



APPENDIX 4-3

IGSL FACTUAL REPORT – WIND FARM

IGSL Ltd

Seven Hills Windfarm

Site Investigation Report
FACTUAL

Project No. 23000

May 2022



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FOREWORD

The following conditions and notes on the geotechnical site investigation procedures should be read in conjunction with this report.

Standards

The ground investigation works for this project (**Seven Hills Windfarm**) have been carried out by IGSL Limited in accordance with Eurocode 7 - Part 2: Ground Investigation & Testing (EN 1997-2:2007). This has been used together with complementary documents such as BS 5930 (2015) and BS 1377 (Parts 1 to 9) and the following European Norms:

- EN 1997-2 Eurocode 7: 2007 – Geotechnical Design – Part 2: Ground Investigation & Testing
- EN ISO 22475-1:2006 Geotechnical Investigation and Sampling – Sampling Methods & Groundwater Measurements
- EN ISO 14688-1:2017 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 1: Identification and Description
- EN ISO 14688-2:2017 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 2: Principles for a classification
- EN ISO 14689-1:2017 Geotechnical Investigation and Testing – Identification, description & classification of rock

Reporting

No responsibility can be held by IGSL Ltd for ground conditions between exploratory hole locations. The engineering logs provide ground profiles and configuration of strata relevant to the investigation depths achieved and caution should be taken when extrapolating between exploratory points. No liability is accepted for ground conditions extraneous to the investigation points. Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction, mining works or karstification below or close to the site.

This report has been prepared for Malachy Walsh & Partners and Energia and the information should not be used without their prior written permission. IGSL Ltd accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

Boring Procedures

Unless otherwise stated, 'shell and auger' or cable percussive boring technique has been employed as defined by Section 6.3 of IS EN ISO 22475-1:2006. The boring operations, sampling and in-situ testing complies with the recommendations of IS EN 1997-2:2007 and BS 1377:1990 and EN ISO 22476-3:2005. The shell and auger boring technique allows for continuous sampling in clay and silt above the water table and sand and gravel below the water table (Table 2 of IS EN ISO 22475-1:2006).

It is highlighted that some disturbance and variation is unavoidable in particular ground (e.g. blowing sands, gravel / cobble dominant glacial deposits etc). Attention is drawn to this condition, whenever it is suspected. Where cobbles and boulders are recorded, no conclusion should be drawn concerning the size, presence, lithological nature, or numbers per unit volume of ground.

In-Situ Testing

Standard penetration tests were conducted strictly in accordance with Section 4.6 of IS EN 1997-2:2007. The SPT equipment (hammer energy test) has been calibrated in accordance with EN ISO 22476-3:2005 and the Energy Ratio (E_r). A calibration certificate is available upon request. The E_r is defined as the ratio of the actual energy E_{meas} (measured energy during calibration) delivered to the drive weight assembly into the drive rod below the anvil, to the theoretical energy (E_{theor}) as calculated from the drive weight assembly. The measured number of blows (N) reported on the

engineering logs are uncorrected. In sands, the energy losses due to rod length and the effect of the overburden pressure should be taken into account (see IS EN ISO 22476-3:2005).

Soil Sampling

Three categories of sampling methods are outlined in EN ISO 22475-1:2006. The categories are referenced A, B and C for any given ground conditions and are shown in Tables 1 and 2 of EN ISO 22475-1:2006. Reference should be made to EN 1997-2:2002 for guidelines on sample class and quality for strength and compressibility testing. Samples of quality classes 1 or 2 can only be obtained by using Category A sampling methods.

Class 1 thin wall undisturbed tube samples (UT100) were obtained in fine grained soils and strictly meet the requirements of EN 1997-2:2002 and EN ISO 22475-1:2006. Soil samples for laboratory tests are divided into five classes with respect to the soil properties that are assumed to remain unchanged during sampling, handling transport and storage. The minimum sample quality required for testing purposes to Eurocode 7 compatibility (EN 1997-2:2002) is shown in Table A.

Table A – Details of Sample Quality Requirements

EN 1997 Clause	Test	Minimum Sample Quality Class
5.5.3	Water Content	3
5.5.4	Bulk Density	2
5.5.5	Particle Density	N/S
5.5.6	Particle Size Analysis	N/S
5.5.7	Consistency Limits	4
5.5.8	Density Index	N/S
5.5.9	Soil Dispersivity	N/S
5.5.10	Frost Susceptibility	N/S
5.6.2	Organic Content	4
5.6.3	Carbonate Content	3
5.6.4	Sulphate Content	3
5.6.5	pH	3
5.6.6	Chloride Content	3
5.7	Strength Index	1
5.8	Strength Tests	1
5.9	Compressibility Tests	1
5.10	Compaction Tests	N/S
5.11	Permeability	2

N/S – not stated. Presume a representative sample of appropriate size.

Samples recovered from trial pits or trenches meet the requirements of IS EN ISO 22475-1. It is highlighted that unforeseen circumstances such as variations in geological strata may lead to lower quality sample classes being obtained.

Groundwater

The depth of entry of any influx of groundwater is recorded during the course of boring operations. However, the normal rate of boring does not usually permit the recording of an equilibrium level for any one water strike. Where possible, drilling is suspended for a period of twenty minutes to monitor the subsequent rise in water level. Groundwater conditions observed in the borings or pits are those appertaining to the period of investigation. It should be noted however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc.

Engineering Logging

Soil and rock identification has been based on the examination of the samples recovered and conforms with IS EN ISO 14688-1:2002 and IS EN ISO 14689-1:2004. Rock weathering classification conforms to IS EN ISO 14689-1:2003 while discontinuities (bedding planes, joints, cleavages, faults etc) are classified in accordance with 4.3.3 of IS EN ISO 14689-1:2003. Rock mechanical indices (TCR, SCR, RQD) are defined in accordance with IS EN ISO 22475-1:2006.

Where peat has been encountered, samples have been logged in accordance with the Von Post Classification (ref. Von Post, L. 1992. Sveriges Gologiska Undersoknings torvinventering och nogra av dess hittills vunna resultat (SGU peat inventory and some preliminary results) Svenska Mosskulturforeningens Tidskrift, Jonkoping, Swedden, 36, 1-37 and Hobbs N. B. Mire morphology and the properties of some British and foreign peats. QJEG, Vol. 19, 1986.

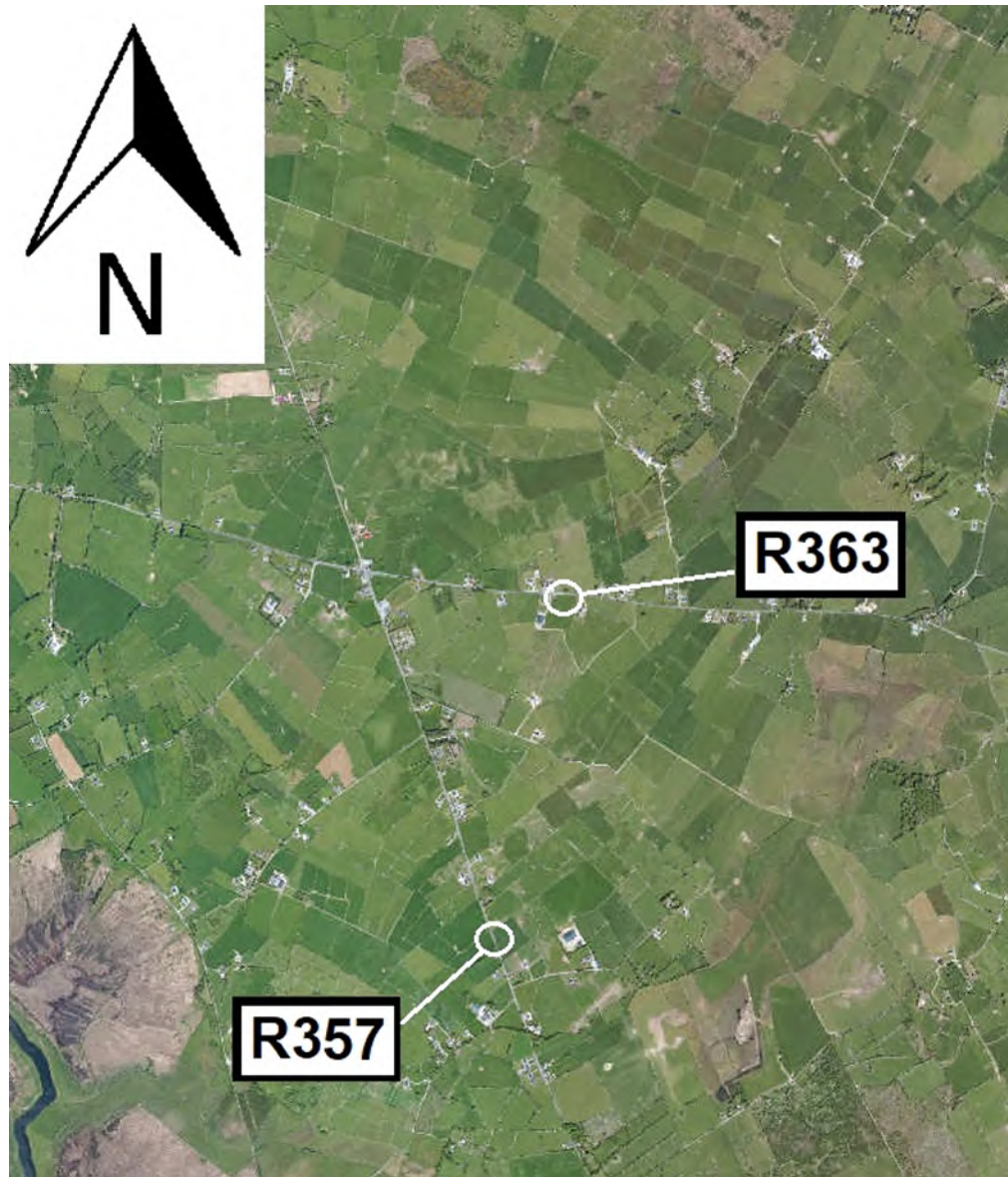
Retention of Samples

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material will be discarded. Unless a period of retention of samples is agreed, it is our normal practice to discard all soil samples one month after submission of our final report.

1. INTRODUCTION

IGSL has undertaken a programme of geotechnical site investigation works for the proposed Seven Hills Windfarm near Dysart, Ballinasloe, County Galway. The works were sited in greenfield lands both to the north and south of the R363 Regional Road and to the east of the R357 Regional Road, both of which meet in Dysart village (Figure 1). It is envisaged that the scheme will consist of some twenty wind turbines together with a substation and meteorological mast. An extensive road network will also be established to link the mast locations.

Figure 1 – Site Location Plan



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The investigation comprised rotary drilling, machine-dug trial pits and dynamic probing. The investigations were executed in accordance with BS 5930, Code of Practice for Site Investigations (2015) and EN 1997-2 Eurocode 7 Part 2 Ground Investigation & Testing and supervised by an IGSL geotechnical engineer. APEX Geophysics conducted a non-intrusive investigation comprising

2D Electrical Resistivity Tomography, 2D P-wave Seismic Refraction profiles as well as a MASW [Multi-channel Analysis of Surface Waves] survey of each turbine / tower location and at the proposed substation location. Additional drillholes and excavations together with non-intrusive geophysical methods were scheduled by Malachy Walsh following a review of the initial survey at both Tower 1 and Tower 11.

Geotechnical and chemical laboratory testing was scheduled on a range of soil samples with chemical testing also undertaken on water samples recovered from three standpipes across the project. Rock testing was also undertaken on a number of selected rock core samples (PLSI & UCS). This report presents the factual geotechnical data acquired from the two phases of investigation.

2. FIELDWORK

2.1 General

The IGSL Limited fieldworks were undertaken in December and September 2020. The works which form this report comprise the following:

- Rotary Core Drillholes (43 No.)
- Trial Pits (45 No.)
- Dynamic Probing (67 No.)
- Geophysical Survey
- Groundwater Monitoring
- Surveying of Exploratory Hole Locations

2.2 Rotary Core Drillholes

Rotary core [RC] drilling was carried out at forty-three locations on site. This comprised forty-one holes constructed at tower locations and a further two at a proposed Meteorological Mast site. The tower drillholes are denoted by their respective tower number being prefixed 'T_'. The two mast drillholes are denoted 'Mast'. Of the forty-three drillholes, the bulk were drilled from late November 2020 through to January 2021. Following a review of the drilling records by Malachy Walsh & Partners, a further two drillholes were undertaken in a separate visit made in late February – early March 2021. These holes, T11-RC03 & T11-RC04, as well as all other drillholes were carried out using a tracked Comacchio GEO 405 drill rig. With the exception of T07, at each tower site, one drillhole was undertaken at the tower site with the second at a proposed hardstanding area. Only one hole was constructed at T07.

Symmetrex openhole drilling was utilised within the overlying superficial deposits as well as being deployed in the majority of holes to confirm bedrock in the absence of coring. In the case of six coreholes (T04 – RC01, T05 – RC01, T11 – RC03, T11 – RC04, T15 – RC02 & T18 – RC02) coring techniques were used in the underlying bedrock once encountered. The rotary drilling produced 78mm diameter cores. Where bedrock was recovered, it was described as a strong to very strong, thickly to thinly bedded, dark grey/blueish grey, fine to medium grained LIMESTONE with, in T04 – RC01, rare very thin to thin shaley bands (up to 200mm thick). Intervals of clay were noted within the rock sequence in cores taken from location T11 – RC03.

Standard Penetration Tests (SPT's) were performed in the overburden strata and given the nature of the soils, a solid cone was used. It is noted that the SPT N-Values reported are the number of blows for 300mm increment penetration (e.g. T02 – RC02 at 1.50m where N=21). These exclude the seating blow values, which represent the initial 150mm depth of penetration. Where partial penetration was achieved during testing, the number of blows is shown for the actual penetration depth achieved (e.g. T10 – RC01 at 4.50m where N=50/20mm). In accordance with Eurocode 7, the SPT hammer has been calibrated and the energy ratio (Er) value is incorporated on the engineering logs. It is highlighted that the SPT N-Values reported on the engineering logs are uncorrected for energy ratio.

The cores were placed in 3m capacity timber boxes and logged by an IGSL engineering geologist. This included photography of the cores with a digital camera. Where rock core was recovered, a graphic fracture log is also presented alongside the mechanical indices. This illustrates the fracture state of the rock cores and allows easy identification of highly fractured / non-intact zones and discontinuity spacings. It should be noted that no correction for dip of the joints has been made and that the spacings shown are successive joint / core intersections within the core.

Groundwater monitoring standpipes were installed in five of the coreholes. The standpipes consisted of 50mm diameter HDPE pipework with proprietary 1mm slots and incorporated a pea gravel filter pack and cement / bentonite grout seal. Headwork covers were concreted in place. The core log records are presented in Appendix 1 and this includes engineering geological descriptions, details of

the bedding / discontinuities and mechanical indices (TCR, SCR and RQD's) for each core run. Core photographs are also presented in Appendix 1 and these illustrate the structure and fracture state of the bedrock.

2.3 Trial Pits

Trial pitting was undertaken at forty-four locations across the site. At each tower site, one pit was excavated at the tower site with the second at an adjoining, proposed hardstanding area. In addition, pits were excavated at the Mast site (2 no.) as well as at the proposed Substation site (2 no.). In all, a total of four pits were positioned at Tower 4. Only one pit was excavated at Tower 11. The trial pits were excavated, logged and sampled under the direction of an IGSL geotechnical engineer in accordance with BS 5930 (1999+A2:2010). Bulk disturbed samples (typically 20 to 30kg) were taken as the pits progressed.

The bulk samples were placed in heavy-duty polyethylene bags and sealed before being transported to Naas for laboratory testing. The trial pits were backfilled with the as-dug arisings and reinstated to the satisfaction of IGSL's site geotechnical engineer. The trial pit logs and photos are presented in Appendix 2 and include descriptions of the soils encountered, groundwater conditions and stability of the pit sidewalls.

2.4 Dynamic Probing

In-situ "Heavy" dynamic probing (DPH) was performed at sixty-seven locations using a compact crawler rig. Probes were positioned on the proposed hardstanding at each tower location as well as every 250m along the proposed site track. The tracked Archway probing unit meets the requirements of BS 1377, Part 9 (1990) and IS EN 1997-2:2007.

The probing rig utilized a 50kg drop weight and 500mm drop height with a 60° cone. In accordance with the standards, the number of blows required to drive the cone each 100mm increment into the sub-soil was recorded. Probing is generally terminated when blow counts, N_{100} values, exceed 25, in order to avoid damage to equipment. The probe records are presented in Appendix 3 and include blow-counts in both numerical and graphical format.

2.5 Geophysical Survey

Geophysical surveying was performed by APEX Geophysics Limited on behalf of IGSL. A combination of techniques comprising Electrical Resistivity Tomography [ERT] and 2D P-wave Seismic Refraction profiling were used to evaluate the ground conditions in terms of stratigraphy and stiffness at the proposed turbine footprint. The seismic and resistivity data was used to produce ground models / profiles while MASW technique was used to derive elastic properties of the superficial deposits and bedrock units. Details of the methodologies employed, cross-sections, data interpretation and small strain stiffness data are presented in the geophysical report (Appendix 4).

2.6 Groundwater Monitoring

Groundwater monitoring was undertaken manually once following the fieldworks period. Levels were measured using an electric dipmeter. The recordings feature in Appendix 5.

2.7 Surveying of Exploratory Hole Locations

Following completion of the exploratory works, surveying was carried out using GPS techniques. Co-ordinates (x, y) were measured to Irish Transverse Mercator and ground levels (z) established to Malin Head. The co-ordinates and ground levels are shown on the exploratory hole logs with locations shown on the exploratory hole plan in Appendix 11.

3. LABORATORY TESTING

Geotechnical laboratory testing was performed at IGSL's INAB-accredited laboratory in accordance with the methods set out in BS1377; British Standard Methods of Test for Soils for Civil Engineering Purposes; British Standards Institute:1990. The geotechnical testing included moisture contents, Atterberg Limits and particle size distribution [PSD] testing. The results from geotechnical testing on selected trial pit soils are presented in Appendix 6.

Chemical analysis incorporating pH levels, analysis to BRE SD1 (Suite D) in addition to organic matter contents were also undertaken on recovered soils. The chemical results are presented in Appendix 7.

The assessment of the redox potential (pE) of a series of soil samples was also undertaken. The results are presented in a Nicholls Colton report featured in Appendix 8.

Chemical testing was conducted on water samples bailed from wells at proposed Towers 04, 18 and 19. Prior to sampling, installations were developed in accordance with ISO 14868 (2003) and then purged of three times well volume (in accordance with BS 6068). The resultant Chemtest reports feature in Appendix 9.


Geotechnical laboratory testing was carried out on selected rock cores. Point load strength index (PLSI) and uniaxial compressive strength (UCS) tests were conducted with the results presented in Appendix 10.

REFERENCES

- 1.0 BS 5930 (1999 + A2:2010) Code of Practice for Site Investigation, British Standards Institution (BSI).
- 2.0 BS 1377 (1990) Methods of Testing of Soils for Civil Engineering Purposes, BSI.
- 3.0 Eurocode 7, Part 2: Ground Investigation & Testing (EN 1997-2:2007)
- 4.0 Site Investigation Practice: Assessing BS 5930 (1986), Geological Society Special Publication, No. 2.


Appendix 1

Rotary Core Drillhole Records & Photographs


		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>						REPORT NUMBER <div style="font-size: 24pt; text-align: center;">23000</div>	
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO Mast - RC01 SHEET Sheet 1 of 1		
CO-ORDINATES 585,591.19 E 747,976.24 N				RIG TYPE GEO405 FLUSH Air/Mist			DATE COMMENCED 08/12/2020 DATE COMPLETED 08/12/2020		
GROUND LEVEL (mOD) 92.46				INCLINATION (deg) -90 CORE DIAMETER (mm) 78			DRILLED BY IGSL LOGGED BY D.O'Shea		
CLIENT Energia ENGINEER Malachy Walsh and Partners									


Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly cobbly CLAY				
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly cobbly CLAY	1.50	90.96		N = 51 (4, 9, 7, 9, 21, 14)
2		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	2.70	89.76		
3	3.00											
4	4.50	0	0	0								
5	5.00	0	0	0				End of Borehole at 5.00 m	5.00	87.46		
6												
7												
8												
9												

REMARKS						WATER STRIKE DETAILS					
Hole cased 0.00-2.70m. Covid 19 Safe Zone erection - 1hr						Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
											No water strike recorded
						GROUNDWATER DETAILS					
INSTALLATION DETAILS						Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							


 <div> <div> GEOTECHNICAL CORE LOG RECORD </div> <div> REPORT NUMBER 23000 </div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO Mast - RC02 SHEET Sheet 1 of 1						
CO-ORDINATES					RIG TYPE GEO405 FLUSH Air/Mist INCLINATION (deg) -90 CORE DIAMETER (mm) 78		DATE COMMENCED 08/12/2020 DATE COMPLETED 08/12/2020 DRILLED BY IGSL LOGGED BY D.O'Shea						
GROUND LEVEL (mOD) CLIENT Energia ENGINEER Malachy Walsh and Partners													
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0					0 250 500			SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey cobbly GRAVEL					
1	1.50	0	0	0									
2		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	2.10				
3	3.00												
4	4.50	0	0	0									
5								End of Borehole at 4.50 m	4.50				
6													
7													
8													
9													
REMARKS Hole cased 0.00-2.10m. Covid 19 Safe Zone erection - 1hr								WATER STRIKE DETAILS					
								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22

 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T01 - RC01						
CO-ORDINATES 586,349.52 E 748,328.00 N							SHEET Sheet 1 of 1						
GROUND LEVEL (mOD) 93.12							DATE COMMENCED 11/12/2020						
CLIENT Energia							DATE COMPLETED 11/12/2020						
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL						
							LOGGED BY D.O'Shea						
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey sandy cobbly GRAVEL					
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL	1.50	91.62		N = 29 (3, 6, 6, 9, 7, 7)	
2		0	0	0									
3	3.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	3.20	89.92		N = 50/50 mm (4, 11, 25, 25)	
4		0	0	0									
5	4.50												
6	5.40	0	0	0					5.40	87.72			
								End of Borehole at 5.40 m					
7													
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-3.20m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T01 - RC02						
CO-ORDINATES 586,354.09 E 748,365.38 N							SHEET Sheet 1 of 1						
GROUND LEVEL (mOD) 90.85							DATE COMMENCED 14/12/2020						
CLIENT Energia							DATE COMPLETED 14/12/2020						
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL						
CORE DIAMETER (mm) 78							LOGGED BY D.O'Shea						
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey sandy cobbly GRAVEL					
1	1.50	0	0	0					1.70	89.15		N = 69/170 mm (4, 9, 7, 12, 25, 25)	
2		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK					
3	3.00	0	0	0									
4	4.00							End of Borehole at 4.00 m	4.00	86.85			
5													
6													
7													
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-1.70m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
INSTALLATION DETAILS								GROUNDWATER DETAILS					
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments				

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		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>						REPORT NUMBER <h2 style="text-align: center;">23000</h2>	
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T02 - RC01		
CO-ORDINATES 586,895.85 E 748,146.85 N							SHEET Sheet 1 of 2		
GROUND LEVEL (mOD) 77.42							DATE COMMENCED 20/01/2021		
CLIENT Energia							DATE COMPLETED 20/01/2021		
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL		
RIG TYPE GEO405							LOGGED BY D.O'Shea		
FLUSH Air/Mist									
INCLINATION (deg) -90									
CORE DIAMETER (mm) 78									

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy CLAY				
1	1.50	0	0	0					1.50	75.92		
2								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly CLAY				N = 23 (2, 4, 4, 6, 6, 7)
3	3.00	0	0	0								N = 31 (4, 5, 6, 7, 9, 9)
4												
5	4.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly SAND	4.50	72.92		N = 29 (3, 5, 6, 6, 8, 9)
6												
7	6.00	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	6.00	71.42		N = 63 (5, 11, 21, 14, 17, 11)
8												N = 76/170 mm (4, 7, 17, 9, 25, 25)
9	9.00	0	0	0								N = 39 (9, 6, 11, 8, 9, 11)
10	10.00								10.00	67.42		

REMARKS						WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr						Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
											No water strike recorded
						GROUNDWATER DETAILS					
INSTALLATION DETAILS						Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22



GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER


23000

CONTRACT Seven Hills Wind Farm						DRILLHOLE NO T02 - RC01				
						SHEET Sheet 2 of 2				
CO-ORDINATES			586,895.85 E 748,146.85 N			RIG TYPE GEO405			DATE COMMENCED 20/01/2021	
GROUND LEVEL (mOD) 77.42						FLUSH Air/Mist			DATE COMPLETED 20/01/2021	
CLIENT Energia						INCLINATION (deg) -90			DRILLED BY IGSL	
ENGINEER Malachy Walsh and Partners						CORE DIAMETER (mm) 78			LOGGED BY D.O'Shea	


Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10					0 250 500							N = 71/170 mm (4, 9, 7, 14, 25, 25)
11												
12												
13												
14												
15												
16												
17												
18												
19												

REMARKS						WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr						Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
											No water strike recorded
						GROUNDWATER DETAILS					
INSTALLATION DETAILS						Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							


IGSL RC FI 10M 23000.GPJ IGSL.GDT 20/5/22

 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>												
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T02 - RC02					
CO-ORDINATES 586,906.89 E 748,180.82 N							SHEET Sheet 1 of 2					
GROUND LEVEL (mOD) 75.58							DATE COMMENCED 20/01/2021					
CLIENT Energia							DATE COMPLETED 20/01/2021					
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL					
							LOGGED BY D.O'Shea					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy CLAY				
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly CLAY	1.50	74.08		N = 21 (3, 5, 4, 5, 6, 6)
2		0	0	0								
3	3.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly SAND	3.00	72.58		N = 32 (2, 6, 6, 9, 9, 8)
4		0	0	0								
5	4.50							SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly cobbly SAND	4.50	71.08		N = 28 (4, 4, 5, 7, 7, 9)
6		0	0	0								
7	6.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	6.00	69.58		N = 38 (3, 7, 11, 8, 9, 10)
8		0	0	0								N = 25/10 mm (25, 25)
9	7.50											
10	9.00											N = 34 (7, 4, 6, 6, 12, 10)
11		0	0	0								
12	10.00								10.00	65.58		
REMARKS End of Borehole at 10.00 m							WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr							Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
												No water strike recorded
							GROUNDWATER DETAILS					
INSTALLATION DETAILS							Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type								

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22

 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T02 - RC02						
CO-ORDINATES 586,906.89 E 748,180.82 N							SHEET Sheet 2 of 2						
GROUND LEVEL (mOD) 75.58							RIG TYPE GEO405						
CLIENT Energia							FLUSH Air/Mist						
ENGINEER Malachy Walsh and Partners							INCLINATION (deg) -90						
							CORE DIAMETER (mm) 78						
							DATE COMMENCED 20/01/2021						
							DATE COMPLETED 20/01/2021						
							DRILLED BY IGSL						
							LOGGED BY D.O'Shea						
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
10					0 250 500							N = 73 (4, 20, 19, 17, 18, 19)	
11													
12													
13													
14													
15													
16													
17													
18													
19													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

IGSL RC FI 10M 23000.GPJ IGSL.GDT 20/5/22

 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T03 - RC01 SHEET Sheet 1 of 2						
CO-ORDINATES 587,112.67 E 747,791.35 N				RIG TYPE GEO405 FLUSH Air/Mist			DATE COMMENCED 01/12/2020 DATE COMPLETED 01/12/2020						
GROUND LEVEL (mOD) 83.52				INCLINATION (deg) -90 CORE DIAMETER (mm) 78			DRILLED BY IGSL LOGGED BY D.O'Shea						
CLIENT Energia ENGINEER Malachy Walsh and Partners													
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy CLAY					
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly CLAY	1.50	82.02		N = 15 (3, 2, 4, 2, 5, 4)	
2		0	0	0									
3	3.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL	3.00	80.52		N = 41 (4, 6, 8, 9, 12, 12)	
4		0	0	0									
5	4.50											N = 87/135 mm (11, 19, 37, 25, 25)	
6		0	0	0									
7	6.00											N = 74 (7, 12, 14, 19, 20, 21)	
8		0	0	0									
9	7.50											N = 63 (5, 9, 11, 14, 19, 19)	
		0	0	0								N = 25/10 mm (25, 25)	
	9.00												
		0	0	0									
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-9.00m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									



GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER


23000

CONTRACT Seven Hills Wind Farm						DRILLHOLE NO T03 - RC01				
						SHEET Sheet 2 of 2				
CO-ORDINATES 587,112.67 E 747,791.35 N						DATE COMMENCED 01/12/2020				
GROUND LEVEL (mOD) 83.52			RIG TYPE GEO405			DATE COMPLETED 01/12/2020				
CLIENT Energia			FLUSH Air/Mist			DRILLED BY IGSL				
ENGINEER Malachy Walsh and Partners			INCLINATION (deg) -90			LOGGED BY D.O'Shea				
CORE DIAMETER (mm) 78										


Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.50							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL (<i>continued</i>)				
	11.00	0	0	0					11.00	72.52		
11								End of Borehole at 11.00 m				
12												
13												
14												
15												
16												
17												
18												
19												

REMARKS					WATER STRIKE DETAILS					
Hole cased 0.00-9.00m. Covid 19 Safe Zone erection - 1hr					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
										No water strike recorded
					GROUNDWATER DETAILS					
INSTALLATION DETAILS					Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type						

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22


 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>												
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T03 - RC02					
CO-ORDINATES 587,102.36 E 747,757.45 N							SHEET Sheet 1 of 2					
GROUND LEVEL (mOD) 83.11							DATE COMMENCED 02/12/2020					
CLIENT Energia							DATE COMPLETED 02/12/2020					
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL					
CORE DIAMETER (mm) 78							LOGGED BY D.O'Shea					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly cobbly CLAY				
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly CLAY	1.50	81.61		N = 26 (4, 7, 4, 5, 9, 8)
2		0	0	0								N = 25/20 mm (25, 25)
3	3.00	0	0	0								N = 76 (5, 9, 14, 23, 20, 19)
4	4.50	0	0	0								N = 25/10 mm (25, 25)
5		0	0	0								N = 68/105 mm (4, 9, 18, 25, 25)
6	6.00	0	0	0								N = 64/115 mm (17, 19, 14, 25, 25)
7	7.50	0	0	0								
8	9.00	0	0	0								
9		0	0	0								
10.00									10.00	73.11		
REMARKS							End of Borehole at 10.00 m					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr							WATER STRIKE DETAILS					
							Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
												No water strike recorded
							GROUNDWATER DETAILS					
INSTALLATION DETAILS							Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type								

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22

		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>										REPORT NUMBER <div style="font-size: 24pt; text-align: center;">23000</div>	
CONTRACT Seven Hills Wind Farm												DRILLHOLE NO T03 - RC02	
CO-ORDINATES 587,102.36 E 747,757.45 N												SHEET Sheet 2 of 2	
GROUND LEVEL (mOD) 83.11						RIG TYPE GEO405 FLUSH Air/Mist				DATE COMMENCED 02/12/2020 DATE COMPLETED 02/12/2020			
CLIENT Energia ENGINEER Malachy Walsh and Partners						INCLINATION (deg) -90 CORE DIAMETER (mm) 78				DRILLED BY IGSL LOGGED BY D.O'Shea			
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
10					0 250 500							N = 60 (4, 9, 12, 12, 19, 17)	
11													
12													
13													
14													
15													
16													
17													
18													
19													

REMARKS						WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr						Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
											No water strike recorded
						GROUNDWATER DETAILS					
INSTALLATION DETAILS						Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							

IGSL RC FI 10M 23000.GPJ IGSL.GDT 20/5/22

 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>																											
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T04 - RC01																				
CO-ORDINATES 587,670.78 E 747,678.07 N							SHEET Sheet 1 of 2																				
GROUND LEVEL (mOD) 72.47							RIG TYPE GEO405																				
CLIENT Energia							FLUSH Air/Mist																				
ENGINEER Malachy Walsh and Partners							INCLINATION (deg) -90																				
							CORE DIAMETER (mm) 78																				
							DATE COMMENCED 04/12/2020																				
							DATE COMPLETED 04/12/2020																				
							DRILLED BY IGSL																				
							LOGGED BY D.O'Shea																				
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)															
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy CLAY																			
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly CLAY	1.50	70.97		N = 15 (1, 1, 3, 4, 4)															
2		0	0	0																							
3	3.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of cobbly CLAY	3.00	69.47		N = 21 (2, 3, 5, 4, 6, 6)															
4		0	0	0																							
5	4.50											N = 55 (4, 9, 12, 11, 15, 17)															
6		0	0	0																							
7	6.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly cobbly CLAY	6.00	66.47		N = 53 (3, 21, 9, 14, 14, 16)															
8		0	0	0																							
9	7.50											N = 64 (19, 21, 11, 15, 17, 21)															
	9.00								9.00	63.47																	
	9.60	100	0	0				Stiff brown slightly sandy gravelly CLAY with occasional cobbles. Sand is fine. Gravel is angular to subrounded fine to coarse of various lithologies predominately limestone.	9.60	62.87		N = 25/10 mm (25, 25)															
REMARKS																											
Hole cased 0.00-9.00m. Covid 19 Safe Zone erection - 1hr																											
<table border="1"> <thead> <tr> <th>Water Strike</th> <th>Casing Depth</th> <th>Sealed At</th> <th>Rise To</th> <th>Time (min)</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>9.40</td> <td>9.00</td> <td>N/S</td> <td></td> <td></td> <td>Slow</td> </tr> </tbody> </table>													Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments	9.40	9.00	N/S			Slow			
Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments																						
9.40	9.00	N/S			Slow																						
<table border="1"> <thead> <tr> <th colspan="5">GROUNDWATER DETAILS</th> </tr> <tr> <th>Date</th> <th>Hole Depth</th> <th>Casing Depth</th> <th>Depth to Water</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>04-12-20</td> <td>14.60</td> <td>8.60</td> <td>14.60</td> <td>50mm SP</td> </tr> </tbody> </table>													GROUNDWATER DETAILS					Date	Hole Depth	Casing Depth	Depth to Water	Comments	04-12-20	14.60	8.60	14.60	50mm SP
GROUNDWATER DETAILS																											
Date	Hole Depth	Casing Depth	Depth to Water	Comments																							
04-12-20	14.60	8.60	14.60	50mm SP																							

