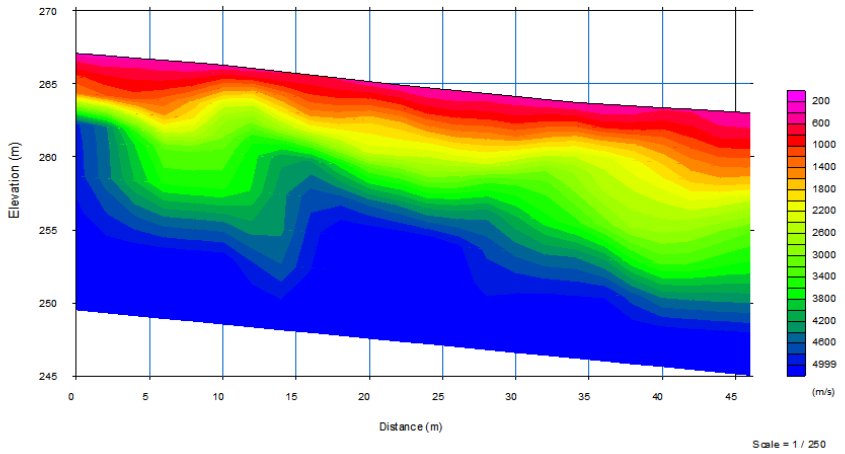


Fig C.26: Turbine Base ALT T04 Seismic Refraction S56 Tomographic Inversion, plotted SW-NE.

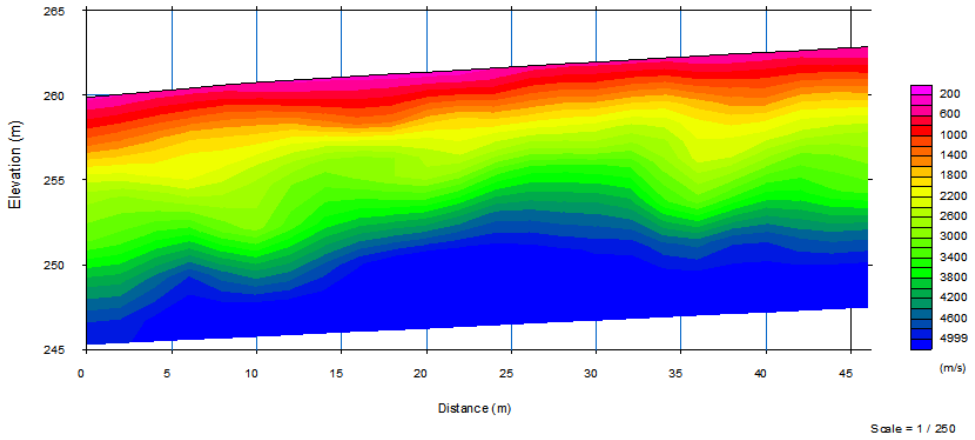


Fig C.27: Turbine Base ALT T04 Seismic Refraction S57 Tomographic Inversion, plotted NE-SW.

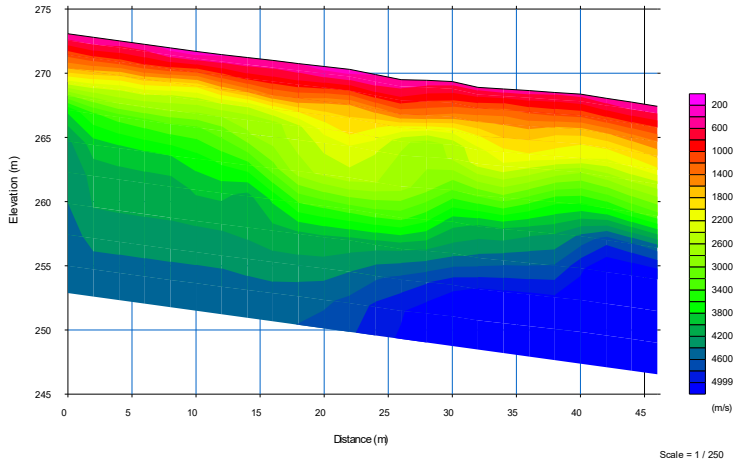


Fig C.28: Turbine Base ALT T04 Seismic Refraction S58 Tomographic Inversion, plotted SW-NE.

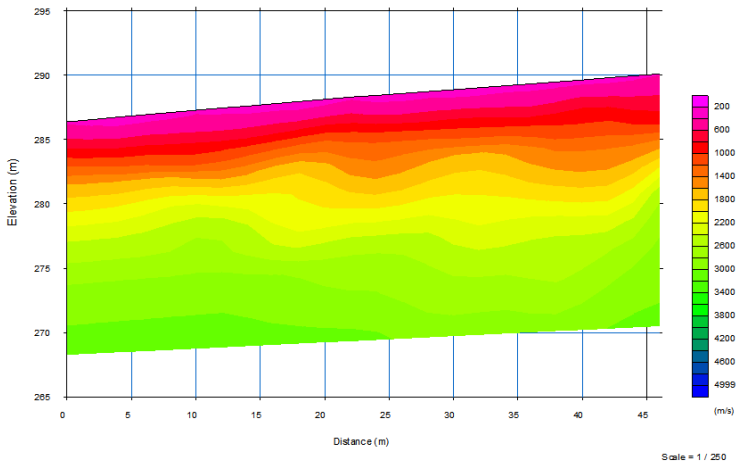


Fig C.29: Turbine Base T05 Seismic Refraction S01 Tomographic Inversion, plotted NW-SE.

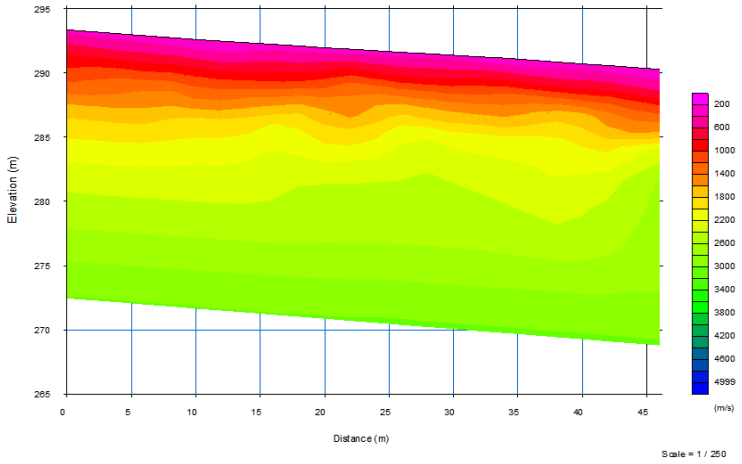


Fig C.30: Turbine Base T05 Seismic Refraction S02 Tomographic Inversion, plotted SE-NW.

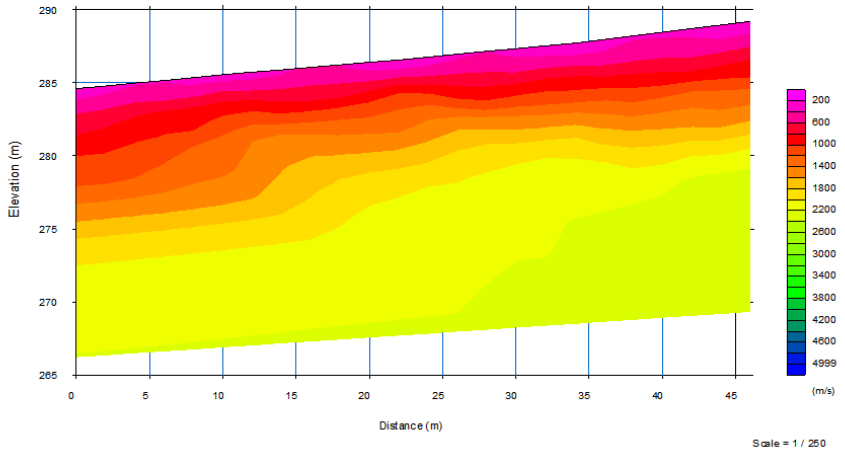


Fig C.31: Turbine Base T05 Seismic Refraction S03 Tomographic Inversion, plotted NE-SW.

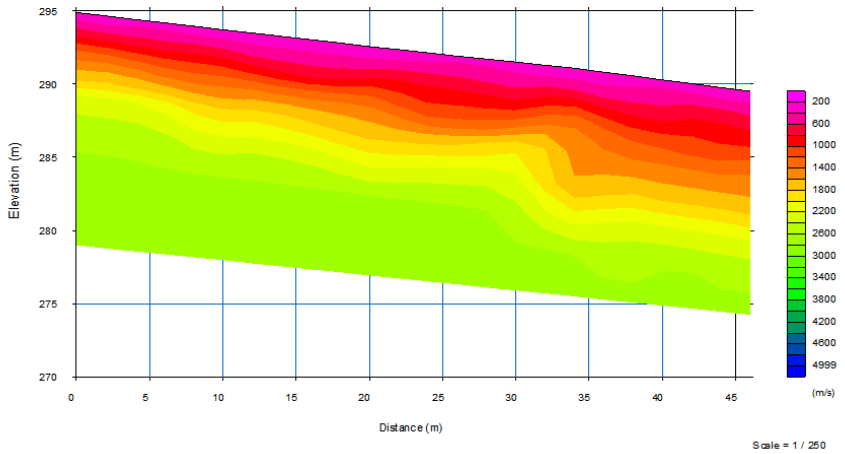


Fig C.32: Turbine Base T05 Seismic Refraction S04 Tomographic Inversion, plotted SW-NE.

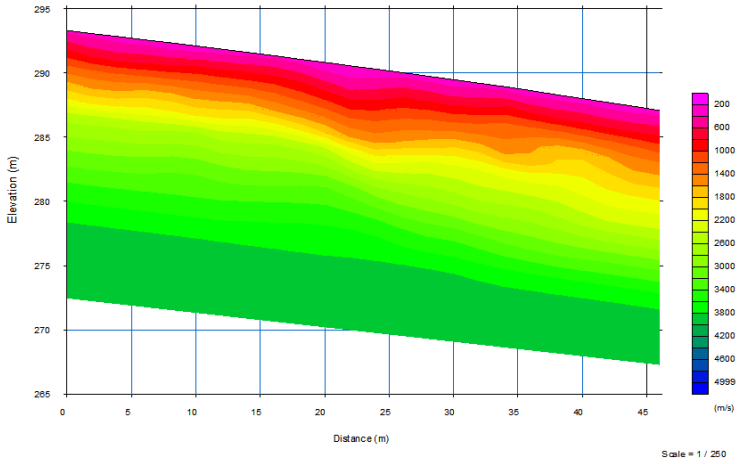


Fig C.33: Turbine Base ALT T05 Seismic Refraction S59 Tomographic Inversion, plotted SW-NE.

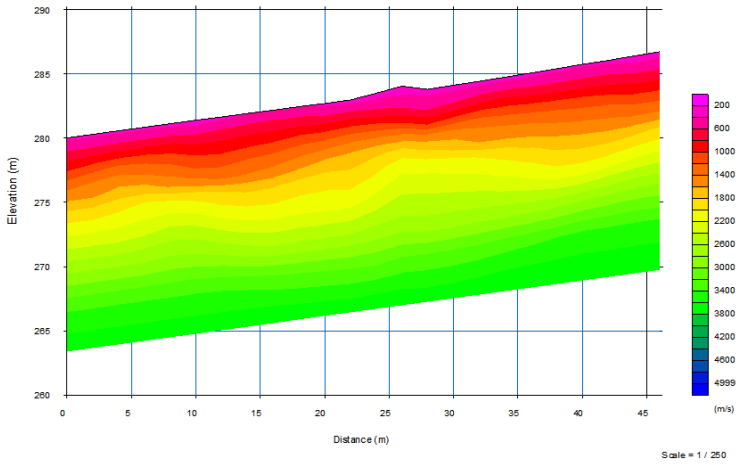


Fig C.34: Turbine Base ALT T05 Seismic Refraction S60 Tomographic Inversion, plotted NW-SE.

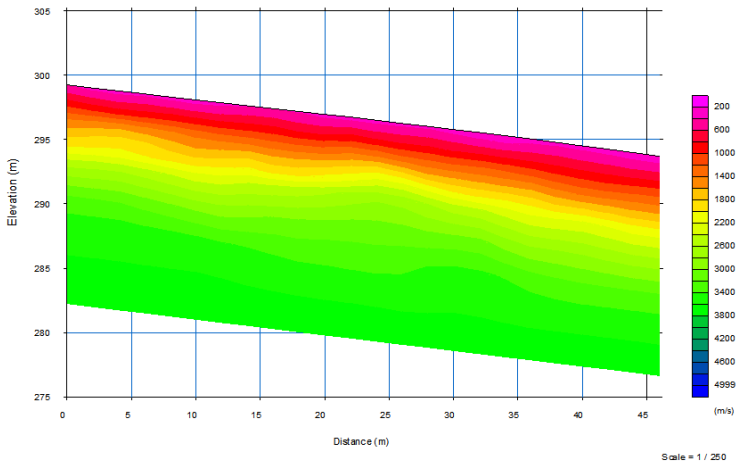


Fig C.35: Turbine Base ALT T05 Seismic Refraction S61 Tomographic Inversion, plotted SW-NE.

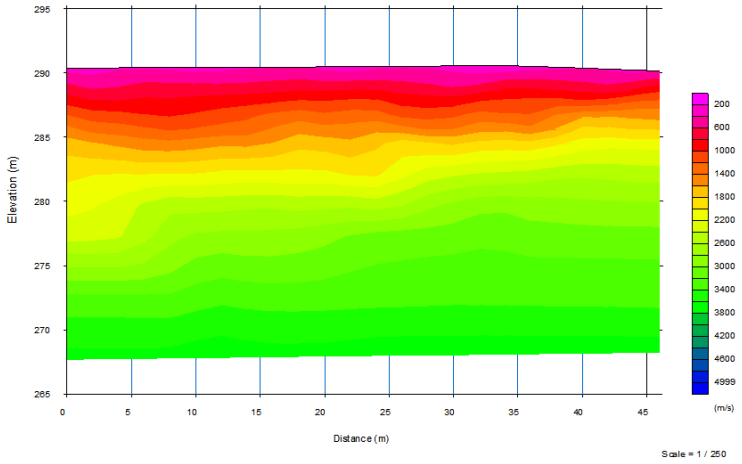


Fig C.36: Turbine Base ALT T05 Seismic Refraction S62 Tomographic Inversion, plotted SE-NW.

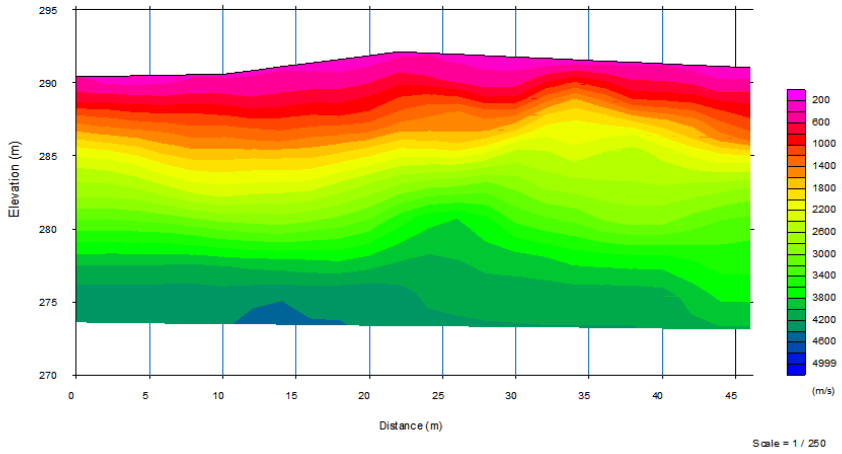


Fig C.37: Turbine Base ALT T05 Seismic Refraction S63 Tomographic Inversion, plotted NW-SE.

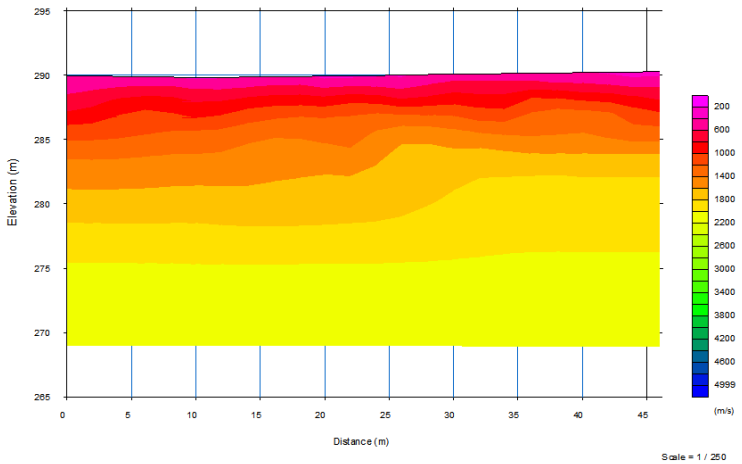


Fig C.38: Turbine Base ALT T05 Seismic Refraction S64 Tomographic Inversion, plotted SE-NW.

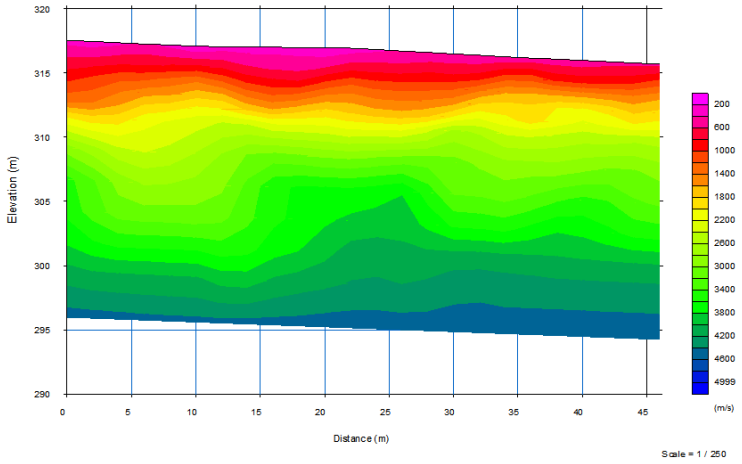


Fig C.39: Turbine Base T06 Seismic Refraction S49 Tomographic Inversion, plotted SE-NW.

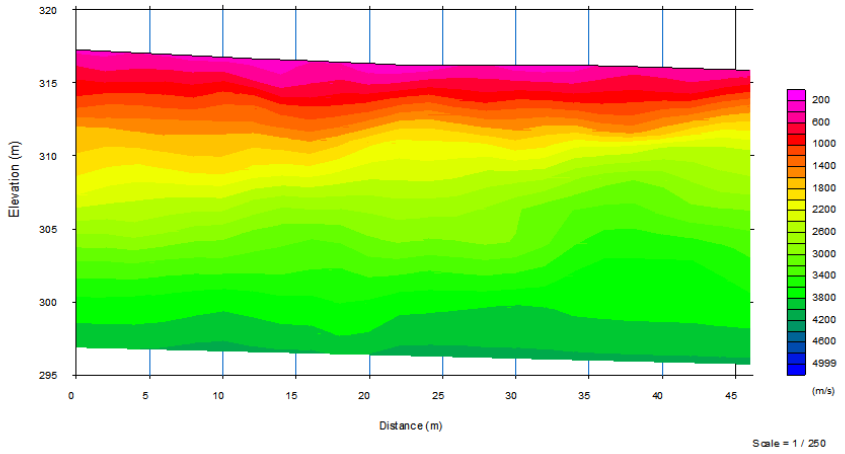


Fig C.40: Turbine Base T06 Seismic Refraction S50 Tomographic Inversion, plotted NE-SW.

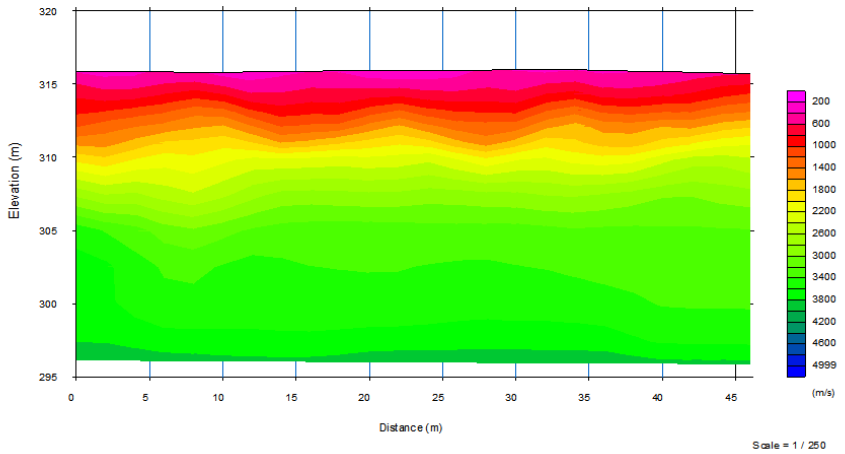


Fig C.41: Turbine Base T06 Seismic Refraction S51Tomographic Inversion, plotted SW-NE.

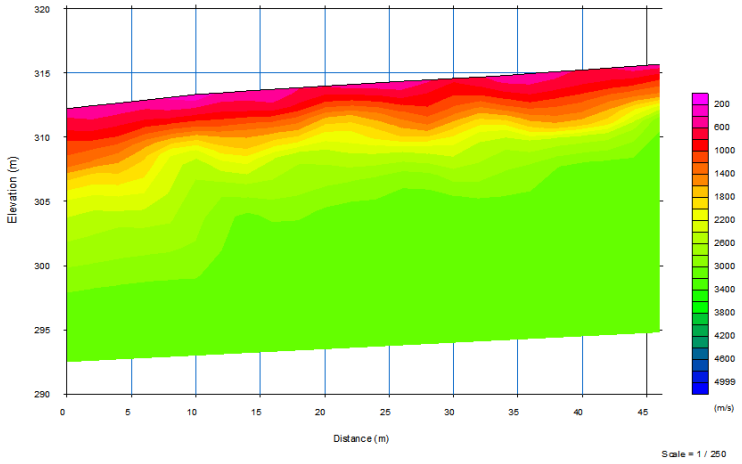


Fig C.42: Turbine Base T06 Seismic Refraction S52 Tomographic Inversion, plotted NW-SE.

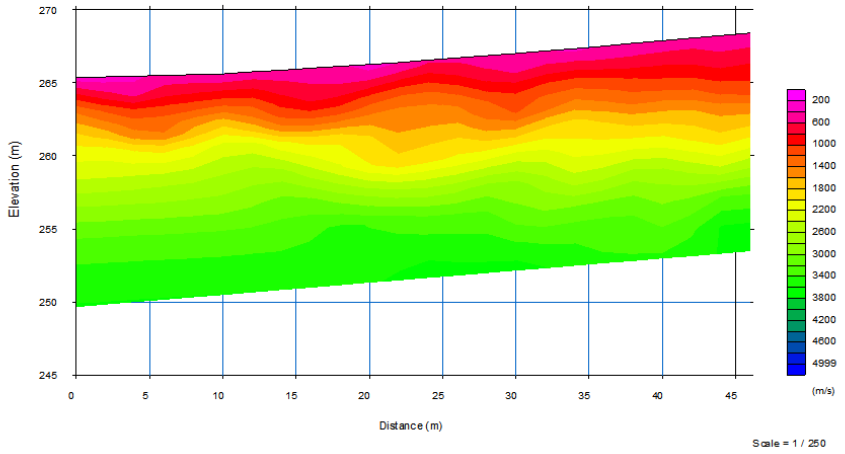


Fig C.43: Turbine Base T07 Seismic Refraction S33 Tomographic Inversion, plotted SE-NW.

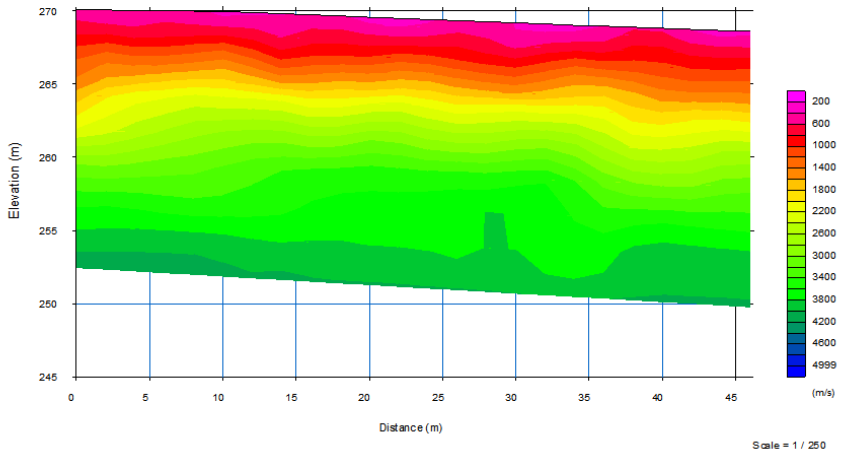


Fig C.44: Turbine Base T07 Seismic Refraction S34 Tomographic Inversion, plotted NE-SW.

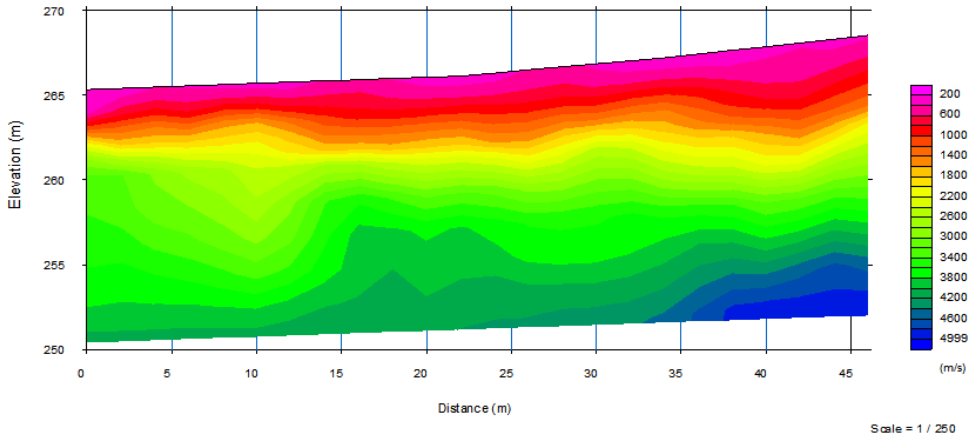


Fig C.45: Turbine Base T07 Seismic Refraction S35 Tomographic Inversion, plotted SW-NE.

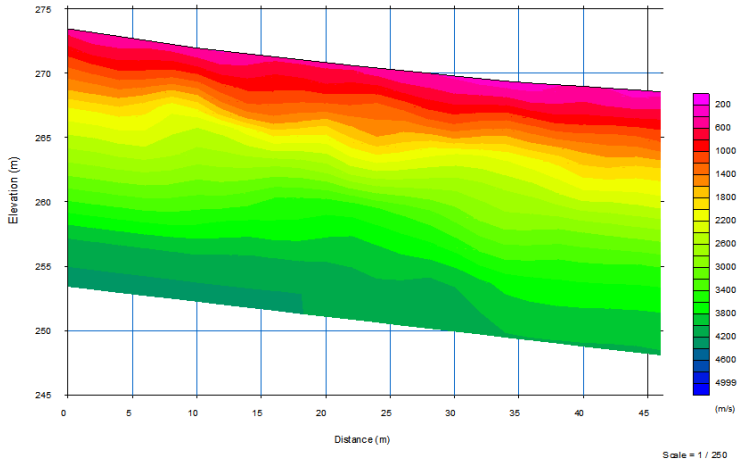


Fig C.46: Turbine Base T07 Seismic Refraction S36 Tomographic Inversion, plotted NW-SE.

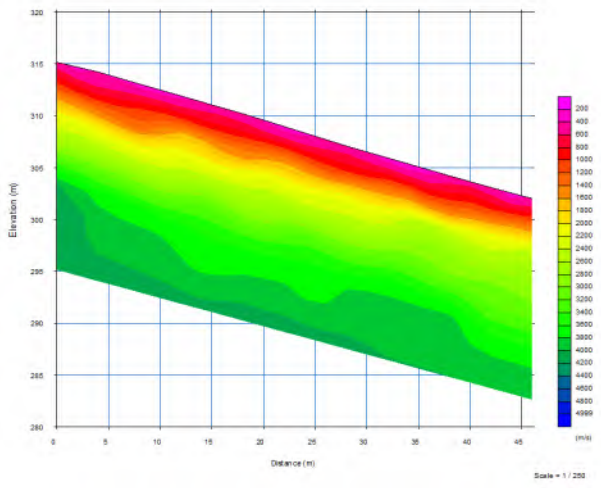


Fig C.47: Turbine Base T08 Seismic Refraction S29 Tomographic Inversion, plotted NW-SE.

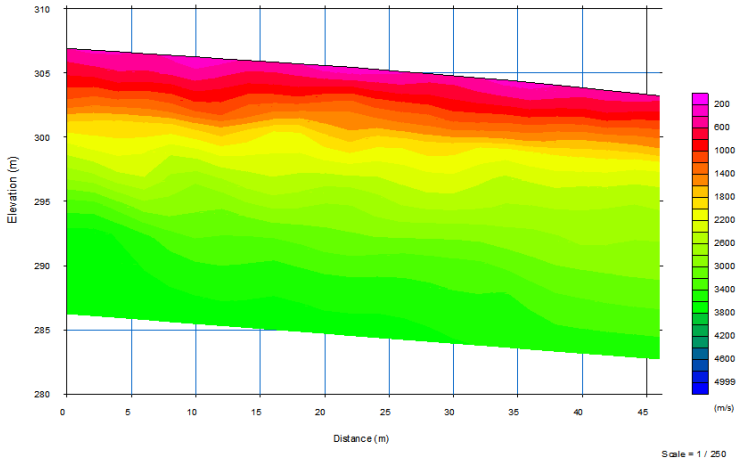


Fig C.48: Turbine Base T08 Seismic Refraction S30 Tomographic Inversion, plotted N-S.

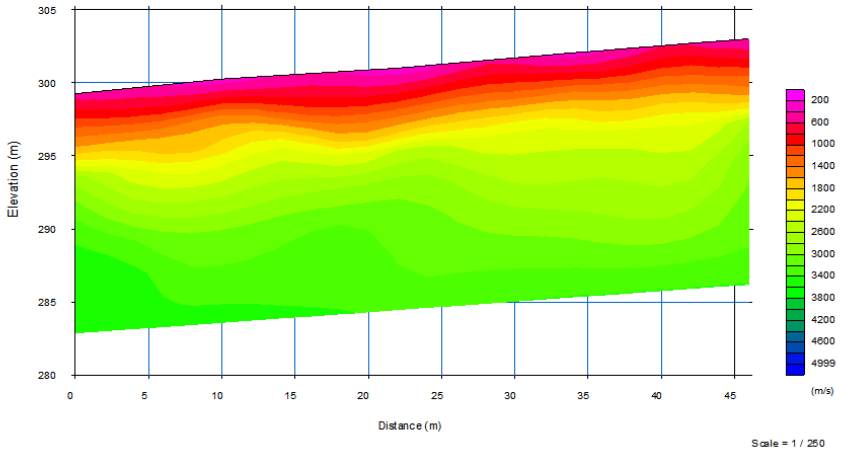


Fig C.49: Turbine Base T08 Seismic Refraction S31 Tomographic Inversion, plotted S-N.

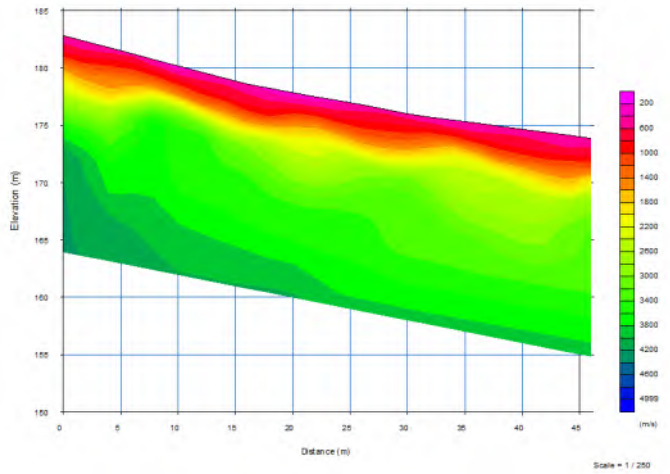


Fig C.50: Turbine Base T08 Seismic Refraction S32 Tomographic Inversion, plotted SE-NW.

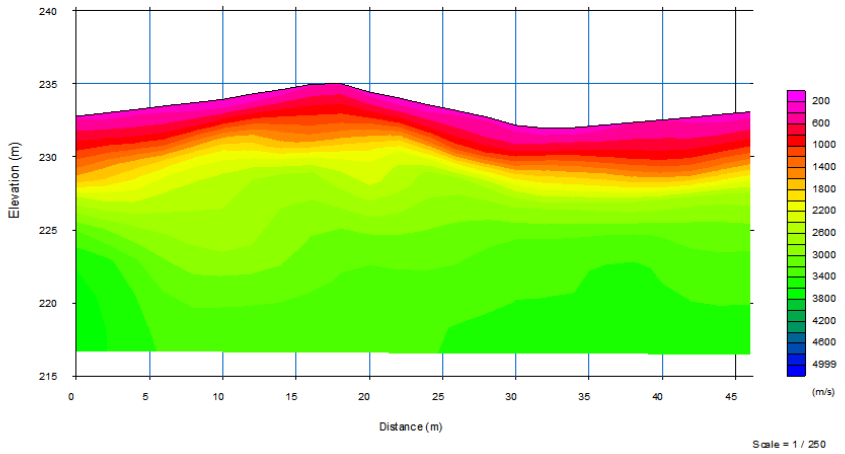


Fig C.51: Turbine Base T09 Seismic Refraction S25 Tomographic Inversion, plotted SW-NE.

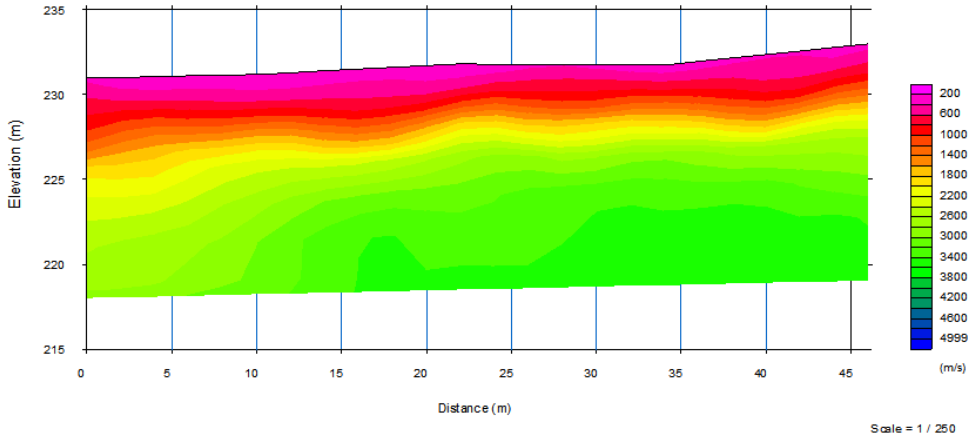


Fig C.52: Turbine Base T09 Seismic Refraction S26 Tomographic Inversion, plotted SE-NW.

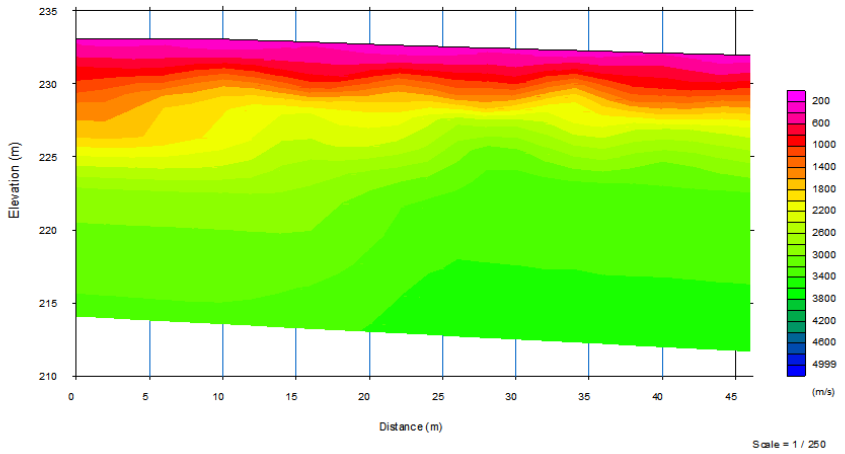


Fig C.53: Turbine Base T09 Seismic Refraction S27 Tomographic Inversion, plotted NW-SE.

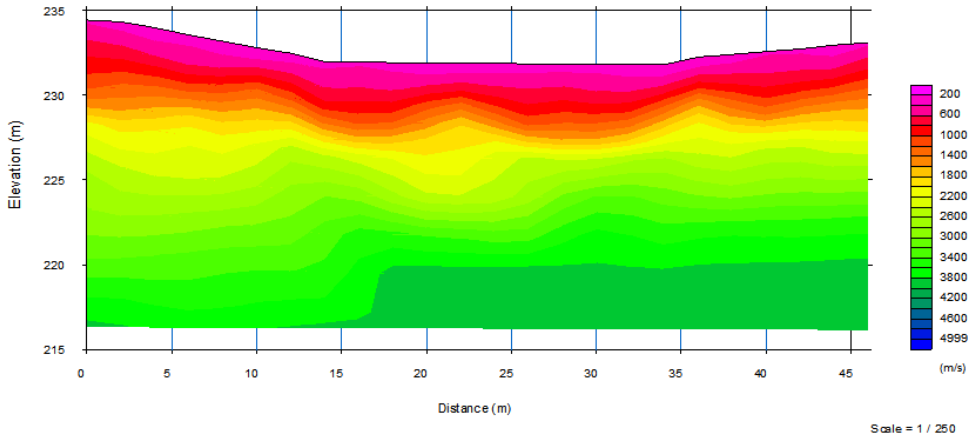


Fig C.54: Turbine Base T09 Seismic Refraction S28 Tomographic Inversion, plotted NE-SW.

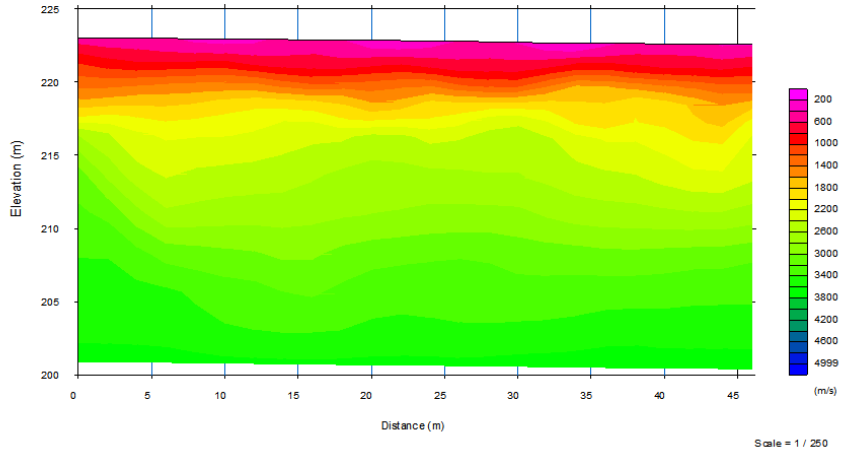


Fig C.55: Turbine Base T10 Seismic Refraction S13 Tomographic Inversion, plotted NW-SE.

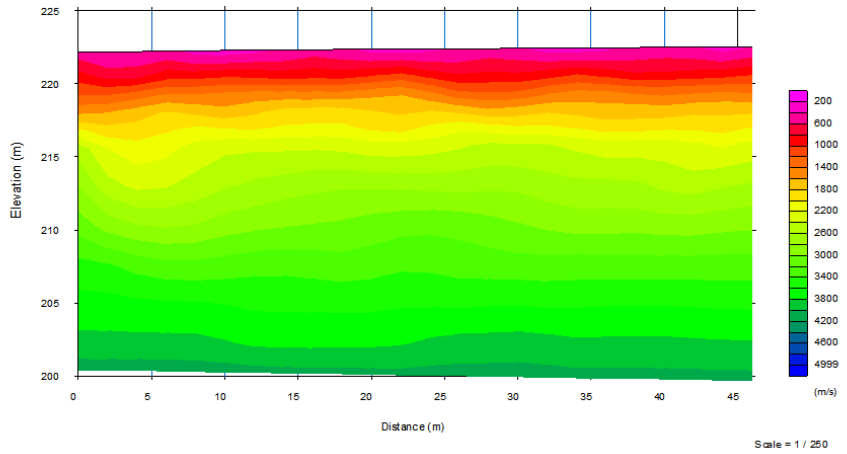


Fig C.56: Turbine Base T10 Seismic Refraction S14 Tomographic Inversion, plotted SE-NW.

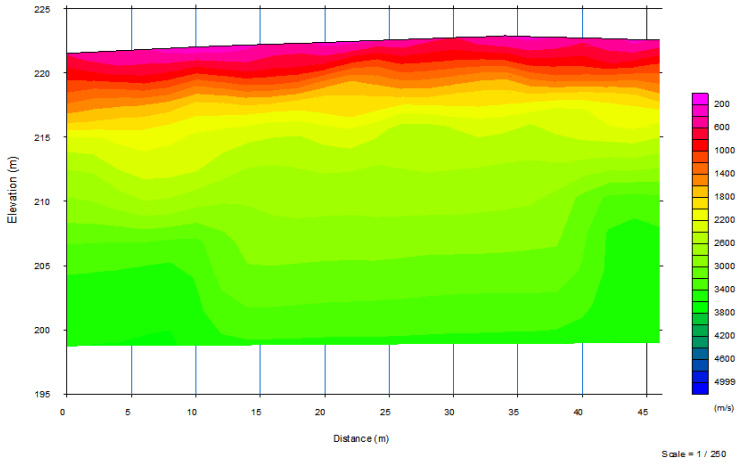


Fig C.57: Turbine Base T10 Seismic Refraction S15 Tomographic Inversion, plotted NE-SW.