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22



GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER


23000

CONTRACT Seven Hills Wind Farm						DRILLHOLE NO T04 - RC01	
CO-ORDINATES 587,670.78 E 747,678.07 N						SHEET Sheet 2 of 2	
GROUND LEVEL (mOD) 72.47						DATE COMMENCED 04/12/2020	
CLIENT Energia						DATE COMPLETED 04/12/2020	
ENGINEER Malachy Walsh and Partners						DRILLED BY IGSL	
RIG TYPE GEO405						LOGGED BY D.O'Shea	
FLUSH Air/Mist							
INCLINATION (deg) -90							
CORE DIAMETER (mm) 78							


Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	100	68	63					<p>Strong to very strong, thickly to thinly bedded (to thinly laminated at shale layers), dark grey/blueish grey, fine to medium grained LIMESTONE (slightly fossiliferous, chert layering, local stylolites), fresh to locally moderately weathered (at thin shale layers at 9.96-10.15m, 10.62-10.66m, 12.49-12.52m, 13.17-13.19m & 13.78--13.88m)</p> <p>Discontinuities are widely to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay/gravel-filled (at 13.78-13.88m & 14.15-14.19m, locally calcite-veined (1-5mm thick) locally slightly iron-oxide stained. Dips are 10-15° & very locally 80°. <i>(continued)</i></p>				
10.60												
11	100	94	93									
12	100	85	67									
13	100	90	77									
13.40												
14	100	90	77									
14.60									14.60	57.87		
End of Borehole at 14.60 m												
15												
16												
17												
18												
19												

REMARKS						WATER STRIKE DETAILS					
Hole cased 0.00-9.00m. Covid 19 Safe Zone erection - 1hr						Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
						9.40	9.00	N/S			Slow
						GROUNDWATER DETAILS					
INSTALLATION DETAILS						Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type		04-12-20	14.60	9.00	8.30	Water level recorded 5 mins after end of drilling.	
04-12-20	14.60	8.60	14.60	50mm SP							

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22

 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>												
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T04 - RC02					
CO-ORDINATES 587,702.27 E 747,657.59 N							SHEET Sheet 1 of 2					
GROUND LEVEL (mOD) 71.53							DATE COMMENCED 04/12/2020					
CLIENT Energia							DATE COMPLETED 04/12/2020					
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL					
							LOGGED BY D.O'Shea					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly CLAY				
1	1.50	0	0	0								N = 23 (3, 4, 4, 6, 6, 7)
2		0	0	0								
3	3.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of cobbly CLAY	3.00	68.53		N = 25 (5, 6, 6, 7, 7, 5)
4	4.50	0	0	0								N = 28 (4, 7, 6, 7, 7, 8)
5		0	0	0								
6	6.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of CLAY	6.00	65.53		N = 25/10 mm (25, 25)
7	7.50	0	0	0								
8								SYMMETRIX DRILLING: No recovery, observed by driller as returns of cobbly CLAY	7.50	64.03		N = 55 (5, 7, 7, 11, 19, 18)
9	9.00	0	0	0								N = 60 (4, 5, 9, 21, 19, 11)
10.00									10.00	61.53		
REMARKS End of Borehole at 10.00 m							WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr							Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
												No water strike recorded
							GROUNDWATER DETAILS					
INSTALLATION DETAILS							Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type								


IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22

		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>						REPORT NUMBER <div style="font-size: 24pt; text-align: center;">23000</div>	
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T04 - RC02 SHEET Sheet 2 of 2		
CO-ORDINATES 587,702.27 E 747,657.59 N				RIG TYPE GEO405 FLUSH Air/Mist			DATE COMMENCED 04/12/2020 DATE COMPLETED 04/12/2020		
GROUND LEVEL (mOD) 71.53				INCLINATION (deg) -90 CORE DIAMETER (mm) 78			DRILLED BY IGSL LOGGED BY D.O'Shea		
CLIENT Energia ENGINEER Malachy Walsh and Partners									


Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10					0 250 500							N = 31 (3, 6, 7, 7, 8, 9)
11												
12												
13												
14												
15												
16												
17												
18												
19												

REMARKS						WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr						Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
											No water strike recorded
						GROUNDWATER DETAILS					
INSTALLATION DETAILS						Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							

IGSL RC FI 10M 23000.GPJ IGSL.GDT 20/5/22

 <div> <div> GEOTECHNICAL CORE LOG RECORD </div> <div> REPORT NUMBER 23000 </div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T05 - RC01 SHEET Sheet 1 of 1						
CO-ORDINATES 585,754.39 E 747,892.28 N				RIG TYPE GEO405 FLUSH Air/Mist			DATE COMMENCED 09/12/2020 DATE COMPLETED 09/12/2020						
GROUND LEVEL (mOD) 90.83				INCLINATION (deg) -90 CORE DIAMETER (mm) 78			DRILLED BY IGSL LOGGED BY D.O'Shea						
CLIENT Energia ENGINEER Malachy Walsh and Partners													
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey gravelly COBBLES					
1	1.50	0	0	0					1.50	89.33			
	1.80	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly COBBLES	1.80	89.03			
2								Strong to very strong, thickly to thinly bedded, dark grey/blueish grey, fine to medium grained LIMESTONE (slightly fossiliferous, chert layering, local stylolites), fresh to locally slightly weathered.					
3	3.30	100	95	85				Discontinuities are widely to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay-filled contributing to small scale coreloss (at 5.74-5.82m & 6.56-6.66m) locally calcite-veined (1-25mm thick) locally slightly iron-oxide stained. Dips are 10-15° & very locally 80°.					
4													
	4.80												
5													
	5.80	100	94	94									
6													
	6.80	100	63	0									
7								End of Borehole at 6.80 m	6.80	84.03			
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-1.80m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									
21-01-21	3.50	1.50	3.50	50mm SP	09-12-20	6.80	1.80	5.10	Water level recorded 5 mins after end of drilling.				

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22

		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>					REPORT NUMBER <h2 style="text-align: center;">23000</h2>		
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T05 - RC02		
CO-ORDINATES 585,786.99 E 747,871.02 N							SHEET Sheet 1 of 1		
GROUND LEVEL (mOD) 89.98							DATE COMMENCED 08/12/2020		
CLIENT Energia							DATE COMPLETED 08/12/2020		
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL		
RIG TYPE GEO405							LOGGED BY D.O'Shea		
FLUSH Air/Mist									
INCLINATION (deg) -90									
CORE DIAMETER (mm) 78									

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey gravelly COBBLES				
1		0	0	0					1.30	88.68		
1.50								SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK				
2		0	0	0								
3												
3.00		0	0	0								
3.50								End of Borehole at 3.50 m	3.50	86.48		
4												
5												
6												
7												
8												
9												

REMARKS					WATER STRIKE DETAILS					
Hole cased 0.00-1.30m. Covid 19 Safe Zone erection - 1hr					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
										No water strike recorded
					GROUNDWATER DETAILS					
INSTALLATION DETAILS					Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type						

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GEOTECHNICAL CORE LOG RECORD


REPORT NUMBER


23000

CONTRACT Seven Hills Wind Farm						DRILLHOLE NO T06 - RC01			
						SHEET Sheet 1 of 1			
CO-ORDINATES 586,467.14 E 747,796.12 N						DATE COMMENCED 10/11/2020			
GROUND LEVEL (mOD) 88.80			RIG TYPE GEO405			DATE COMPLETED 10/11/2020			
CLIENT Energia			FLUSH Air/Mist			DRILLED BY IGSL			
ENGINEER Malachy Walsh and Partners			INCLINATION (deg) -90			LOGGED BY D.O'Shea			
CORE DIAMETER (mm) 78									


Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey gravelly COBBLES				
1	1.50	0	0	0					1.50	87.30		
2								SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly COBBLES	1.80	87.00		N = 71/95 mm (12, 19, 21, 25, 25)
3	3.00	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK				
4	4.20	0	0	0					4.20	84.60		
End of Borehole at 4.20 m												
5												
6												
7												
8												
9												

REMARKS						WATER STRIKE DETAILS					
Hole cased 0.00-1.80m. Covid 19 Safe Zone erection - 1hr						Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
											No water strike recorded
						GROUNDWATER DETAILS					
INSTALLATION DETAILS						Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							


 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T06 - RC02						
CO-ORDINATES 586,448.85 E 747,760.20 N							SHEET Sheet 1 of 1						
GROUND LEVEL (mOD) 87.97							DATE COMMENCED 10/12/2020						
CLIENT Energia							DATE COMPLETED 10/12/2020						
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL						
RIG TYPE GEO405							LOGGED BY D.O'Shea						
FLUSH Air/Mist													
INCLINATION (deg) -90													
CORE DIAMETER (mm) 78													
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey gravelly COBBLES					
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly COBBLES	1.50	86.47		N = 83 (6, 9, 23, 19, 20, 21)	
2		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	2.50	85.47			
3	3.00												
4	4.50	0	0	0									
	4.70	0	0	0				End of Borehole at 4.70 m	4.70	83.27			
5													
6													
7													
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-2.50m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									


 <div> <div> GEOTECHNICAL CORE LOG RECORD </div> <div> REPORT NUMBER 23000 </div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T07 - RC02 SHEET Sheet 1 of 1						
CO-ORDINATES 586,544.51 E 747,394.65 N				RIG TYPE GEO405 FLUSH Air/Mist			DATE COMMENCED 03/12/2020 DATE COMPLETED 03/12/2020						
GROUND LEVEL (mOD) 72.32				INCLINATION (deg) -90 CORE DIAMETER (mm) 78			DRILLED BY IGSL LOGGED BY D.O'Shea						
CLIENT Energia ENGINEER Malachy Walsh and Partners													
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey gravelly COBBLES					
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	1.50	70.82		N = 78 (9, 7, 14, 21, 23, 20)	
2		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	2.40	69.92			
3	3.00												
4	4.40	0	0	0				End of Borehole at 4.40 m	4.40	67.92			
5													
6													
7													
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-2.40m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

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 <div> <div> GEOTECHNICAL CORE LOG RECORD </div> <div> REPORT NUMBER 23000 </div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T08 - RC01 SHEET Sheet 1 of 1						
CO-ORDINATES 587,538.17 E 743,028.07 N				RIG TYPE GEO405 FLUSH Air/Mist			DATE COMMENCED 18/01/2021 DATE COMPLETED 18/01/2021						
GROUND LEVEL (mOD) 71.33				INCLINATION (deg) -90 CORE DIAMETER (mm) 78			DRILLED BY IGSL LOGGED BY D.O'Shea						
CLIENT Energia ENGINEER Malachy Walsh and Partners													
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly CLAY					
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL	1.50	69.83		N = 25/10 mm (4, 25, 25)	
2		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL	3.00	68.33		N = 25 (2, 4, 4, 6, 8, 7)	
3	3.00	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	3.90	67.43			
4	4.50												
5		0	0	0									
6	6.20							End of Borehole at 6.20 m	6.20	65.13			
7													
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-3.90m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

IGSL RC FI 10M 23000.GPJ IGSL.GDT 20/5/22

 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T08 - RC02						
CO-ORDINATES 587,569.79 E 743,014.62 N							SHEET Sheet 1 of 1						
GROUND LEVEL (mOD) 72.82							DATE COMMENCED 19/01/2021						
CLIENT Energia							DATE COMPLETED 19/01/2021						
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL						
							LOGGED BY D.O'Shea						
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy COBBLES					
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	1.50	71.32		N = 25/10 mm (7, 25, 25)	
2		0	0	0									
3	3.00	0	0	0								N = 100/170 mm (4, 9, 21, 29, 25, 25)	
4	3.50	0	0	0									
5	4.50	0	0	0								N = 71 (7, 14, 17, 21, 14, 19)	
6	6.00	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	5.10	67.72			
7	7.30							End of Borehole at 7.30 m	7.30	65.52			
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-5.10m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>												
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T10 - RC01					
CO-ORDINATES 588,283.77 E 742,464.21 N							SHEET Sheet 1 of 2					
GROUND LEVEL (mOD) 99.81							DATE COMMENCED 15/01/2020					
CLIENT Energia							DATE COMPLETED 15/01/2020					
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL					
							LOGGED BY D.O'Shea					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES				
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL	1.50	98.31		N = 44 (4, 11, 14, 10, 11, 9)
2		0	0	0								
3	3.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	3.00	96.81		N = 35 (2, 7, 9, 9, 12, 5)
4		0	0	0								
5	4.50							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL	4.50	95.31		N = 50/20 mm (41, 25, 25)
6		0	0	0								
7	6.00											N = 53 (5, 19, 17, 20, 7, 9)
8		0	0	0								
9	7.50											N = 61/95 mm (15, 14, 11, 25, 25)
10		0	0	0								N = 32 (9, 7, 5, 8, 9, 10)
10.00									10.00	89.81		
<div>REMARKS End of Borehole at 10.00 m</div> <div> <div>Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr</div> <div> <div>Water Strike</div> <div>Casing Depth</div> <div>Sealed At</div> <div>Rise To</div> <div>Time (min)</div> <div>Comments</div> </div> </div>												
No water strike recorded												
<div>GROUNDWATER DETAILS</div> <div> <div>INSTALLATION DETAILS</div> <div> <div>Date</div> <div>Hole Depth</div> <div>Casing Depth</div> <div>Depth to Water</div> <div>Comments</div> </div> </div>												
<div> <div>Date</div> <div>Tip Depth</div> <div>RZ Top</div> <div>RZ Base</div> <div>Type</div> </div> <div> <div>15-01-21</div> <div>10.00</div> <div>4.00</div> <div>10.00</div> <div>50mm SP</div> </div>												

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GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER


23000

CONTRACT Seven Hills Wind Farm						DRILLHOLE NO T10 - RC01							
						SHEET Sheet 2 of 2							
CO-ORDINATES 588,283.77 E 742,464.21 N			RIG TYPE GEO405			DATE COMMENCED 15/01/2020							
GROUND LEVEL (mOD) 99.81			FLUSH Air/Mist			DATE COMPLETED 15/01/2020							
CLIENT Energia			INCLINATION (deg) -90			DRILLED BY IGSL							
ENGINEER Malachy Walsh and Partners			CORE DIAMETER (mm) 78			LOGGED BY D.O'Shea							
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
10					0 250 500							N = 40 (4, 8, 7, 7, 12, 14)	
11													
12													
13													
14													
15													
16													
17													
18													
19													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									
15-01-21	10.00	4.00	10.00	50mm SP									

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22


 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>												
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T10 - RC02					
CO-ORDINATES 588,272.80 E 742,493.91 N							SHEET Sheet 1 of 2					
GROUND LEVEL (mOD) 97.99							DATE COMMENCED 14/01/2021					
CLIENT Energia							DATE COMPLETED 14/01/2021					
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL					
							LOGGED BY D.O'Shea					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES				
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL	1.50	96.49		N = 42 (4, 9, 11, 10, 12, 9)
2		0	0	0								
3	3.00											N = 35 (3, 5, 7, 8, 9, 11)
4		0	0	0								
5	4.50							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	4.50	93.49		N = 41 (4, 7, 9, 14, 9, 9)
6		0	0	0								N = 62/95 mm (2, 6, 12, 25, 25)
7	6.00											
8		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL	7.50	90.49		N = 50/20 mm (4, 7, 25, 25)
9	7.50											
10		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	9.00	88.99		N = 37 (6, 6, 11, 9, 10, 7)
11	9.00											
12												
13	10.00								10.00	87.99		
REMARKS End of Borehole at 10.00 m							WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr							Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
												No water strike recorded
							GROUNDWATER DETAILS					
INSTALLATION DETAILS							Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type								

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22

		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>										REPORT NUMBER <div style="font-size: 24pt; text-align: center;">23000</div>			
CONTRACT Seven Hills Wind Farm												DRILLHOLE NO T10 - RC02			
CO-ORDINATES 588,272.80 E 742,493.91 N												SHEET Sheet 2 of 2			
GROUND LEVEL (mOD) 97.99						RIG TYPE GEO405 FLUSH Air/Mist				DATE COMMENCED 14/01/2021 DATE COMPLETED 14/01/2021					
CLIENT Energia ENGINEER Malachy Walsh and Partners						INCLINATION (deg) -90 CORE DIAMETER (mm) 78				DRILLED BY IGSL LOGGED BY D.O'Shea					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10					0 250 500										N = 50/20 mm (4, 20, 25, 25)
11															
12															
13															
14															
15															
16															
17															
18															
19															

REMARKS						WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr						Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
											No water strike recorded
						GROUNDWATER DETAILS					
INSTALLATION DETAILS						Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							


IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22

		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>					REPORT NUMBER <h2 style="text-align: center;">23000</h2>		
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T11 - RC01		
CO-ORDINATES 587,887.22 E 743,612.11 N							SHEET Sheet 1 of 1		
GROUND LEVEL (mOD) 72.63							DATE COMMENCED 17/12/2020 DATE COMPLETED 17/12/2020		
CLIENT Energia ENGINEER Malachy Walsh and Partners							RIG TYPE GEO405 FLUSH Air/Mist INCLINATION (deg) -90 CORE DIAMETER (mm) 78		
DRILLED BY IGSL LOGGED BY D.O'Shea									

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES				
1	1.50	0	0	0					1.70	70.93		N = 50/20 mm (4, 9, 25, 25)
2		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK				
3	3.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of CLAY	2.50	70.13		
4		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	2.60	70.03		
5	4.50											
6	5.50	0	0	0					5.50	67.13		
End of Borehole at 5.50 m												
7												
8												
9												


REMARKS					WATER STRIKE DETAILS					
Hole cased 0.00-1.70m. Covid 19 Safe Zone erection - 1hr					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
										No water strike recorded
					GROUNDWATER DETAILS					
INSTALLATION DETAILS					Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type						

REMARKS					WATER STRIKE DETAILS					
Hole cased 0.00-2.00m. Covid 19 Safe Zone erection - 1 hr					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
										No water strike recorded
					GROUNDWATER DETAILS					
INSTALLATION DETAILS					Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type						


 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T11 - RC03						
CO-ORDINATES 587,887.00 E 743,629.00 N							SHEET Sheet 1 of 2						
GROUND LEVEL (mOD) 71.84							RIG TYPE GEO405						
CLIENT Energia							FLUSH Air/Mist						
ENGINEER Malachy Walsh and Partners							INCLINATION (deg) -90						
							CORE DIAMETER (mm) 78						
							DATE COMMENCED 01/03/2021						
							DATE COMPLETED 01/03/2021						
							DRILLED BY IGSL						
							LOGGED BY D.O'Shea						
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0					0 250 500			SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES					
1												N = 50 (2, 19, 7, 10, 12, 21)	
2													
3												N = 46 (4, 5, 7, 9, 11, 19)	
4													
5								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly CLAY	4.50	67.34		N = 52 (6, 9, 7, 12, 19, 14)	
6	6.00							Possible ROCK with clay bands - recovered as gravelly cobbly boulders with layers of clay	6.00	65.84		N = 25/10 mm (25, 25)	
7		67	21	17									
8	7.50											N = 25/10 mm (25, 25)	
9		87	55	52									
	9.00												
									9.45	62.39			
		59	14	14									
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-6.00m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									


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 <div> GEOTECHNICAL CORE LOG RECORD </div>										REPORT NUMBER <div>23000</div>			
CONTRACT Seven Hills Wind Farm								DRILLHOLE NO T11 - RC04		SHEET Sheet 2 of 2			
CO-ORDINATES 587,883.00 E 743,646.00 N				RIG TYPE GEO405 FLUSH Air/Mist				DATE COMMENCED 25/02/2021		DATE COMPLETED 25/02/2021			
GROUND LEVEL (mOD) 69.13				INCLINATION (deg) -90 CORE DIAMETER (mm) 78				DRILLED BY IGSL		LOGGED BY D.O'Shea			
CLIENT Energia ENGINEER Malachy Walsh and Partners													
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
10		100	93	83				Strong to very strong, thickly to thinly bedded, dark grey/blueish grey, fine to medium grained LIMESTONE (slightly fossiliferous, chert layering, local stylolites), fresh to locally slightly weathered.					
11	11.20							Discontinuities are widely to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay/gravel-filled (at 4.20-4.24m & 5.44-5.46m), locally calcite-veined (1-2mm thick) locally slightly iron-oxide stained. Dips are 10-15° & very locally 80°. (continued)					
12	12.20	100	100	92				End of Borehole at 12.20 m	12.20	56.93			
13													
14													
15													
16													
17													
18													
19													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-2.20m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type				26-02-21	12.20	2.20	7.50	Water level recorded 5 mins after end of drilling.	

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 <div> GEOTECHNICAL CORE LOG RECORD </div>										REPORT NUMBER <div>23000</div>			
CONTRACT Seven Hills Wind Farm								DRILLHOLE NO T12 - RC01					
CO-ORDINATES 588,338.01 E 743,475.97 N								SHEET Sheet 1 of 1					
GROUND LEVEL (mOD) 87.24				RIG TYPE GEO405 FLUSH Air/Mist				DATE COMMENCED 15/12/2020 DATE COMPLETED 15/12/2020					
CLIENT Energia ENGINEER Malachy Walsh and Partners				INCLINATION (deg) -90 CORE DIAMETER (mm) 78				DRILLED BY IGSL LOGGED BY D.O'Shea					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL					
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey sandy GRAVEL	1.50	85.74		N = 23 (3, 5, 4, 7, 5, 7)	
2		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible ROCK	2.70	84.54			
3	3.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL	3.80	83.44			
4	4.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	4.30	82.94			
5		0	0	0									
6	6.00	0	0	0									
	6.50							End of Borehole at 6.50 m	6.50	80.74			
7													
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-2.70m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									


 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T12 - RC02						
CO-ORDINATES 588,356.53 E 743,444.03 N							SHEET Sheet 1 of 1						
GROUND LEVEL (mOD) 89.97							DATE COMMENCED 15/12/2020						
CLIENT Energia							DATE COMPLETED 15/12/2020						
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL						
							LOGGED BY D.O'Shea						
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL					
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey sandy GRAVEL	1.50	88.47		N = 15 (1, 2, 2, 4, 4, 5)	
2		0	0	0									
3	3.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	3.10	86.87		N = 25/10 mm (7, 25, 25)	
4		0	0	0									
5	4.50												
6	5.40	0	0	0					5.40	84.57			
								End of Borehole at 5.40 m					
7													
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-3.10m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

		<h1>GEOTECHNICAL CORE LOG RECORD</h1>					REPORT NUMBER <h2>23000</h2>		
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T13 - RC01 SHEET Sheet 1 of 1		
CO-ORDINATES 588,168.44 E 742,945.12 N				RIG TYPE GEO405 FLUSH Air/Mist			DATE COMMENCED 16/12/2020 DATE COMPLETED 16/12/2020		
GROUND LEVEL (mOD) 79.95				INCLINATION (deg) -90 CORE DIAMETER (mm) 78			DRILLED BY IGSL LOGGED BY D.O'Shea		
CLIENT Energia ENGINEER Malachy Walsh and Partners									

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey sandy GRAVEL				
1	0	0	0	0					1.30	78.65		
1.50								SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK				
2	0	0	0	0								
3	0	0	0	0								
3.00												
3.50								End of Borehole at 3.50 m	3.50	76.45		
4												
5												
6												
7												
8												
9												


REMARKS					WATER STRIKE DETAILS					
Hole cased 0.00-1.30m. Covid 19 Safe Zone erection - 1hr					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
										No water strike recorded
					GROUNDWATER DETAILS					
INSTALLATION DETAILS					Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type						

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 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>												
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T13 - RC02					
CO-ORDINATES 588,156.86 E 742,980.56 N							SHEET Sheet 1 of 2					
GROUND LEVEL (mOD) 80.01							RIG TYPE GEO405					
CLIENT Energia							FLUSH Air/Mist					
ENGINEER Malachy Walsh and Partners							INCLINATION (deg) -90					
							CORE DIAMETER (mm) 78					
							DATE COMMENCED 17/12/2020					
							DATE COMPLETED 17/12/2020					
							DRILLED BY IGSL					
							LOGGED BY D.O'Shea					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey sandy GRAVEL				
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL	1.50	78.51		N = 26 (2, 4, 5, 5, 9, 7)
2		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly SAND	3.00	77.01		N = 22 (3, 3, 9, 5, 5, 3)
3	3.00	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	4.50	75.51		N = 22 (2, 4, 7, 5, 6, 4)
4	4.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey gravelly COBBLES	6.00	74.01		N = 33 (2, 11, 7, 6, 9, 11)
5	6.00	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly CLAY	7.50	72.51		N = 47 (4, 7, 9, 12, 12, 14)
6		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	8.70	71.31		
7	7.50											
8		0	0	0								
9	9.00											
		0	0	0								

REMARKS					WATER STRIKE DETAILS					
Hole cased 0.00-8.70m. Covid 19 Safe Zone erection - 1hr					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
										No water strike recorded


INSTALLATION DETAILS					GROUNDWATER DETAILS				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments


		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>										REPORT NUMBER <div style="font-size: 24pt; text-align: center;">23000</div>	
CONTRACT Seven Hills Wind Farm												DRILLHOLE NO T13 - RC02	
CO-ORDINATES 588,156.86 E 742,980.56 N												SHEET Sheet 2 of 2	
GROUND LEVEL (mOD) 80.01						RIG TYPE GEO405 FLUSH Air/Mist				DATE COMMENCED 17/12/2020 DATE COMPLETED 17/12/2020			
CLIENT Energia ENGINEER Malachy Walsh and Partners						INCLINATION (deg) -90 CORE DIAMETER (mm) 78				DRILLED BY IGSL LOGGED BY D.O'Shea			
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
10	10.50							SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK (<i>continued</i>)					
	11.00	0	0	0					11.00	69.01			
11								End of Borehole at 11.00 m					
12													
13													
14													
15													
16													
17													
18													
19													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-8.70m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									


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 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>												
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T14 - RC01					
CO-ORDINATES 588,836.69 E 743,739.12 N							SHEET Sheet 1 of 1					
GROUND LEVEL (mOD) 86.77							DATE COMMENCED 18/12/2020					
CLIENT Energia							DATE COMPLETED 18/12/2020					
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL					
CORE DIAMETER (mm) 78							LOGGED BY D.O'Shea					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly CLAY				
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL	1.50	85.27		N = 12 (1, 2, 3, 2, 4, 3)
2	3.00	0	0	0								N = 35 (5, 3, 7, 9, 11, 8)
3	4.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	4.50	82.27		N = 25/10 mm (25, 25)
4	6.00	0	0	0								
5	6.70	0	0	0				End of Borehole at 6.70 m	6.70	80.07		
6												
7												
8												
9												
10	10.00	0	0	0								
REMARKS							WATER STRIKE DETAILS					
Hole cased 0.00-4.50m. Covid 19 Safe Zone erection - 1hr							Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
												No water strike recorded
							GROUNDWATER DETAILS					
INSTALLATION DETAILS							Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type								

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 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T14 - RC02						
CO-ORDINATES 588,816.84 E 743,766.46 N							SHEET Sheet 1 of 1						
GROUND LEVEL (mOD) 84.43							DATE COMMENCED 21/12/2020						
CLIENT Energia							DATE COMPLETED 21/12/2020						
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL						
							LOGGED BY D.O'Shea						
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly CLAY					
1	1.50	0	0	0					1.50	82.93		N = 12 (2, 4, 2, 3, 3, 4)	
2		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL					
3	3.00								3.00	81.43		N = 25 (3, 6, 5, 5, 6, 9)	
4		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL					
5	4.50								4.50	79.93		N = 57/95 mm (4, 6, 7, 25, 25)	
6		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK					
7	6.00												
	6.90	0	0	0					6.90	77.53			
7								End of Borehole at 6.90 m					
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-4.50m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

 <div> <div> GEOTECHNICAL CORE LOG RECORD </div> <div> REPORT NUMBER 23000 </div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T15 - RC01 SHEET Sheet 1 of 1						
CO-ORDINATES 588,861.30 E 744,152.76 N				RIG TYPE GEO405 FLUSH Air/Mist			DATE COMMENCED 27/11/2020 DATE COMPLETED 27/11/2020						
GROUND LEVEL (mOD) 72.61				INCLINATION (deg) -90 CORE DIAMETER (mm) 78			DRILLED BY IGSL LOGGED BY D.O'Shea						
CLIENT Energia ENGINEER Malachy Walsh and Partners													
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly CLAY					
1	1.50	0	0	0								N = 64 (4, 9, 12, 21, 14, 17)	
2		0	0	0									
3	3.00	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	3.00	69.61		N = 79 (7, 11, 15, 17, 24, 23)	
4	3.70								3.70	68.91			
5	5.20	100	100	100				Strong to very strong, thickly to thinly bedded, dark grey/blueish grey, fine to medium grained LIMESTONE (slightly fossiliferous, chert layering, local stylolites), fresh to locally slightly weathered.					
6	6.70	100	87	87				Discontinuities are widely to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay/gravel-filled (at 5.69-5.78m) locally calcite-veined (1-2mm thick) locally slightly iron-oxide stained. Dips are 10-15°.					
7	7.70	100	97	97									
8	8.90	100	99	99					8.90	63.71			
9								End of Borehole at 8.90 m					
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-3.70m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T15 - RC02						
CO-ORDINATES 588,830.04 E 744,173.62 N							SHEET Sheet 1 of 1						
GROUND LEVEL (mOD) 71.83							DATE COMMENCED 30/11/2020						
CLIENT Energia							DATE COMPLETED 30/11/2020						
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL						
RIG TYPE GEO405							LOGGED BY D.O'Shea						
FLUSH Air/Mist													
INCLINATION (deg) -90													
CORE DIAMETER (mm) 78													
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly CLAY					
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL	1.50	70.33		N = 56 (7, 14, 17, 12, 11, 16)	
2		0	0	0									
3	3.00											N = 50/20 mm (4, 20, 25, 25)	
4		0	0	0									
5	4.50							SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly COBBLES	4.50	67.33		N = 87 (6, 17, 21, 20, 22, 24)	
6		0	0	0									
7	6.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of COBBLES	6.00	65.83		N = 91 (3, 19, 17, 21, 25, 28)	
8		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	6.50	65.33			
9	7.50												
	8.70							End of Borehole at 8.70 m	8.70	63.13			
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-8.70m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

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GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm						DRILLHOLE NO T16 - RC01			
CO-ORDINATES 589,367.51 E 744,489.27 N						SHEET Sheet 1 of 1			
GROUND LEVEL (mOD) 78.30						DATE COMMENCED 21/12/2020			
CLIENT Energia						DATE COMPLETED 21/12/2020			
ENGINEER Malachy Walsh and Partners						DRILLED BY IGSL			
RIG TYPE GEO405						LOGGED BY D.O'Shea			
FLUSH Air/Mist									
INCLINATION (deg) -90									
CORE DIAMETER (mm) 78									

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey sandy gravelly COBBLES				
1	1.50	0	0	0					1.50	76.80		
2		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly SAND				
3	3.00								3.00	75.30		
4		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES				
5	4.50											
6		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	5.30	73.00		
7	6.00											
8		0	0	0								
9	7.50							End of Borehole at 7.50 m	7.50	70.80		

REMARKS						WATER STRIKE DETAILS					
Hole cased 0.00-5.70m. Covid 19 Safe Zone erection - 1hr						Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
											No water strike recorded
						GROUNDWATER DETAILS					
INSTALLATION DETAILS						Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							



GEOTECHNICAL CORE LOG RECORD


REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm						DRILLHOLE NO T16 - RC02			
						SHEET Sheet 1 of 1			
CO-ORDINATES 589,399.85 E 744,479.50 N						DATE COMMENCED 22/12/2020			
GROUND LEVEL (mOD) 77.44			RIG TYPE GEO405			DATE COMPLETED 22/12/2020			
CLIENT Energia			FLUSH Air/Mist			DRILLED BY IGSL			
ENGINEER Malachy Walsh and Partners			INCLINATION (deg) -90			LOGGED BY D.O'Shea			
CORE DIAMETER (mm) 78									

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey gravelly COBBLES				
1	1.50	0	0	0					1.50	75.94		N = 28 (4, 7, 5, 9, 7, 7)
2		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly CLAY				
3	3.00								2.70	74.74		
4		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK				
5	4.50	0	0	0					5.00	72.44		
5	5.00							End of Borehole at 5.00 m				
6												
7												
8												
9												


REMARKS						WATER STRIKE DETAILS					
Hole cased 0.00-2.70m. Covid 19 Safe Zone erection - 1hr						Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
											No water strike recorded
						GROUNDWATER DETAILS					
INSTALLATION DETAILS						Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							


		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>					REPORT NUMBER <div style="font-size: 24pt; text-align: center;">23000</div>		
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T17 - RC01		
CO-ORDINATES 589,657.66 E 744,131.74 N							SHEET Sheet 1 of 1		
GROUND LEVEL (mOD) 85.93							DATE COMMENCED 07/01/2021 DATE COMPLETED 07/01/2021		
CLIENT Energia ENGINEER Malachy Walsh and Partners							RIG TYPE GEO405 FLUSH Air/Mist INCLINATION (deg) -90 CORE DIAMETER (mm) 78		
DRILLED BY IGSL LOGGED BY D.O'Shea									

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES					
1	1.50	0	0	0									
2		0	0	0									N = 41 (5, 21, 14, 7, 9, 11)
3	3.00												N = 39 (4, 5, 5, 11, 9, 14)
4	4.50							SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	4.20	81.73			
5		0	0	0									
6	6.00	0	0	0									
	6.50								6.50	79.43			
End of Borehole at 6.50 m													
7													
8													
9													


REMARKS					WATER STRIKE DETAILS					
Hole cased 0.00-4.20m. Covid 19 Safe Zone erection - 1hr					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
										No water strike recorded
					GROUNDWATER DETAILS					
INSTALLATION DETAILS					Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type						

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 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T17 - RC02						
CO-ORDINATES 589,678.39 E 744,107.11 N							SHEET Sheet 1 of 1						
GROUND LEVEL (mOD) 87.57							DATE COMMENCED 07/01/2021						
CLIENT Energia							DATE COMPLETED 07/01/2021						
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL						
RIG TYPE GEO405							LOGGED BY D.O'Shea						
FLUSH Air/Mist													
INCLINATION (deg) -90													
CORE DIAMETER (mm) 78													
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES					
1	1.50	0	0	0								N = 41 (7, 12, 9, 7, 11, 14)	
2		0	0	0								N = 25/10 mm (25, 25)	
3	3.00												
4	4.50	0	0	0								N = 56/235 mm (4, 5, 5, 9, 17, 25)	
5		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	4.90	82.67			
6	6.00												
7	7.10	0	0	0									
								End of Borehole at 7.10 m	7.10	80.47			
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-4.90m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

 <div> <div> GEOTECHNICAL CORE LOG RECORD </div> <div> REPORT NUMBER 23000 </div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T18 - RC01 SHEET Sheet 1 of 1						
CO-ORDINATES 590,531.00 E 744,167.93 N				RIG TYPE GEO405 FLUSH Air/Mist			DATE COMMENCED 05/01/2021 DATE COMPLETED 05/01/2021						
GROUND LEVEL (mOD) 88.59				INCLINATION (deg) -90 CORE DIAMETER (mm) 78			DRILLED BY IGSL LOGGED BY D.O'Shea						
CLIENT Energia ENGINEER Malachy Walsh and Partners													
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES					
1	1.50	0	0	0								N = 23 (3, 4, 6, 5, 5, 7)	
2		0	0	0					3.00	85.59			
3	3.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL				N = 23 (2, 3, 3, 5, 7, 8)	
4	4.50	0	0	0					4.80	83.79			
5		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK				N = 67/95 mm (6, 5, 17, 25, 25)	
6	6.00	0	0	0									
7	7.10							End of Borehole at 7.10 m	7.10	81.49			
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-4.80m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

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GEOTECHNICAL CORE LOG RECORD


REPORT NUMBER
23000

CONTRACT Seven Hills Wind Farm						DRILLHOLE NO T18 - RC02	
CO-ORDINATES 590,521.18 E 744,202.41 N						SHEET Sheet 1 of 1	
GROUND LEVEL (mOD) 90.87						DATE COMMENCED 05/01/2021	
CLIENT Energia						DATE COMPLETED 05/01/2021	
ENGINEER Malachy Walsh and Partners						DRILLED BY IGSL	
RIG TYPE GEO405						LOGGED BY D.O'Shea	
FLUSH Air/Mist							
INCLINATION (deg) -90							
CORE DIAMETER (mm) 78							


Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES				
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL	1.50	89.37		N = 17 (1, 3, 3, 4, 5, 5)
2	3.00	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly SAND	3.00	87.87		N = 25 (2, 4, 5, 7, 6, 7)
3	4.60							Strong to very strong, thickly to thinly bedded, dark grey/blueish grey, fine to medium grained LIMESTONE (slightly fossiliferous, chert layering, local stylolites), fresh to locally slightly weathered.	4.50	86.37		N = 50/20 mm (3, 25, 25)
4	6.10	100	100	0				Discontinuities are widely to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay/gravel-filled (at 8.82-8.94m), locally calcite-veined (1-2mm thick) locally slightly iron-oxide stained. Dips are 10-15° & very locally 80°.				
5	7.60	100	98	0								
6	8.60	100	91	0								
7	9.60	100	76	0								
End of Borehole at 9.60 m									9.60	81.27		


REMARKS					WATER STRIKE DETAILS					
Hole cased 0.00-4.60m. Covid 19 Safe Zone erection - 1hr					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
										No water strike recorded
INSTALLATION DETAILS					GROUNDWATER DETAILS					
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments	
05-01-21	9.60	3.60	9.60	50mm SP	05-01-21	9.60	4.60	7.80	Water level recorded 5 mins after end of drilling.	

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 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T19 - RC01						
CO-ORDINATES 590,475.07 E 744,603.07 N							SHEET Sheet 1 of 1						
GROUND LEVEL (mOD) 108.45							DATE COMMENCED 06/01/2021						
CLIENT Energia							DATE COMPLETED 06/01/2021						
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL						
							LOGGED BY D.O'Shea						
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL					
1	1.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	1.50	106.95		N = 25/10 mm (25, 25)	
2		0	0	0									
3	3.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL	3.00	105.45		N = 33 (2, 5, 7, 8, 9, 9)	
4	4.50	0	0	0					4.50	103.95		N = 25/10 mm (25, 25)	
5		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK					
6	6.00												
	6.70	0	0	0					6.70	101.75			
7								End of Borehole at 6.70 m					
8													
9													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-4.50m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

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		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>					REPORT NUMBER <h2 style="text-align: center;">23000</h2>								
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T19 - RC02								
CO-ORDINATES 590,454.48 E 744,627.70 N							SHEET Sheet 1 of 1								
GROUND LEVEL (mOD) 109.38							DATE COMMENCED 06/01/2021								
RIG TYPE GEO405							DATE COMPLETED 06/01/2021								
FLUSH Air/Mist							DRILLED BY IGSL								
CLIENT Energia							LOGGED BY D.O'Shea								
ENGINEER Malachy Walsh and Partners							CORE DIAMETER (mm) 78								
Downhole Depth (m) 0 250 500		Core Run Depth (m)		T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0				0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES				N = 27 (6, 11, 7, 6, 7, 7)	
1.50															
2				0	0	0								N = 27 (2, 4, 8, 6, 6, 7)	
3.00															
3				0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL	3.00	106.38			
4															
4.50										SYMMETRIX DRILLING: No recovery, observed by driller as returns of ROCK	4.10	105.28			
5				0	0	0									
6.00															
6.40				0	0	0					6.40	102.98			
										End of Borehole at 6.40 m					
7															
8															
9															
REMARKS										WATER STRIKE DETAILS					
Hole cased 0.00-4.10m. Covid 19 Safe Zone erection - 1hr										Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
															No water strike recorded
INSTALLATION DETAILS										GROUNDWATER DETAILS					
Date	Tip Depth	RZ Top	RZ Base	Type						Date	Hole Depth	Casing Depth	Depth to Water	Comments	

		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>					REPORT NUMBER <h2 style="text-align: center;">23000</h2>		
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T20 - RC01		
CO-ORDINATES 591,156.88 E 744,395.97 N							SHEET Sheet 1 of 2		
GROUND LEVEL (mOD) 95.29							DATE COMMENCED 09/01/2021		
CLIENT Energia							DATE COMPLETED 09/01/2021		
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL		
RIG TYPE GEO405							LOGGED BY D.O'Shea		
FLUSH Air/Mist									
INCLINATION (deg) -90									
CORE DIAMETER (mm) 78									

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly CLAY				
1	1.50	0	0	0								N = 28 (3, 5, 9, 6, 6, 7)
2		0	0	0								
3	3.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey sandy GRAVEL	3.00	92.29		N = 39 (4, 5, 8, 14, 8, 9)
4		0	0	0								
5	4.50							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	4.50	90.79		N = 41 (2, 5, 6, 9, 12, 14)
6		0	0	0								N = 50/40 mm (12, 8, 25, 25)
7	6.00											
8		0	0	0								N = 41 (4, 7, 9, 14, 8, 10)
9	7.50											
10	9.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL	9.00	86.29		N = 37 (5, 19, 7, 9, 7, 14)
11		0	0	0								
12	10.00								10.00	85.29		


REMARKS							WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr							Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
												No water strike recorded
							GROUNDWATER DETAILS					
INSTALLATION DETAILS							Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type								

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		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>										REPORT NUMBER <h2 style="text-align: center;">23000</h2>			
CONTRACT Seven Hills Wind Farm												DRILLHOLE NO T20 - RC01			
CO-ORDINATES 591,156.88 E 744,395.97 N												SHEET Sheet 2 of 2			
GROUND LEVEL (mOD) 95.29						RIG TYPE GEO405 FLUSH Air/Mist				DATE COMMENCED 09/01/2021 DATE COMPLETED 09/01/2021					
CLIENT Energia ENGINEER Malachy Walsh and Partners						INCLINATION (deg) -90 CORE DIAMETER (mm) 78				DRILLED BY IGSL LOGGED BY D.O'Shea					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10					0 250 500										N = 31 (6, 4, 11, 7, 7, 6)
11															
12															
13															
14															
15															
16															
17															
18															
19															

REMARKS						WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr						Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
											No water strike recorded
						GROUNDWATER DETAILS					
INSTALLATION DETAILS						Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							

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 <div> <div>GEOTECHNICAL CORE LOG RECORD</div> <div>REPORT NUMBER 23000</div> </div>												
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T20 - RC02					
CO-ORDINATES 591,184.93 E 744,371.72 N							SHEET Sheet 1 of 2					
GROUND LEVEL (mOD) 94.11							DATE COMMENCED 08/01/2021					
CLIENT Energia							DATE COMPLETED 08/01/2021					
ENGINEER Malachy Walsh and Partners							DRILLED BY IGSL					
							LOGGED BY D.O'Shea					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly CLAY				
1	1.50	0	0	0								N = 25 (2, 4, 5, 7, 6, 7)
2		0	0	0								
3	3.00											N = 38 (4, 7, 7, 12, 9, 10)
4		0	0	0								
4.50									4.50	89.61		N = 31 (3, 5, 4, 9, 7, 11)
5		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES				
6	6.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly SAND	6.00	88.11		N = 25/10 mm (25, 25)
7		0	0	0								
7.50								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey sandy COBBLES	7.50	86.61		N = 31 (4, 9, 7, 5, 8, 11)
8		0	0	0								
9	9.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	9.00	85.11		N = 27 (2, 4, 6, 6, 8, 7)
10.00		0	0	0					10.00	84.11		
REMARKS End of Borehole at 10.00 m							WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr							Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
												No water strike recorded
							GROUNDWATER DETAILS					
INSTALLATION DETAILS							Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type								

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		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>						REPORT NUMBER <div style="font-size: 24pt; text-align: center;">23000</div>				
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T20 - RC02					
CO-ORDINATES 591,184.93 E 744,371.72 N							SHEET Sheet 2 of 2					
GROUND LEVEL (mOD) 94.11							DATE COMMENCED 08/01/2021					
RIG TYPE GEO405							DATE COMPLETED 08/01/2021					
FLUSH Air/Mist							DRILLED BY IGSL					
CLIENT Energia							LOGGED BY D.O'Shea					
ENGINEER Malachy Walsh and Partners							CORE DIAMETER (mm) 78					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10					<div style="text-align: center;"> 0 250 500 </div>							N = 36 (7, 19, 11, 6, 9, 10)
11												
12												
13												
14												
15												
16												
17												
18												
19												

REMARKS
 Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded


INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

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 <div> <div> GEOTECHNICAL CORE LOG RECORD </div> <div> REPORT NUMBER 23000 </div> </div>													
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T21 - RC01 SHEET Sheet 1 of 2						
CO-ORDINATES 591,423.17 E 744,105.64 N				RIG TYPE GEO405 FLUSH Air/Mist			DATE COMMENCED 14/01/2021 DATE COMPLETED 14/01/2021						
GROUND LEVEL (mOD) 89.95				INCLINATION (deg) -90 CORE DIAMETER (mm) 78			DRILLED BY IGSL LOGGED BY D.O'Shea						
CLIENT Energia ENGINEER Malachy Walsh and Partners													
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly CLAY					
1	1.50	0	0	0									N = 26 (2, 5, 4, 5, 10, 7)
2		0	0	0									
3	3.00												N = 27 (4, 7, 5, 6, 7, 9)
4	4.50	0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey sandy gravelly COBBLES	4.50	85.45		N = 27 (3, 4, 4, 7, 9, 7)	
5		0	0	0									
6	6.00							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL	6.00	83.95		N = 31 (2, 5, 9, 6, 7, 9)	
7		0	0	0									
8	7.50							SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	7.50	82.45		N = 33 (2, 5, 7, 7, 9, 10)	
9		0	0	0									
10	9.00												N = 26 (4, 4, 6, 9, 4, 7)
10.00		0	0	0					10.00	79.95			
REMARKS End of Borehole at 10.00 m													
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr								WATER STRIKE DETAILS					
								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
INSTALLATION DETAILS								GROUNDWATER DETAILS					
								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
								Date	Tip Depth	RZ Top	RZ Base	Type	

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22




GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER


23000

CONTRACT Seven Hills Wind Farm						DRILLHOLE NO T21 - RC01							
						SHEET Sheet 2 of 2							
CO-ORDINATES 591,423.17 E 744,105.64 N			RIG TYPE GEO405			DATE COMMENCED 14/01/2021							
GROUND LEVEL (mOD) 89.95			FLUSH Air/Mist			DATE COMPLETED 14/01/2021							
CLIENT Energia			INCLINATION (deg) -90			DRILLED BY IGSL							
ENGINEER Malachy Walsh and Partners			CORE DIAMETER (mm) 78			LOGGED BY D.O'Shea							
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
10					0 250 500							N = 33 (3, 12, 9, 7, 9, 8)	
11													
12													
13													
14													
15													
16													
17													
18													
19													
REMARKS								WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr								Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
													No water strike recorded
								GROUNDWATER DETAILS					
INSTALLATION DETAILS								Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type									

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22

 <div> <div> GEOTECHNICAL CORE LOG RECORD </div> <div> REPORT NUMBER 23000 </div> </div>												
CONTRACT Seven Hills Wind Farm							DRILLHOLE NO T21 - RC02 SHEET Sheet 1 of 2					
CO-ORDINATES 591,432.80 E 744,073.91 N				RIG TYPE GEO405 FLUSH Air/Mist			DATE COMMENCED 13/01/2021 DATE COMPLETED 13/01/2021					
GROUND LEVEL (mOD) 90.01				INCLINATION (deg) -90 CORE DIAMETER (mm)			DRILLED BY IGSL LOGGED BY D.O'Shea					
CLIENT Energia ENGINEER Malachy Walsh and Partners												
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0					0 250 500			SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly CLAY				
1												N = 26 (3, 4, 4, 6, 8, 8)
2												
3												N = 23 (2, 7, 3, 5, 7, 8)
4												
5												N = 47 (3, 5, 12, 17, 8, 10)
6								SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly cobbly CLAY	6.00	84.01		N = 25/10 mm (12, 25, 25)
7												
8								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES	7.50	82.51		N = 45 (3, 5, 7, 14, 15, 9)
9												N = 41 (4, 6, 6, 9, 11, 15)
									10.00	80.01		
REMARKS End of Borehole at 10.00 m										WATER STRIKE DETAILS		
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr							Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
												No water strike recorded
INSTALLATION DETAILS							GROUNDWATER DETAILS					
							Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type								
13-01-21	10.00	6.00	10.00	50mm SP								

IGSL RC Fl 10M 23000.GPJ IGSL.GDT 20/5/22

		<h1 style="text-align: center;">GEOTECHNICAL CORE LOG RECORD</h1>										REPORT NUMBER <h2 style="text-align: center;">23000</h2>			
CONTRACT Seven Hills Wind Farm												DRILLHOLE NO T21 - RC02			
CO-ORDINATES 591,432.80 E 744,073.91 N												SHEET Sheet 2 of 2			
GROUND LEVEL (mOD) 90.01						RIG TYPE GEO405 FLUSH Air/Mist				DATE COMMENCED 13/01/2021 DATE COMPLETED 13/01/2021					
CLIENT Energia ENGINEER Malachy Walsh and Partners						INCLINATION (deg) -90 CORE DIAMETER (mm)				DRILLED BY IGSL LOGGED BY D.O'Shea					
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10					0 250 500										N = 32 (3, 5, 5, 8, 10, 9)
11															
12															
13															
14															
15															
16															
17															
18															
19															

REMARKS						WATER STRIKE DETAILS					
Hole cased 0.00-10.00m. Covid 19 Safe Zone erection - 1hr						Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
											No water strike recorded
						GROUNDWATER DETAILS					
INSTALLATION DETAILS						Date	Hole Depth	Casing Depth	Depth to Water	Comments	
Date	Tip Depth	RZ Top	RZ Base	Type							
13-01-21	10.00	6.00	10.00	50mm SP							

IGSL RC FI 10M 23000.GPJ IGSL.GDT 20/5/22

T04 – RC01 – Box 1 of 2 – 9.00-12.00m



T04 – RC01 – Box 2 of 2 – 12.00-14.60m



T05 – RC01 – Box 1 of 2 – 1.80-4.80m



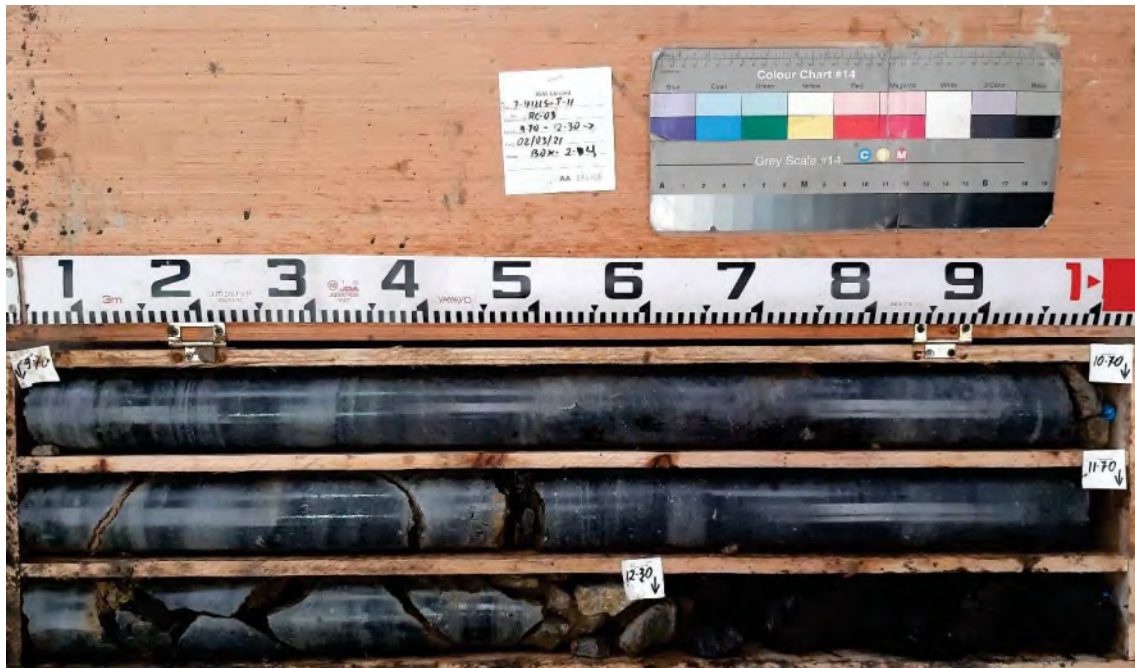
T05 – RC01 – Box 2 of 2 – 4.80-6.80m



T11 – RC03 – Box 1 of 4 – 6.00-9.70m



T11 – RC03 – Box 2 of 4 – 9.70-12.30m



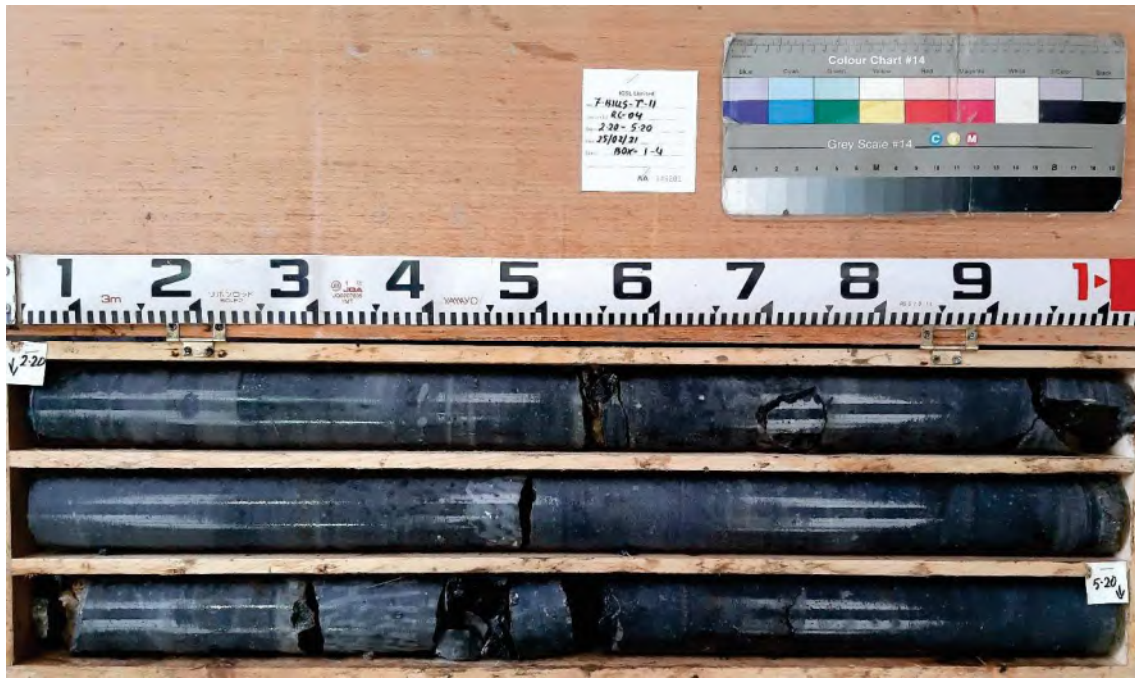
T11 – RC03 – Box 3 of 4 – 12.30-16.40m



T11 – RC03 – Box 4 of 4 – 16.40-18.30m



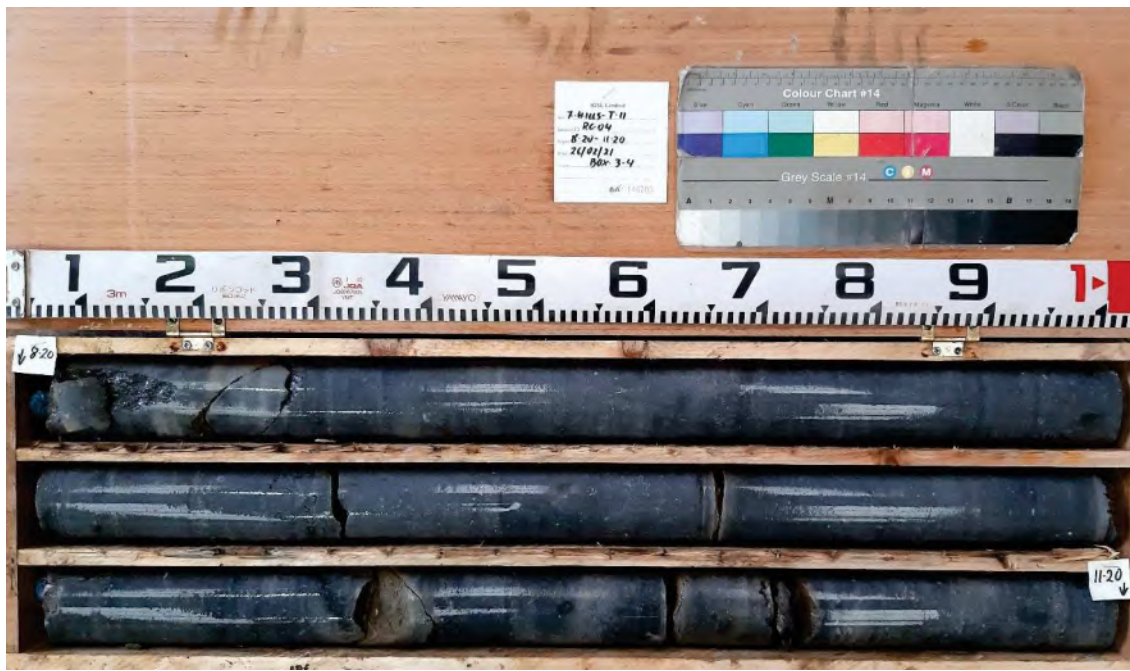
T11 – RC04 – Box 1 of 4 – 2.20-5.20m



T11 – RC04 – Box 2 of 4 – 5.20-8.20m



T11 – RC04 – Box 3 of 4 – 8.20-11.20m



T11 – RC04 – Box 4 of 4 – 11.20-12.20m



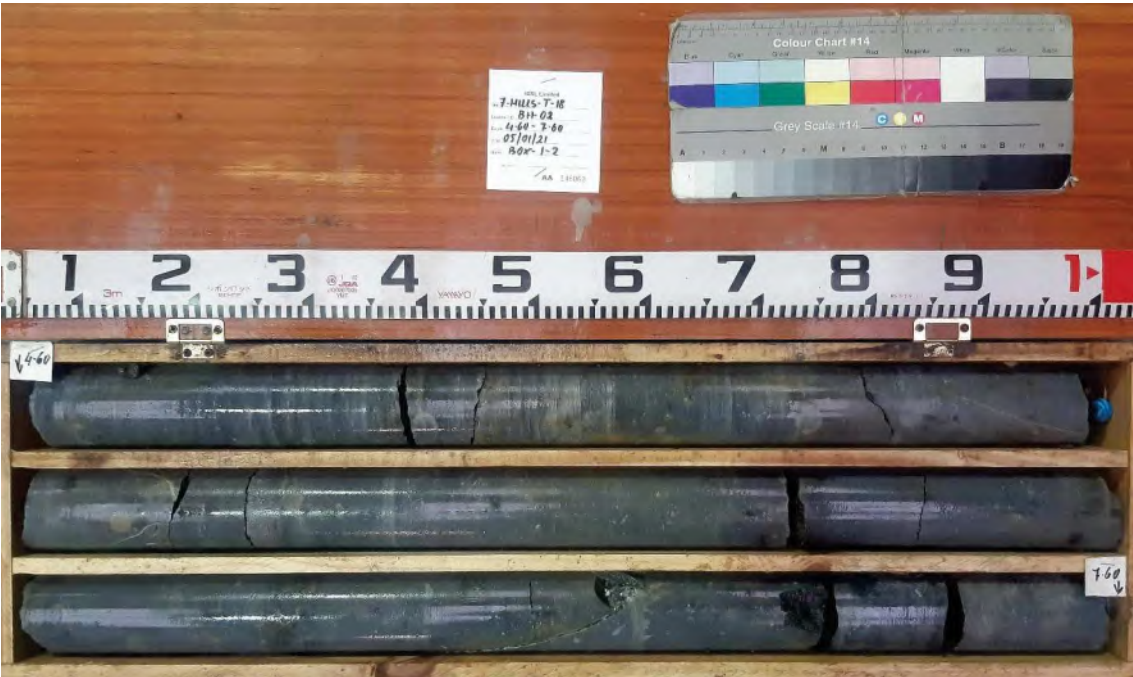
T15 – RC02 – Box 1 of 2 – 3.70-6.70m



T15 – RC02 – Box 2 of 2 – 6.708.90m



T18 – RC02 – Box 1 of 2 – 4.60-7.60m



T18 – RC02 – Box 2 of 2 – 7.60-9.60m



Appendix 2

Trial Pit Records and Photographs



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO.
SHEETT01 TP01
Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 586,359.15 E
748,307.29 NDATE STARTED 23/11/2020
DATE COMPLETED 23/11/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 94.04

EXCAVATION
METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.20	93.84		145084	B	0.50-0.80		
1.0	Dense light brown sandy clayey GRAVEL with medium cobble content and many boulders. Sand is medium to coarse. Gravel is fine to coarse subangular to subrounded.					140085	B	1.50-1.80		
2.0	End of Trial Pit at 2.10m		2.10	91.94						
3.0										

Groundwater Conditions

Stability
GoodGeneral Remarks
Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO.

T01 TP02

SHEET

Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES

586,361.61 E
748,345.98 N

DATE STARTED

23/11/2020

DATE COMPLETED

23/11/2020

CLIENT Energia

ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 91.09

EXCAVATION
METHOD

Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.20	90.89		145085	B	0.50-0.80		
1.0	Medium dense to dense grey sandy GRAVEL with medium cobble content and some boulders. Sand is medium to coarse. Gravel is fine to coarse subangular to subrounded					140086	B	1.50-1.70		
1.70	End of Trial Pit at 1.70m		1.70	89.39						
2.0										
3.0										

Groundwater Conditions

Stability
Good

General Remarks

Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T01 TP03	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 586,343.98 E 748,379.41 N		DATE STARTED 03/02/2021	
GROUND LEVEL (m)		DATE COMPLETED 03/02/2021	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL		0.30			145470	B	0.50-0.60		
	Medium dense light greyish brown slightly clayey very sandy GRAVEL with medium cobble content and some boulders. Sand is fine to coarse. Gravel is fine to coarse, subangular to angular.									
1.0										
2.0										
	Possible Rockhead End of Trial Pit at 2.30m		2.30			145471	B	2.20-2.30		
3.0										

Groundwater Conditions
Stability Good
General Remarks



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T01 TP04	
LOGGED BY JC		SHEET Sheet 1 of 1	
CLIENT Energia		DATE STARTED 03/02/2021	
ENGINEER Malachy Walsh and Partners		DATE COMPLETED 03/02/2021	
GROUND LEVEL (m)		EXCAVATION METHOD Tracked digger	

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL		0.30			145472	B	0.50-0.60		
1.0	Medium dense to dense light greyish brown slightly clayey very sandy GRAVEL with medium cobble content and some to many boulders. Sand is fine to coarse. Gravel is fine to coarse, subangular to angular.									
2.0										
2.40	Possible Rockhead End of Trial Pit at 2.40m		2.40			140473	B	2.30-2.40		
3.0										

Groundwater Conditions

Stability Good

General Remarks



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T02 TP01
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 586,892.28 E
748,168.78 NDATE STARTED 23/11/2020
DATE COMPLETED 23/11/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 76.13

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.10	76.03						
	Soft light brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.30	75.83						
	Medium dense light brown sandy clayey GRAVEL. Sand is medium to coarse. Gravel is fine to coarse, subrounded to subangular.					145081	B	0.50-0.80		
1.0										
						140082	B	1.50-1.80		
2.0										
						145082	B	2.50-3.00		
3.0										
	End of Trial Pit at 3.20m		3.50	72.63						

Groundwater Conditions

Stability
Good

General Remarks



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T02 TP02	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 586,898.41 E 748,122.20 N		DATE STARTED 23/11/2020	
GROUND LEVEL (m) 78.14		DATE COMPLETED 23/11/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.									
	Soft light brown slightly sandy gravelly CLAY with medium cobble content and occasional boulders. Sand is fine to medium. Gravel is fine to coarse, rounded to subangular.		0.40	77.74		140083	B	0.50-0.80		
	Loose light brown sandy clayey GRAVEL. Sand is medium to coarse. Gravel is fine to coarse, subrounded to subangular.		0.80	77.34						
1.0										
						145083	B	1.50-1.80		
2.0										
						140084	B	2.50-3.00		
3.0										
	End of Trial Pit at 3.10m		3.50	74.64						

Groundwater Conditions
Stability Good
General Remarks



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T03 TP01
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 587,097.65 E
747,778.40 N

DATE STARTED 19/11/2020
DATE COMPLETED 19/11/2020

CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 83.29

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.30	82.99		145073	B	0.50-0.80		
1.0	Soft brown slightly sandy gravelly CLAY with medium cobble content and occasional to some boulders. Sand is medium to coarse. Gravel is fine to medium, rounded to subangular.					145074	B	1.50-1.80		
2.0										
3.0	Firm to stiff brown slightly sandy gravelly CLAY with medium cobble content and occasional to some boulders. Sand is medium to coarse. Gravel is fine to medium, rounded to subangular.		2.80	80.49		140075	B	2.90-3.20		
	End of Trial Pit at 3.20m		3.20	80.09						

Groundwater Conditions

Stability
Good

General Remarks



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO.