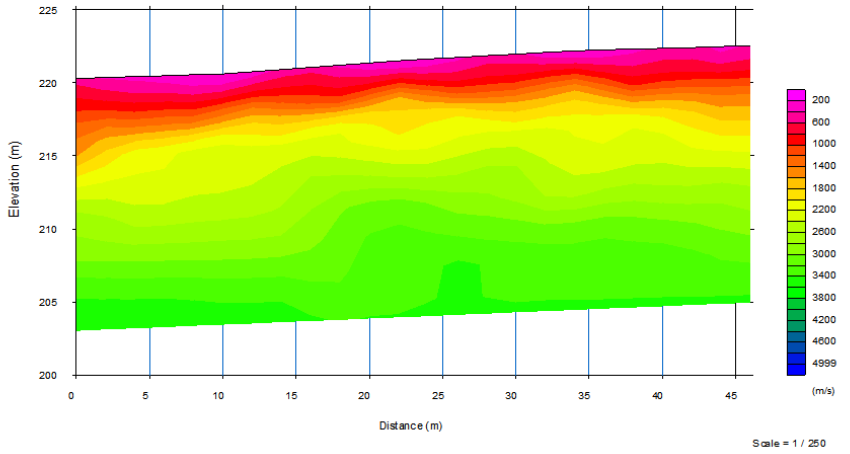


Fig C.58: Turbine Base T10 Seismic Refraction S16 Tomographic Inversion, plotted SW-NE.

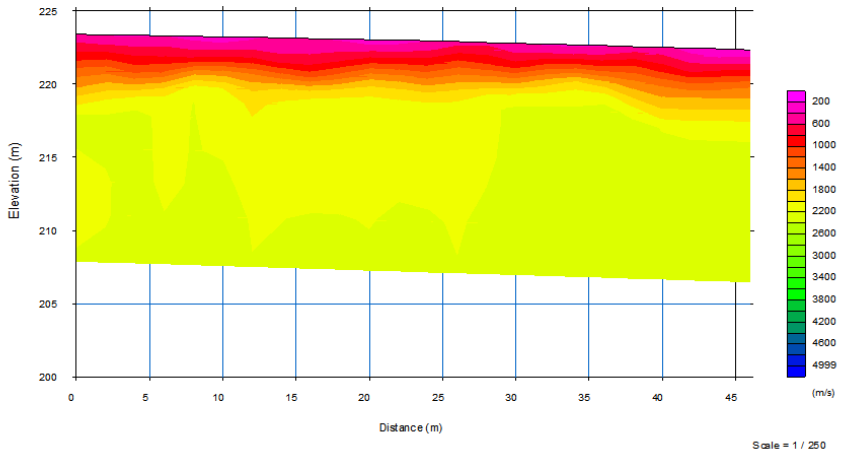


Fig C.59: Turbine Base T11 Seismic Refraction S45 Tomographic Inversion, plotted SW-NE.

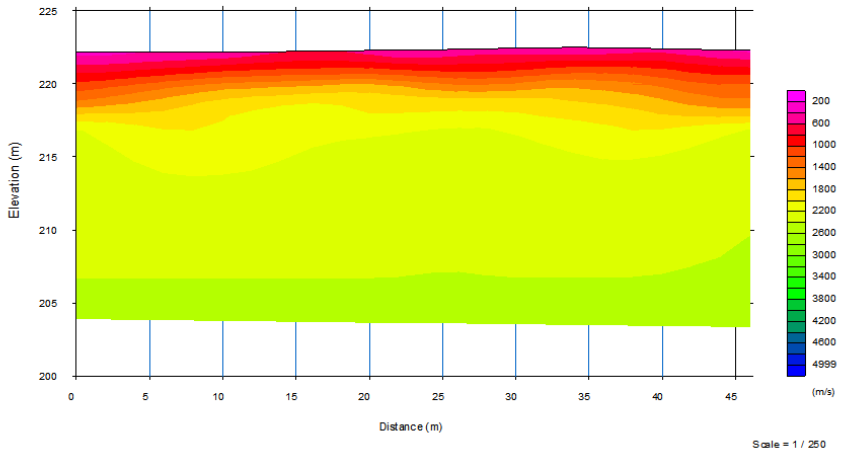


Fig C.60: Turbine Base T11 Seismic Refraction S46 Tomographic Inversion, plotted NE-SW.

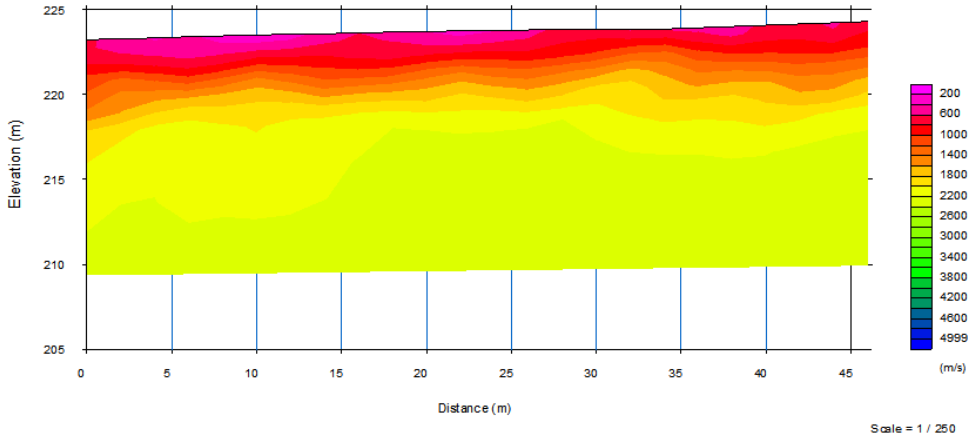


Fig C.61: Turbine Base T11 Seismic Refraction S47 Tomographic Inversion, plotted NW-SE.

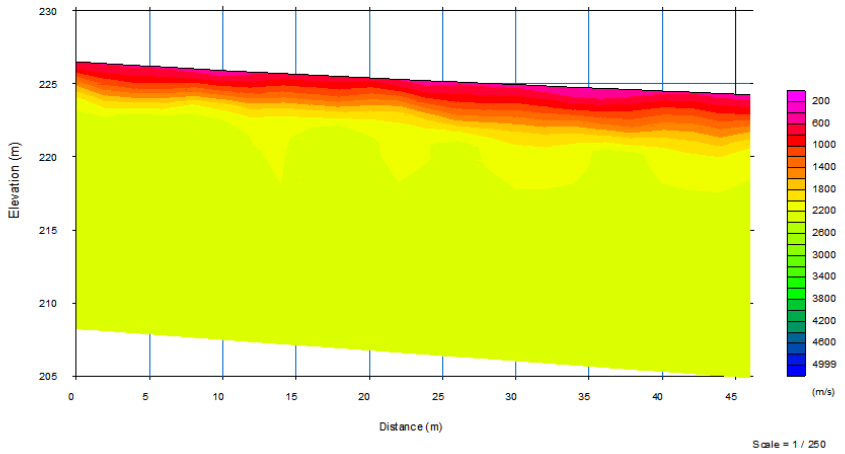


Fig C.62: Turbine Base T11 Seismic Refraction S48 Tomographic Inversion, plotted SE-NW.

APPENDIX D: DRAWINGS

The information derived from the geophysical investigation as well as correlation with the available direct investigation is presented in the following drawings:

AGP26012_01	Geophysical Survey Locations	1:10000@A3
AGP26012_T01	Fig 1: Turbine base T01, Results and Interpretation ERT R5 & S9-S12	1:1000@A3
	Fig 2: Turbine base T01, Results and Interpretation ERT R6 & S5-S12	1:1000@A3
AGP26012_T02	Fig 1: Turbine base T02, Results and Interpretation ERT R11 & S21 & S22	1:750@A3
	Fig 2: Turbine base T02, Results and Interpretation ERT R12 & S22 & S24	1:750@A3
AGP26012_T03	Fig 1: Turbine base T03, Results and Interpretation ERT R9 & S17 & S18	1:750@A3
	Fig 2: Turbine base T03, Results and Interpretation ERT R10 & S19 & S20	1:750@A3
AGP26012_T04	Fig 1: Turbine base T04, Results and Interpretation ERT R3 & S37-S40	1:750@A3
	Fig 2: Turbine base T04, Results and Interpretation ERT R4 & S41-S44	1:750@A3
AGP26012_ALTT04A	Fig 1: Turbine base ALT T04, Results and Interpretation ERT R23 & S53-S55	1:1000@A3
	Fig 2: Turbine base ALT T04, Results and Interpretation ERT R24 & S56-S58	1:1000@A3
AGP26012_ALTT04B	Residual Microgravity Contours	1:1000@A3
AGP26012_T05	Fig 1: Turbine base T05, Results and Interpretation ERT R1 & S1 & S2	1:750@A3
	Fig 2: Turbine base T05, Results and Interpretation ERT R2 & S3 & S4	1:750@A3
AGP26012_ALTT05	Fig 1: Turbine base ALT T05, Results and Interpretation ERT R25 & S60-S61	1:1000@A3
	Fig 2: Turbine base ALT T05, Results and Interpretation ERT R26 & S62-S64	1:1000@A3
AGP26012_T06	Fig 1: Turbine base T06, Results and Interpretation ERT R21 & S49 & S52	1:750@A3
	Fig 2: Turbine base T06, Results and Interpretation ERT R22 & S50 & S51	1:750@A3
AGP26012_T07	Fig 1: Turbine base T07, Results and Interpretation ERT R17 & S33 & S36	1:750@A3
	Fig 2: Turbine base T07, Results and Interpretation ERT R18 & S34 & S35	1:750@A3
AGP26012_T08	Fig 1: Turbine base T08, Results and Interpretation ERT R15 & S29 & S32	1:750@A3
	Fig 2: Turbine base T08, Results and Interpretation ERT R16 & S30 & S31	1:750@A3
AGP26012_T09	Fig 1: Turbine base T09, Results and Interpretation ERT R13 & S25 & S28	1:750@A3
	Fig 2: Turbine base T09, Results and Interpretation ERT R14 & S26 & S27	1:750@A3
AGP26012_T10	Fig 1: Turbine base T10, Results and Interpretation ERT R7 & S13 & S14	1:750@A3
	Fig 2: Turbine base T10, Results and Interpretation ERT R8 & S15 & S16	1:750@A3
AGP26012_T11	Fig 1: Turbine base T11, Results and Interpretation ERT R19 & S47 & S48	1:750@A3
	Fig 2: Turbine base T11, Results and Interpretation ERT R20 & S45 & S46	1:750@A3

GEOPHYSICAL SURVEY LOCATIONS

SCALE 1:10000

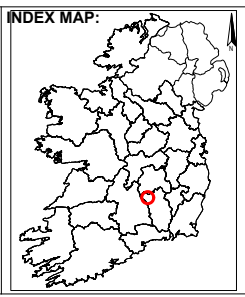


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INDEX MAP:



LEGEND:

- T5 — Proposed turbine base location
- R1 — 2D resistivity profile
- S1 — Seismic refraction profile
- 101 — Gravity station location
- BH01 — Borehole location
- T01_PBH1 — Proposed borehole location

The information displayed here is to be used in conjunction with AGP26012_02 Report on the Geophysical Investigation at Killoshulan Wind Farm, Co. Kilkenny for GII Ltd., APEX Geophysics Ltd. 12th October 2026.

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Version:	Date:	Drawn By:	Checked:
01	11-09-2026	SC	TL
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FIG 1: TURBINE BASE T1, RESULTS AND INTERPRETATION ERT R5 & SEISMIC REFRACTION S9 - S12

SCALE 1:1000

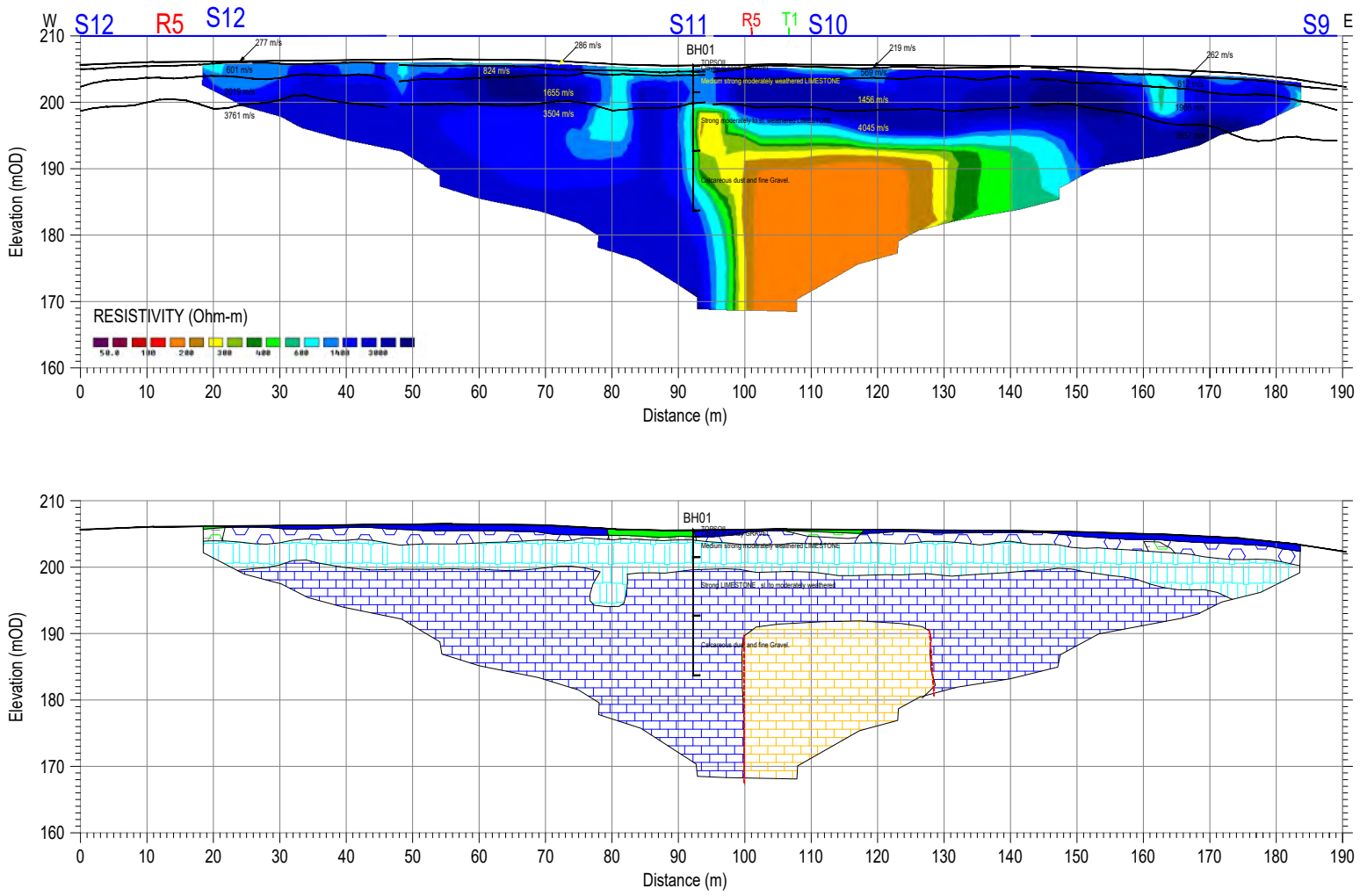
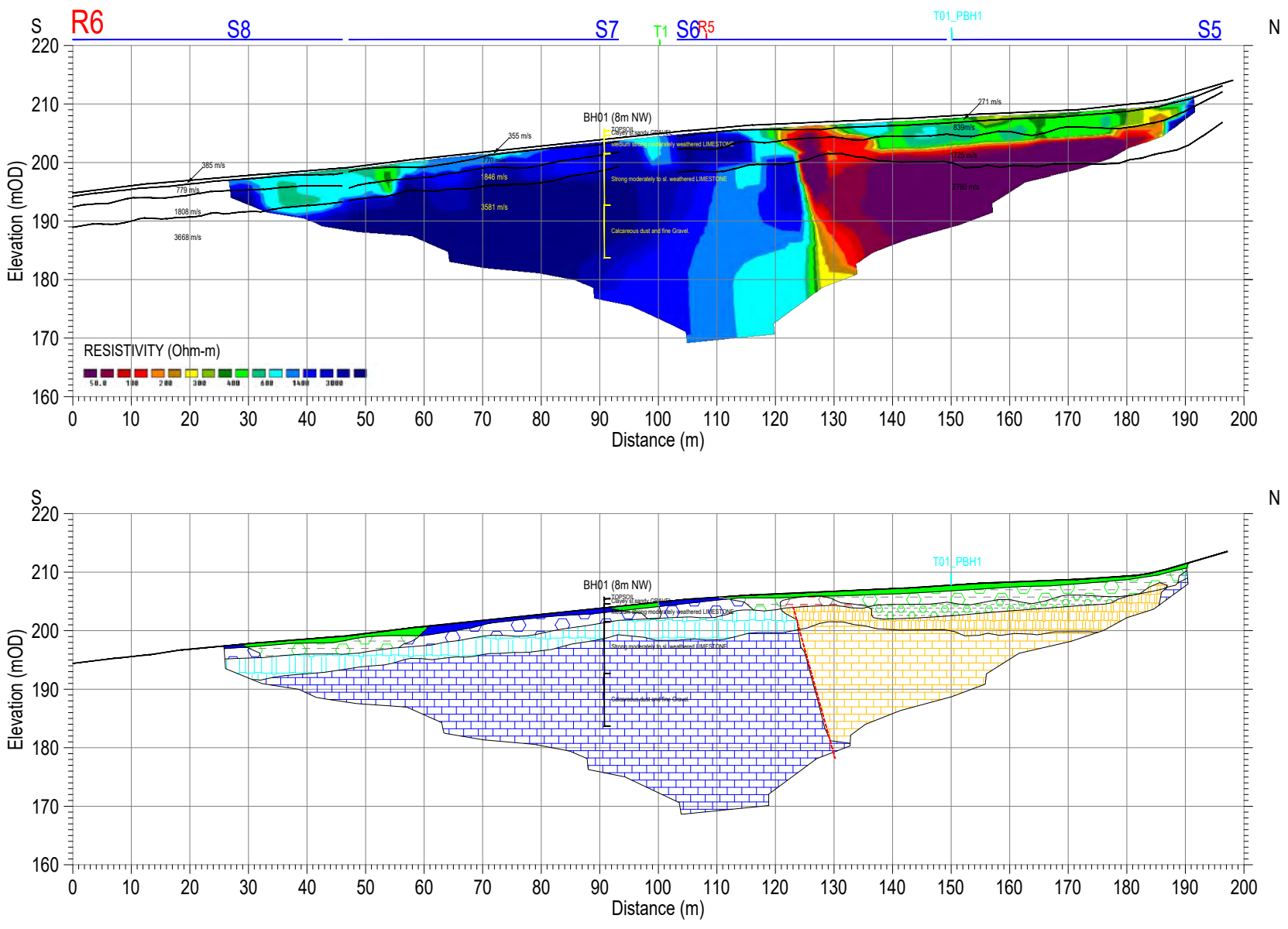


FIG 2: TURBINE BASE T1, RESULTS AND INTERPRETATION ERT R6 & SEISMIC REFRACTION S5 - S8

SCALE 1:1000

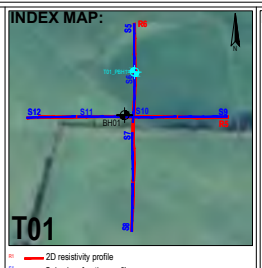


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- Firm Sandy Gravelly SILT/CLAY (Possible Weathered Rock towards base)
- Stiff-Very Stiff Sandy Gravelly SILT/CLAY (Possible Weathered Rock towards base)
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FIG 1: TURBINE BASE T2, RESULTS AND INTERPRETATION ERT R11 & SEISMIC REFRACTION S21 & S22