T03 TP02

SHEET

Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES

587,102.21 E
747,734.12 N

DATE STARTED

19/11/2020

DATE COMPLETED

19/11/2020

CLIENT Energia

GROUND LEVEL (m)

82.99

ENGINEER Malachy Walsh and Partners

EXCAVATION
METHOD

Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.30	82.69		145075	B	0.50-0.80		
	Soft brown slightly sandy gravelly CLAY with medium cobble content and occasional to some boulders. Sand is medium to coarse. Gravel is fine to medium, subrounded to rounded.									
1.0	Soft to firm brown slightly sandy very gravelly CLAY with medium to high cobble content and some boulders. Sand is coarse. Gravel is fine to medium subrounded to subangular.		1.00	81.99		145076	B	1.50-1.80		
2.0						140076	B	2.50-3.00		
3.0										
	End of Trial Pit at 3.30m		3.30	79.69						

Groundwater Conditions

Stability
Good

General Remarks



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T04 TP01
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 587,648.10 E
747,681.57 N

DATE STARTED 20/11/2020
DATE COMPLETED 20/11/2020

CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 72.83

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly gravelly CLAY. Gravel is fine to medium, subrounded to subangular.									
	Soft light yellowish brown sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse, rounded to subrounded.		0.20	72.63						
	Loose grey slightly gravelly SAND. Sand is medium to coarse. Gravel is medium to coarse, rounded to subrounded.		0.50	72.33						
	Firm light yellowish brown slightly sandy very gravelly CLAY with medium to high cobble content and occasional boulder. Sand is medium to coarse. Gravel is medium to coarse, rounded to subrounded.		0.80	72.03		145078	B	0.90-1.20		
1.0										
2.0										
3.0										
	End of Trial Pit at 3.20m		3.50	69.33						

Groundwater Conditions

Stability
Good

General Remarks



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T04 TP02	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 587,692.75 E 747,675.56 N		DATE STARTED 20/11/2020	
GROUND LEVEL (m) 70.87		DATE COMPLETED 20/11/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to medium. Gravel is fine to medium, subrounded to subangular.		0.20	70.67		140077	B	0.50-0.80		
	Soft brown very sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to medium, subrounded to angular.									
1.0						145077	B	1.50-2.00		
						140079	B	1.70-2.00		
2.0	Firm light yellowish brown slightly sandy very gravelly CLAY with medium to high cobble content and occasional boulder. Sand is medium to coarse. Gravel is medium to coarse, rounded to subrounded.		1.80	69.07						
						140078	B	2.80-3.20		
3.0										
	End of Trial Pit at 3.20m		3.50	67.37						

Groundwater Conditions

Stability Good

General Remarks



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T05 TP01	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 585,732.23 E 747,889.50 N		DATE STARTED 24/11/2020	
GROUND LEVEL (m) 90.37		DATE COMPLETED 24/11/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown gravelly CLAY. Gravel is fine to medium, subrounded to subangular Medium dense light brownish grey slightly clayey sandy GRAVEL with medium to high cobble content and some boulders. Sand is medium to coarse. Gravel is fine to coarse, subrounded to angular.		0.10	90.27		140087	B	0.50-0.80		
1.0	End of Trial Pit at 1.20m		1.20	89.17						
2.0										
3.0										

Groundwater Conditions

Stability Good

General Remarks Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T05 TP02	
		SHEET Sheet 1 of 1	
LOGGED BY JC	CO-ORDINATES 585,774.15 E 747,887.80 N	DATE STARTED 24/11/2020	
		DATE COMPLETED 24/11/2020	
CLIENT Energia	GROUND LEVEL (m) 91.04	EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown gravelly CLAY with low to medium cobble content. Gravel is fine to medium, subrounded to subangular.		0.20	90.84		145086	B	0.50-0.80		
	Medium dense light brownish grey slightly clayey sandy GRAVEL with medium to high cobble content and some boulders. Sand is medium to coarse. Gravel is fine to coarse, subrounded to angular.									
1.0			1.20	89.84						
	End of Trial Pit at 1.20m									
2.0										
3.0										

Groundwater Conditions	
Stability Good	
General Remarks Refusal due to large boulders	



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO.
SHEETT06 TP01
Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 586,437.53 E
747,722.61 NDATE STARTED 24/11/2020
DATE COMPLETED 24/11/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 86.09

EXCAVATION
METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown gravelly CLAY. Gravel is fine to medium, subrounded to subangular.									
	Medium dense grey very sandy GRAVEL with medium to high cobble content and many boulders. Sand is medium to coarse. Gravel is fine to coarse, subrounded to angular.		0.20	85.89		145087	B	0.50-0.80		
1.0										
	End of Trial Pit at 1.30m		1.30	84.79						
2.0										
3.0										

Groundwater Conditions

Stability
GoodGeneral Remarks
Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO.
SHEETT06 TP02
Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 586,450.92 E
747,790.42 NDATE STARTED 24/11/2020
DATE COMPLETED 24/11/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 89.29

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown gravelly CLAY. Gravel is fine to medium, subrounded to subangular.									
	Soft brown sandy gravelly CLAY with medium cobble content and occasional boulder. Sand is medium to coarse. Gravel is fine to coarse, surrounded to very angular.		0.20	89.09		140088	B	0.40-0.60		
	Medium dense grey very sandy GRAVEL with medium to high cobble content and many boulders. Sand is medium to coarse. Gravel is fine to coarse, subrounded to angular.		0.60	88.69						
1.0										
						145088	B	1.50-2.00		
2.0										
	End of Trial Pit at 2.10m		2.10	87.19						
3.0										

Groundwater Conditions

Stability
GoodGeneral Remarks
Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T07 TP01	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 586,523.28 E 747,406.73 N		DATE STARTED 20/11/2020	
GROUND LEVEL (m) 72.62		DATE COMPLETED 20/11/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Brown slightly gravelly CLAY. Gravel is fine to medium, subrounded to subangular.		0.30	72.32		145080	B	0.50-0.80		
	Soft light yellowish brown sandy very gravelly CLAY with medium to high cobble content and some boulders. Sand is fine to coarse. Gravel is fine to medium, subrounded to angular.		0.90	71.72		140080	B	1.40-1.70		
1.0	Medium dense brownish grey very gravelly SAND with high cobble content and some boulders. Sand is fine to coarse. Gravel is fine to coarse, surrounded to subangular.		1.70	70.92						
	End of Trial Pit at 1.70m									
2.0										
3.0										

Groundwater Conditions
Stability Good
General Remarks Rock



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO.
SHEETT07 TP02
Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 586,526.30 E
747,450.71 NDATE STARTED 20/11/2020
DATE COMPLETED 20/11/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 73.12

EXCAVATION
METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Brown slightly gravelly CLAY. Gravel is fine to medium, subrounded to subangular.		0.30	72.82		140081	B	0.80-1.20		
	Dense brownish grey very gravelly SAND with medium to high cobble content and some to many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.									
1.0			1.20	71.92						
	End of Trial Pit at 1.20m									
2.0										
3.0										

Groundwater Conditions

Stability
GoodGeneral Remarks
Rock



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T08 TP02	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 587,596.17 E 743,018.99 N		DATE STARTED 02/12/2020	
GROUND LEVEL (m) 71.91		DATE COMPLETED 02/12/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content and some boulders. Gravel is fine to coarse, subrounded to subangular.		0.20	71.71		149656	B	0.50-0.90		
	Medium dense to dense greyish brown sandy clayey GRAVEL with high cobble content and many boulders. Sand is fine to medium. Gravel is fine to coarse, subangular to very angular.									
1.0	End of Trial Pit at 0.90m		0.90	71.01						
2.0										
3.0										

Groundwater Conditions										
Stability Good										
General Remarks Refusal due to large boulders										



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T10 TP01
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 588,281.51 E
742,438.49 N

DATE STARTED 01/12/2020
DATE COMPLETED 01/12/2020

CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 99.53

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.30	99.23						
	Medium dense grey very sandy GRAVEL with medium to high cobble content and some to many boulders. Sand is fine to coarse. Gravel is fine to coarse, subangular to angular.					144653	B	0.50-0.80		
1.0						149653	B	1.50-1.80		
2.0						144654	B	2.50-2.80		
3.0										
	End of Trial Pit at 3.70m		3.70	95.83						

Groundwater Conditions

Stability
Good

General Remarks
Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T10 TP02	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 588,274.83 E 742,475.84 N		DATE STARTED 01/12/2020	
GROUND LEVEL (m) 98.99		DATE COMPLETED 01/12/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.20	98.79		149654	B	0.50-0.80		
1.0	Medium dense grey very sandy GRAVEL with medium to high cobble content and some to many boulders. Sand is fine to coarse. Gravel is fine to coarse, subangular to angular.					144655	B	1.50-1.80		
2.0						149655	B	2.50-2.80		
3.0										
	End of Trial Pit at 3.50m		3.50	95.49						

Groundwater Conditions

Stability Good

General Remarks Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO.
SHEETT11 TP01
Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 587,874.20 E
743,590.07 NDATE STARTED 30/11/2020
DATE COMPLETED 30/11/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 73.29

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.20	73.09						
	Medium dense grey slightly clayey sandy GRAVEL with medium to high cobble content and some to many boulders. Sand is medium to coarse. Gravel is fine to coarse, subrounded to angular.					170966	B	0.50		
1.0						170967	B	1.00		
	End of Trial Pit at 1.40m		1.40	71.89						
2.0										
3.0										

Groundwater Conditions

Stability
GoodGeneral Remarks
Rock



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T12 TP01	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 588,355.23 E 743,467.46 N		DATE STARTED 27/11/2020	
GROUND LEVEL (m) 88.64		DATE COMPLETED 27/11/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content and some boulders. Sand is fine. Gravel is fine to coarse, subrounded to subangular.									
	Medium dense grey very sandy GRAVEL with medium to high cobble content and many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.		0.40	88.24		145098	B	0.50-0.80		
1.0										
						140099	B	1.50-1.80		
2.0										
	End of Trial Pit at 2.40m		2.40	86.24						
3.0										

Groundwater Conditions
Stability Good
General Remarks Rock



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T12 TP02	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 588,360.77 E 743,419.55 N		DATE STARTED 27/11/2020	
GROUND LEVEL (m) 92.03		DATE COMPLETED 27/11/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content and some boulders. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular.		0.40	91.63		145097	B	0.50-0.80		
1.0	Medium dense grey very sandy GRAVEL with medium to high cobble content and many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.									
2.0	Medium dense light brownish grey slightly clayey sandy GRAVEL with medium to high cobble content and some boulders. Sand is medium to coarse. Gravel is fine to coarse, subrounded to angular.		1.70	90.33		140098	B	2.00-2.30		
	End of Trial Pit at 2.60m		2.60	89.43						
3.0										

Groundwater Conditions
Stability Good
General Remarks Rock



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T13 TP01
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 588,166.88 E
742,964.11 NDATE STARTED 30/11/2020
DATE COMPLETED 30/11/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 80.13

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content and some boulders. Sand is fine to medium. Gravel is fine to medium, subrounded to subangular.		0.20	79.93		145099	B	0.30-0.50		
	Soft light brown slightly sandy gravelly CLAY with medium cobble content and some boulders. Sand is fine to medium. Gravel is fine to medium, subrounded to subangular.		0.50	79.63						
	Medium dense grey very sandy GRAVEL with medium to high cobble content and some boulders. Sand is medium to coarse. Gravel is fine to coarse, subangular to angular.									
1.0										
2.0						140100	B	1.50-2.00		
	End of Trial Pit at 2.20m		2.20	77.93						
3.0										

Groundwater Conditions

Stability
GoodGeneral Remarks
Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T13 TP02	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 588,135.57 E 742,999.12 N		DATE STARTED 30/11/2020	
GROUND LEVEL (m) 79.33		DATE COMPLETED 30/11/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy GRAVEL with medium cobble content and some boulders. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.30	79.03		149651	B	0.50-0.80		
	Loose greyish yellow slightly gravelly clayey SAND. Sand is fine to medium. Gravel fine to medium, subrounded to angular.		0.90	78.43						
1.0	Medium dense greyish brown very sandy GRAVEL with medium to high cobble content and some boulders. Sand is fine to coarse. Gravel is fine to coarse, subangular to angular.					144651	B	1.50-1.80		
2.0										
						144652	B	2.50-2.70		
	End of Trial Pit at 2.70m		2.70	76.63						
3.0										

Groundwater Conditions										
Stability Good										
General Remarks Refusal due to large boulders										



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T14 TP01
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 588,819.10 E
743,747.10 NDATE STARTED 26/11/2020
DATE COMPLETED 26/11/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 85.60

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content and some boulders. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular.									
	Loose light brown sandy clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.		0.60	85.00						
	Lense of loose yellow gravelly SAND with medium to high cobble content. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.80	84.80		145095	B	0.80-1.00		
1.0	Medium dense light brown sandy clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.		1.00	84.60						
	End of Trial Pit at 1.70m		1.70	83.90		140096	B	1.50-1.80		
2.0										
3.0										

Groundwater Conditions

Stability
GoodGeneral Remarks
Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T14 TP02	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 588,811.24 E 743,793.19 N		DATE STARTED 26/11/2020	
GROUND LEVEL (m) 83.71		DATE COMPLETED 26/11/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
					Sample Ref	Type	Depth		
0.0 TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content and some boulders. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular.		0.30	83.41						
Dense grey slightly clayey very sandy GRAVEL with high cobble content and many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to angular.					145096	B	0.50-0.80		
					140097	B	1.50-1.80		
2.0 End of Trial Pit at 2.10m		2.10	81.61						
3.0									

Groundwater Conditions
Stability Good
General Remarks Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T15 TP01
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 588,852.35 E
744,170.74 NDATE STARTED 26/11/2020
DATE COMPLETED 26/11/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 72.32

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content and occasional boulders. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.30	72.02		145094	B	0.50-0.80		
	Loose yellow slightly clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, subrounded to angular.		0.40	71.92						
	Medium dense to dense grey slightly clayey very sandy GRAVEL with medium to high cobble content and some boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to angular.									
1.0										
2.0						140094	B	1.50-1.80		
						140095	B	2.00-2.20		
	End of Trial Pit at 2.20m		2.20	70.12						
3.0										

Groundwater Conditions

Stability
GoodGeneral Remarks
Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T15 TP02
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 588,804.14 E
744,176.77 NDATE STARTED 26/11/2020
DATE COMPLETED 26/11/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 71.90

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content and occasional boulders. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.									
	Loose yellow clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.		0.50	71.40		145092	B	0.50-0.90		
	Medium dense to dense grey slightly clayey very sandy GRAVEL with medium to high cobble content and some boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.		0.90	71.00						
1.0						145093	B	1.50-1.80		
2.0						140093	B	2.50-2.80		
3.0	End of Trial Pit at 3.00m		3.00	68.90						

Groundwater Conditions

Stability
GoodGeneral Remarks
Possible Rockhead



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T16 TP01	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 589,385.41 E 744,495.87 N		DATE STARTED 25/11/2020	
GROUND LEVEL (m) 77.84		DATE COMPLETED 25/11/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown gravelly CLAY with medium cobble content. Gravel is fine to medium, subrounded to subangular.		0.30	77.54						
	Medium dense to dense grey slightly clayey very sandy GRAVEL with medium to high cobble content and some boulders. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular.					145090	B	0.50-0.80		
1.0										
						140091	B	1.50-1.80		
2.0										
	End of Trial Pit at 1.80m		2.50	75.34						
3.0										

Groundwater Conditions

Stability Good

General Remarks Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T16 TP02	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 589,419.30 E 744,462.78 N		DATE STARTED 25/11/2020	
GROUND LEVEL (m) 77.66		DATE COMPLETED 25/11/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown gravelly CLAY. Gravel is fine to medium, subrounded to subangular.		0.20	77.46						
	Medium dense to dense grey slightly clayey very sandy GRAVEL with medium to high cobble content and some boulders. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular.					170968	B	0.50-0.80		
1.0										
						170969	B	1.40-1.60		
	End of Trial Pit at 1.60m		1.60	76.06						
2.0										
3.0										

Groundwater Conditions										
Stability Good										
General Remarks Refusal due to large boulders										



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T17 TP02
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 589,674.51 E
744,127.05 NDATE STARTED 02/12/2020
DATE COMPLETED 02/12/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 88.87

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content and some boulders. Gravel is fine to coarse, subrounded to subangular.		0.20	88.67		149657	B	0.50-0.80		
1.0	Medium dense to dense grey slightly clayey very sandy GRAVEL with high cobble content and many boulders. Sand is fine to coarse. Gravel is fine to coarse, subangular to very angular.					144657	B	1.50-2.00		
2.0										
2.60	End of Trial Pit at 2.60m		2.60	86.27						
3.0										

Groundwater Conditions

Stability
GoodGeneral Remarks
Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T18 TP01
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 590,536.15 E
744,144.73 NDATE STARTED 03/12/2020
DATE COMPLETED 03/12/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 87.24

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium to high cobble content and some to many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular. Medium dense light greyish brown clayey very sandy GRAVEL with high cobble content and many boulders. Sand is fine to coarse. Gravel is fine to coarse, subangular to angular.		0.20	87.04		144660	B	0.50-0.80		
1.0						149660	B	1.50-1.80		
2.0						144661	B	2.50-2.80		
3.0	End of Trial Pit at 3.00m		3.00	84.24						

Groundwater Conditions

Stability
GoodGeneral Remarks
Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T18 TP02	
LOGGED BY JC		SHEET Sheet 1 of 1	
CLIENT Energia		DATE STARTED 03/12/2020	
ENGINEER Malachy Walsh and Partners		DATE COMPLETED 03/12/2020	
CO-ORDINATES 590,537.51 E 744,188.61 N		EXCAVATION METHOD Tracked digger	
GROUND LEVEL (m) 89.24			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium to high cobble content and some to many boulders. Sand is fine to coarse Gravel is fine to coarse, subrounded to subangular.		0.30	88.94		144659	B	0.50-0.80		
1.0	Medium dense to dense greyish brown clayey very sandy GRAVEL with high cobble content and many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to angular.					149659	B	1.50-1.80		
2.0	End of Trial Pit at 1.80m		1.80	87.44						
3.0										

Groundwater Conditions

Stability Good

General Remarks Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T19 TP01	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 590,474.41 E 744,621.34 N		DATE STARTED 03/12/2020	
GROUND LEVEL (m) 109.13		DATE COMPLETED 03/12/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content and some boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.		0.20	108.93		149661	B	0.50-0.80		
1.0	Medium dense light brownish cream clayey very sandy GRAVEL with high cobble content and some to many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.					144662	B	1.50-1.80		
2.0						149662	B	2.50-3.00		
3.0	End of Trial Pit at 3.00m		3.00	106.13						

Groundwater Conditions

Stability Good

General Remarks Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. T19 TP02	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 590,430.94 E 744,641.94 N		DATE STARTED 03/12/2020	
GROUND LEVEL (m) 107.53		DATE COMPLETED 03/12/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium cobble content and occasional boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.		0.20	107.33		144663	B	0.50-0.80		
1.0	Medium dense light brown clayey sandy GRAVEL with high cobble content and some to many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to angular.					144664	B	1.50-1.80		
2.0						149663	B	2.20-2.50		
	End of Trial Pit at 2.50m		2.50	105.03						
3.0										

Groundwater Conditions

Stability Good

General Remarks Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT	Seven Hills Wind Farm
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TRIAL PIT NO. **T20 TP01**
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES	591,173.25 E 744,393.81 N
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DATE STARTED	10/12/2020
DATE COMPLETED	10/12/2020

CLIENT	Energia
ENGINEER	Malachy Walsh and Partners

GROUND LEVEL (m)	94.09
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EXCAVATION METHOD	Tracked digger
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Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
					Sample Ref	Type	Depth		
<p>0.0</p> <p>TOPSOIL: Brown slightly sandy gravelly CLAY with medium to high cobble content and occasional boulders. Sand is fine to medium. Gravel is fine to medium, subrounded to subangular.</p> <p>Medium dense light brown sandy clayey GRAVEL with high cobble content and some to many boulders. Sand is medium to coarse. Gravel is fine to coarse, subrounded to subangular.</p> <p>1.0</p> <p>2.0</p> <p>3.0</p>		0.20	93.89		149674	B	0.50-0.80		
					144675	B	1.50-1.80		
					149675	B	2.80-3.20		
End of Trial Pit at 3.30m		3.50	90.59						

Groundwater Conditions

Stability Good

General Remarks	
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GSL TP LOG 23000.GPJ IGSL.GDT 23/3/21



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T20 TP02
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 591,192.64 E
744,349.28 NDATE STARTED 10/12/2020
DATE COMPLETED 10/12/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 94.30

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium to high cobble content and occasional boulders. Sand is fine to medium. Gravel is fine to medium, subrounded to angular.		0.20	94.10						
	Medium dense light greyish brown sandy clayey GRAVEL with high cobble content and many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.					149673	B	0.50-0.80		
1.0						144673	B	1.50-1.80		
2.0						144674	B	2.80-3.20		
3.0	End of Trial Pit at 3.20m		3.20	91.10						

Groundwater Conditions

Stability
Good

General Remarks



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T21 TP01
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 591,428.83 E
744,137.09 NDATE STARTED 08/11/2020
DATE COMPLETED 08/11/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 88.83

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium to high cobble content and occasional boulders. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular.		0.30	88.53						
	Medium dense light brown sandy clayey GRAVEL with medium to high cobble content and some to many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to angular.					149671	B	0.50-0.80		
1.0						144672	B	1.50-1.80		
2.0						149672	B	2.50-3.00		
3.0										
	End of Trial Pit at 3.50m		3.50	85.33						

Groundwater Conditions

Stability
Good

General Remarks



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO. T21 TP02
SHEET Sheet 1 of 1

LOGGED BY JC

CO-ORDINATES 591,418.43 E
744,088.28 NDATE STARTED 08/11/2020
DATE COMPLETED 08/11/2020CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 90.37

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY with medium to high cobble content and occasional boulders. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular.		0.30	90.07						
	Medium dense light brown sandy clayey GRAVEL with medium to high cobble content and many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to angular.					149670	B	0.50-0.80		
1.0						144670	B	1.50-1.80		
2.0						144671	B	2.50-3.00		
3.0										
	End of Trial Pit at 3.10m		3.50	86.87						

Groundwater Conditions

Stability
Good

General Remarks



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

TRIAL PIT NO.

MAST TP01

LOGGED BY JC

CO-ORDINATES 585,600.00 E
747,971.98 N

SHEET Sheet 1 of 1

DATE STARTED 25/11/2020
DATE COMPLETED 25/11/2020

CLIENT Energia
ENGINEER Malachy Walsh and Partners

GROUND LEVEL (m) 91.83

EXCAVATION METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown gravelly CLAY with low to medium cobble content and occasional boulder. Gravel is fine to medium, subrounded to subangular.		0.30	91.53		140089	B	0.40-0.60		
	Brown gravelly CLAY with medium to high cobble content and some to many boulders. Gravel is fine to medium, subrounded to angular.		0.60	91.23						
1.0	Medium dense brown slightly clayey gravelly SAND with medium cobble content and some boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.					145089	B	1.70-2.00		
2.0	End of Trial Pit at 2.00m		2.00	89.83						
3.0										

Groundwater Conditions

Stability
Good

General Remarks
Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. MAST TP02	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 585,615.04 E 747,964.42 N		DATE STARTED 25/11/2020	
GROUND LEVEL (m) 91.42		DATE COMPLETED 25/11/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown gravelly CLAY. Gravel is fine to medium, subrounded to subangular.									
	Medium dense greyish brown slightly clayey very sandy GRAVEL with high cobble content and some boulders. Gravel is fine to medium, subrounded to angular.		0.30	91.12		140090	B	0.50-0.80		
	End of Trial Pit at 0.80m		0.80	90.62						
1.0										
2.0										
3.0										

Groundwater Conditions

Stability Good

General Remarks Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm		TRIAL PIT NO. Substation TP01	
LOGGED BY JC		SHEET Sheet 1 of 1	
CO-ORDINATES 590,922.20 E 744,749.52 N		DATE STARTED 07/12/2020	
GROUND LEVEL (m) 91.87		DATE COMPLETED 07/12/2020	
CLIENT Energia		EXCAVATION METHOD Tracked digger	
ENGINEER Malachy Walsh and Partners			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.									
	Medium dense light greyish brown clayey very sandy GRAVEL with medium to high cobble content and many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.		0.30	91.57		144667	B	0.50-1.00		
1.0										
						149667	B	1.50-1.80		
2.0										
						144668	B	2.20-2.50		
	End of Trial Pit at 2.50m		2.50	89.37						
3.0										

Groundwater Conditions

Stability
Good

General Remarks
Refusal due to large boulders



TRIAL PIT RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm**TRIAL PIT NO.**
SHEET**Substation TP02**

Sheet 1 of 1

LOGGED BY JC**CO-ORDINATES** 590,962.88 E
744,753.65 N**DATE STARTED** 07/12/2020**DATE COMPLETED** 07/12/2020**CLIENT** Energia
ENGINEER Malachy Walsh and Partners**GROUND LEVEL (m)** 91.34**EXCAVATION**
METHOD Tracked digger

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse, subrounded to subangular.		0.40	90.94						
	Medium dense light brownish grey clayey very sandy GRAVEL with high cobble content and many boulders. Sand is fine to coarse. Gravel is fine to coarse, subrounded to subangular.					149668	B	0.50-1.00		
1.0										
						144669	B	1.50-1.80		
2.0			2.70	88.64		149669	B	2.20-2.50		
	End of Trial Pit at 2.70m									
3.0										

Groundwater Conditions**Stability**
Good**General Remarks**
Refusal due to large boulders

IGSL TP LOG 23000.GPJ IGSL GDT 23/3/21

T1 TP01 – 1 of 3



T1 TP01 – 2 of 3



T1 TP01 – 3 of 3



T1 TP02 – 1 of 1



T1 TP03 – 1 of 3



T1 TP03 – 2 of 3



T1 TP03 – 3 of 3



T1 TP04 – 1 of 3



T1 TP04 – 2 of 3



T1 TP04 – 3 of 3



T2 TP01 – 1 of 1



T2 TP02 – 1 of 3



T2 TP02 – 2 of 3



T2 TP02 – 3 of 3



T3 TP01 – 1 of 2



T3 TP01 – 2 of 2



T3 TP02 – 1 of 2



T3 TP02 – 2 of 2



T4 TP01 – 1 of 2



T4 TP01 – 2 of 2



T4 TP02 – 1 of 2



T4 TP02 – 2 of 2



T5 TP01 – 1 of 2



T5 TP01 – 2 of 2



T5 TP02 – 1 of 1



T6 TP01 – 1 of 2



T6 TP01 – 2 of 2



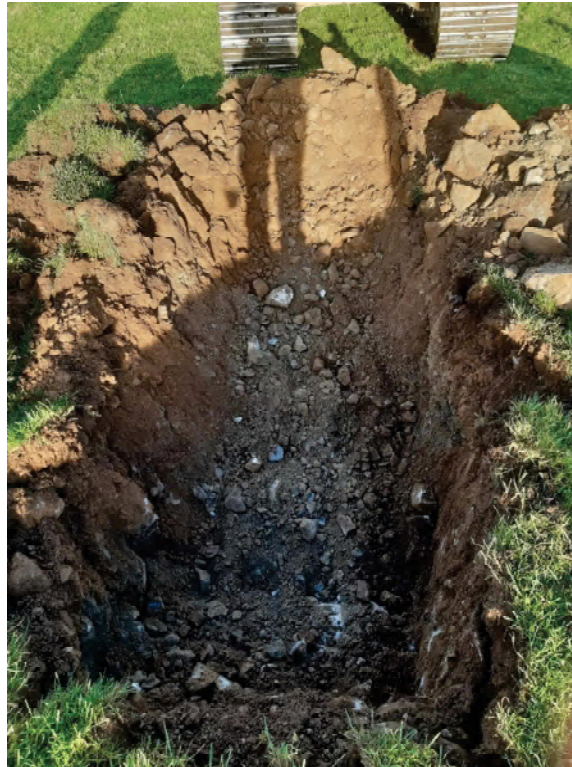
T6 TP02 – 1 of 2



T6 TP02 – 2 of 2



T8 TP01 – 1 of 2



T8 TP01 – 2 of 2



T8 TP02 – 1 of 2



T8 TP02 – 2 of 2



T10 TP01 – 1 of 2



T10 TP01 – 2 of 2



T10 TP02 – 1 of 1



T12 TP01 – 1 of 2



T12 TP01 – 2 of 2



T12 TP02 – 1 of 1



T13 TP01 – 1 of 2



T13 TP01 – 2 of 2



T13 TP02 – 1 of 2



T13 TP02 – 2 of 2



T14 TP01 – 1 of 3



T14 TP01 – 2 of 3



T14 TP01 – 3 of 3



T14 TP02 – 1 of 2



T14 TP02 – 2 of 2



T15 TP01 – 1 of 1



T15 TP02 – 1 of 2



T15 TP02 – 2 of 2



T16 TP01 – 1 of 2



T16 TP01 – 2 of 2



T16 TP02 – 1 of 2



T16 TP02 – 2 of 2



T17 TP01 – 1 of 2



T17 TP01 – 2 of 2



T17 TP02 – 1 of 2



T17 TP02 – 2 of 2



T18 TP01 – 1 of 2



T18 TP01 – 2 of 2



T18 TP02 – 1 of 2



T18 TP02 – 2 of 2



T19 TP01 – 1 of 2



T19 TP01 – 2 of 2



T19 TP02 – 1 of 2



T19 TP02 – 2 of 2



T20 TP01 – 1 of 2



T20 TP01 – 2 of 2



T21 TP01 – 1 of 2



T21 TP01 – 2 of 2



T21 TP02 – 1 of 2



T21 TP02 – 2 of 2



Mast TP01 – 1 of 2



Mast TP01 – 2 of 2



Mast TP02 – 1 of 1



Substation TP01 – 1 of 2



Substation TP01 – 2 of 2



Substation TP02 – 1 of 2



Substation TP02 – 2 of 2



Appendix 3

Dynamic Probe Records



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP01

SHEET Sheet 1 of 1

CO-ORDINATES 585,607.87 E
747,967.66 N

DATE DRILLED 03/12/2020

DATE LOGGED 03/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

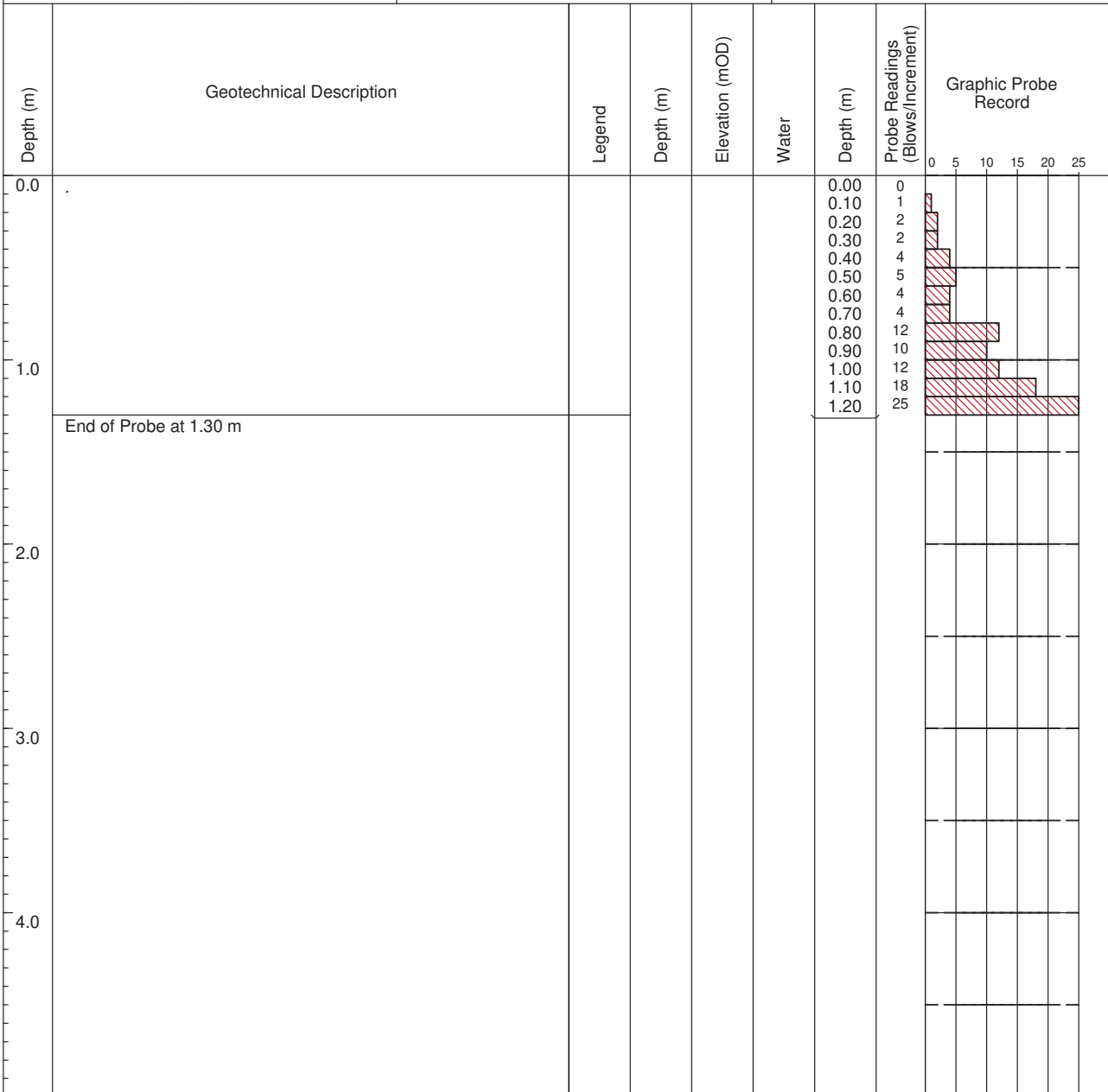
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO.

DP02

CO-ORDINATES 585,741.01 E
747,894.87 N

SHEET

Sheet 1 of 1

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

DATE DRILLED 03/12/2020

DATE LOGGED 03/12/2020

CLIENT Energia

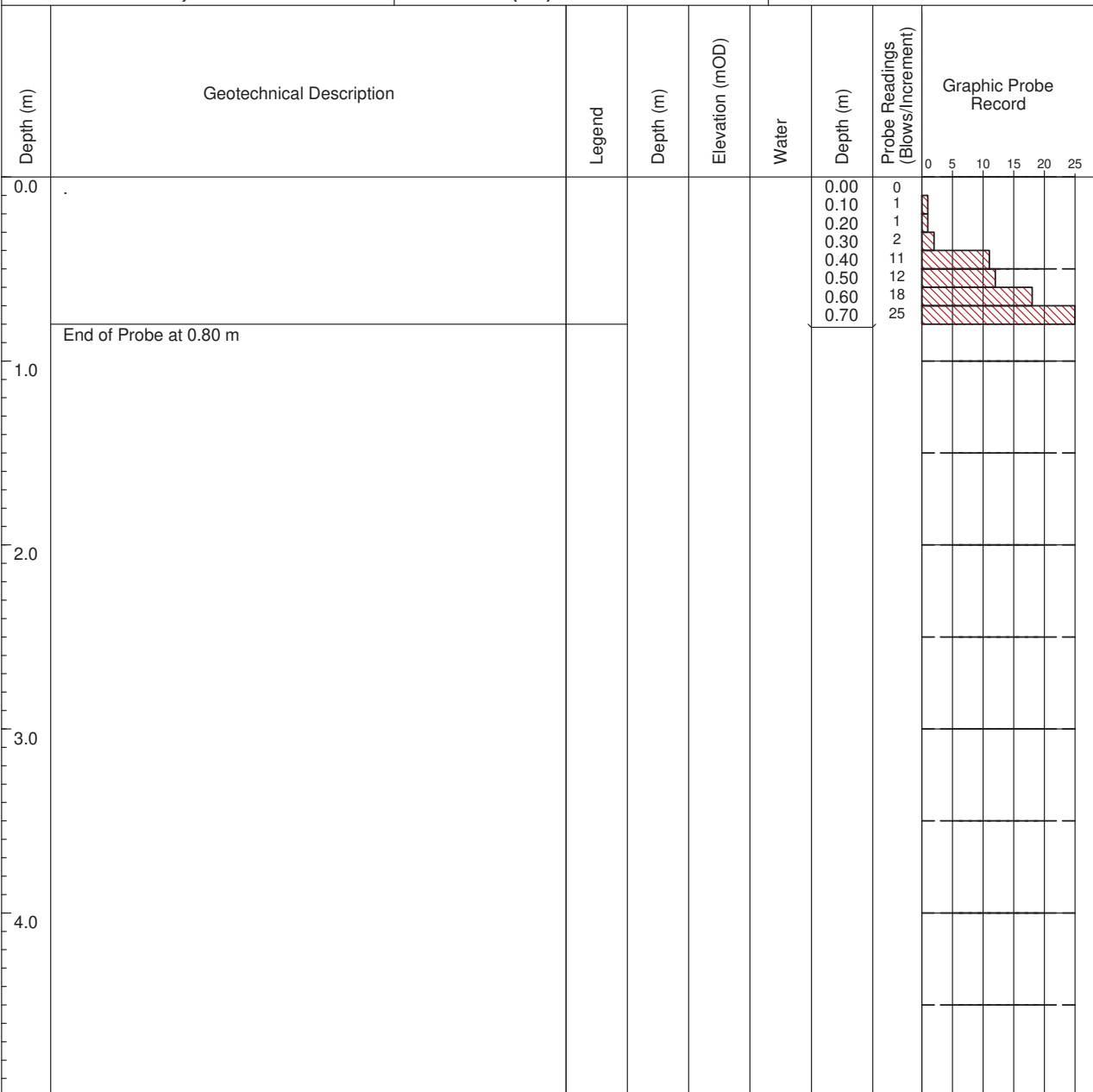
INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE

DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP03

SHEET Sheet 1 of 1

CO-ORDINATES 585,966.60 E
747,771.06 N

DATE DRILLED 03/12/2020

DATE LOGGED 03/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

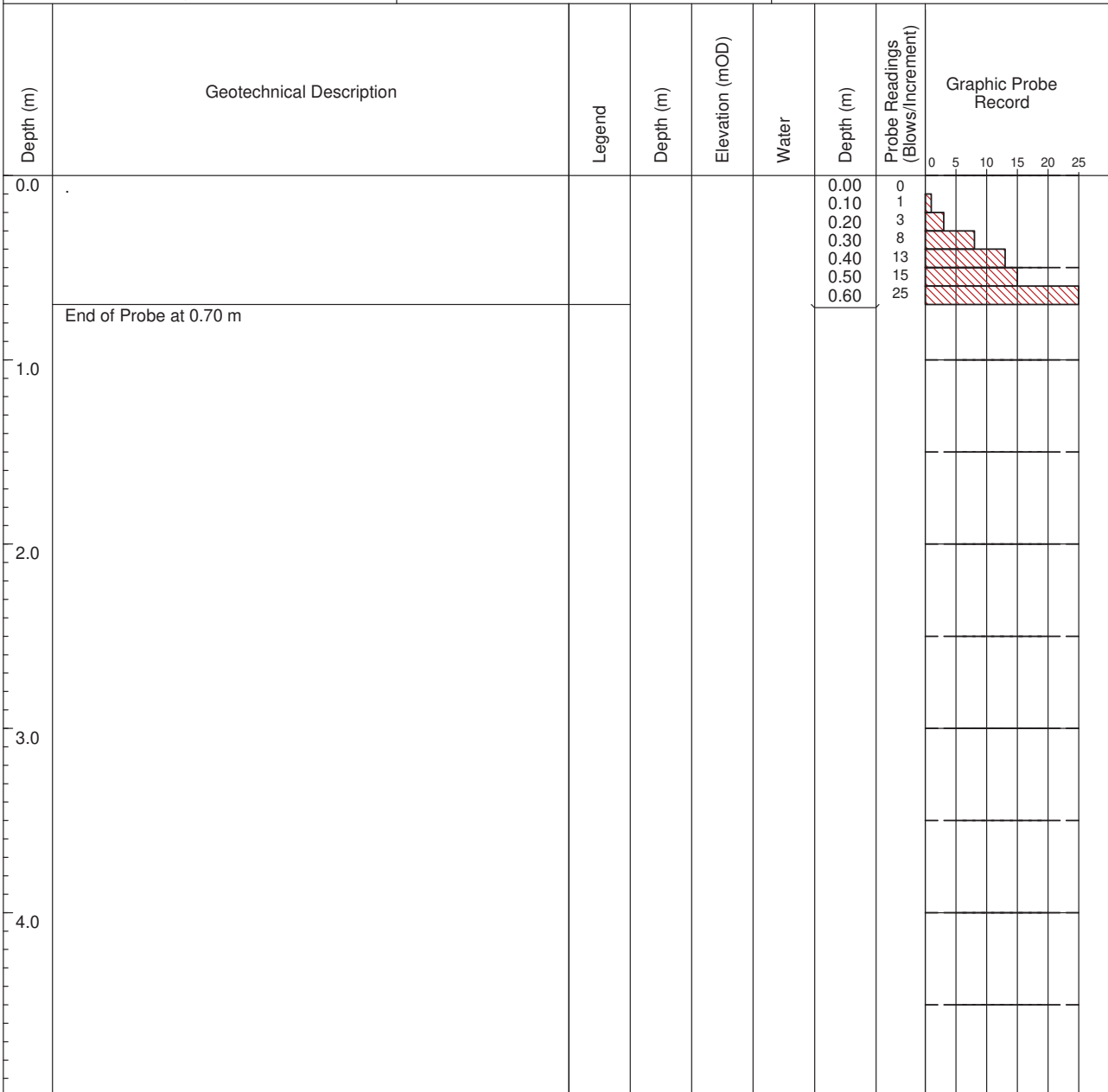
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP04

SHEET Sheet 1 of 1

CO-ORDINATES 586,212.71 E
747,835.55 N

DATE DRILLED 03/12/2020

DATE LOGGED 03/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

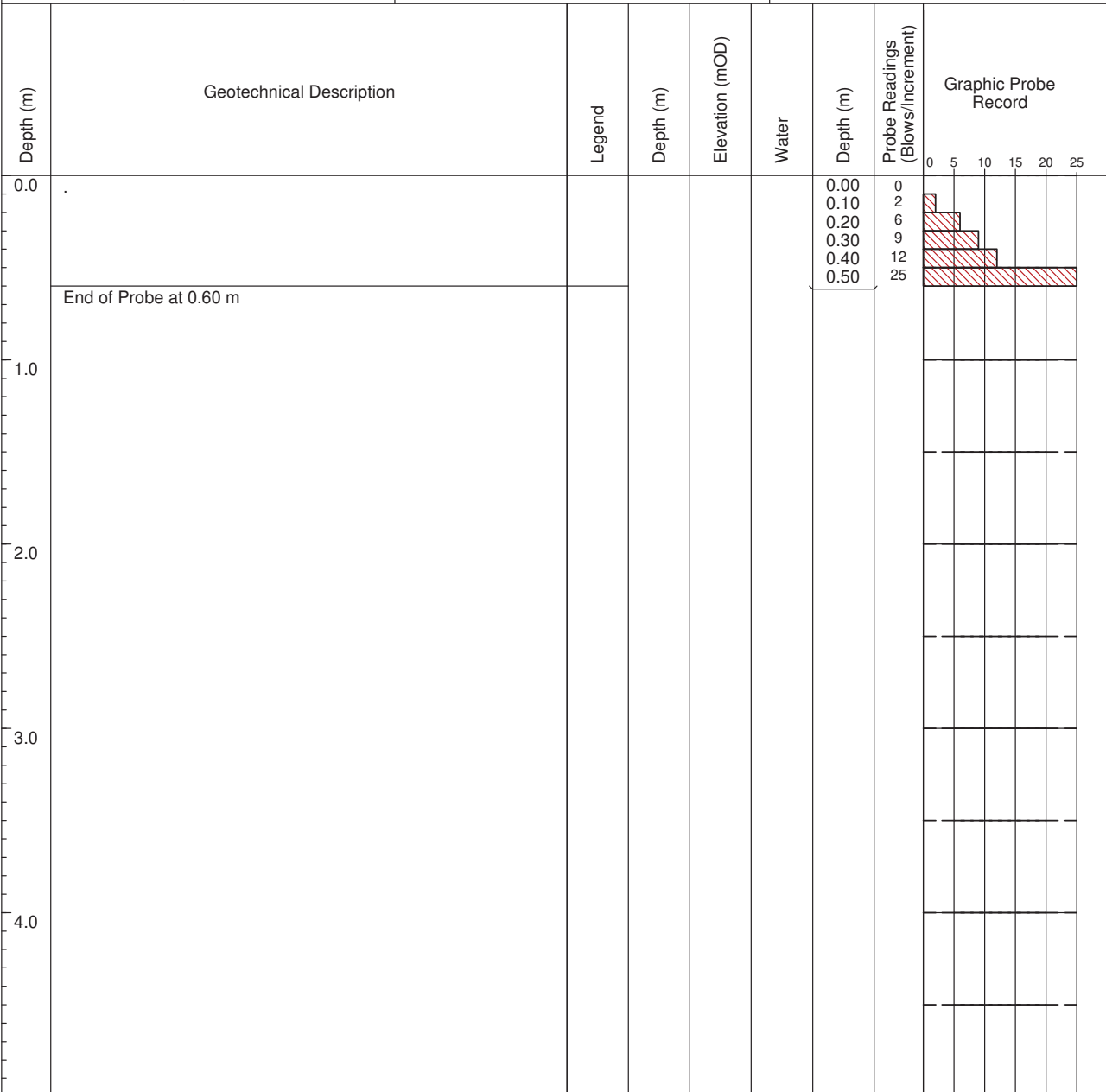
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP06

SHEET Sheet 1 of 1

CO-ORDINATES 586,336.28 E
748,179.52 N

DATE DRILLED 03/12/2020

DATE LOGGED 03/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

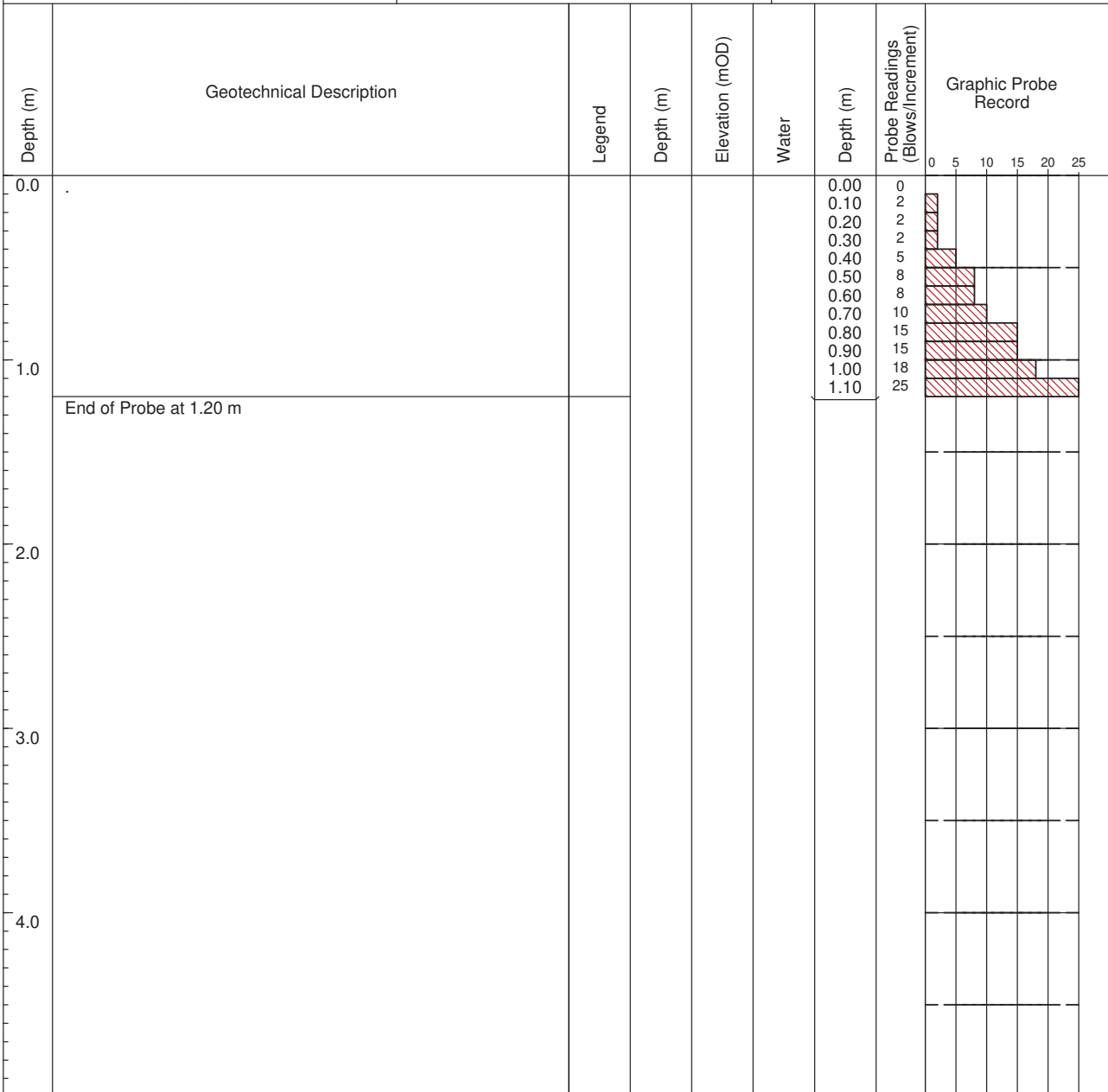
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO.

DP07

SHEET

Sheet 1 of 1

CO-ORDINATES 586,348.13 E
748,310.47 N

DATE DRILLED 03/12/2020

DATE LOGGED 03/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

CLIENT Energia

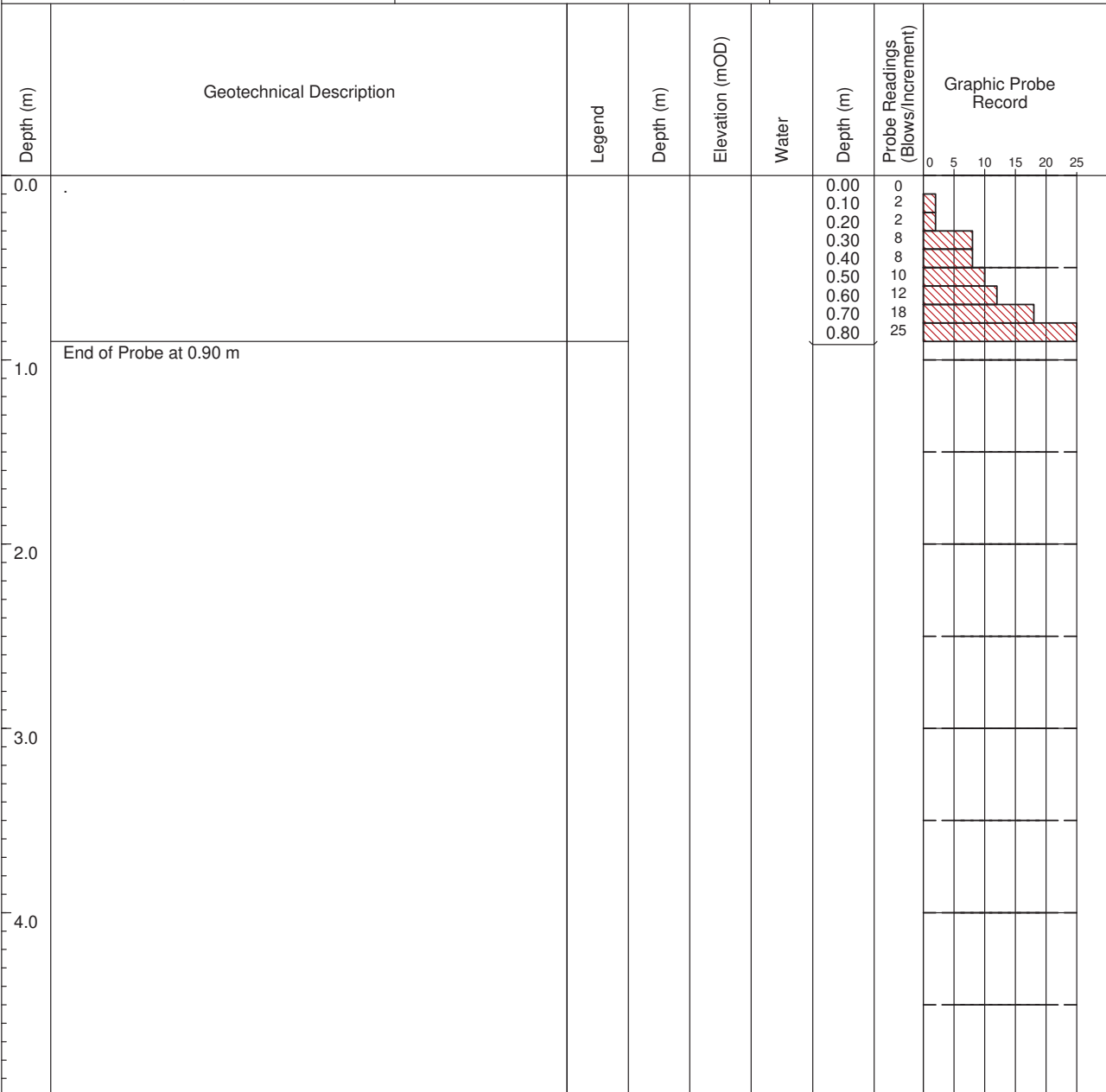
INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE

DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP08

SHEET Sheet 1 of 1

CO-ORDINATES 586,441.11 E
747,745.35 N

DATE DRILLED 03/12/2020

DATE LOGGED 03/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

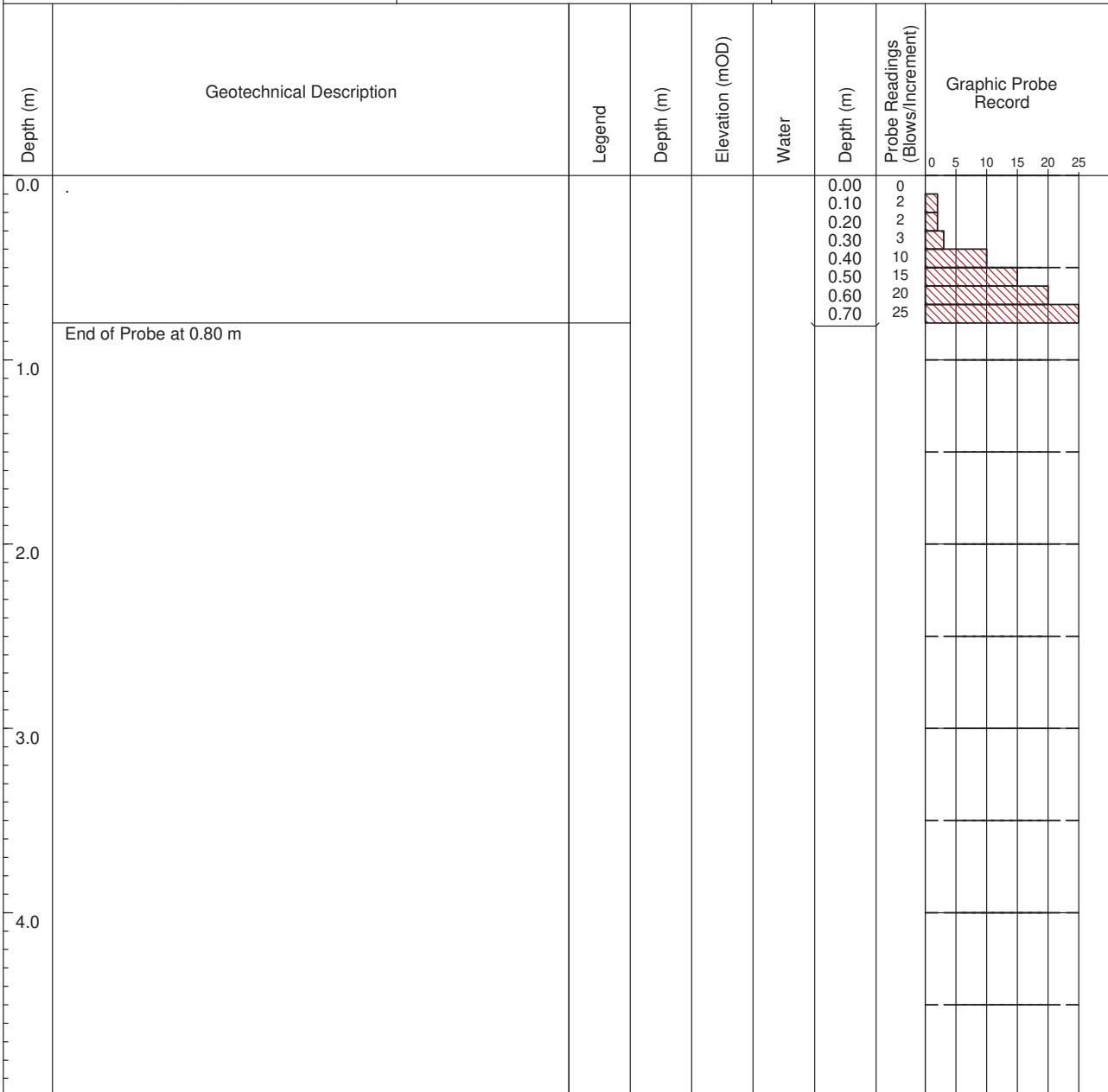
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP11

SHEET Sheet 1 of 1

CO-ORDINATES 586,604.89 E
747,880.97 N

DATE DRILLED 07/12/2020

DATE LOGGED 07/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

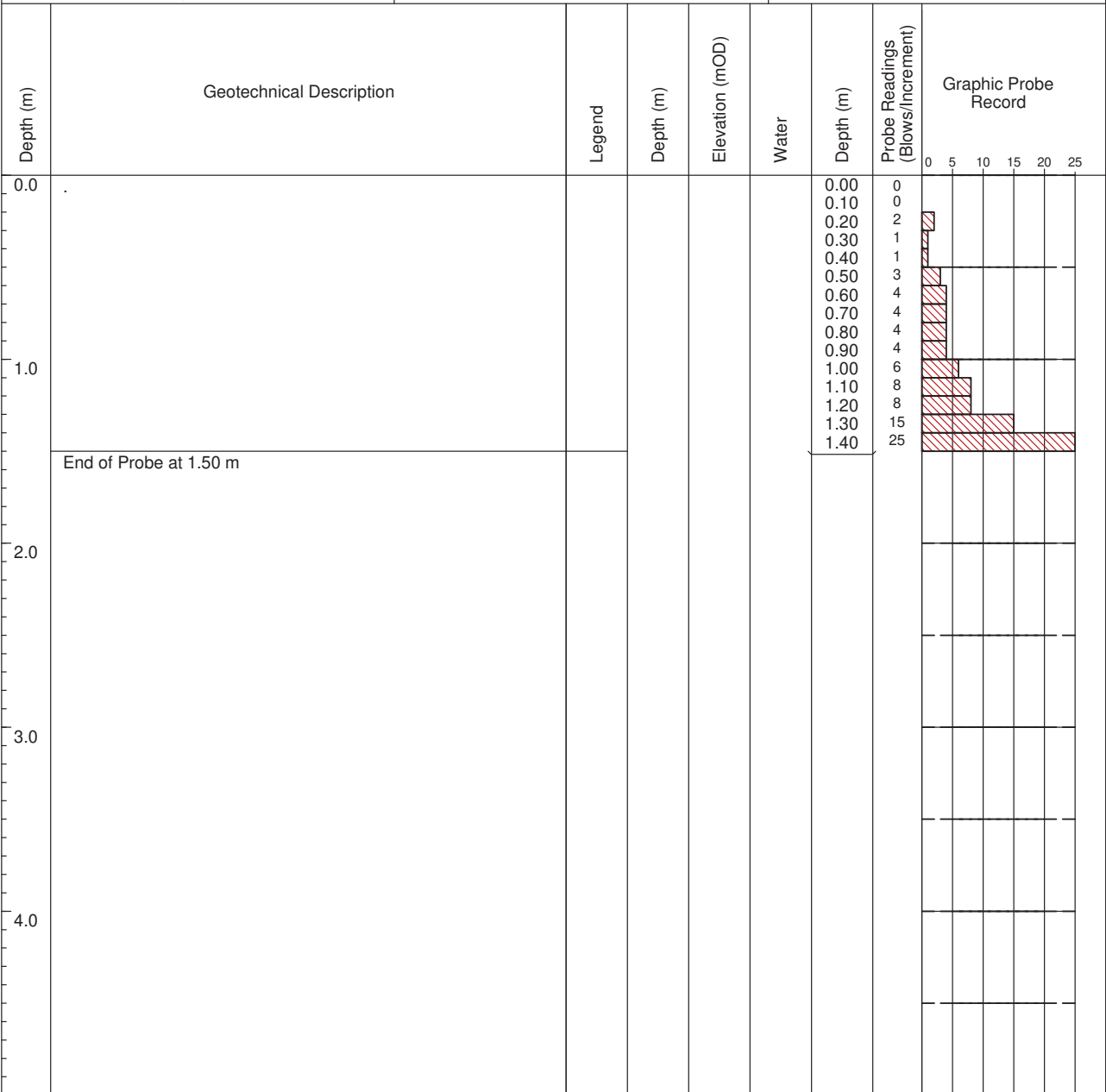
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP12

SHEET Sheet 1 of 1

CO-ORDINATES 586,842.02 E
747,971.38 N

DATE DRILLED 07/12/2020

DATE LOGGED 07/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

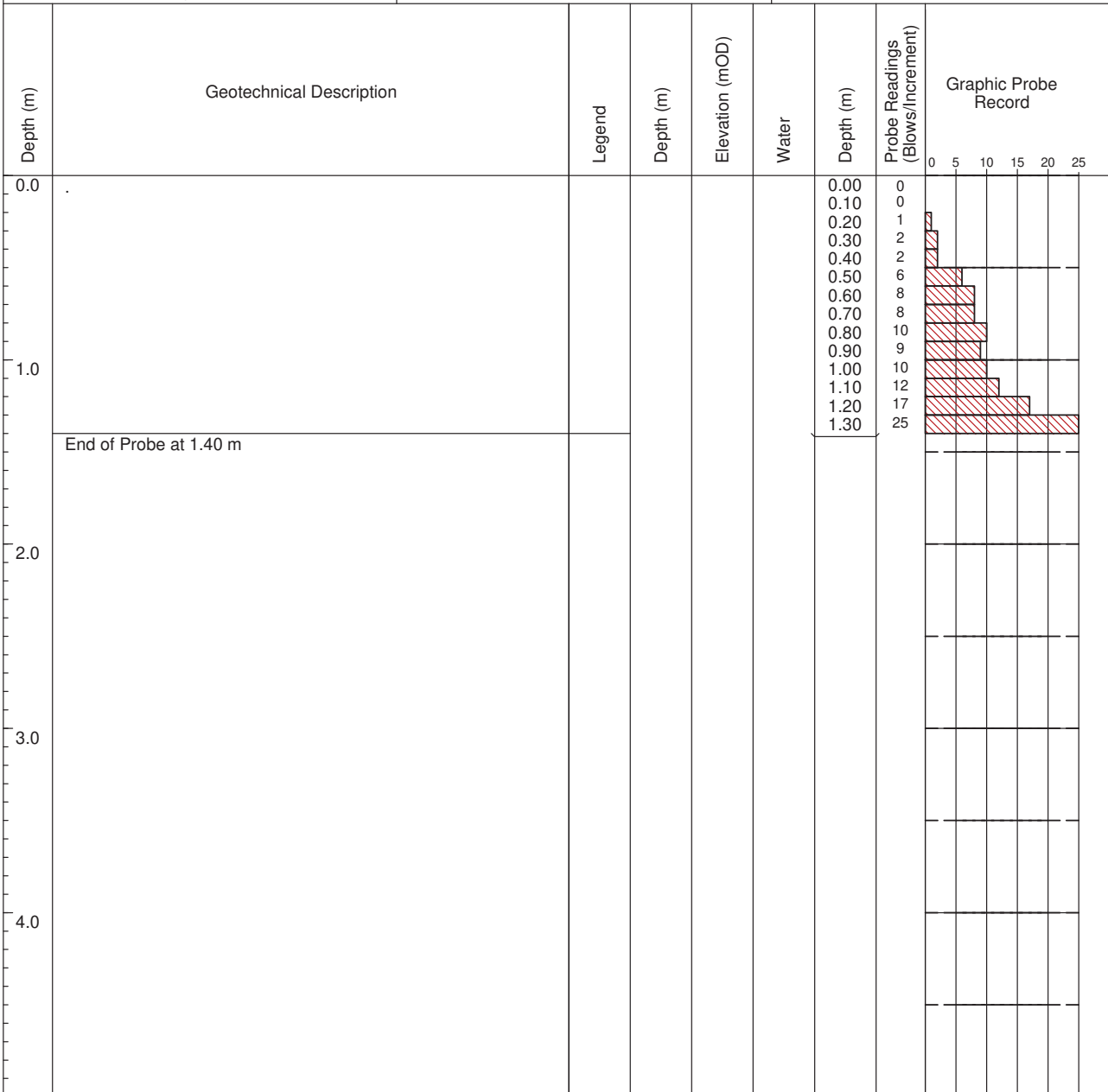
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP16

SHEET Sheet 1 of 1

CO-ORDINATES 587,544.50 E
747,866.09 N

DATE DRILLED 07/12/2020

DATE LOGGED 07/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

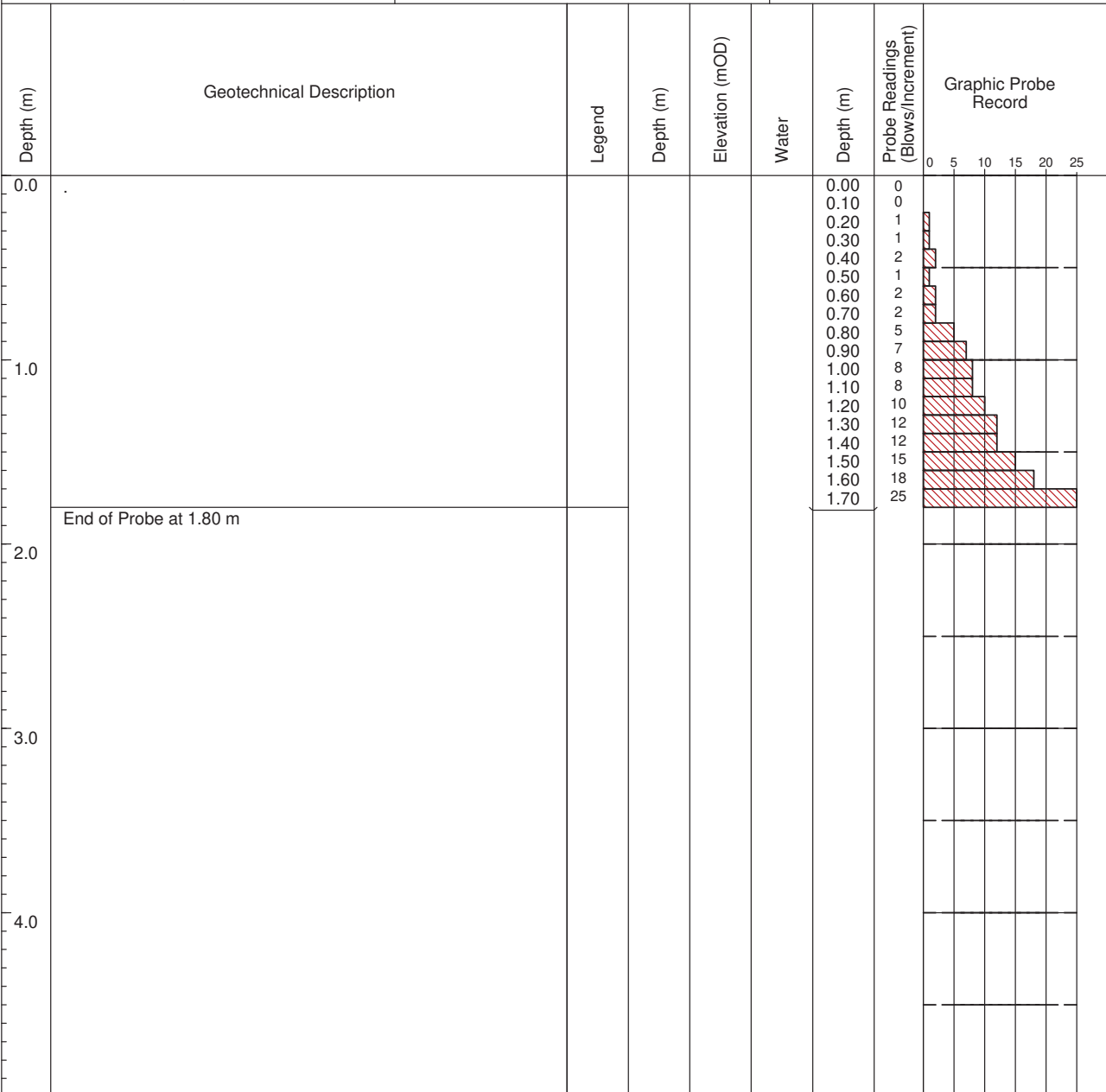
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO.