SCALE 1:750

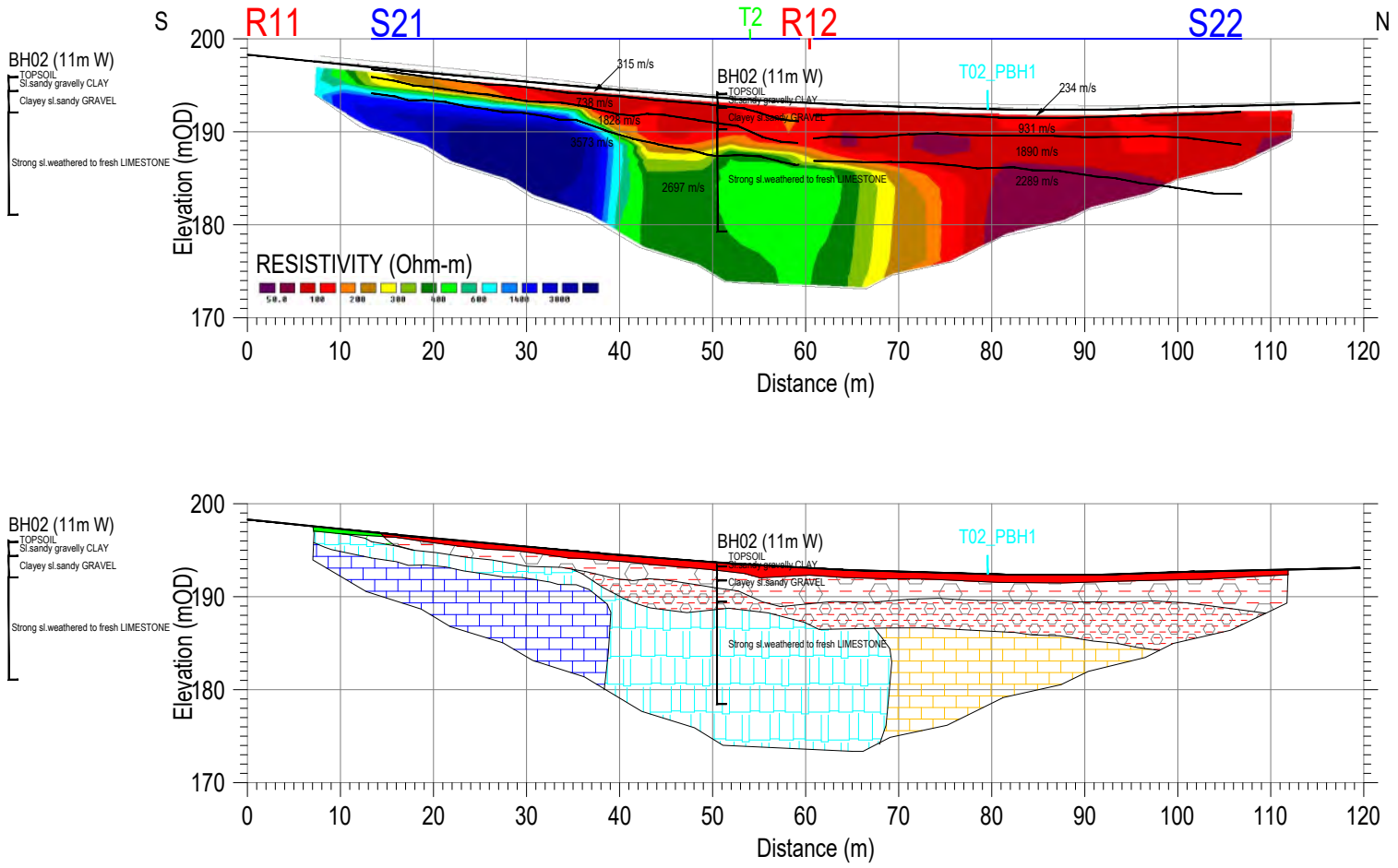
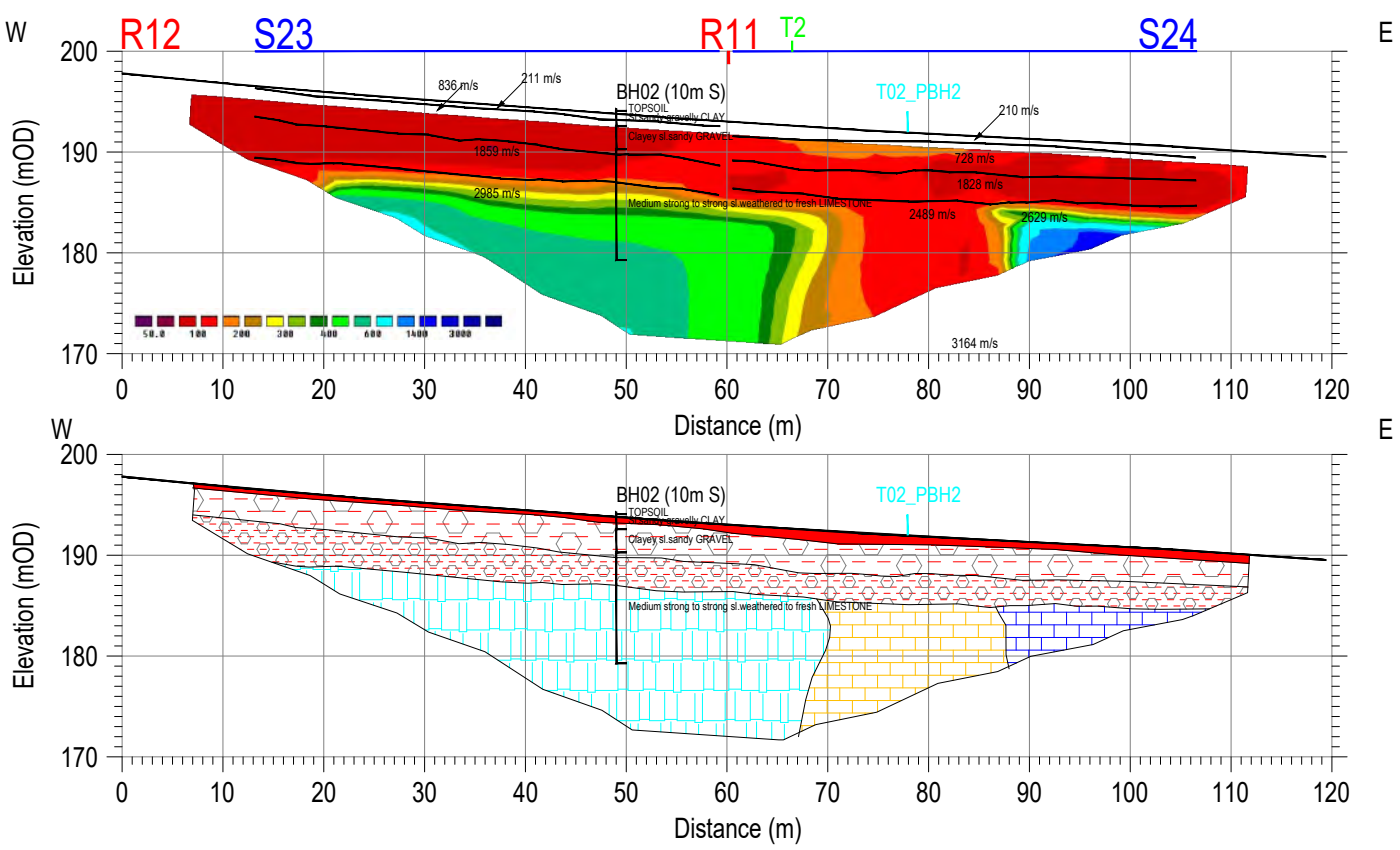


FIG 2: TURBINE BASE T2, RESULTS AND INTERPRETATION ERT R12 & SEISMIC REFRACTION S23 & S24

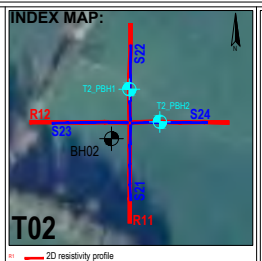
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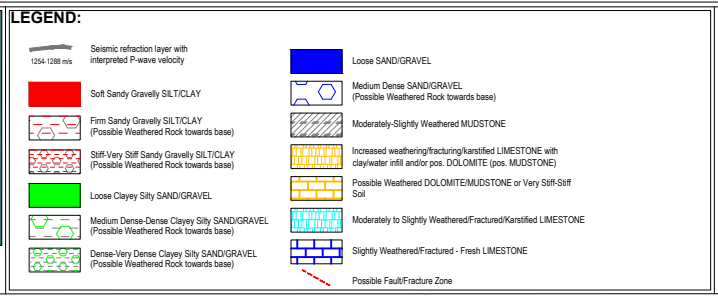


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02	12-10-2026	SC	TL

FIG 1: TURBINE BASE T3, RESULTS AND INTERPRETATION ERT R9 & SEISMIC REFRACTION S17 - S18

SCALE 1:750

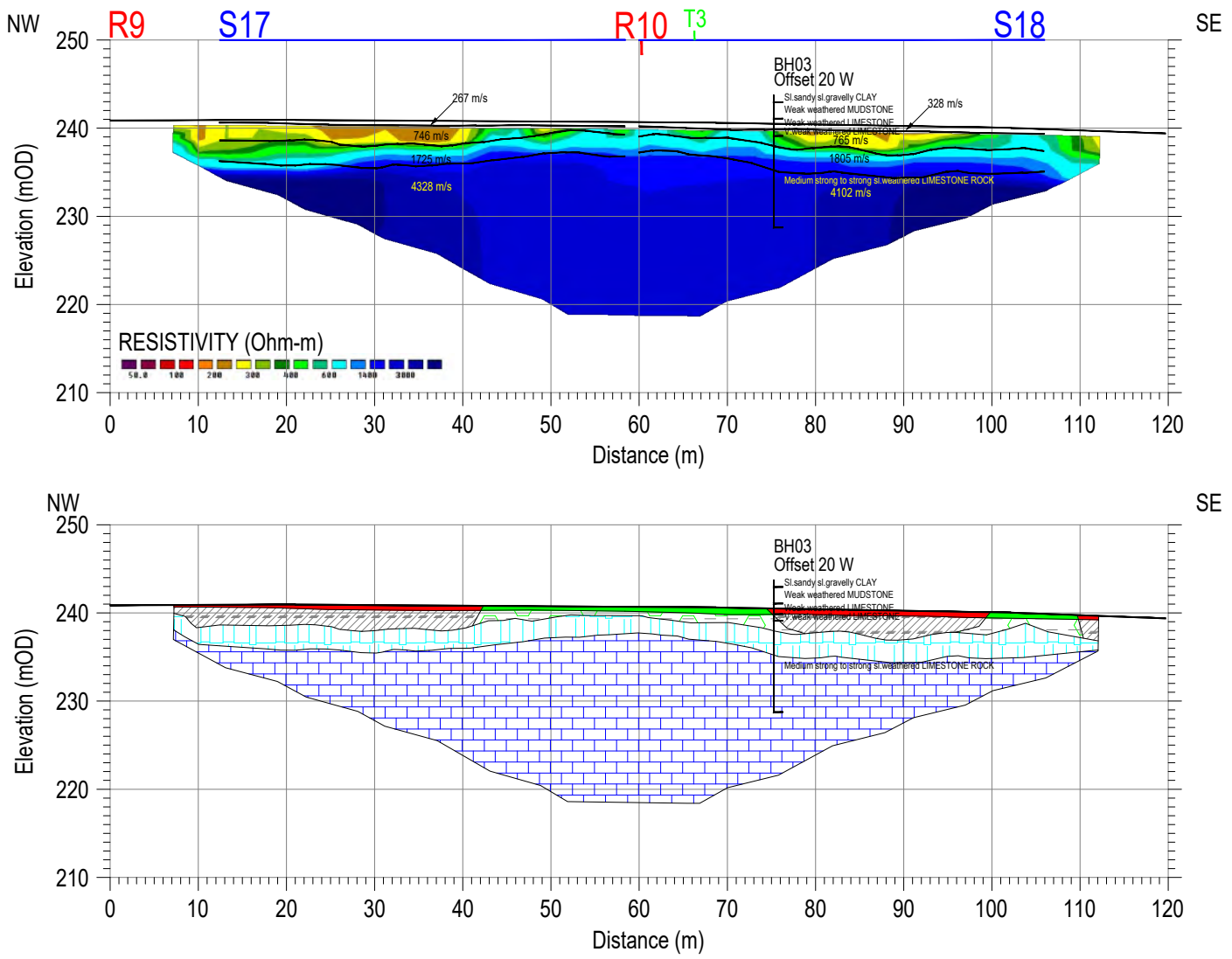
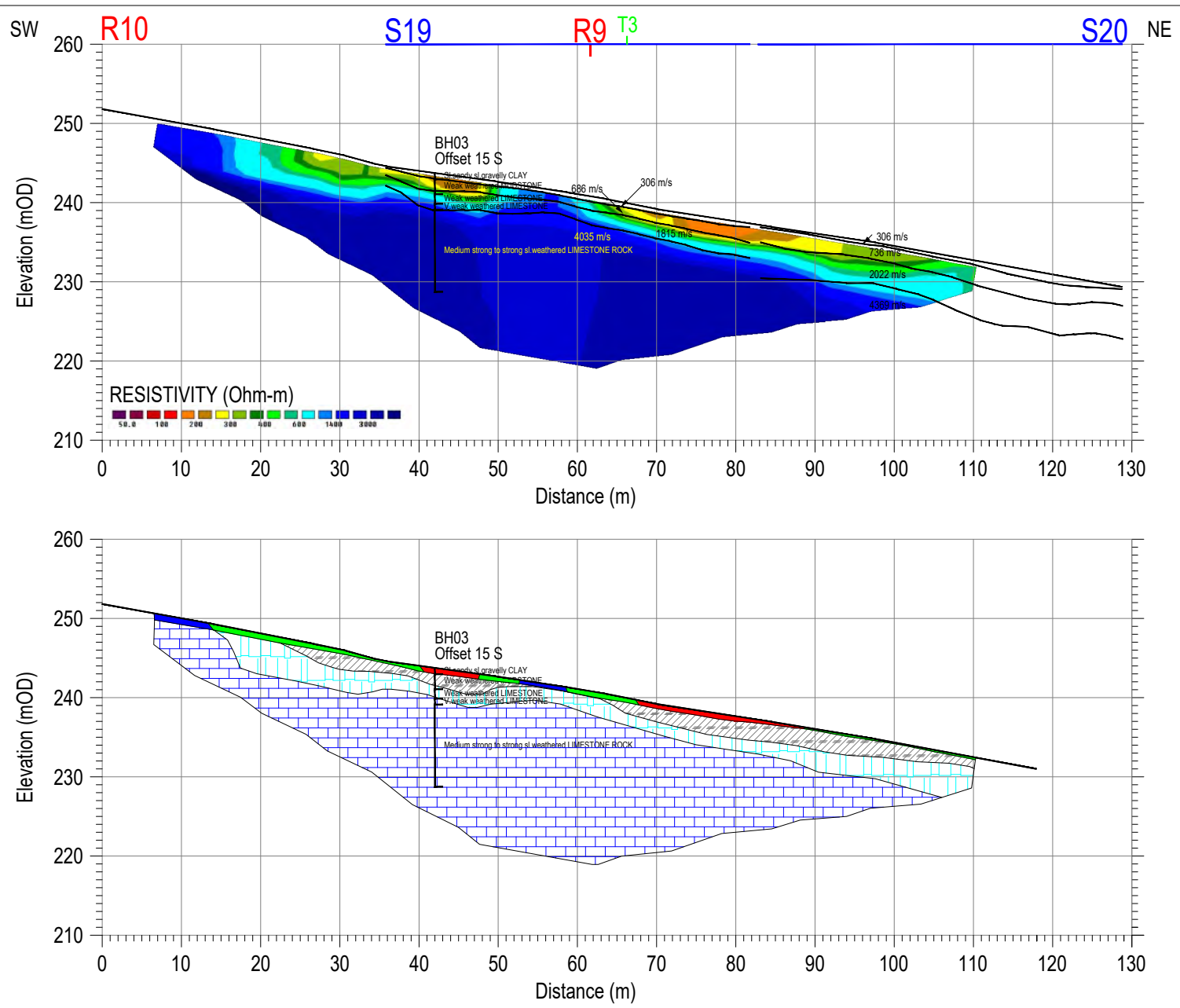


FIG 2: TURBINE BASE T3, RESULTS AND INTERPRETATION ERT R10 & SEISMIC REFRACTION S19 & S20

SCALE 1:750

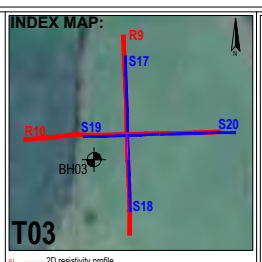


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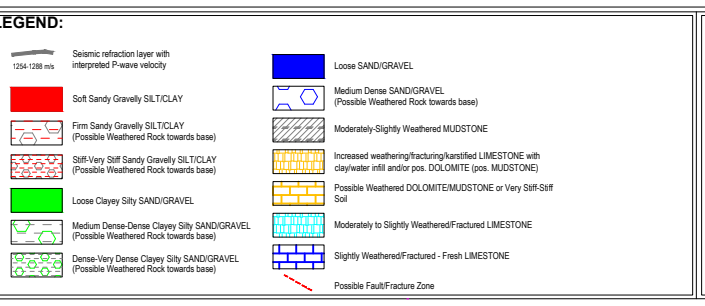
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01	11-09-2026	SC	TL
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FIG 1: TURBINE BASE T4, RESULTS AND INTERPRETATION ERT R3 & SEISMIC REFRACTION S37 - S40

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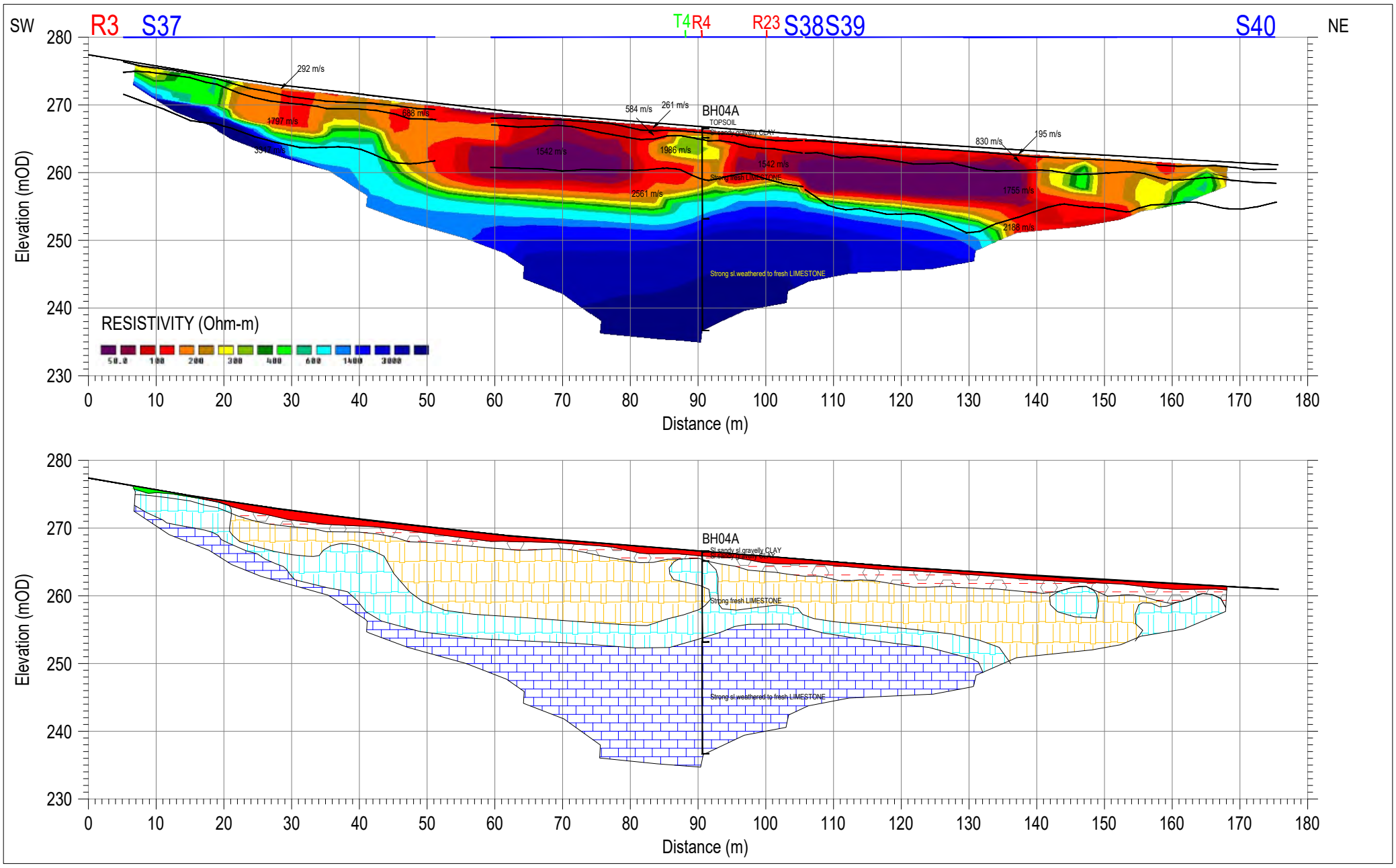
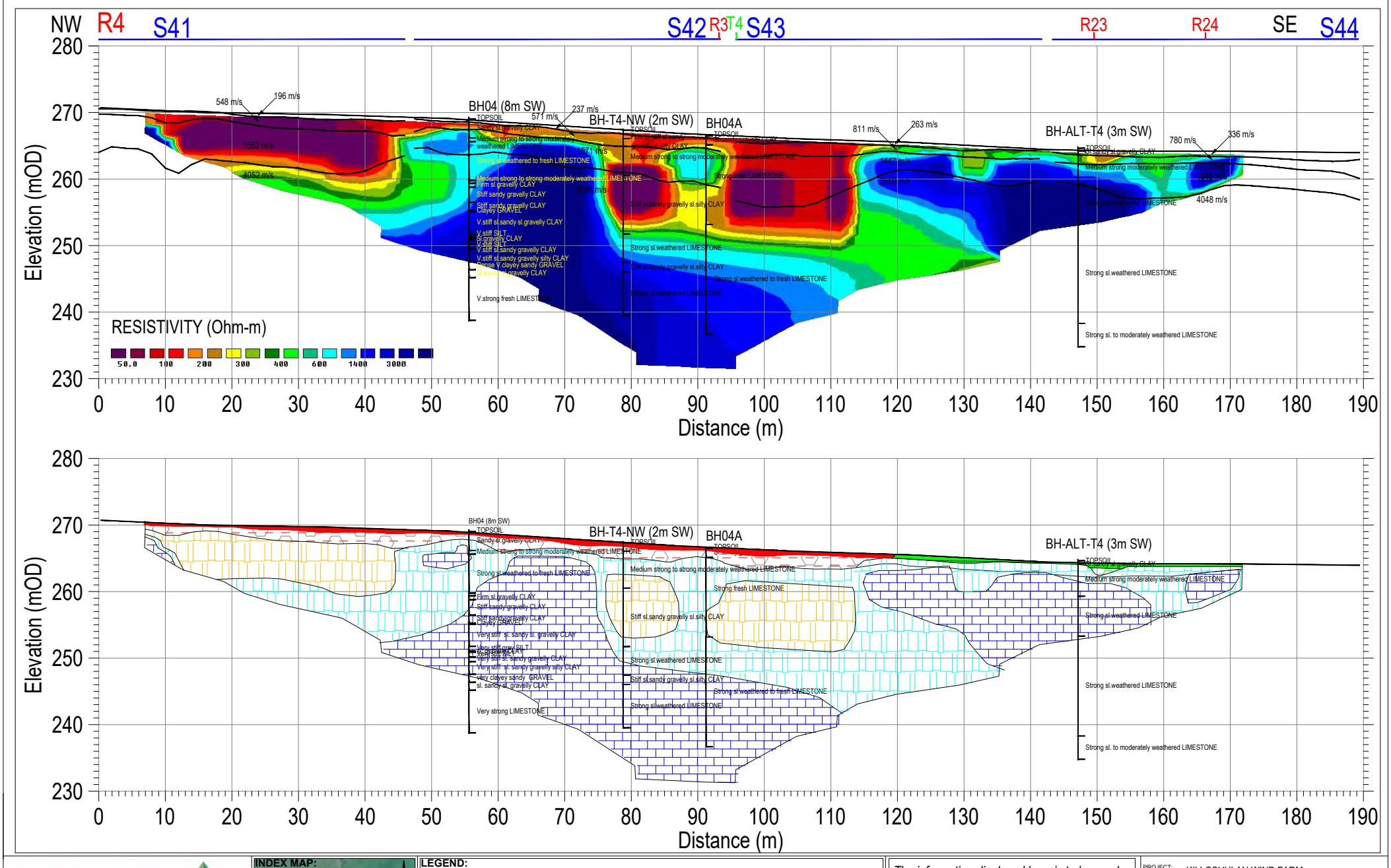