DP17

SHEET

Sheet 1 of 1

CO-ORDINATES 587,659.16 E
747,684.08 N

DATE DRILLED 07/12/2020

DATE LOGGED 07/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

CLIENT Energia

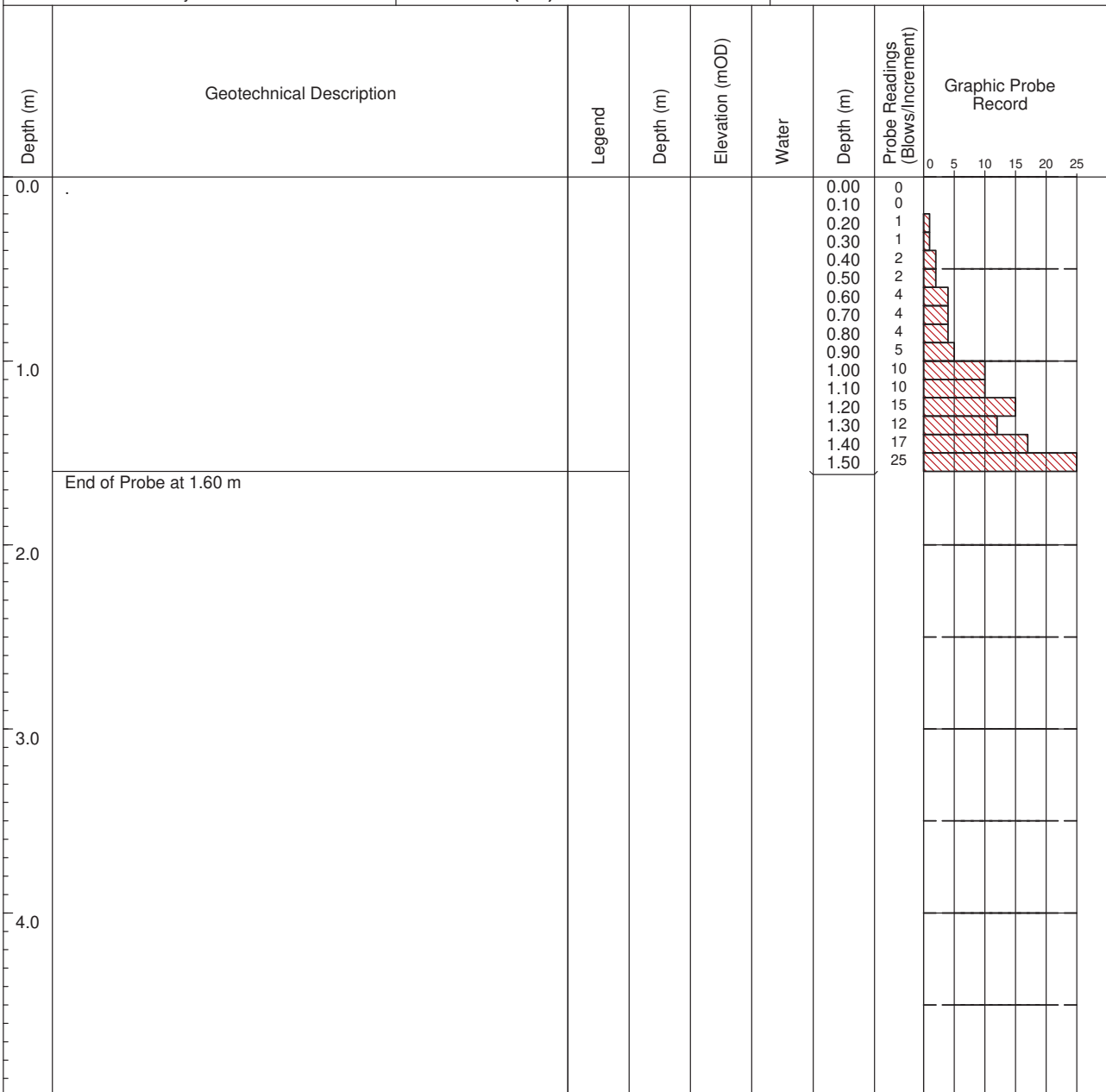
INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE

DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP18

SHEET Sheet 1 of 1

CO-ORDINATES 587,097.75 E
747,743.69 N

DATE DRILLED 01/12/2020

DATE LOGGED 01/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

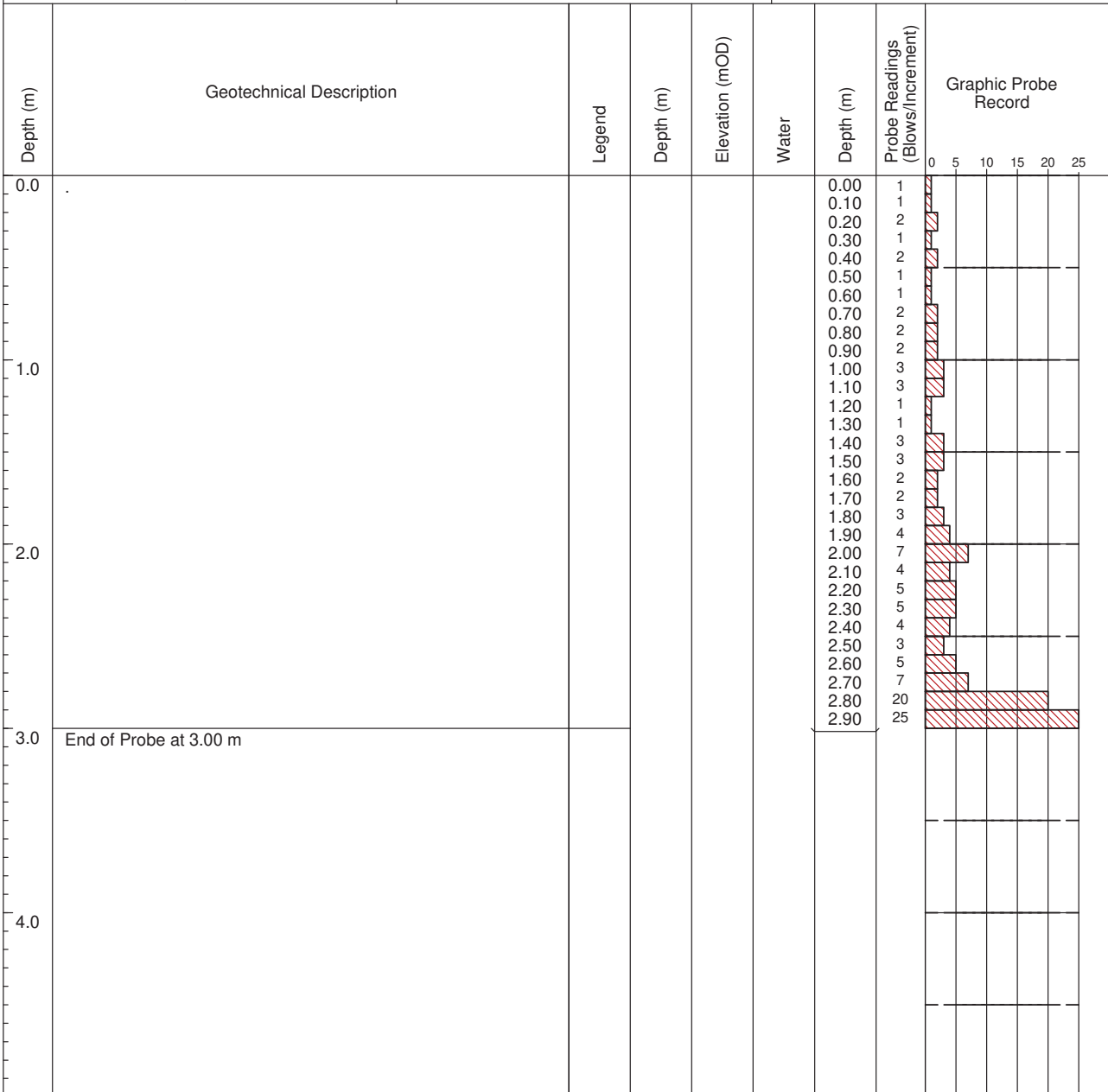
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS

Tower3



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP20

SHEET Sheet 1 of 1

CO-ORDINATES 587,100.51 E
747,622.11 N

DATE DRILLED 01/12/2020

DATE LOGGED 01/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

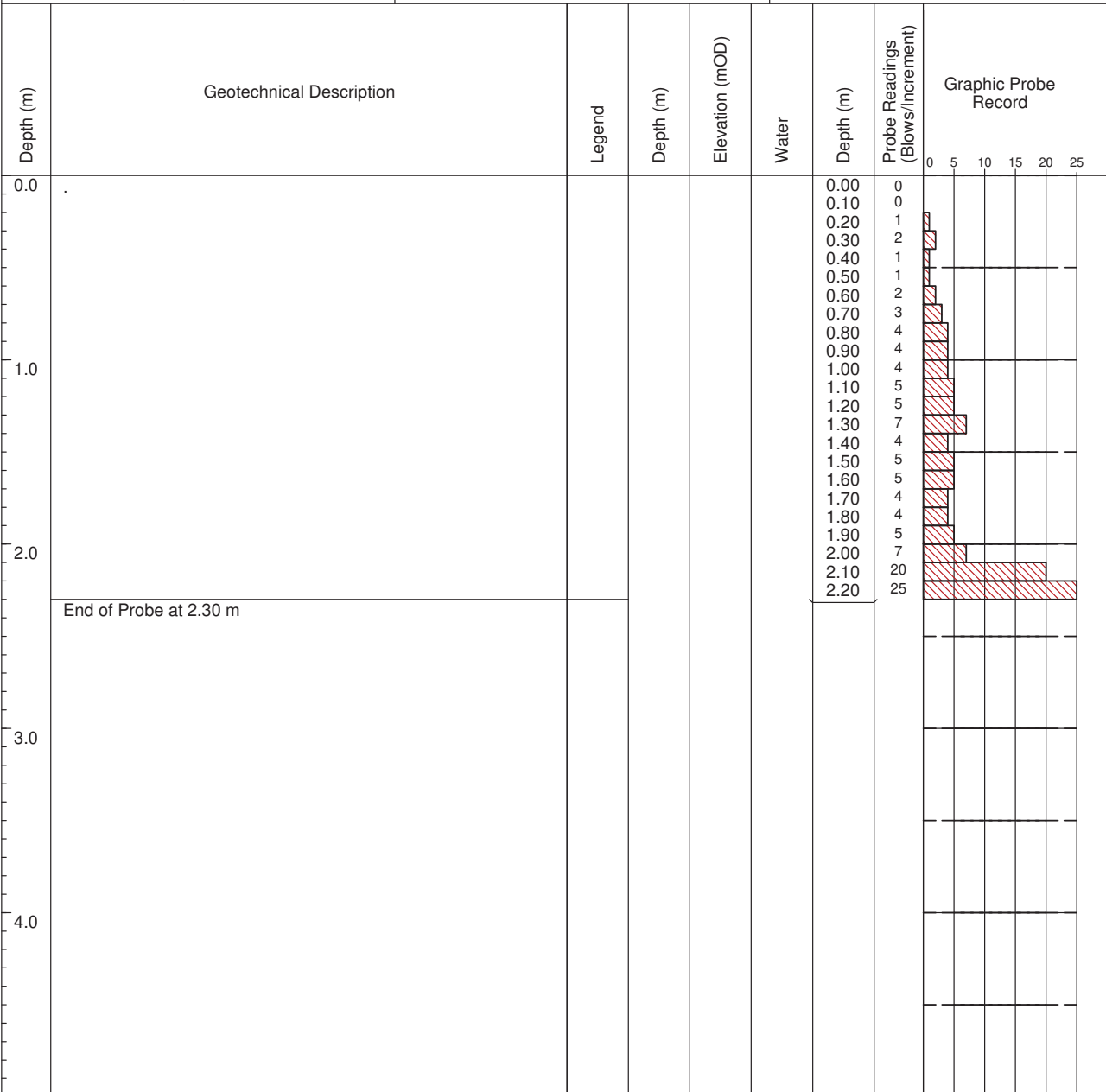
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP21

SHEET Sheet 1 of 1

CO-ORDINATES 587,323.00 E
747,495.82 N

DATE DRILLED 01/12/2020

DATE LOGGED 01/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

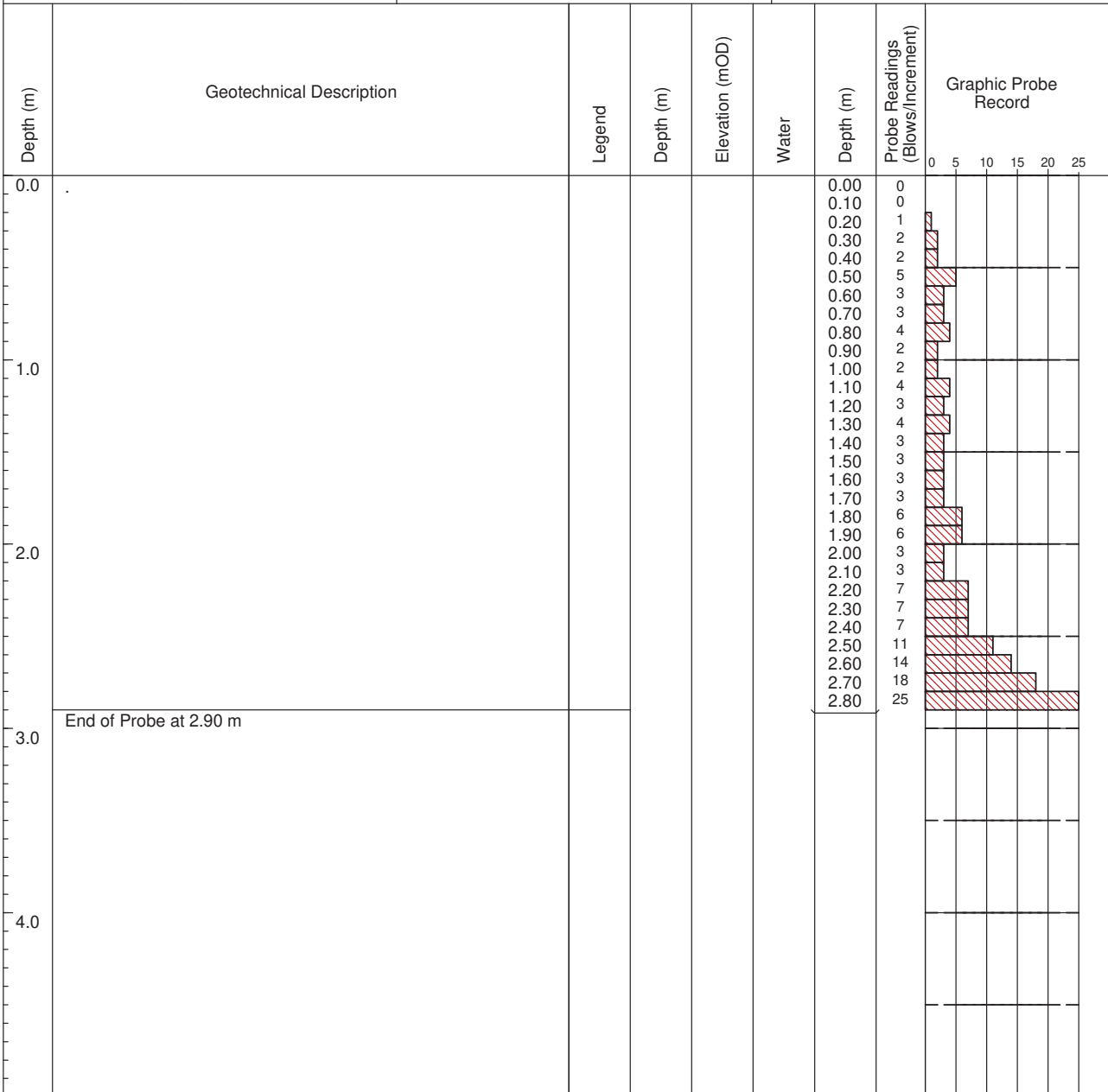
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP22

SHEET Sheet 1 of 1

CO-ORDINATES 587,408.87 E
747,256.57 N

DATE DRILLED 01/12/2020

DATE LOGGED 01/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

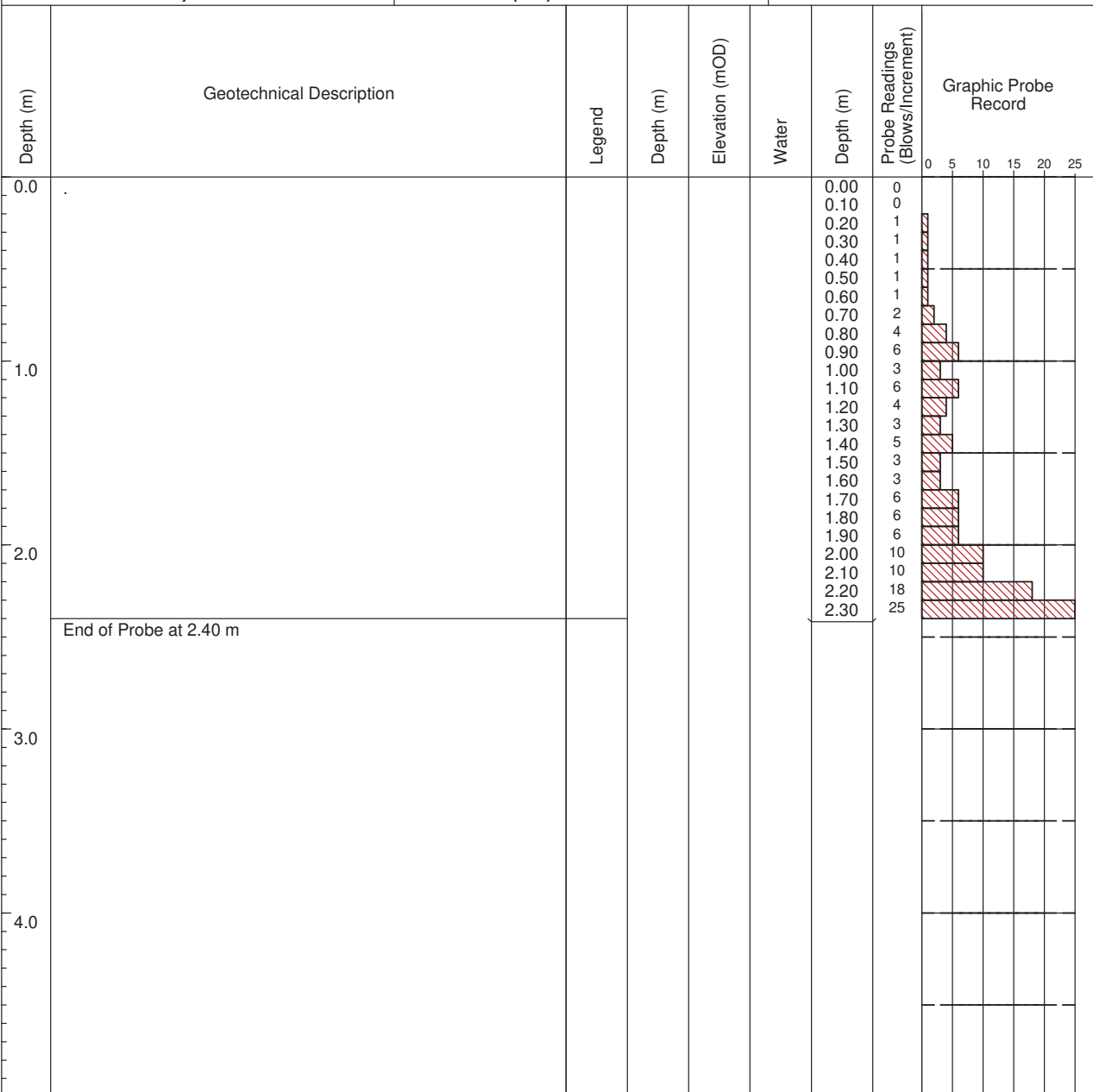
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP23

SHEET Sheet 1 of 1

CO-ORDINATES 587,585.59 E
743,010.27 N

DATE DRILLED 30/01/2021

DATE LOGGED 30/01/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

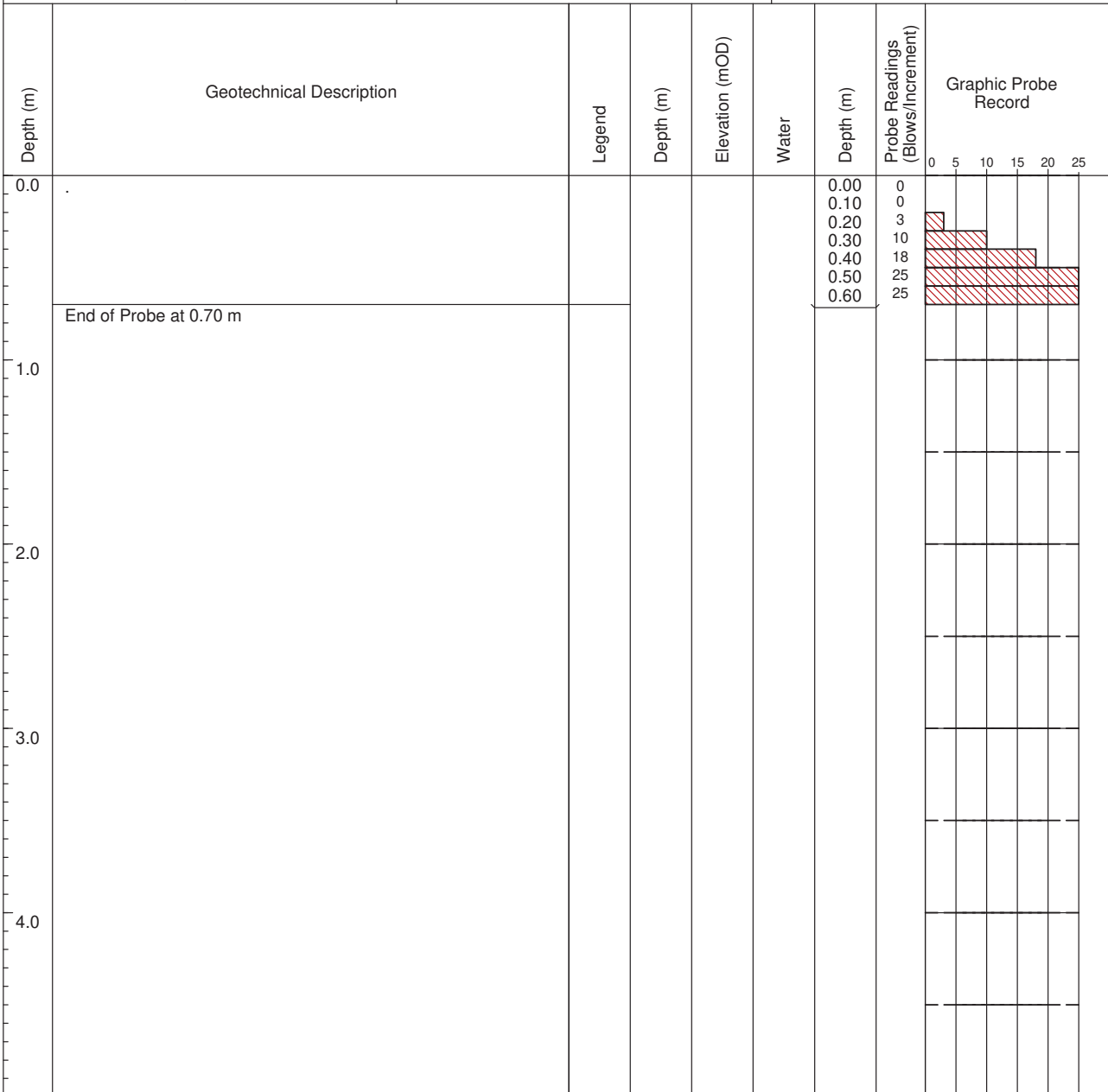
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP24

SHEET Sheet 1 of 1

CO-ORDINATES 587,848.44 E
742,981.65 N

DATE DRILLED 30/01/2021

DATE LOGGED 30/01/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0						0.00	0	
						0.10	0	
						0.20	18	
						0.30	10	
						0.40	25	
						0.50	25	
	End of Probe at 0.60 m							
1.0								
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP26

SHEET Sheet 1 of 1

CO-ORDINATES 588,234.27 E
742,734.60 N

DATE DRILLED 29/01/2021

DATE LOGGED 29/01/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

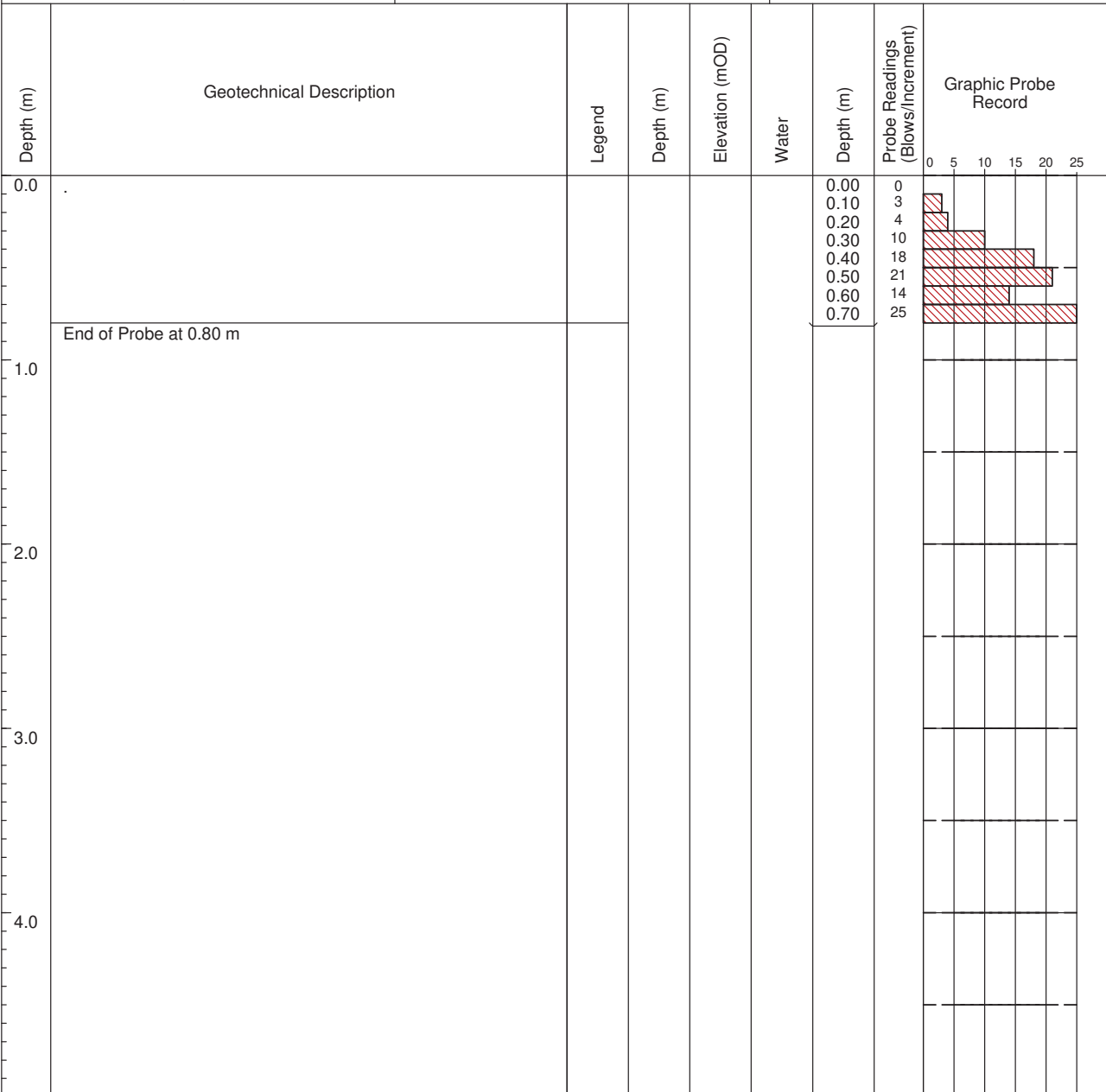
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm				PROBE NO. DP27	
CO-ORDINATES 588,150.70 E 742,993.90 N				SHEET Sheet 1 of 1	
GROUND LEVEL (mOD)				DATE DRILLED 29/01/2021	
CLIENT Energia				DATE LOGGED 29/01/2021	
ENGINEER Malachy Walsh and Partners				PROBE TYPE DPH	
HAMMER MASS (kg) 50					
INCREMENT SIZE (mm) 100					
FALL HEIGHT (mm) 500					

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0						0.00	0	
						0.10	0	
						0.20	7	
						0.30	12	
						0.40	16	
						0.50	22	
						0.60	25	
	End of Probe at 0.70 m							
1.0								
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm			PROBE NO. DP28
CO-ORDINATES 588,000.29 E 743,239.15 N			SHEET Sheet 1 of 1
GROUND LEVEL (mOD)			DATE DRILLED 30/01/2021
CLIENT Energia			DATE LOGGED 30/01/2021
ENGINEER Malachy Walsh and Partners			PROBE TYPE DPH
HAMMER MASS (kg) 50			
INCREMENT SIZE (mm) 100			
FALL HEIGHT (mm) 500			