FIG 2: TURBINE BASE T4, RESULTS AND INTERPRETATION ERT R4 & SEISMIC REFRACTION S41 - S44

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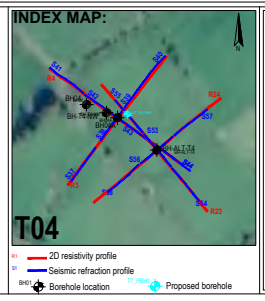


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FIG 1: TURBINE BASE ALT_T4, RESULTS AND INTERPRETATION ERT R23 & SEISMIC REFRACTION S53 - S55

SCALE 1:1000

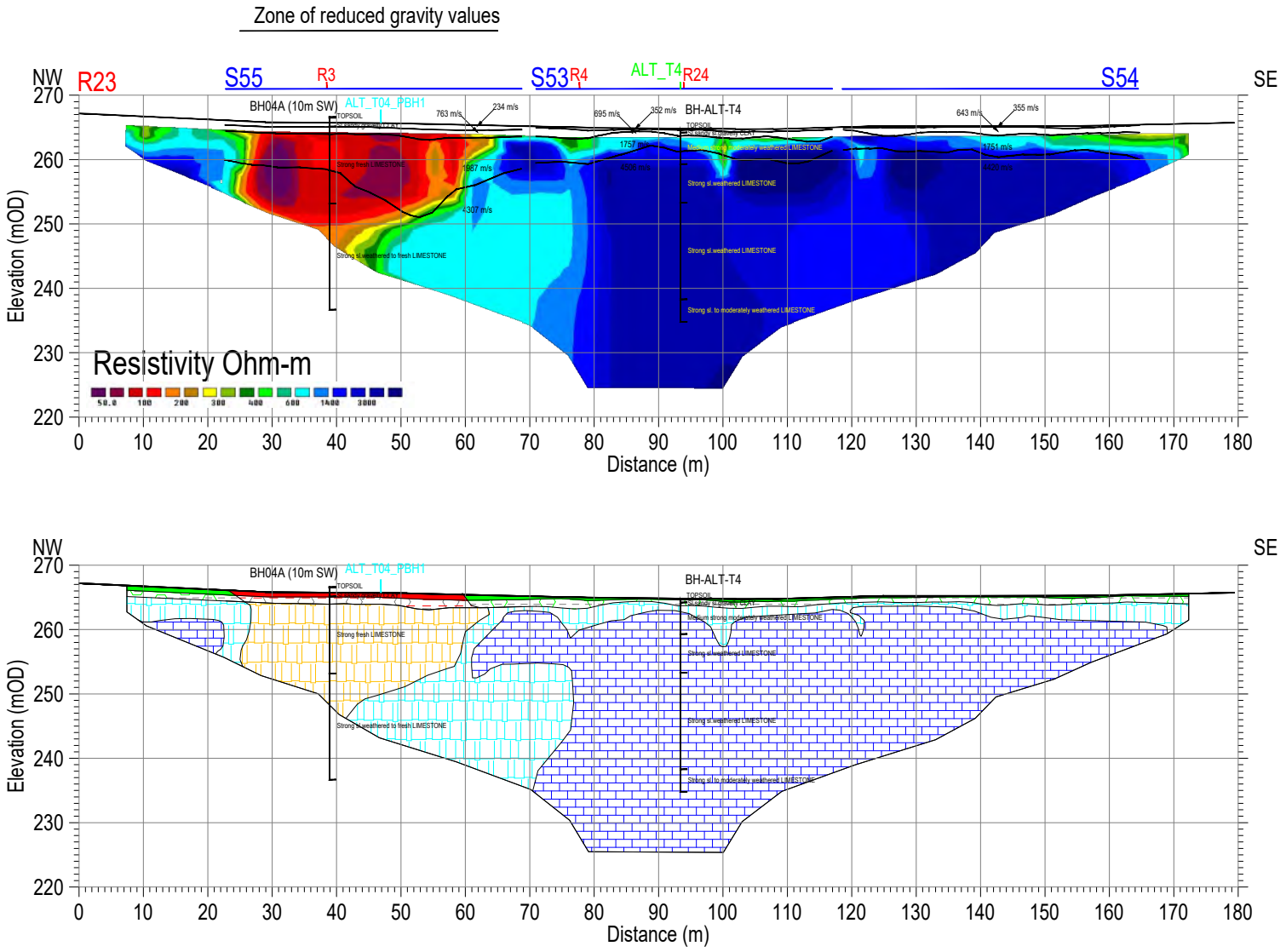
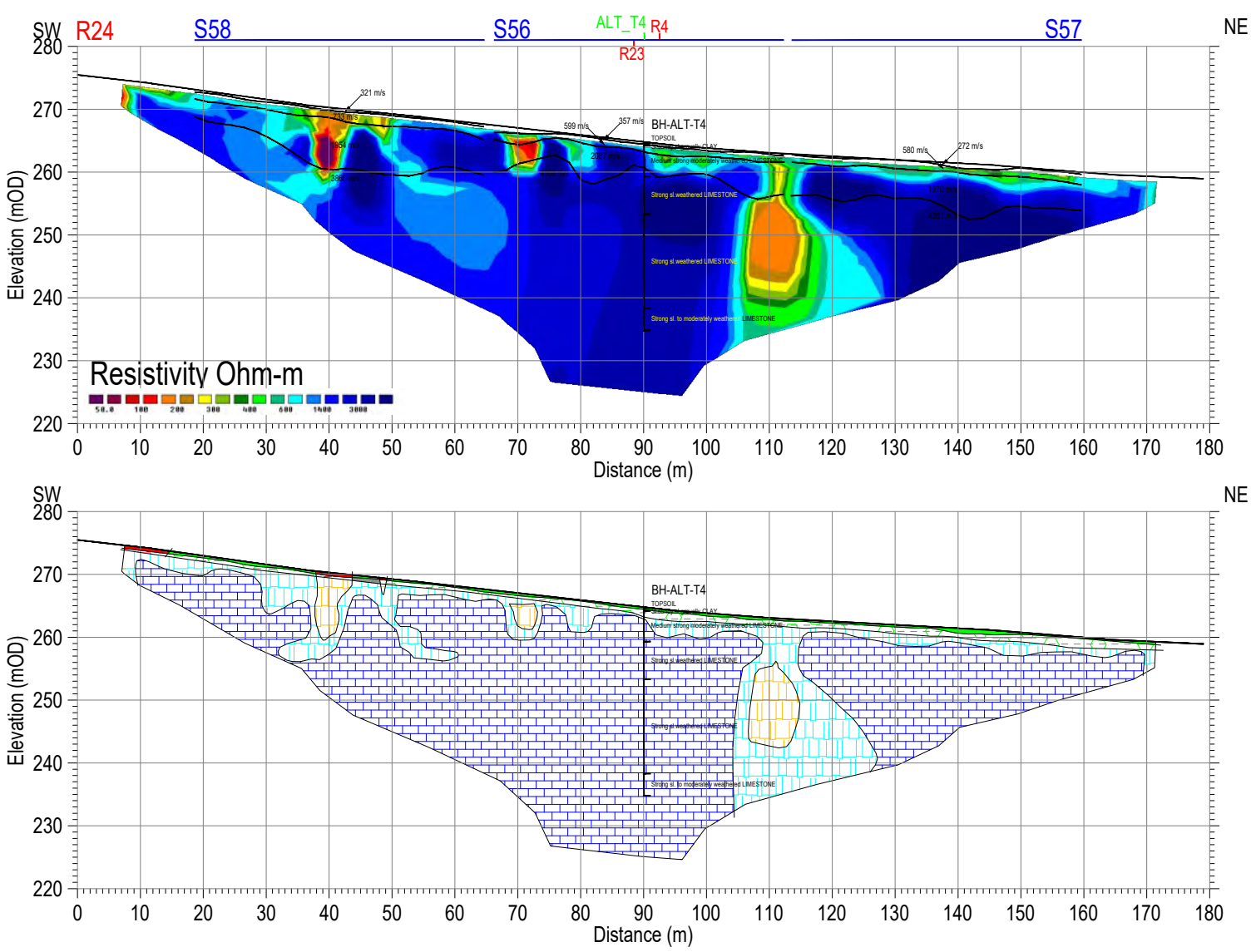


FIG 2: TURBINE BASE ALT_T4, RESULTS AND INTERPRETATION ERT R24 & SEISMIC REFRACTION S56 - S58

SCALE 1:1000

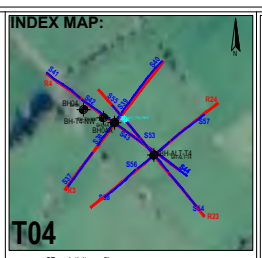


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- Possible Fault/Fracture Zone

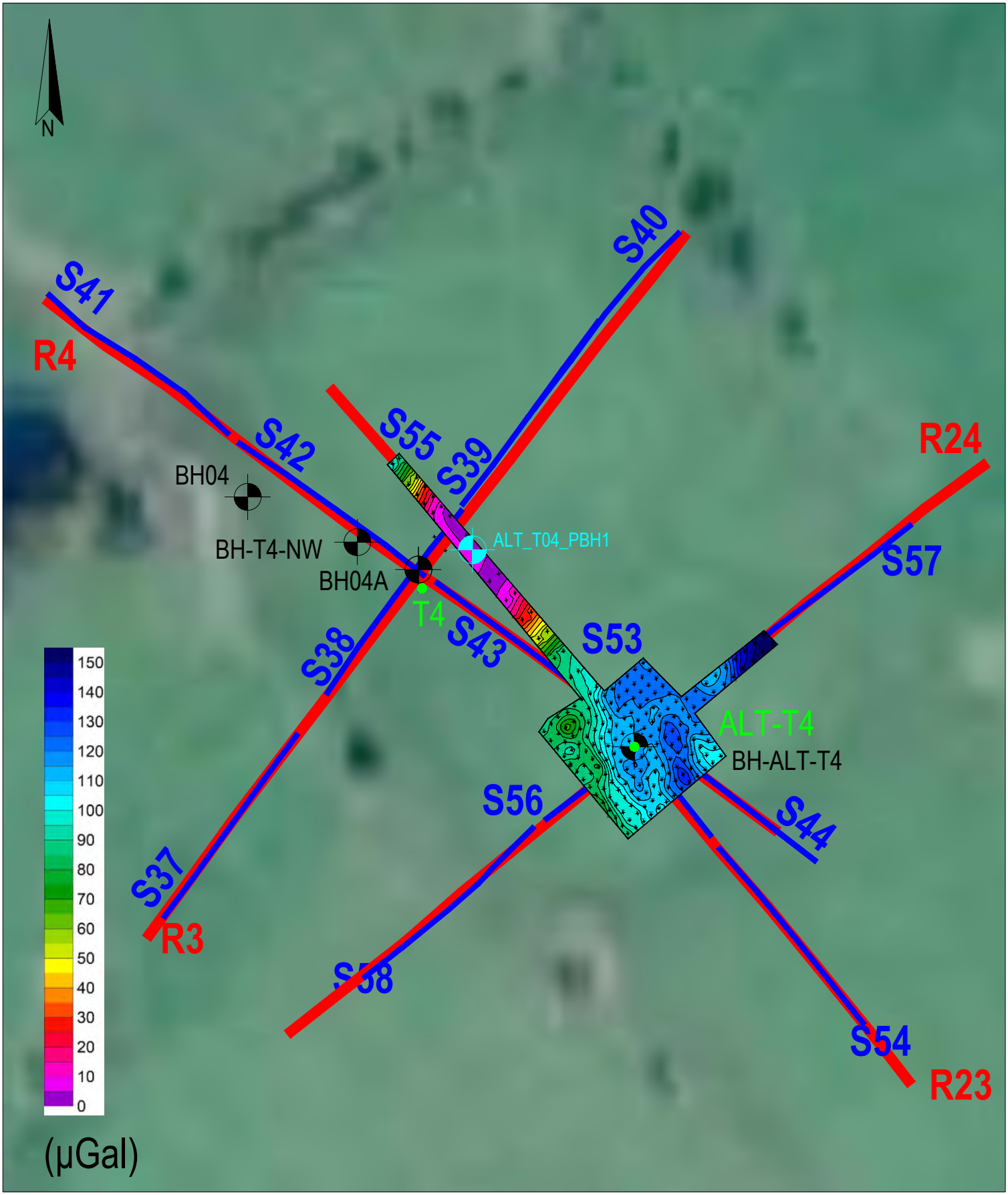
The information displayed here is to be used in conjunction with AGP26012_02 Report on the Geophysical Investigation at Killoshulan Wind Farm, Co. Kilkenny for GII Ltd., APEX Geophysics Ltd. 12th October 2026.

PROJECT:	KILLOSHULAN WIND FARM GEOPHYSICAL INVESTIGATION
CLIENT.:	GROUND INVESTIGATIONS IRELAND
DRAWING NO:	AGP26012_ALT_T04a
SCALE:	AS INDICATED @ A3
DATE:	12-10-2026

Version:	Date:	Drawn By:	Checked:
01	11-09-2026	SC	TL
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RESIDUAL MICROGRAVITY CONTOURS (microGals)

SCALE 1:1000

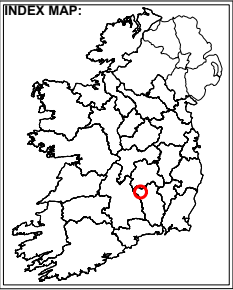


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INDEX MAP:



LEGEND:

- 101 — Gravity station location
- T5 — Proposed turbine base location
- R1 — 2D resistivity profile
- S1 — Seismic refraction profile
- BH01 — Borehole location
- ALT_T04_PBH1 — Proposed borehole location

The information displayed here is to be used in conjunction with AGP26012_02 Report on the Geophysical Investigation at Killoshulan Wind Farm, Co. Kilkenny for GII Ltd., APEX Geophysics Ltd. 12th October 2026.

PROJECT:	KILLOSHULAN WIND FARM GEOPHYSICAL INVESTIGATION
CLIENT.:	GROUND INVESTIGATIONS IRELAND
DRAWING NO:	AGP26012_ALT_T04b
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Version:	Date:	Drawn By:	Checked:
01	11-09-2026	SC	TL
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FIG 1: TURBINE BASE T5, RESULTS AND INTERPRETATION ERT R1 & SEISMIC REFRACTION S1 & S2

SCALE 1:750

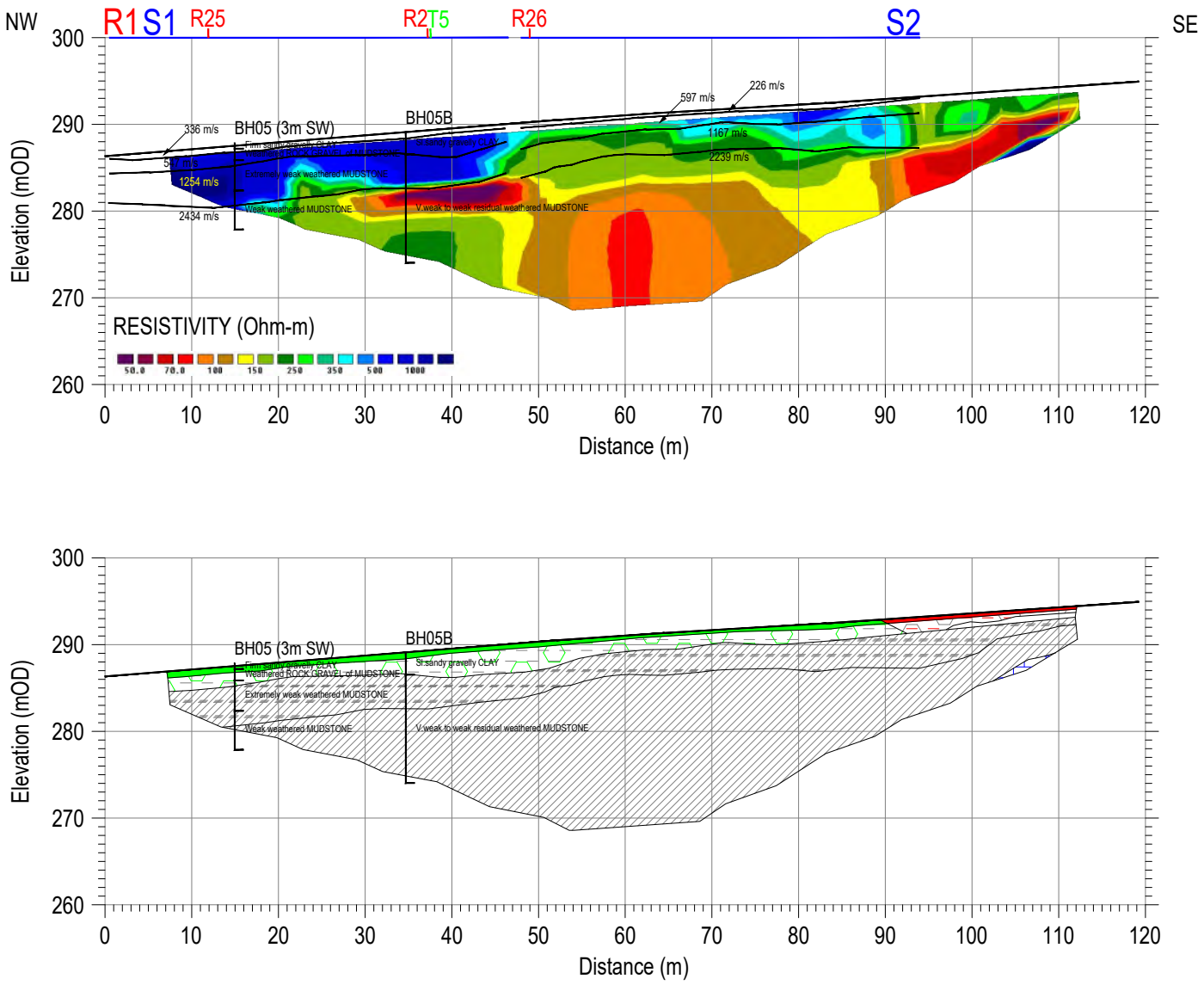
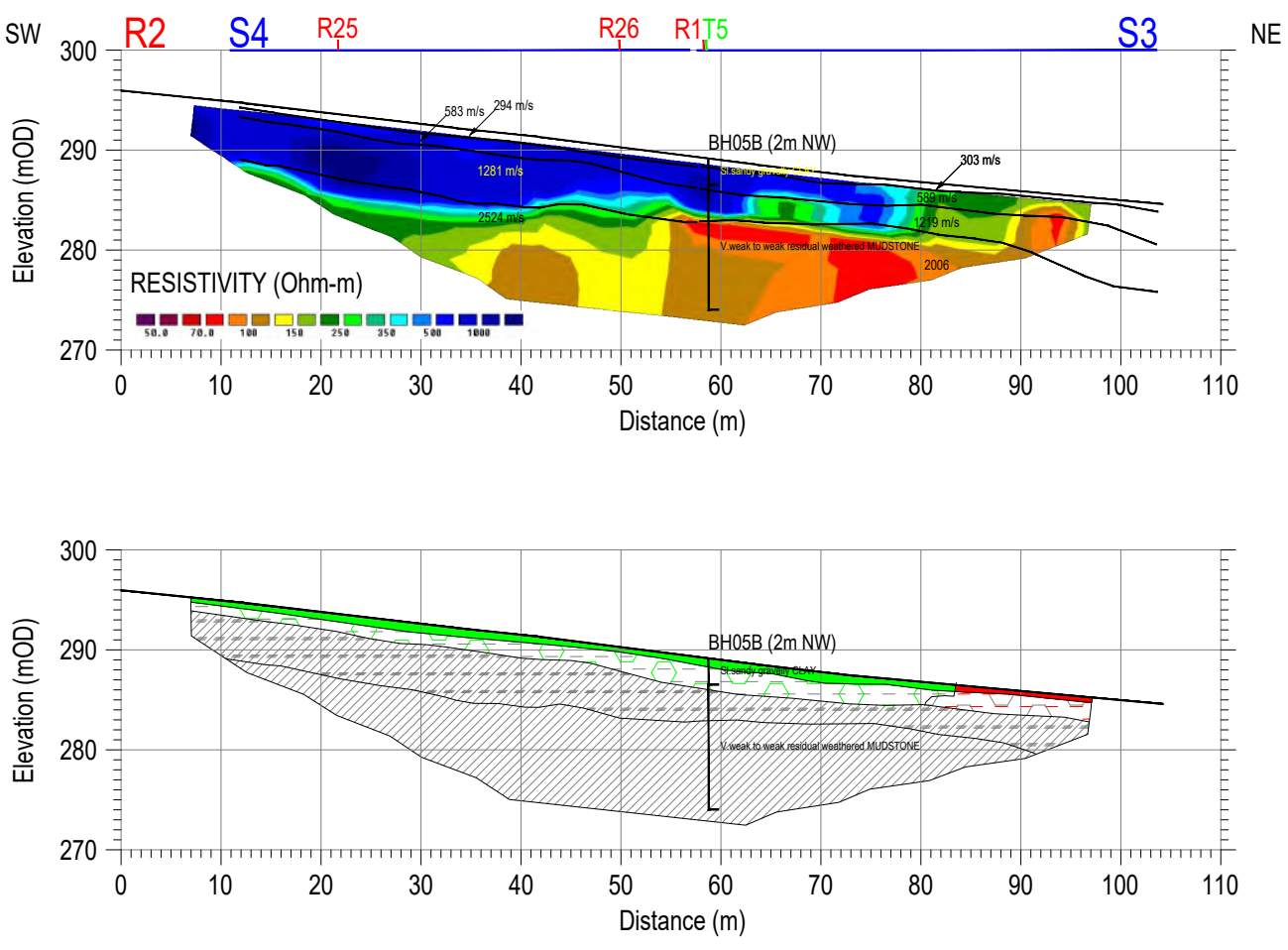