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0						0.00	0	
						0.10	6	
						0.20	10	
						0.30	12	
						0.40	25	
	End of Probe at 0.50 m							
1.0								
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm			PROBE NO. DP29
CO-ORDINATES 587,910.43 E 743,417.95 N			SHEET Sheet 1 of 1
GROUND LEVEL (mOD)			DATE DRILLED 30/01/2021
CLIENT Energia			DATE LOGGED 30/01/2021
ENGINEER Malachy Walsh and Partners			PROBE TYPE DPH
HAMMER MASS (kg) 50			
INCREMENT SIZE (mm) 100			
FALL HEIGHT (mm) 500			

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0						0.00	0	
						0.10	2	
						0.20	7	
						0.30	9	
						0.40	10	
						0.50	16	
						0.60	23	
						0.70	25	
	End of Probe at 0.80 m							
1.0								
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP30

SHEET Sheet 1 of 1

CO-ORDINATES 587,888.27 E
743,597.80 N

DATE DRILLED 30/01/2021

DATE LOGGED 30/01/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

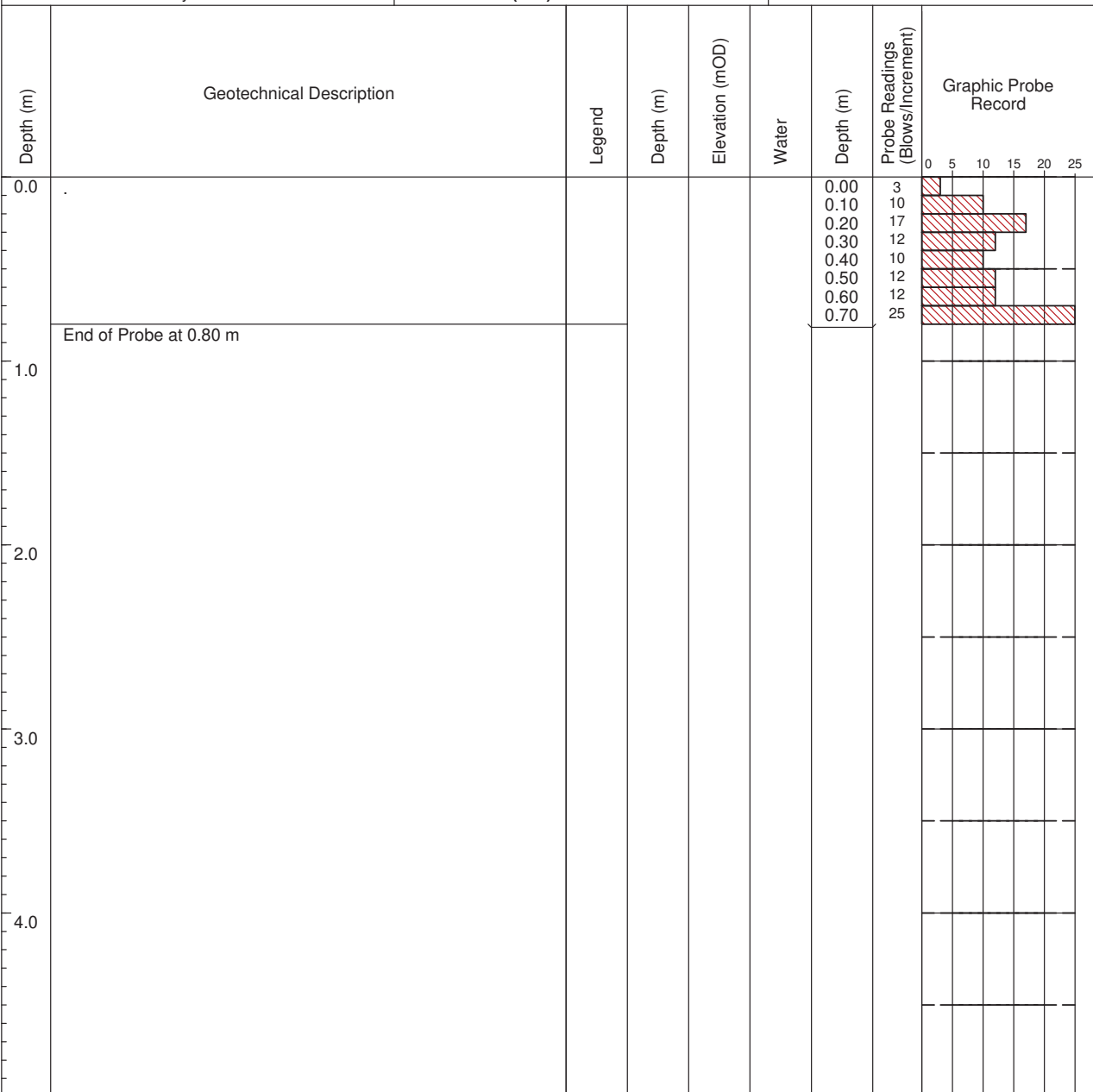
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP31

SHEET Sheet 1 of 1

CO-ORDINATES 588,200.87 E
743,334.53 N

DATE DRILLED 30/01/2021

DATE LOGGED 30/01/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

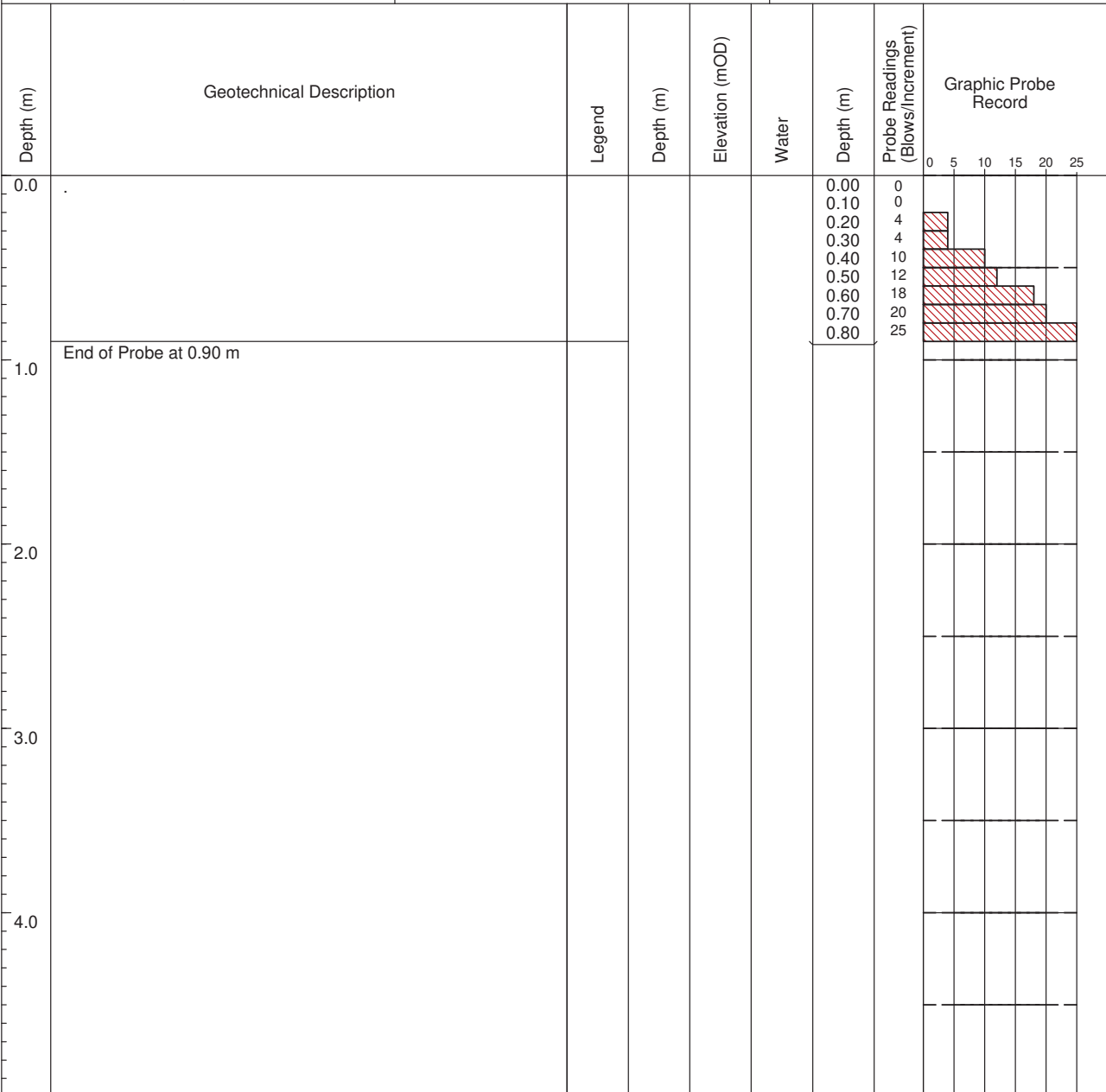
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH





DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP32

SHEET Sheet 1 of 1

CO-ORDINATES 588,367.54 E
743,433.88 N

DATE DRILLED 30/11/2020

DATE LOGGED 30/11/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

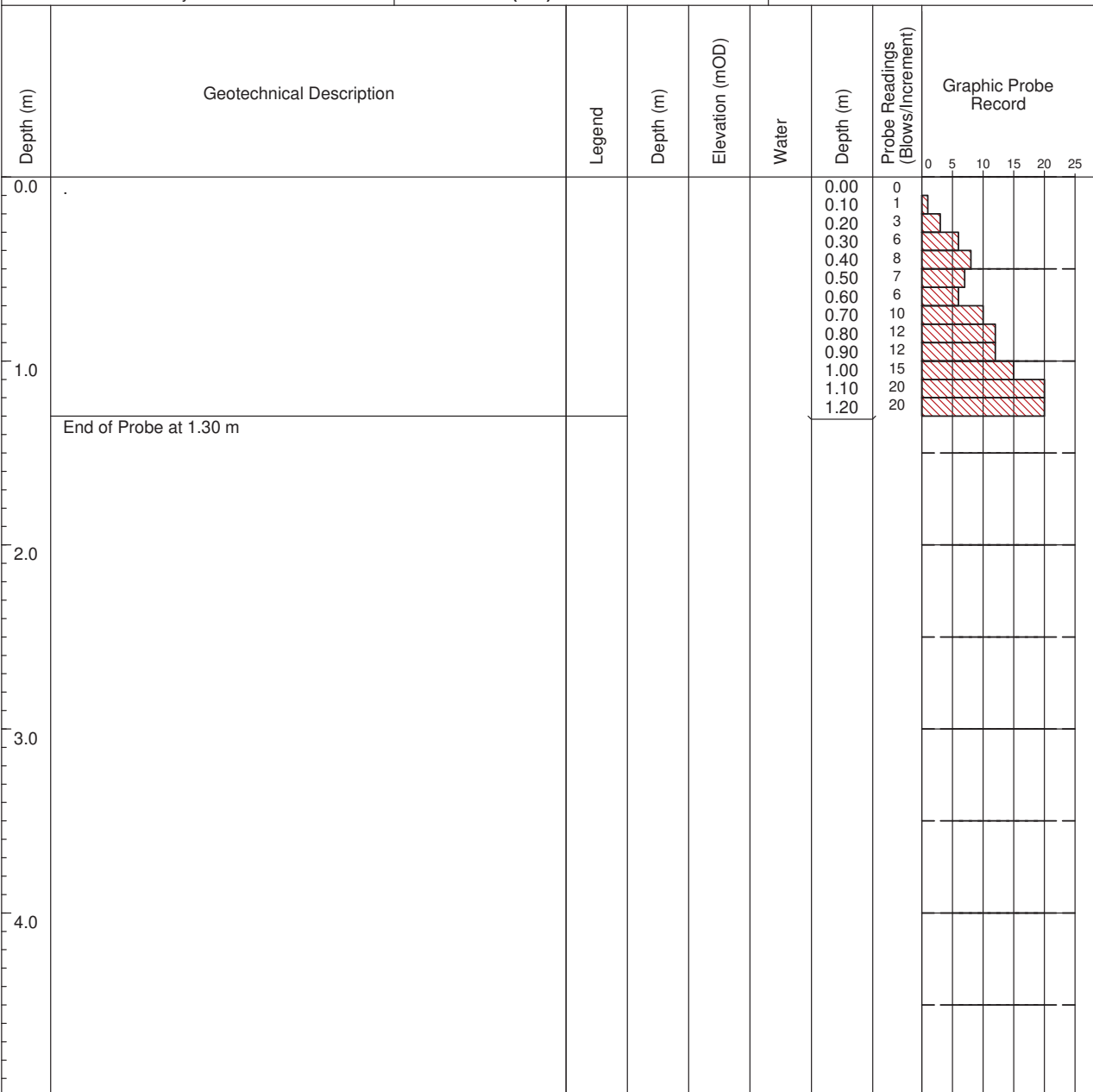
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP33

SHEET Sheet 1 of 1

CO-ORDINATES 588,445.84 E
743,268.32 N

DATE DRILLED 30/11/2020

DATE LOGGED 30/11/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

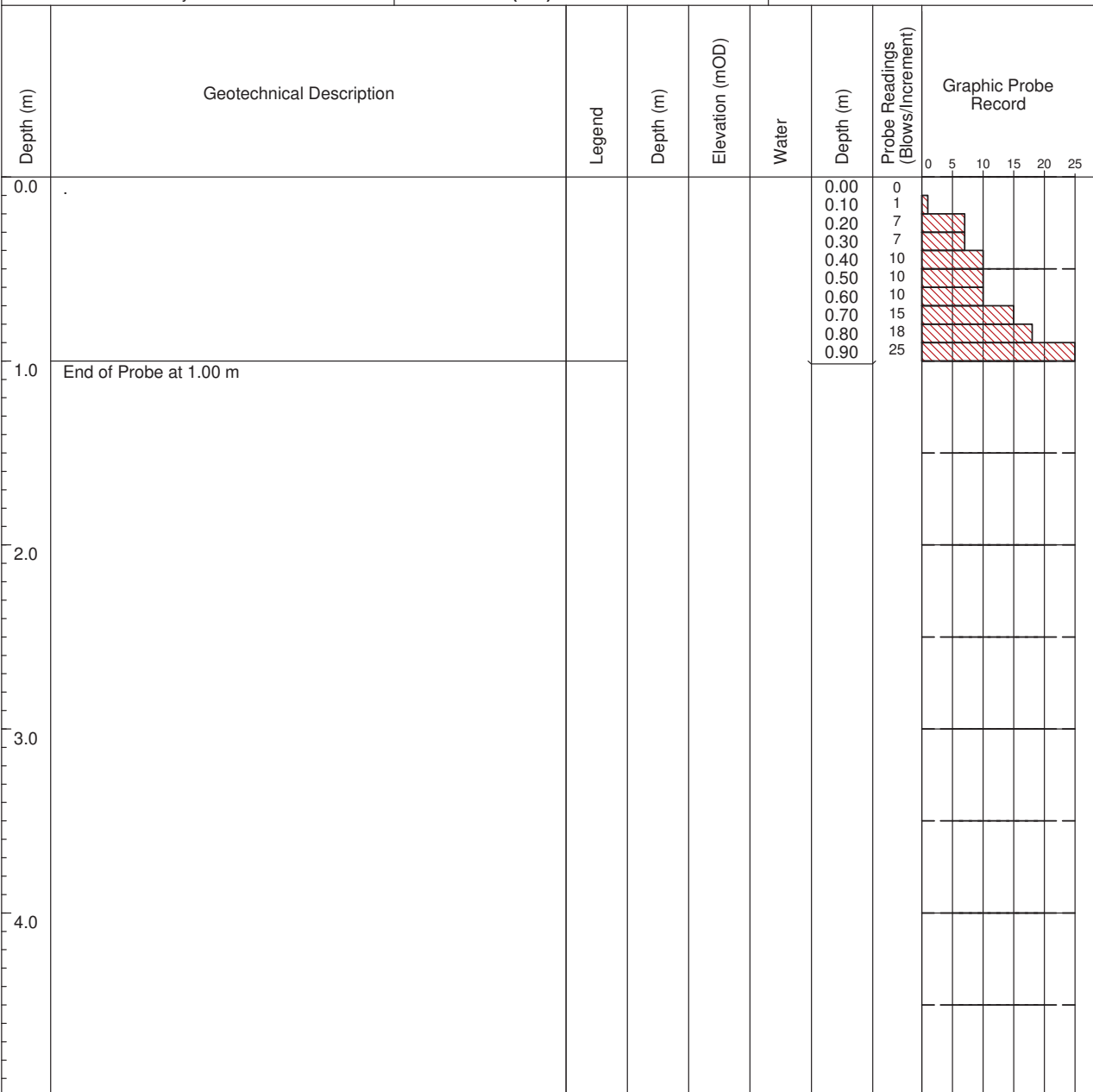
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP36

SHEET Sheet 1 of 1

CO-ORDINATES 589,127.30 E
743,382.34 N

DATE DRILLED 01/02/2021

DATE LOGGED 01/02/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

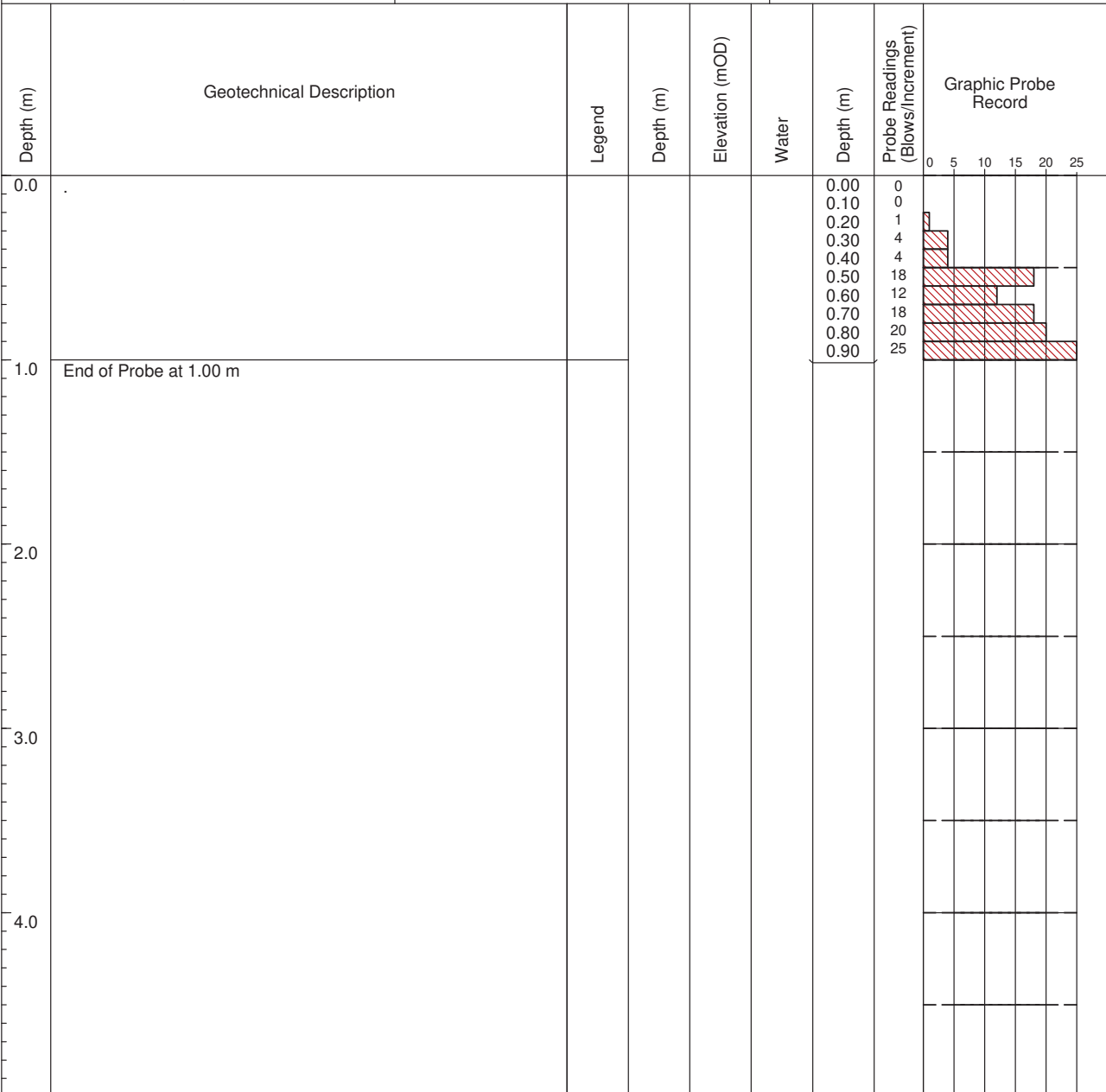
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm				PROBE NO. DP38	
CO-ORDINATES 588,810.26 E 743,775.62 N				SHEET Sheet 1 of 1	
GROUND LEVEL (mOD)				DATE DRILLED 30/11/2020	
CLIENT Energia				DATE LOGGED 30/11/2020	
ENGINEER Malachy Walsh and Partners				PROBE TYPE DPH	
HAMMER MASS (kg) 50					
INCREMENT SIZE (mm) 100					
FALL HEIGHT (mm) 500					

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0						0.00 0.10 0.20 0.30 0.40	0 1 7 15 25	
1.0	End of Probe at 0.50 m							
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

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DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP39

SHEET Sheet 1 of 1

CO-ORDINATES 588,713.58 E
744,018.28 N

DATE DRILLED 30/11/2020

DATE LOGGED 30/11/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

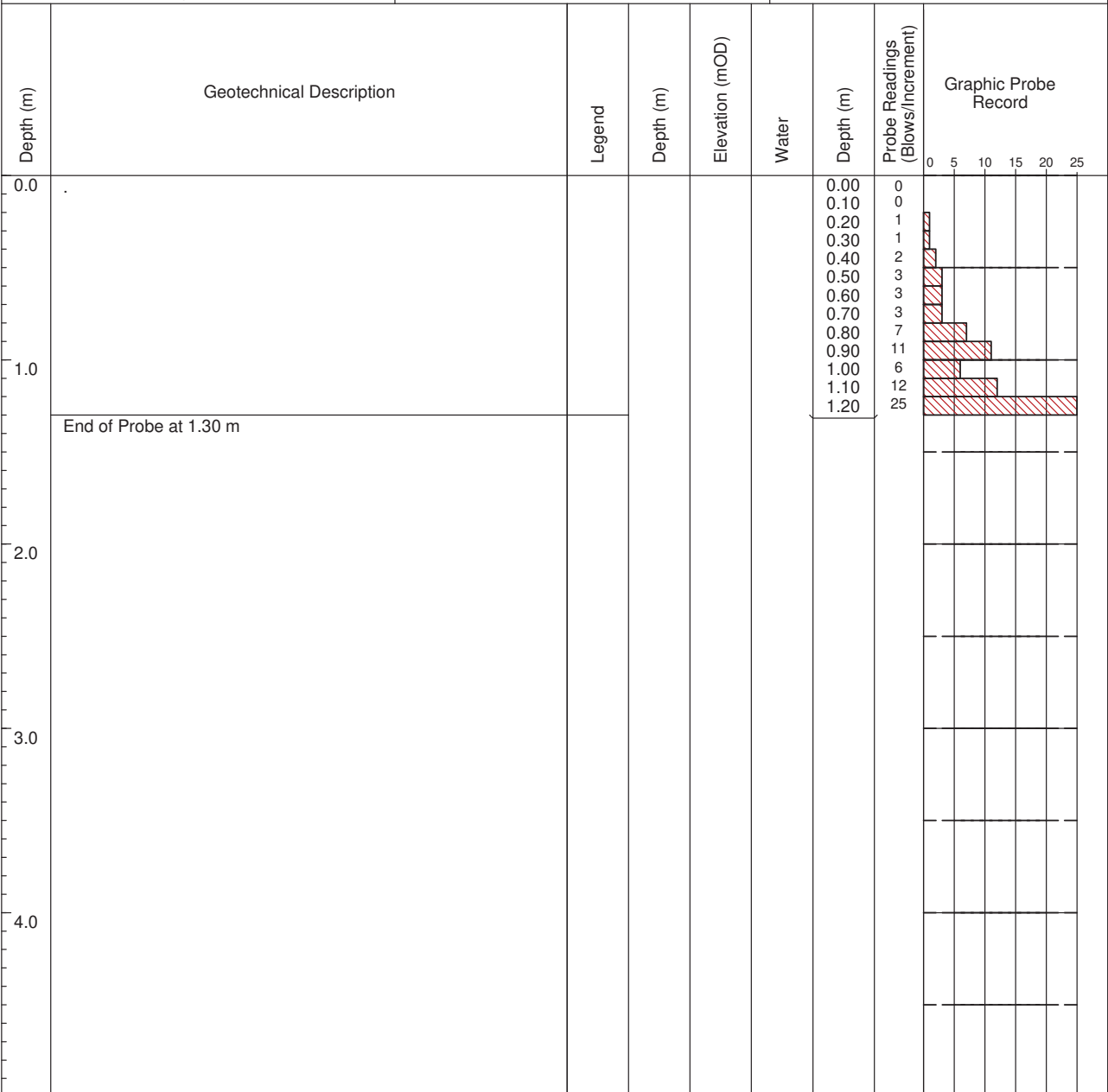
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP41

SHEET Sheet 1 of 1

CO-ORDINATES 588,818.51 E
744,178.06 N

DATE DRILLED 30/11/2020

DATE LOGGED 30/11/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

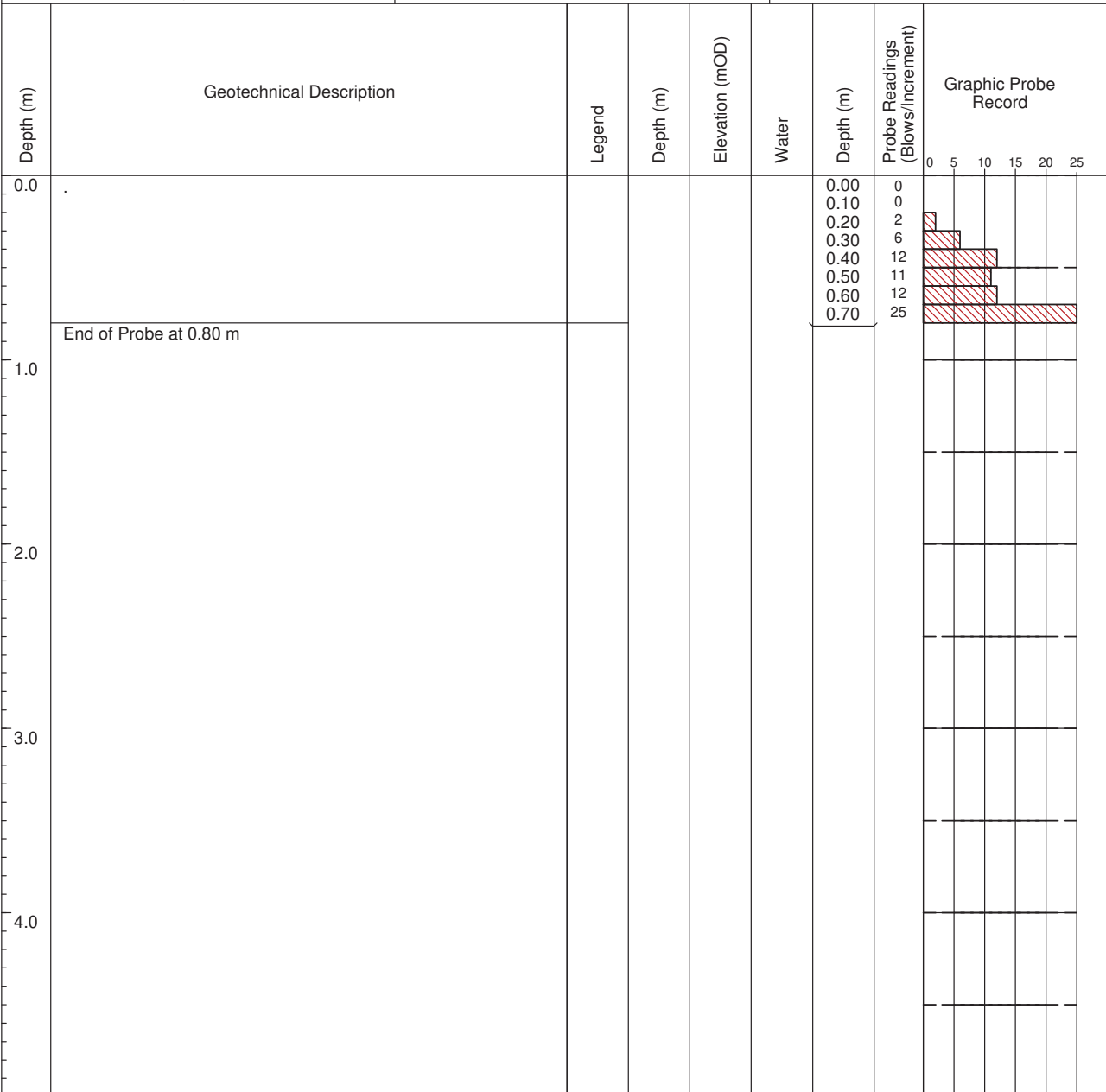
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS

Tower15



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP42

SHEET Sheet 1 of 1

CO-ORDINATES 588,801.82 E
744,368.15 N

DATE DRILLED 30/01/2021

DATE LOGGED 30/01/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

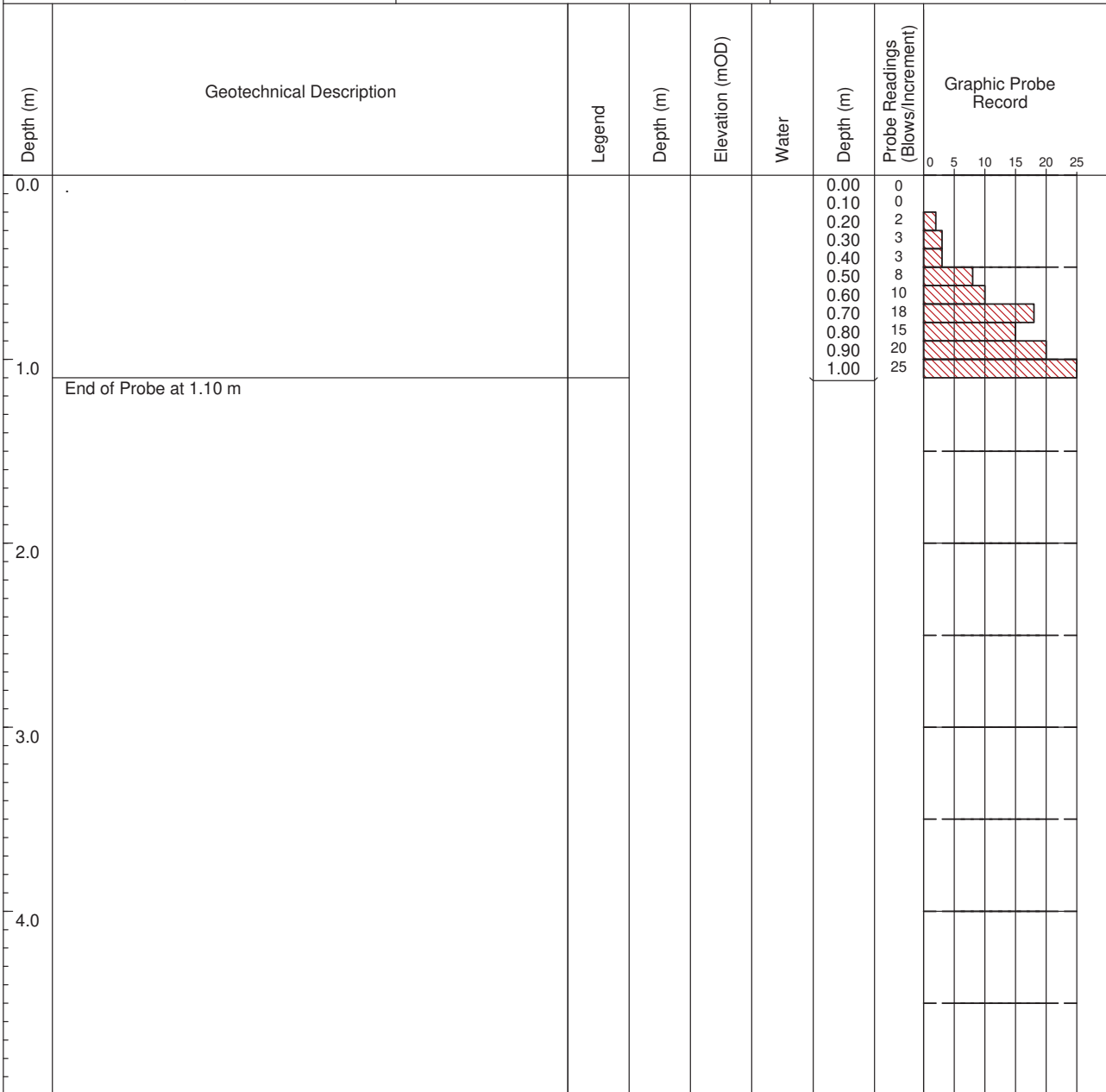
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP43