FIG 2: TURBINE BASE T5, RESULTS AND INTERPRETATION ERT R2 & SEISMIC REFRACTION S3 & S4

SCALE 1:750

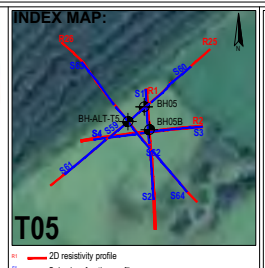


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Version:	Date:	Drawn By:	Checked:
01	11-09-2026	SC	TL
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FIG 1: TURBINE BASE ALT_T5, RESULTS AND INTERPRETATION ERT R25 & SEISMIC REFRACTION S59 - S61

SCALE 1:1000

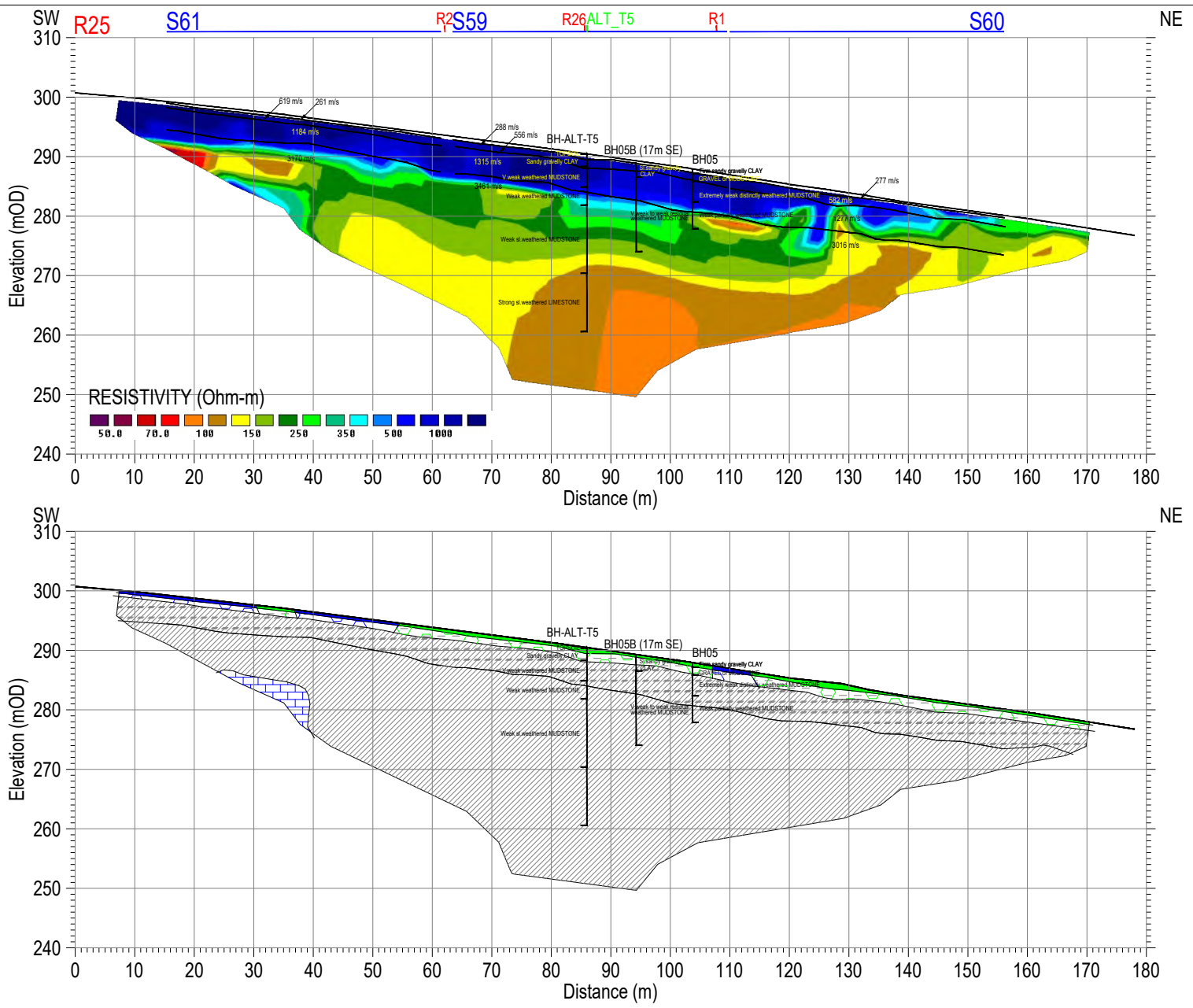
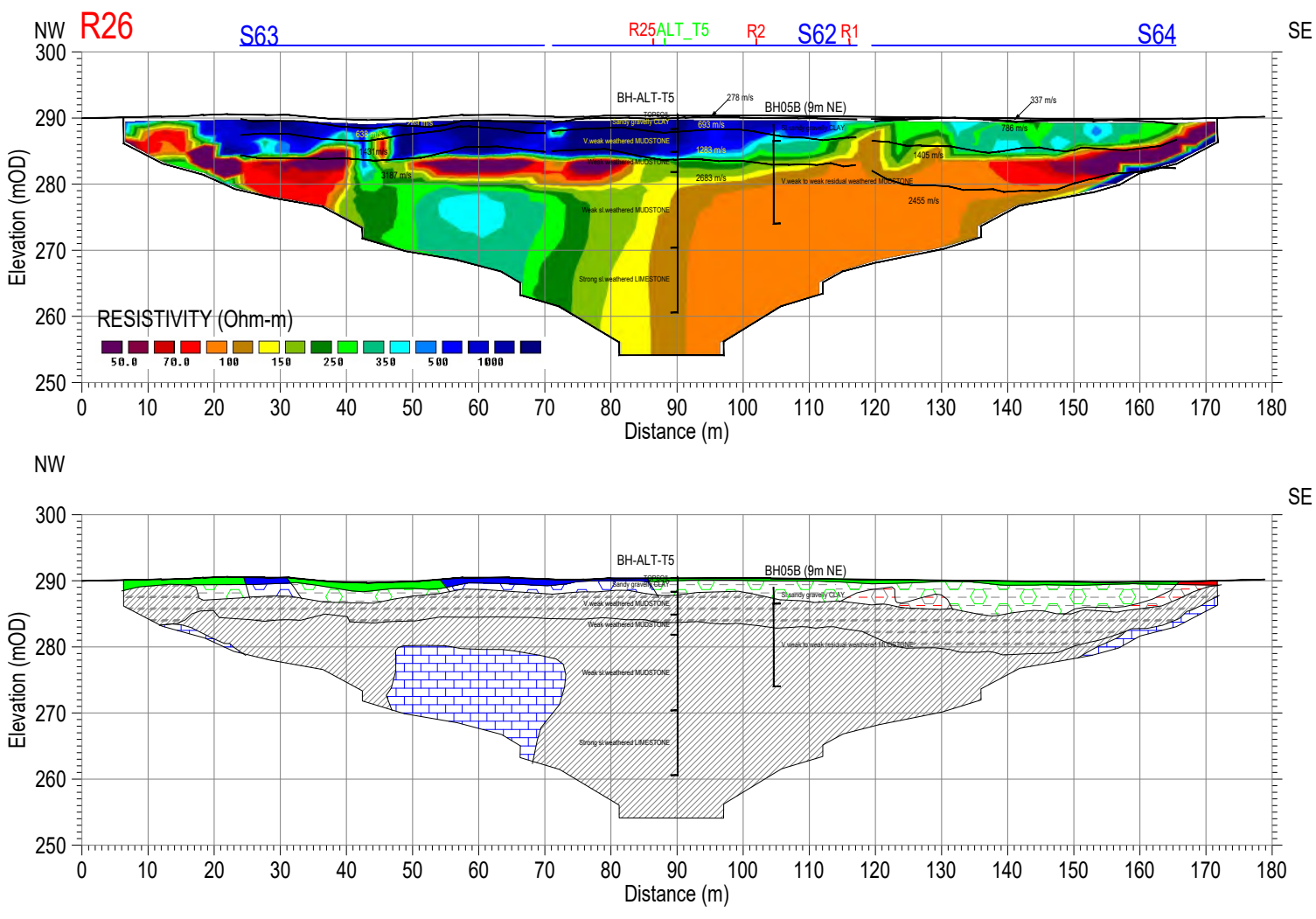


FIG 2: TURBINE BASE ALT_T5, RESULTS AND INTERPRETATION ERT R26 & SEISMIC REFRACTION S62 - S64

SCALE 1:1000

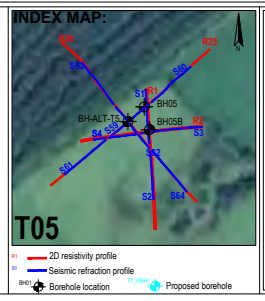


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CLIENT.:	GROUND INVESTIGATIONS IRELAND
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01	11-09-2026	SC	TL
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FIG 1: TURBINE BASE T6, RESULTS AND INTERPRETATION ERT R21 & SEISMIC REFRACTION S49 & S52

SCALE 1:750

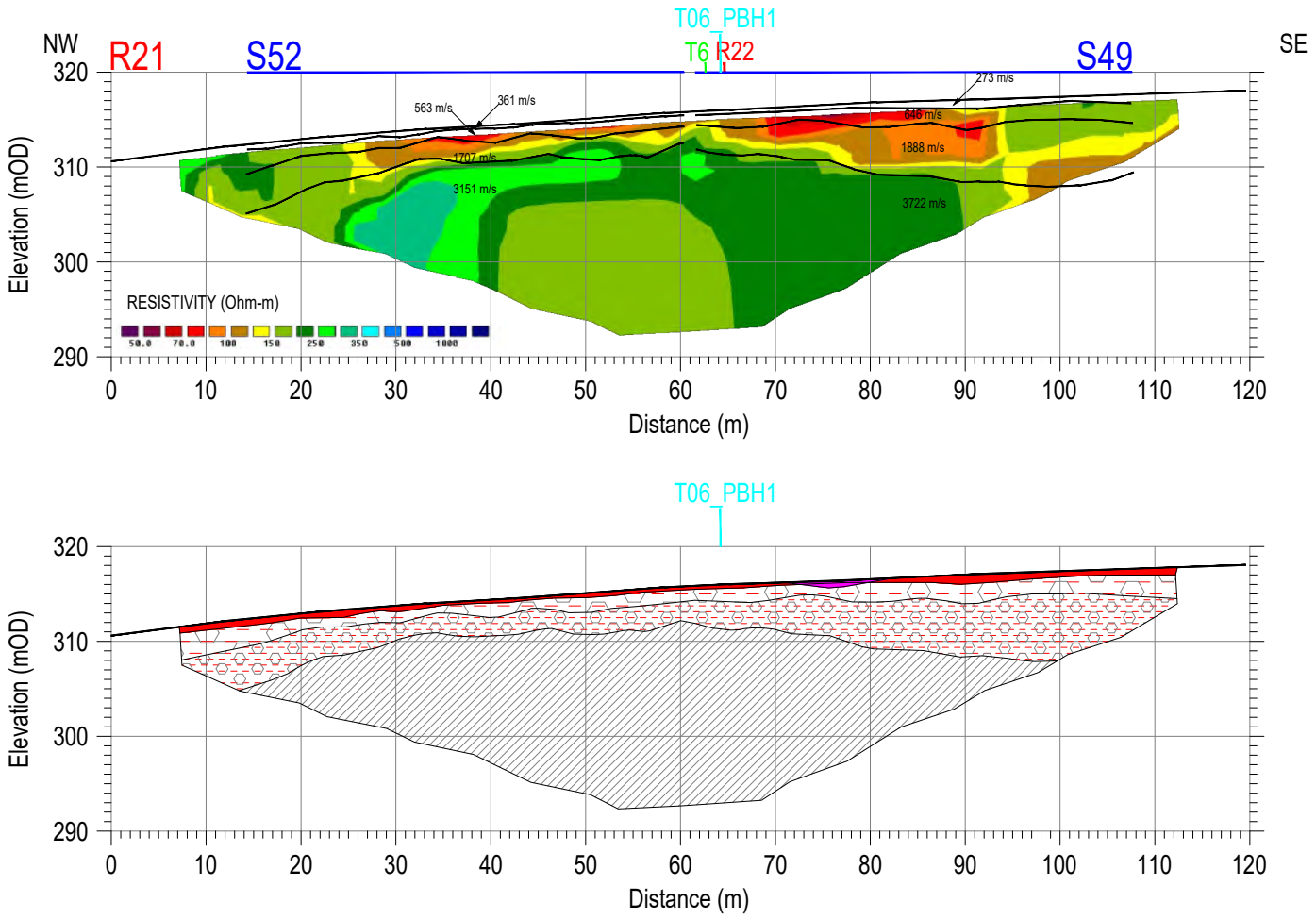
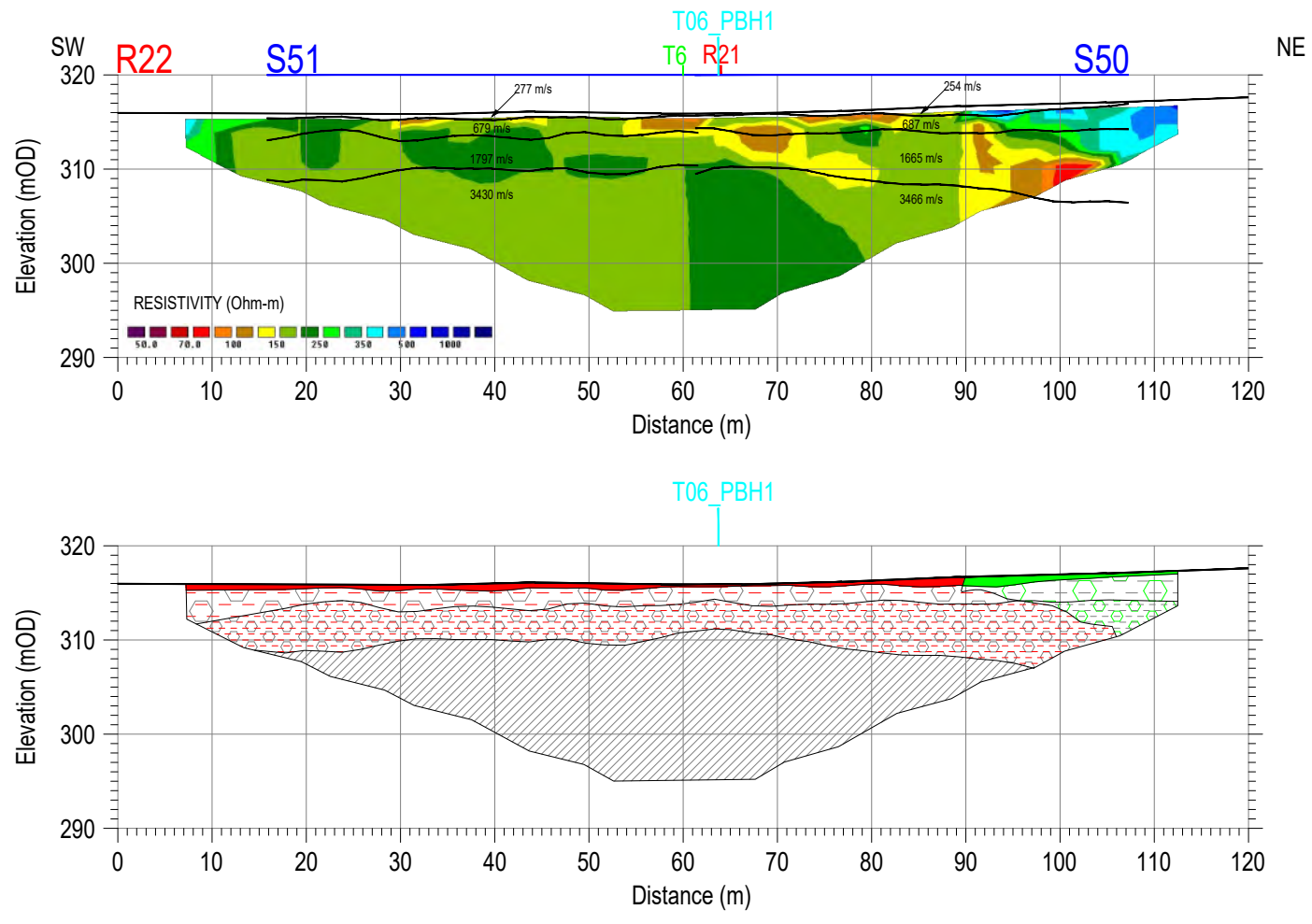


FIG 2: TURBINE BASE T6, RESULTS AND INTERPRETATION ERT R22 & SEISMIC REFRACTION S50 & S51

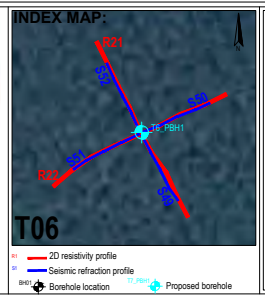
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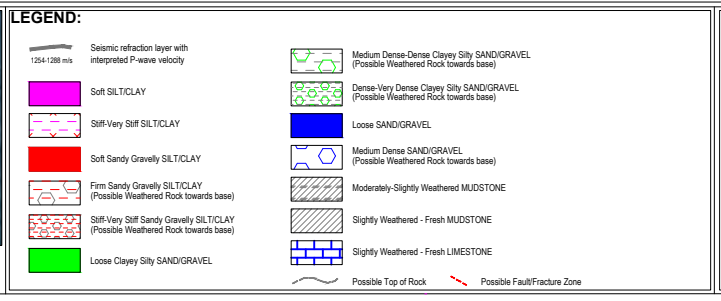


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SCALE:	AS INDICATED @ A3
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01	11-09-2026	SC	TL
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FIG 1: TURBINE BASE T7, RESULTS AND INTERPRETATION ERT R17 & SEISMIC REFRACTION S33 & S36

SCALE 1:750

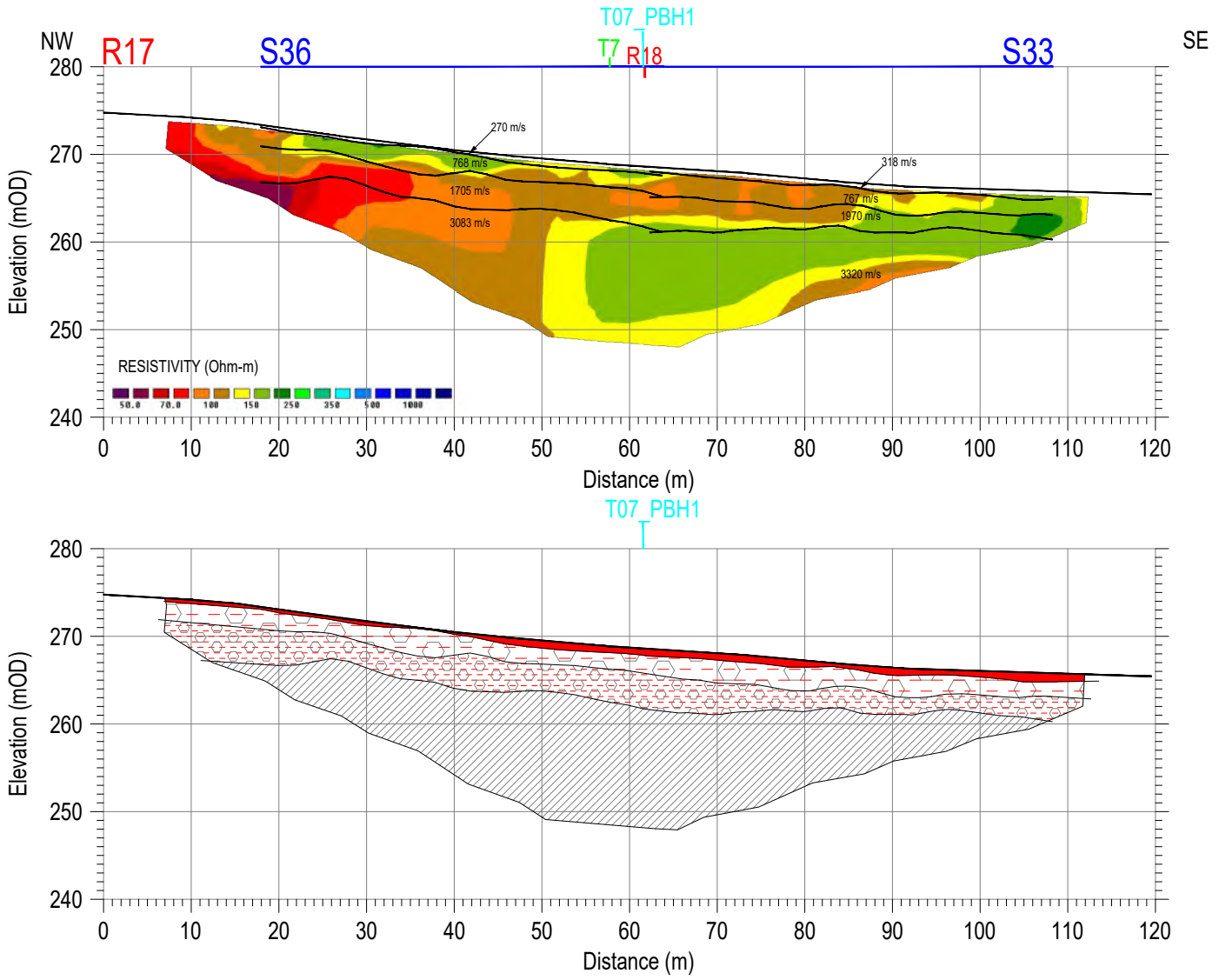
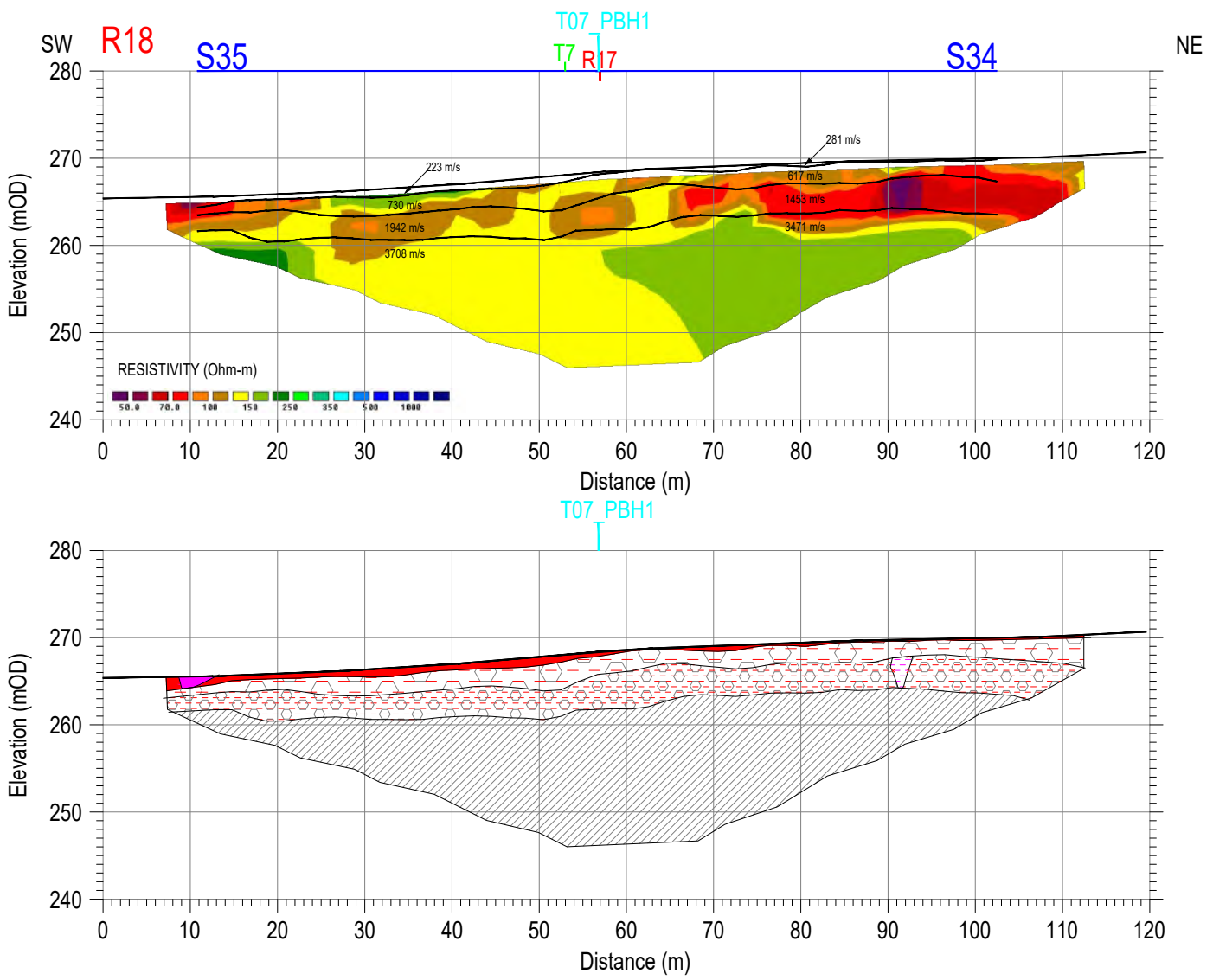


FIG 2: TURBINE BASE T7, RESULTS AND INTERPRETATION ERT R18 & SEISMIC REFRACTION S34 & S35

SCALE 1:750

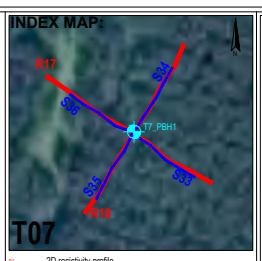


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INDEX MAP:



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SCALE:	AS INDICATED @ A3
DATE:	12-10-2026

Version:	Date:	Drawn By:	Checked:
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FIG 1: TURBINE BASE T8, RESULTS AND INTERPRETATION ERT R15 & SEISMIC REFRACTION S29 & S32

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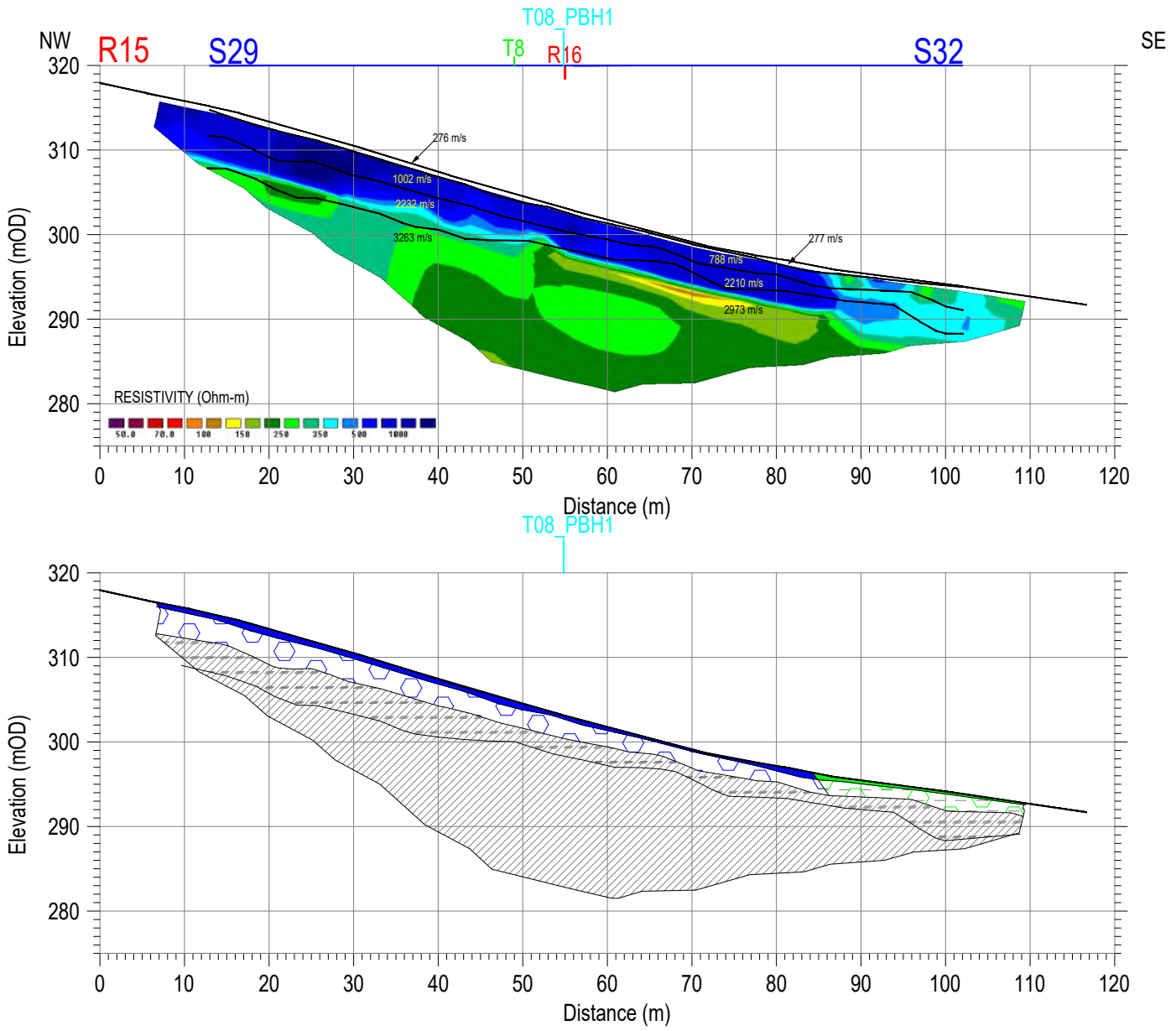
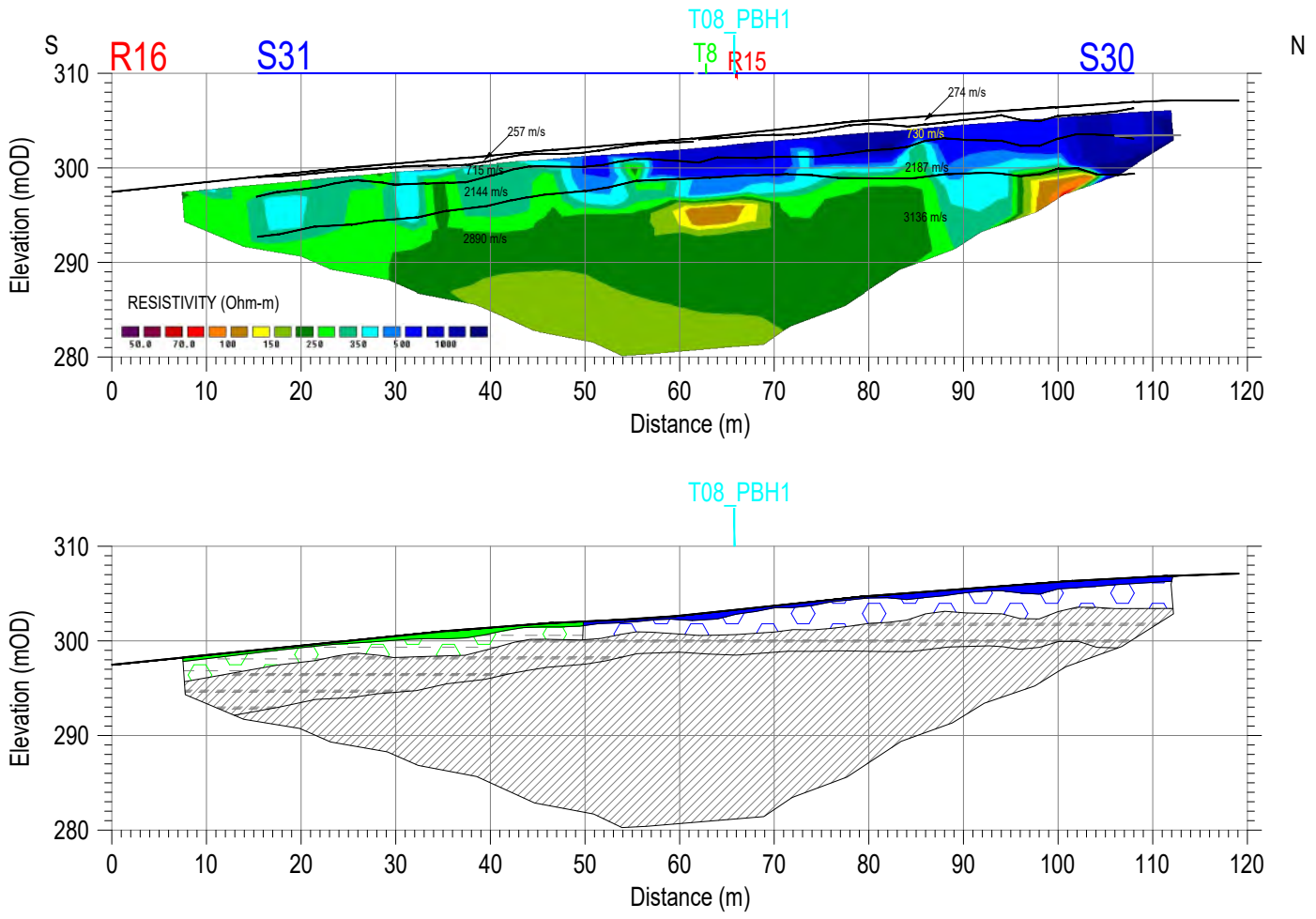


FIG 2: TURBINE BASE T8, RESULTS AND INTERPRETATION ERT R16 & SEISMIC REFRACTION S30 & S31

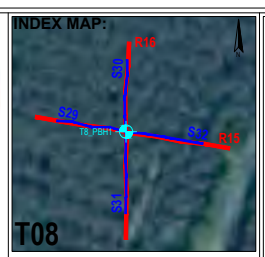
SCALE 1:750



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PROJECT:	KILLOSHULAN WIND FARM GEOPHYSICAL INVESTIGATION
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FIG 1: TURBINE BASE T9, RESULTS AND INTERPRETATION ERT R13 & SEISMIC REFRACTION S25 & S28

SCALE 1:750

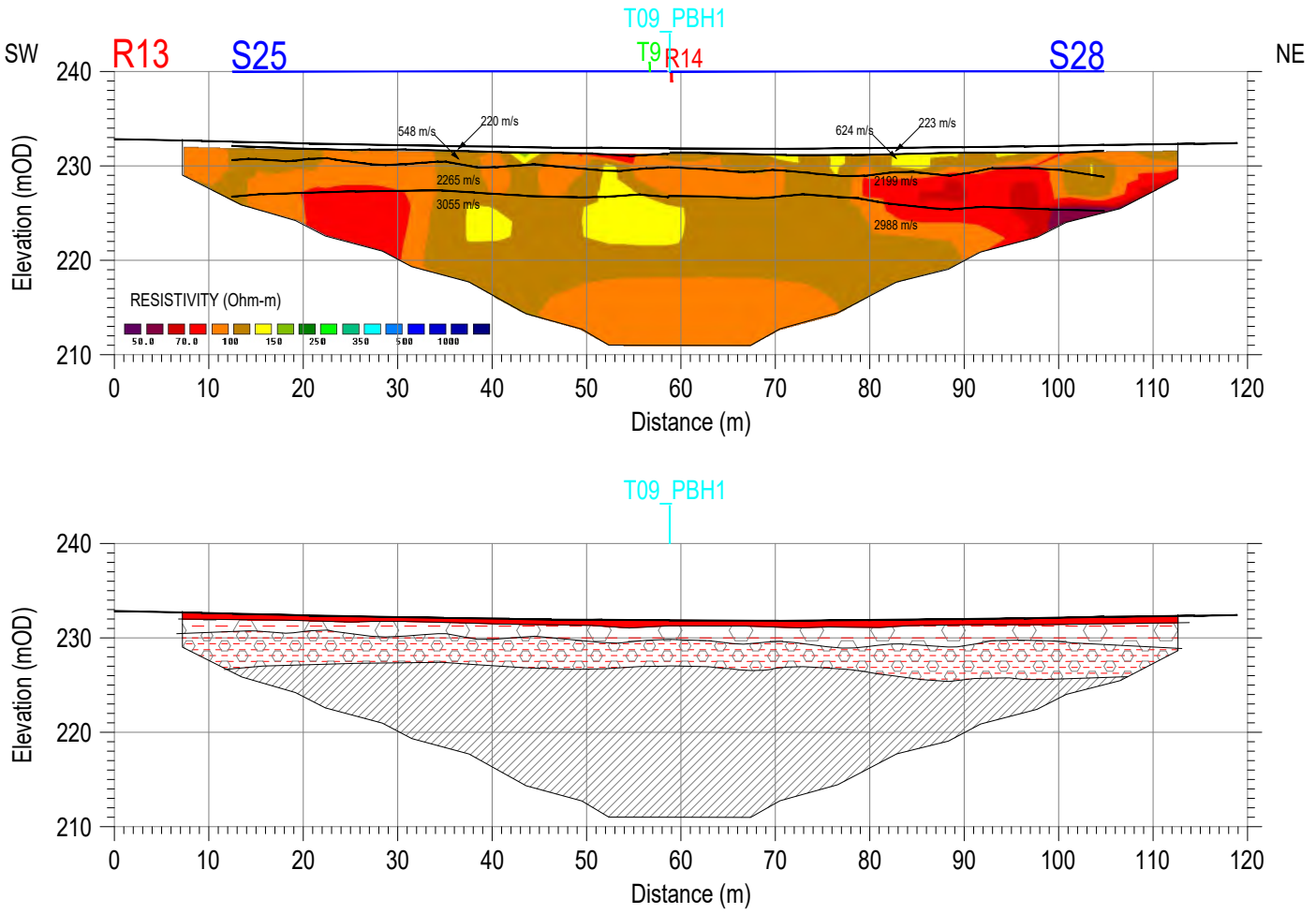
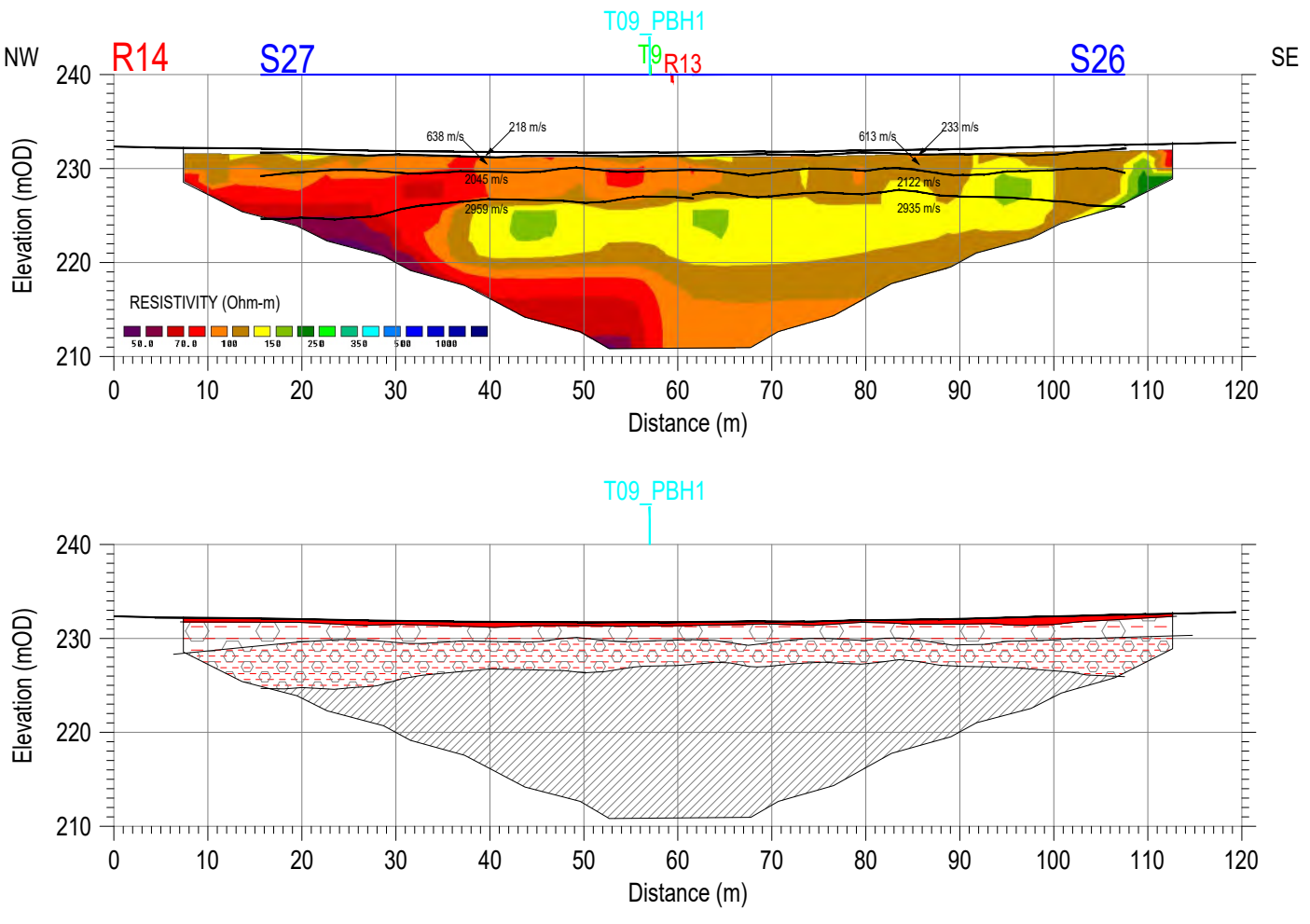


FIG 2: TURBINE BASE T9, RESULTS AND INTERPRETATION ERT R14 & SEISMIC REFRACTION S26 & S27

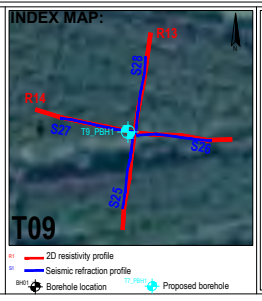
SCALE 1:750



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01	11-09-2026	SC	TL
02	12-10-2026	SC	TL

FIG 1: TURBINE BASE T10, RESULTS AND INTERPRETATION ERT R7 & SEISMIC REFRACTION S13 & S14

SCALE 1:750

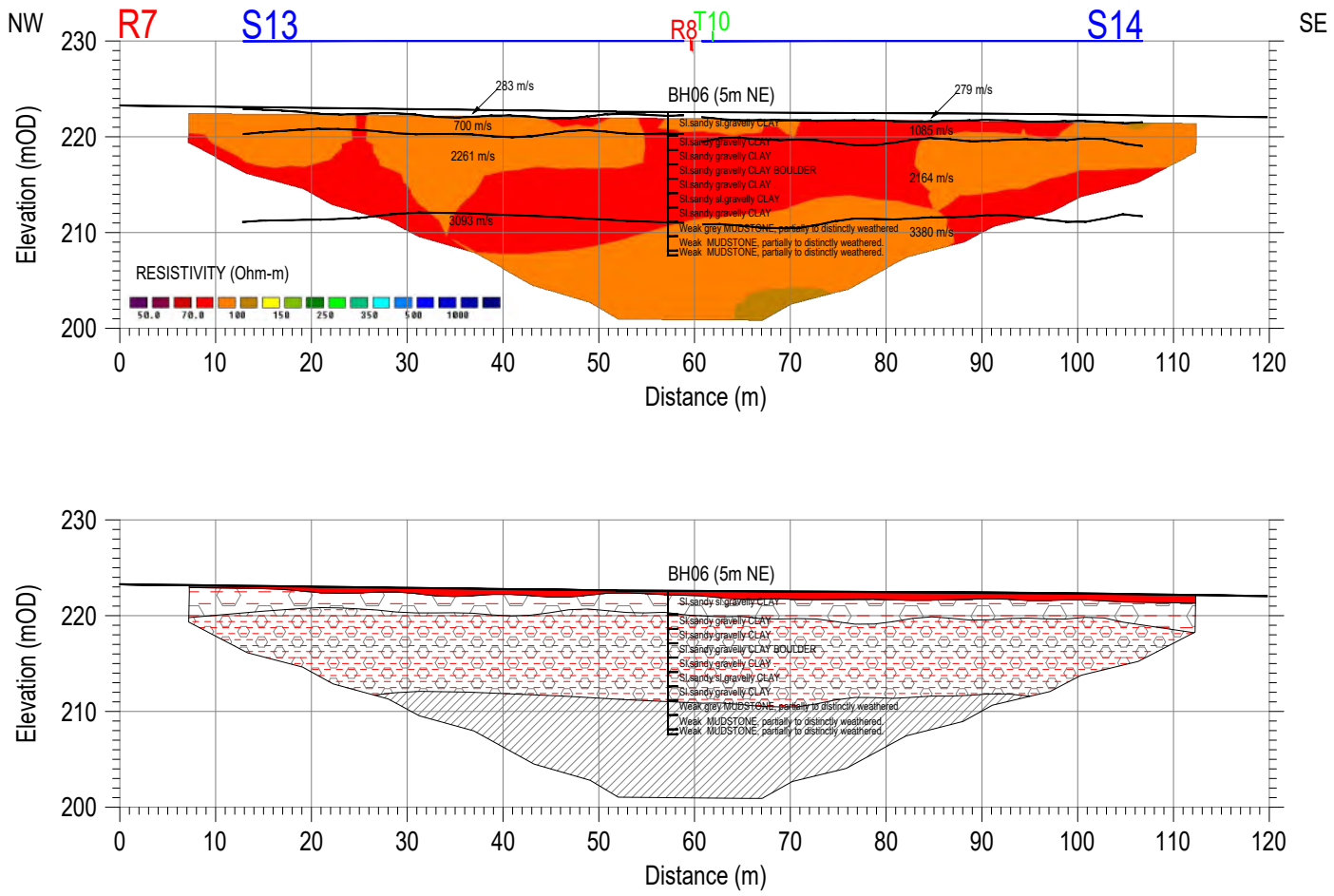
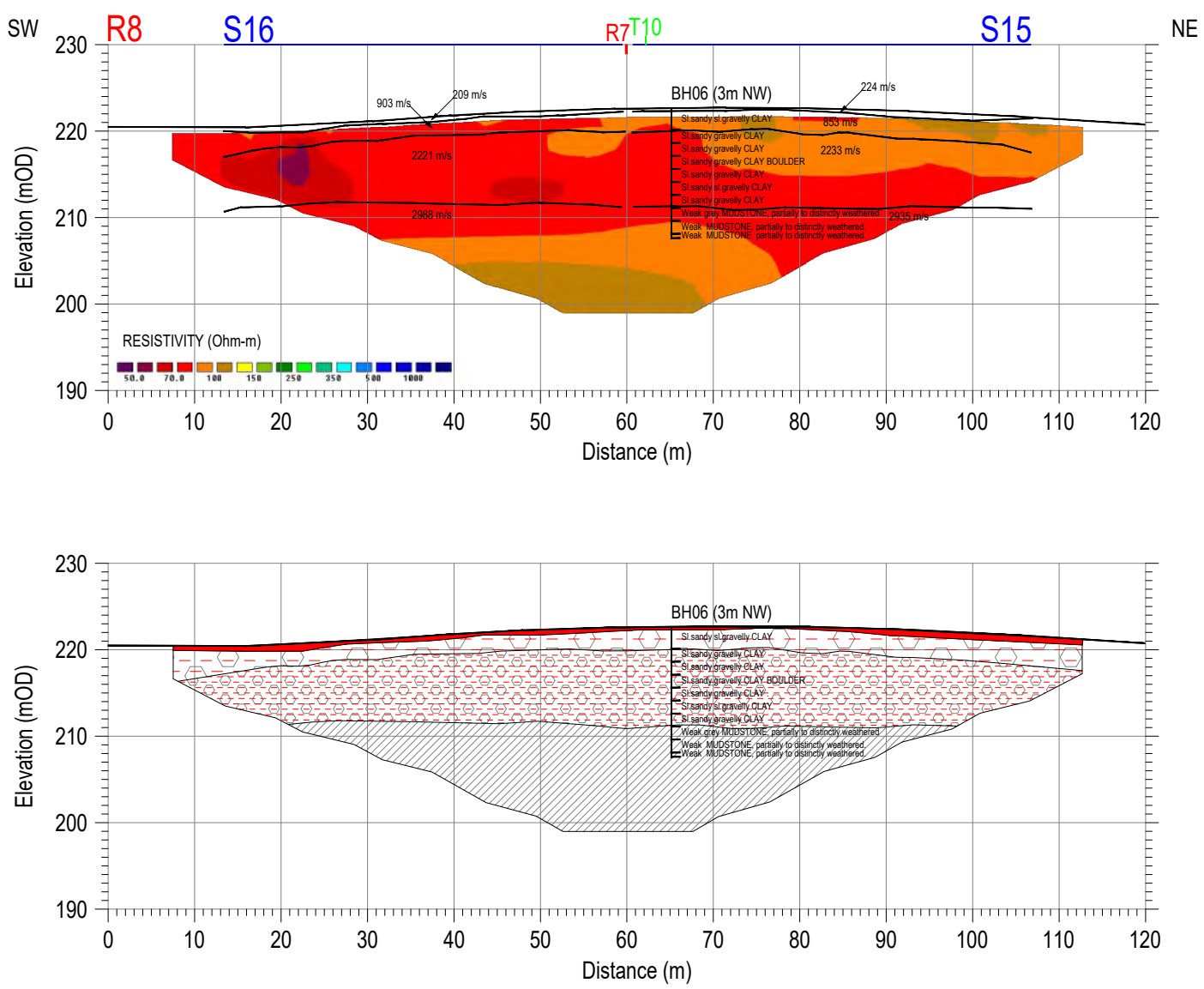


FIG 2: TURBINE BASE T10, RESULTS AND INTERPRETATION ERT R8 & SEISMIC REFRACTION S15 & S16

SCALE 1:750

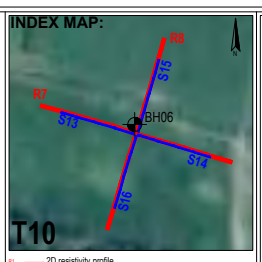


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SCALE:	AS INDICATED @ A3
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02	12-10-2026	SC	TL

FIG 1: TURBINE BASE T11, RESULTS AND INTERPRETATION ERT R19 & SEISMIC REFRACTION S47 & S48

SCALE 1:750

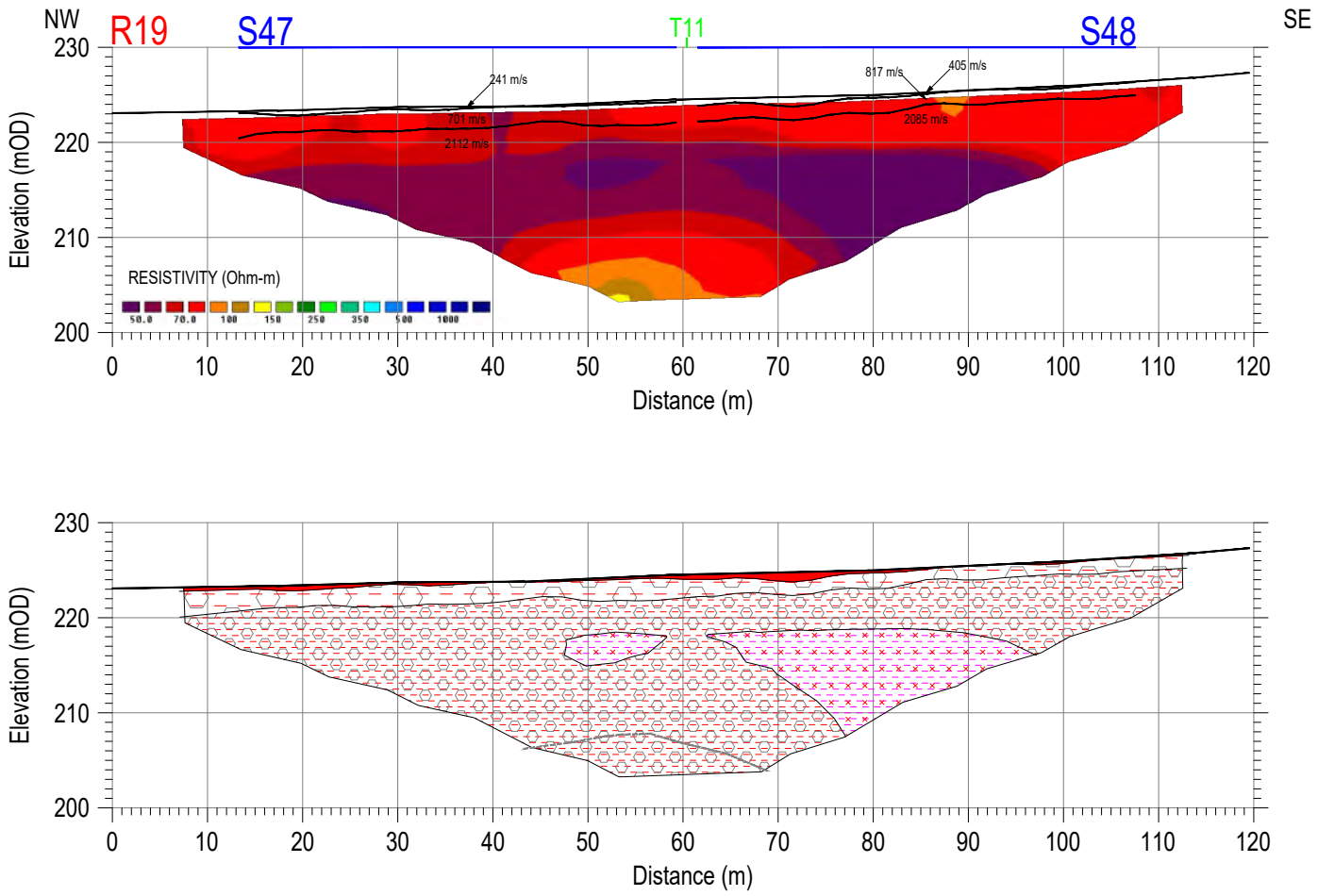
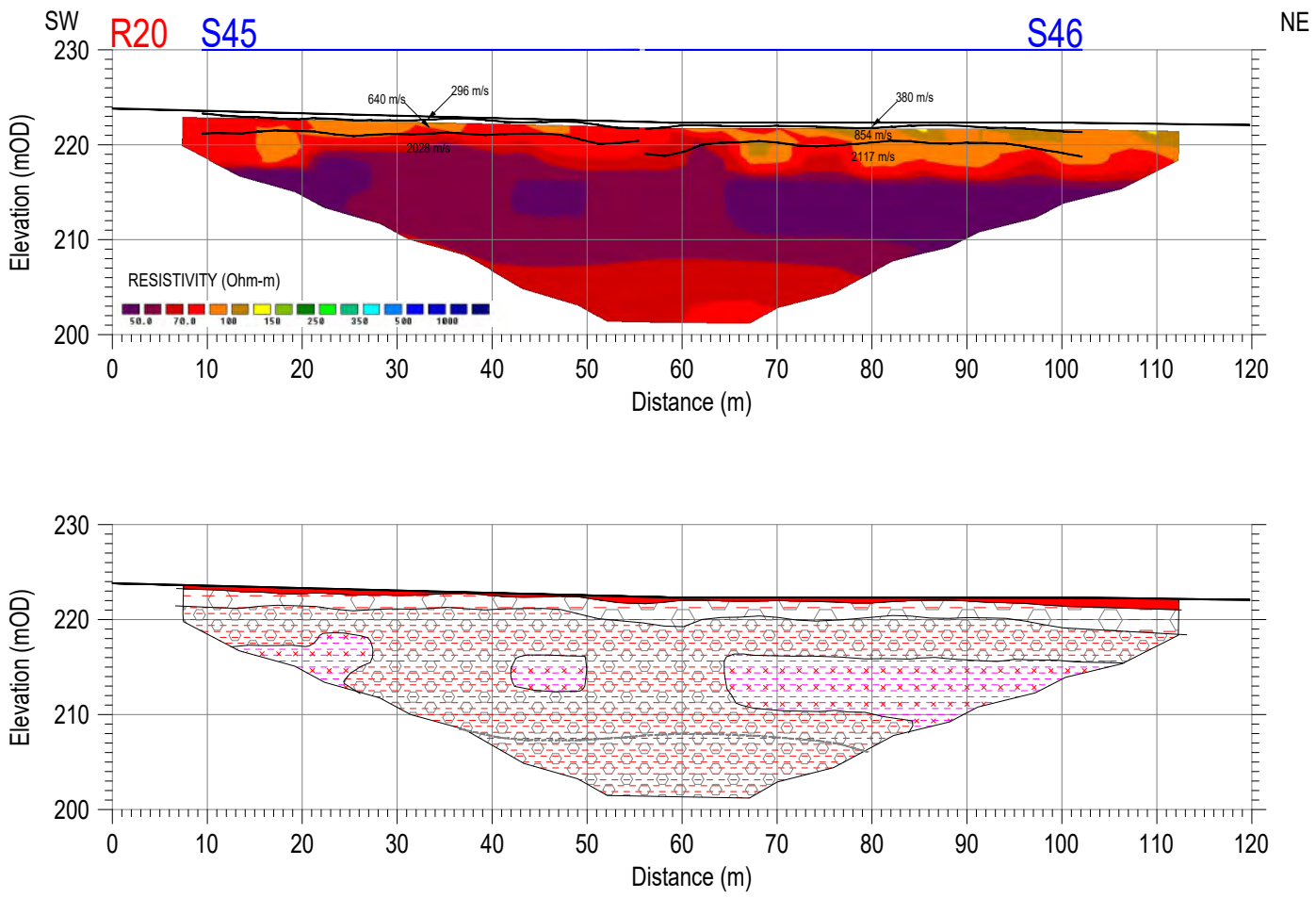


FIG 2: TURBINE BASE T11, RESULTS AND INTERPRETATION ERT R20 & SEISMIC REFRACTION S45 & S46

SCALE 1:750

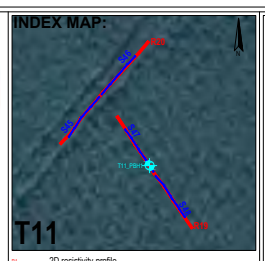


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INDEX MAP:



LEGEND:

- Seismic refraction layer with interpreted P-wave velocity (1254-1288 m/s)
- Soft SILT/CLAY
- Stiff-Very Stiff SILT/CLAY
- Soft Sandy Gravelly SILT/CLAY
- Firm Sandy Gravelly SILT/CLAY (Possible Weathered Rock towards base)
- Stiff-Very Stiff Sandy Gravelly SILT/CLAY (Possible Weathered Rock towards base)
- Loose Clayey Silty SAND/GRAVEL
- Medium Dense-Dense Clayey Silty SAND/GRAVEL (Possible Weathered Rock towards base)
- Dense-Very Dense Clayey Silty SAND/GRAVEL (Possible Weathered Rock towards base)
- Loose SAND/GRAVEL
- Medium Dense SAND/GRAVEL (Possible Weathered Rock towards base)
- Moderately-Slightly Weathered MUDSTONE
- Slightly Weathered - Fresh MUDSTONE
- Slightly Weathered - Fresh LIMESTONE
- Possible Top of Rock
- Possible Fault/Fracture Zone

The information displayed here is to be used in conjunction with AGP26012_02 Report on the Geophysical Investigation at Killoshulan Wind Farm, Co. Kilkenny for GII Ltd., APEX Geophysics Ltd. 12th October 2026.

PROJECT:	KILLOSHULAN WIND FARM GEOPHYSICAL INVESTIGATION
CLIENT.:	GROUND INVESTIGATIONS IRELAND
DRAWING NO:	AGP26012_T11
SCALE:	AS INDICATED @ A3
DATE:	12-10-2026

Version:	Date:	Drawn By:	Checked:
01	11-09-2026	SC	TL
02	12-10-2026	SC	TL

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