SHEET Sheet 1 of 1

CO-ORDINATES 588,963.00 E
744,562.71 N

DATE DRILLED 30/01/2021

DATE LOGGED 30/01/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

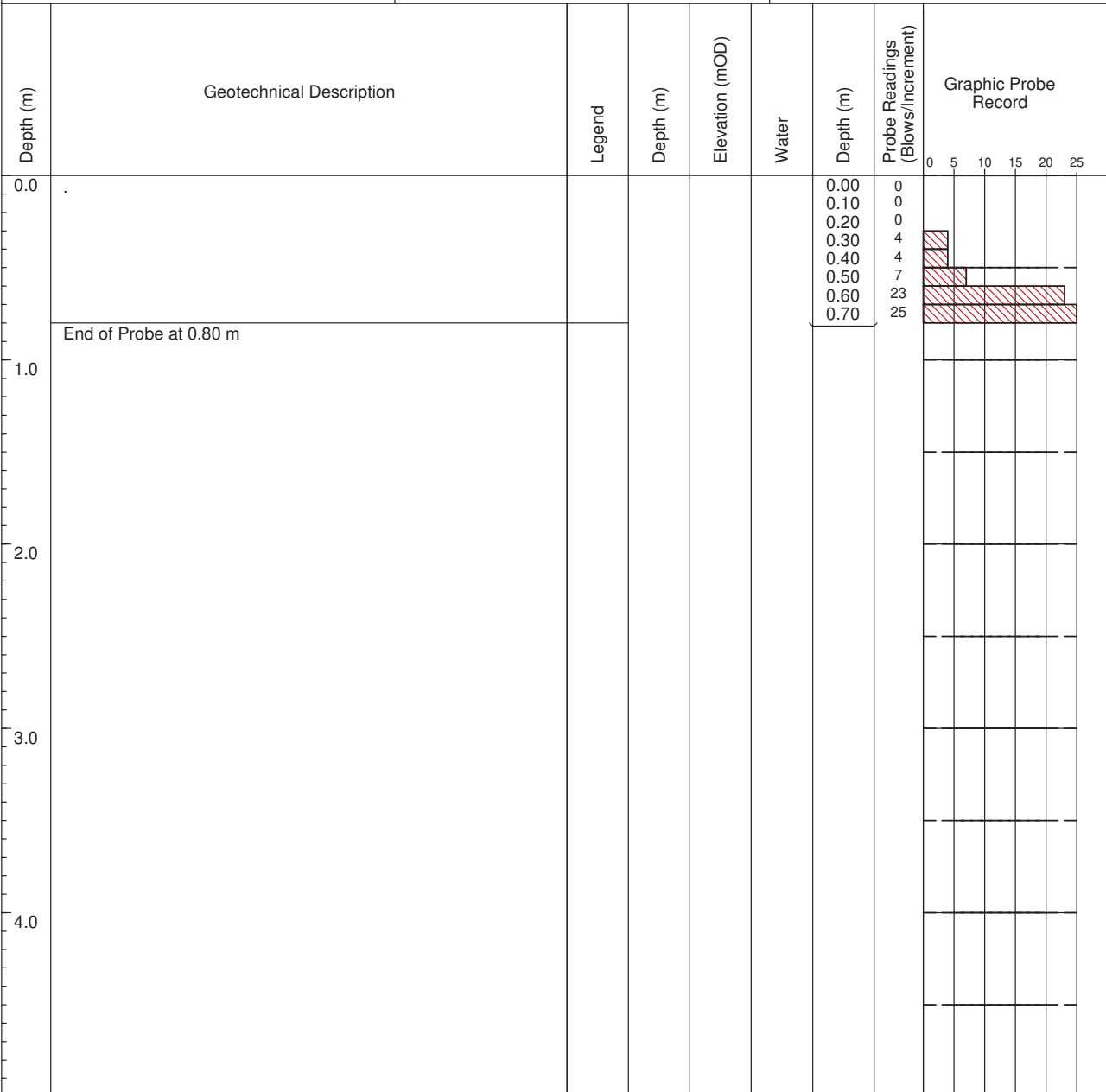
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP45

SHEET Sheet 1 of 1

CO-ORDINATES 589,057.34 E
745,002.33 N

DATE DRILLED 08/12/2020

DATE LOGGED 08/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

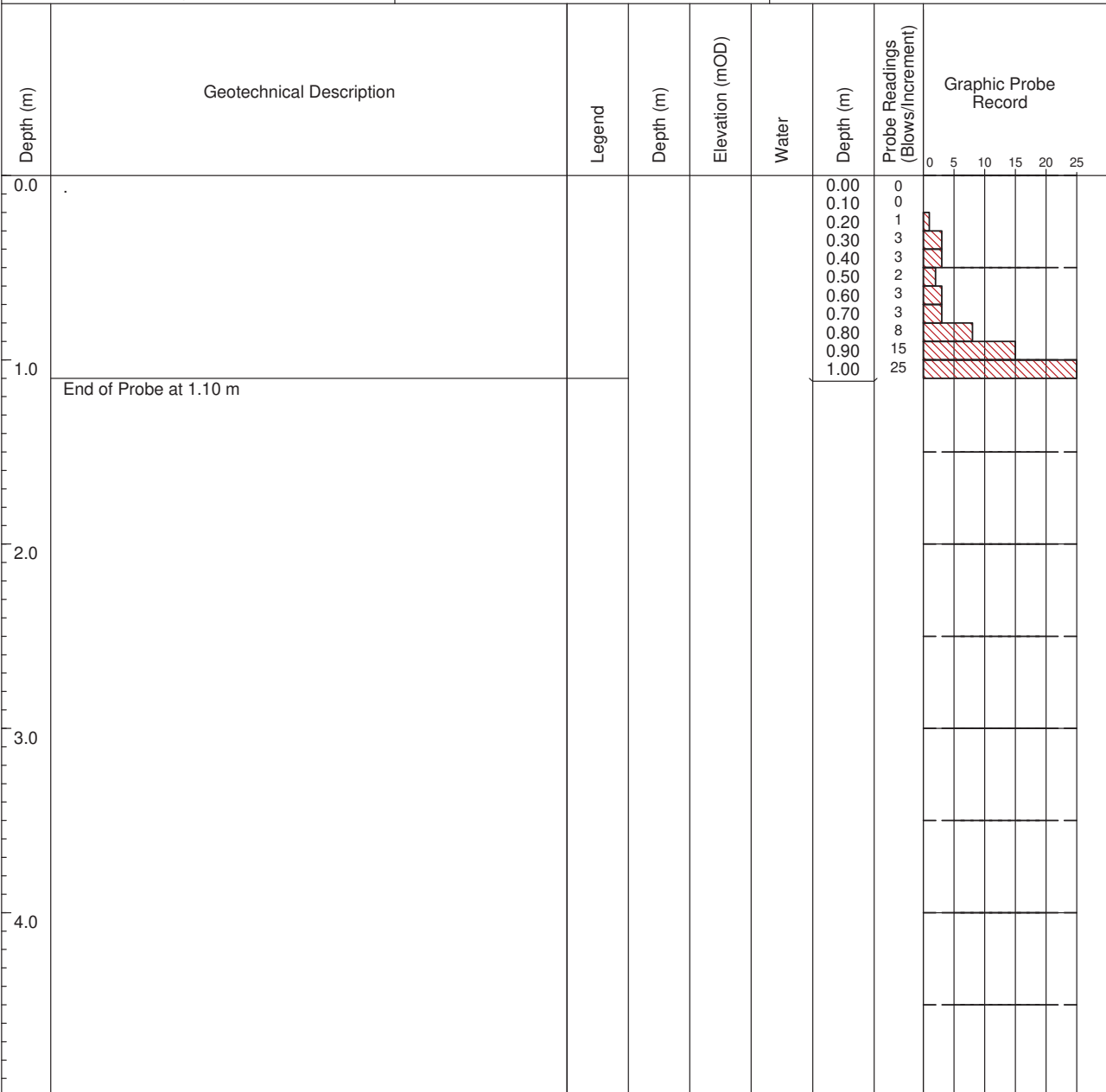
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP46

SHEET Sheet 1 of 1

CO-ORDINATES 588,872.02 E
745,398.15 N

DATE DRILLED 08/12/2020

DATE LOGGED 08/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

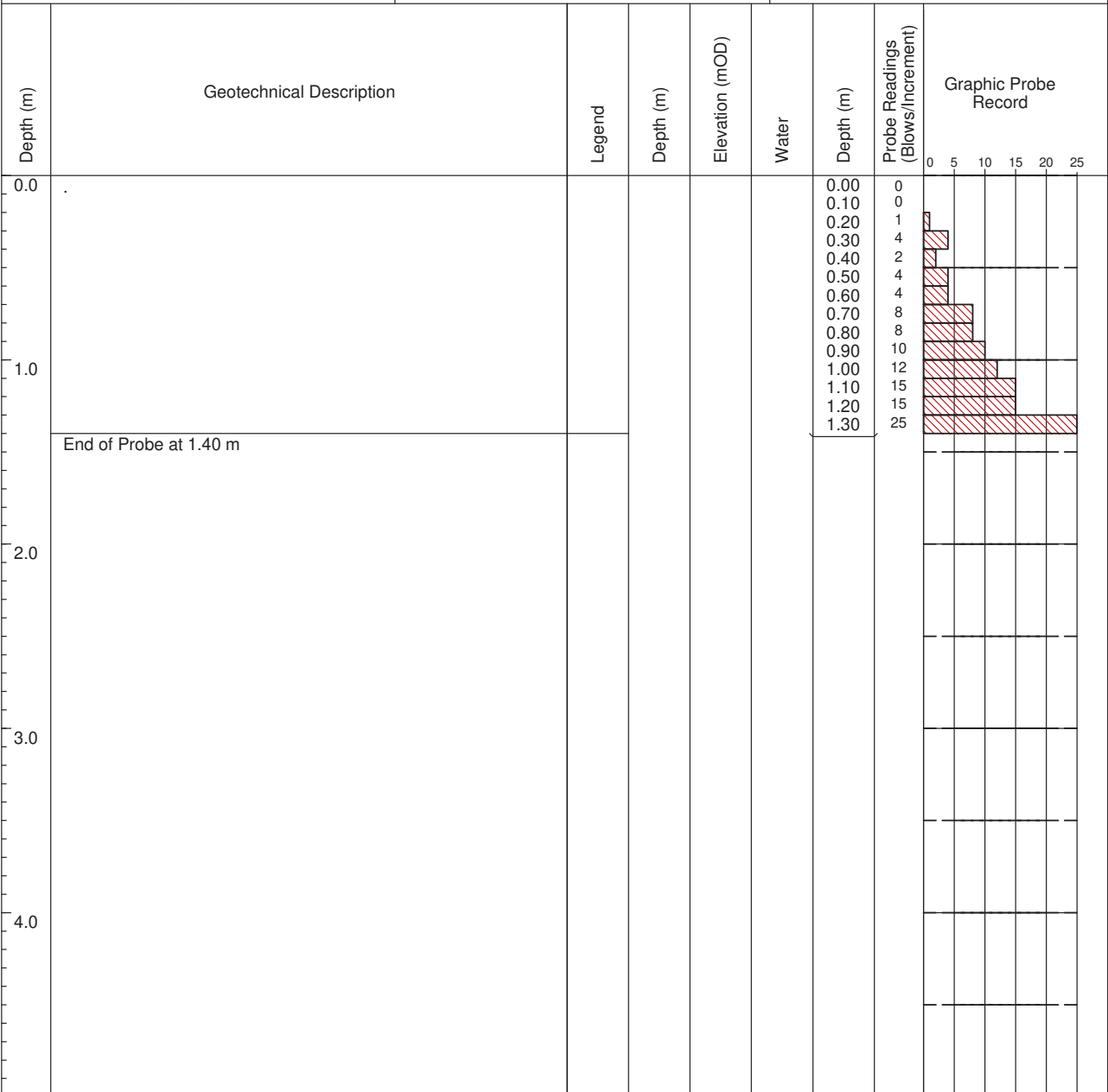
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm			PROBE NO. DP49
CO-ORDINATES 589,530.16 E 744,282.99 N			SHEET Sheet 1 of 1
GROUND LEVEL (mOD)			DATE DRILLED 29/01/2021
CLIENT Energia			DATE LOGGED 29/01/2021
ENGINEER Malachy Walsh and Partners			PROBE TYPE DPH
HAMMER MASS (kg) 50			
INCREMENT SIZE (mm) 100			
FALL HEIGHT (mm) 500			

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0						0.00	0	
						0.10	0	
						0.20	5	
						0.30	8	
						0.40	10	
						0.50	18	
						0.60	25	
	End of Probe at 0.70 m							
1.0								
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP50

SHEET Sheet 1 of 1

CO-ORDINATES 589,645.84 E
744,144.30 N

DATE DRILLED 29/01/2021

DATE LOGGED 29/01/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

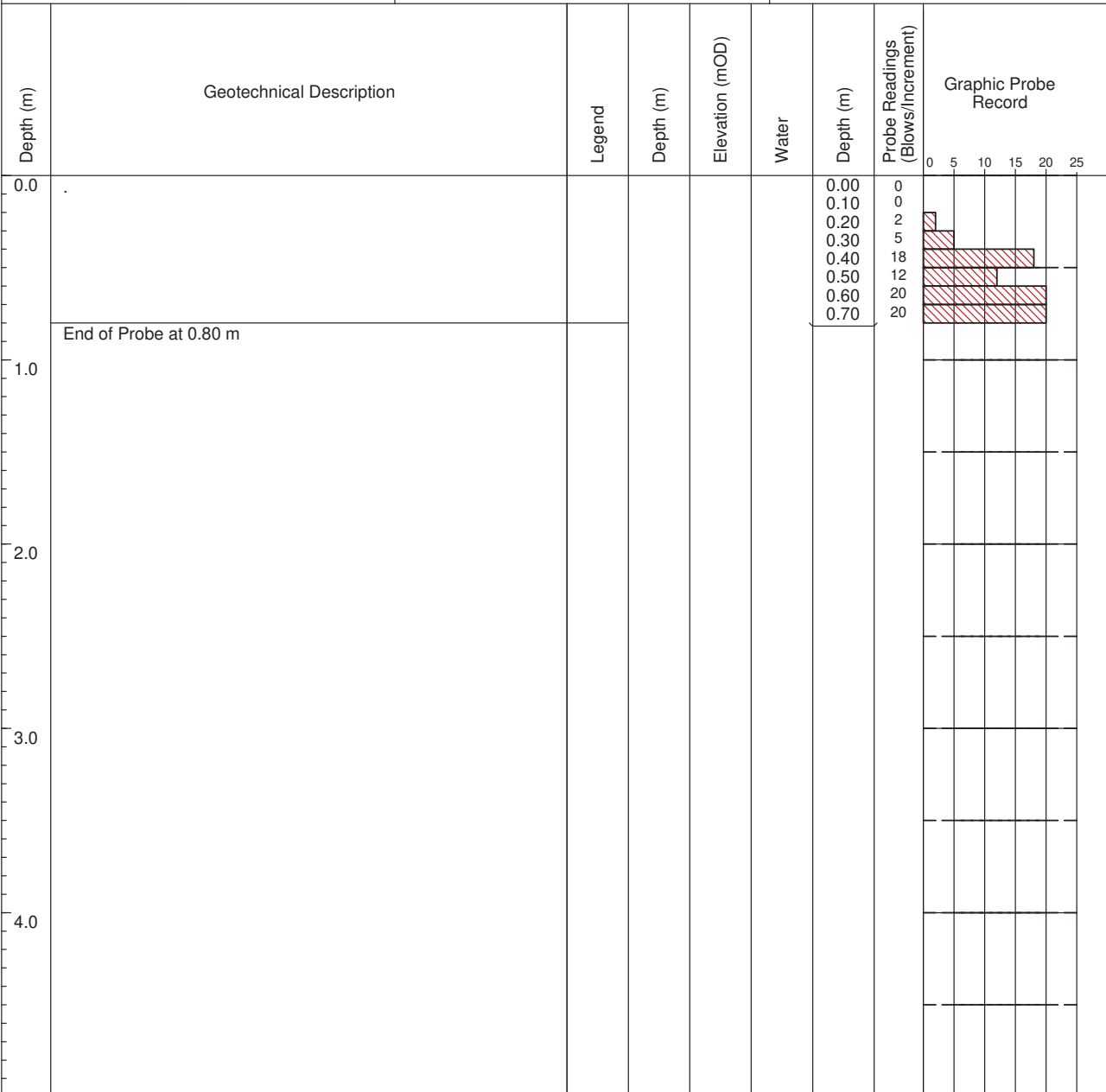
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP51

SHEET Sheet 1 of 1

CO-ORDINATES 589,859.35 E
743,976.20 N

DATE DRILLED 29/01/2021

DATE LOGGED 29/01/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

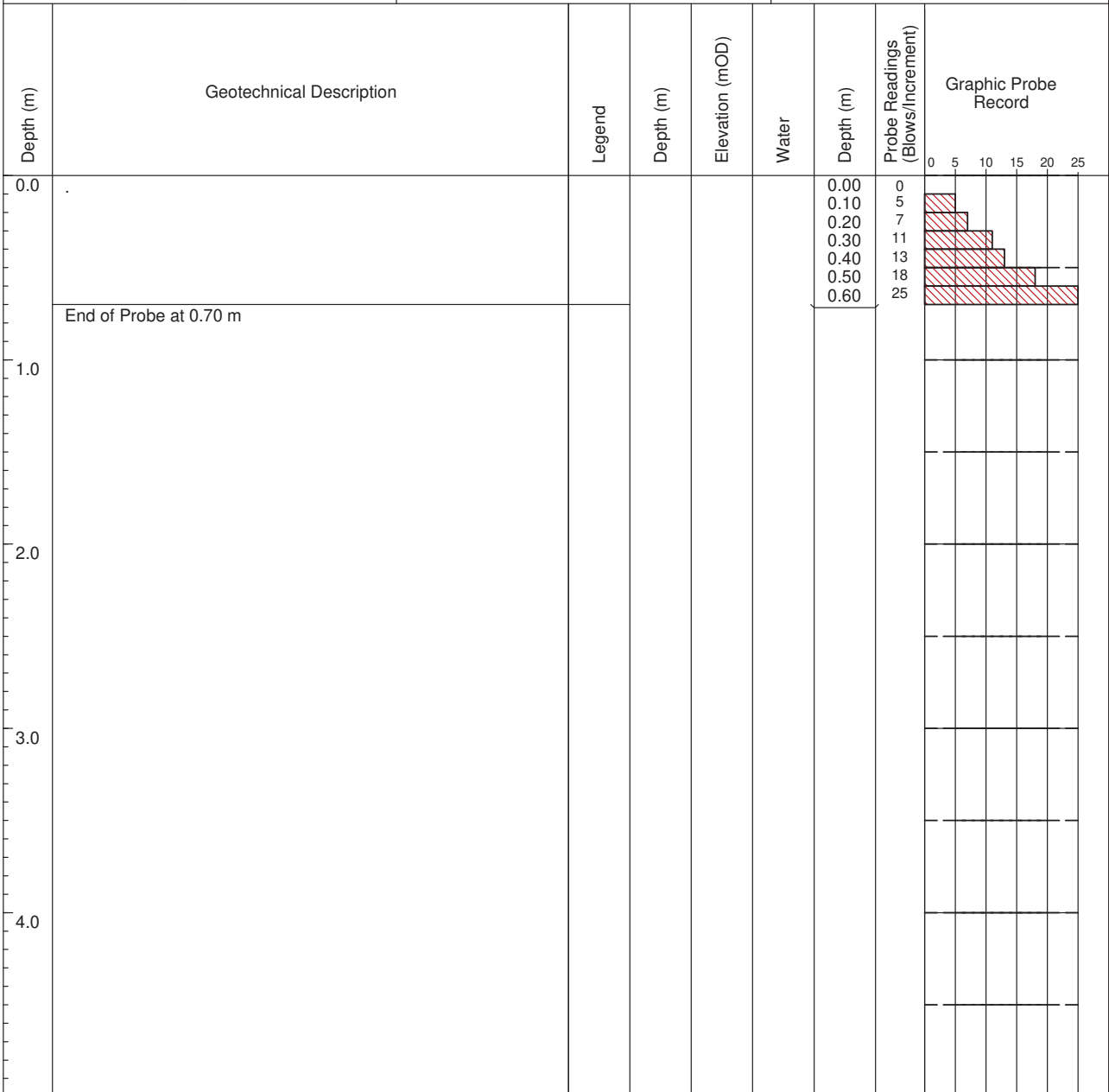
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP52

SHEET Sheet 1 of 1

CO-ORDINATES 590,514.94 E
743,857.56 N

DATE DRILLED 29/01/2021

DATE LOGGED 29/01/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

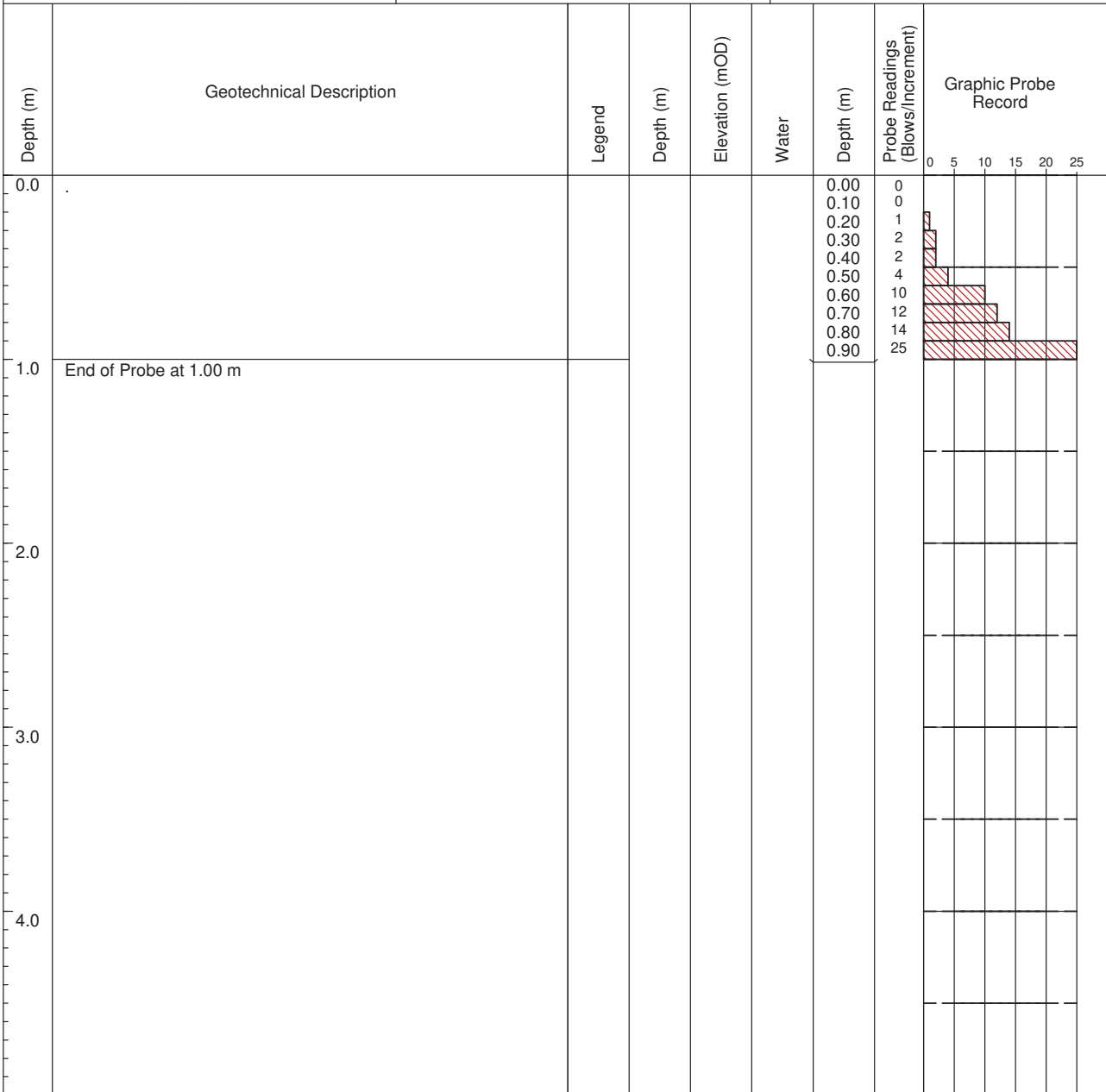
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP53

SHEET Sheet 1 of 1

CO-ORDINATES 590,534.74 E
744,154.13 N

DATE DRILLED 29/01/2021

DATE LOGGED 29/01/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0						0.00	0	
						0.10	6	
						0.20	18	
						0.30	20	
						0.40	25	
	End of Probe at 0.50 m							
1.0								
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP56

SHEET Sheet 1 of 1

CO-ORDINATES 590,395.03 E
744,878.02 N

DATE DRILLED 08/12/2020

DATE LOGGED 08/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

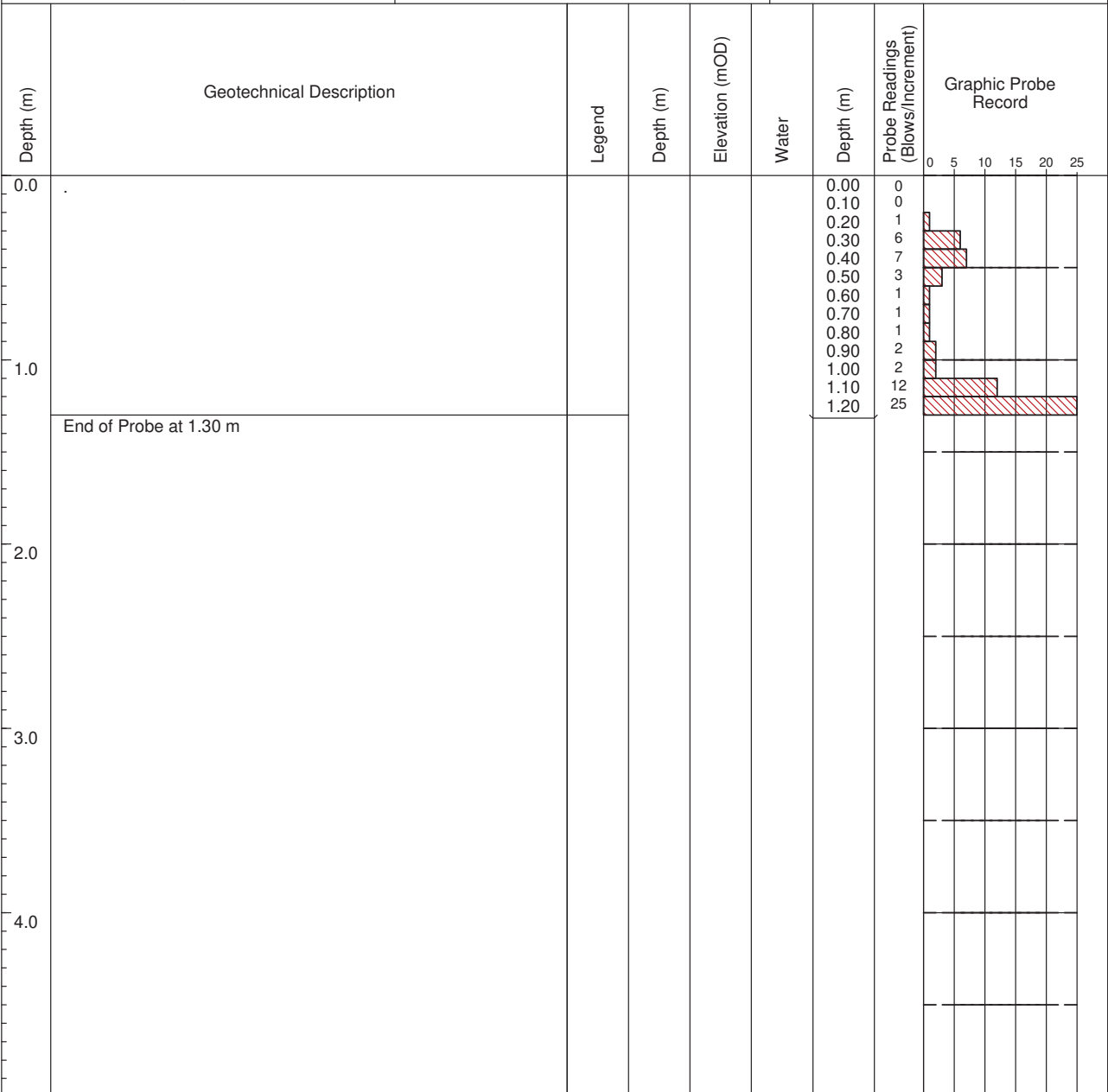
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm			PROBE NO. DP57	
CO-ORDINATES 590,395.03 E 745,129.94 N			SHEET Sheet 1 of 1	
GROUND LEVEL (mOD)			DATE DRILLED 08/12/2020	
CLIENT Energia			DATE LOGGED 08/12/2020	
ENGINEER Malachy Walsh and Partners			PROBE TYPE DPH	
HAMMER MASS (kg) 50				
INCREMENT SIZE (mm) 100				
FALL HEIGHT (mm) 500				

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0						0.00	0	
						0.10	0	
						0.20	0	
						0.30	1	
						0.40	9	
						0.50	17	
						0.60	25	
	End of Probe at 0.70 m							
1.0								
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP58

SHEET Sheet 1 of 1

CO-ORDINATES 590,423.02 E
745,372.99 N

DATE DRILLED 08/12/2020

DATE LOGGED 08/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

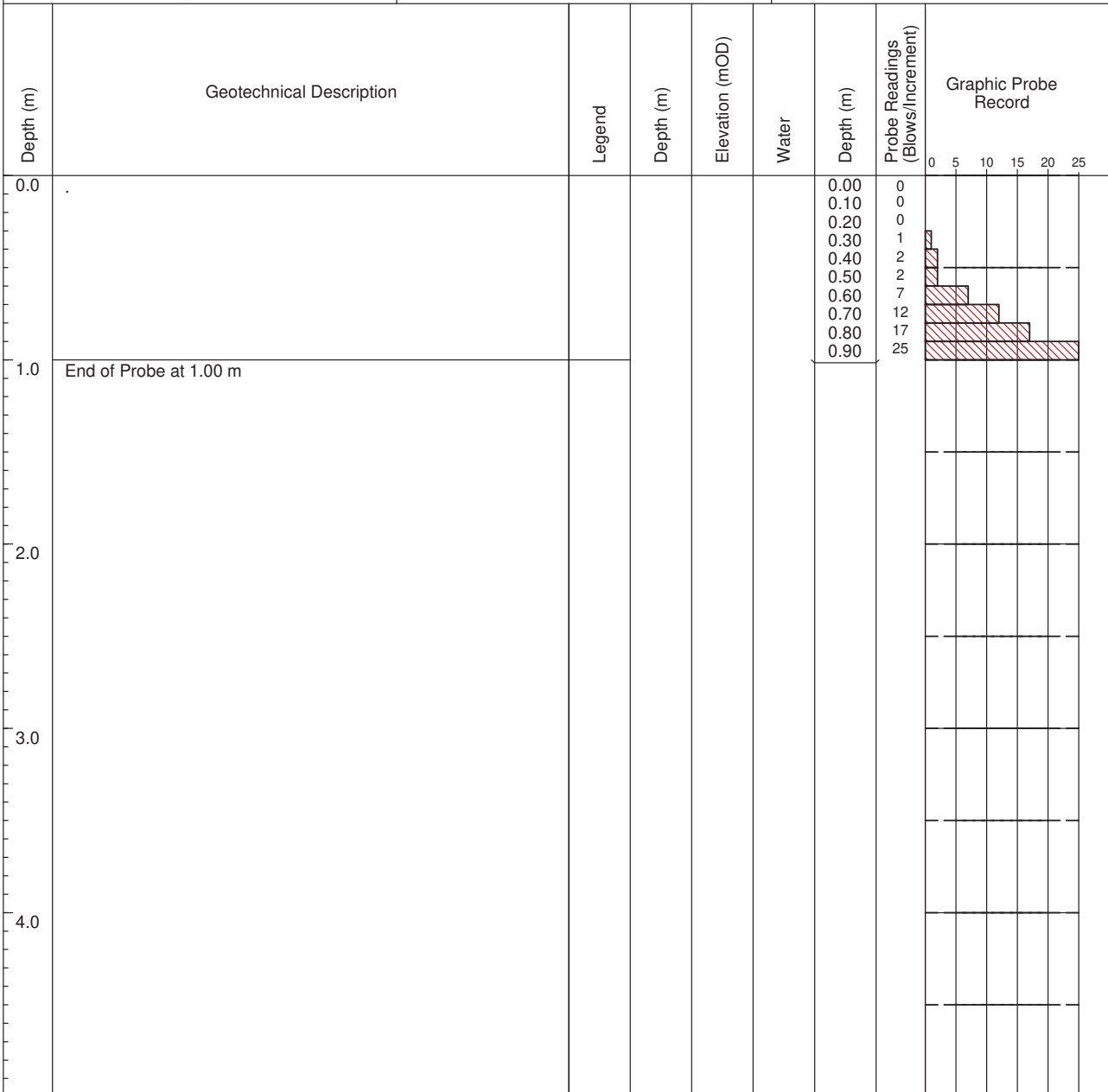
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP59

SHEET Sheet 1 of 1

CO-ORDINATES 590,634.64 E
744,785.35 N

DATE DRILLED 08/12/2020

DATE LOGGED 08/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

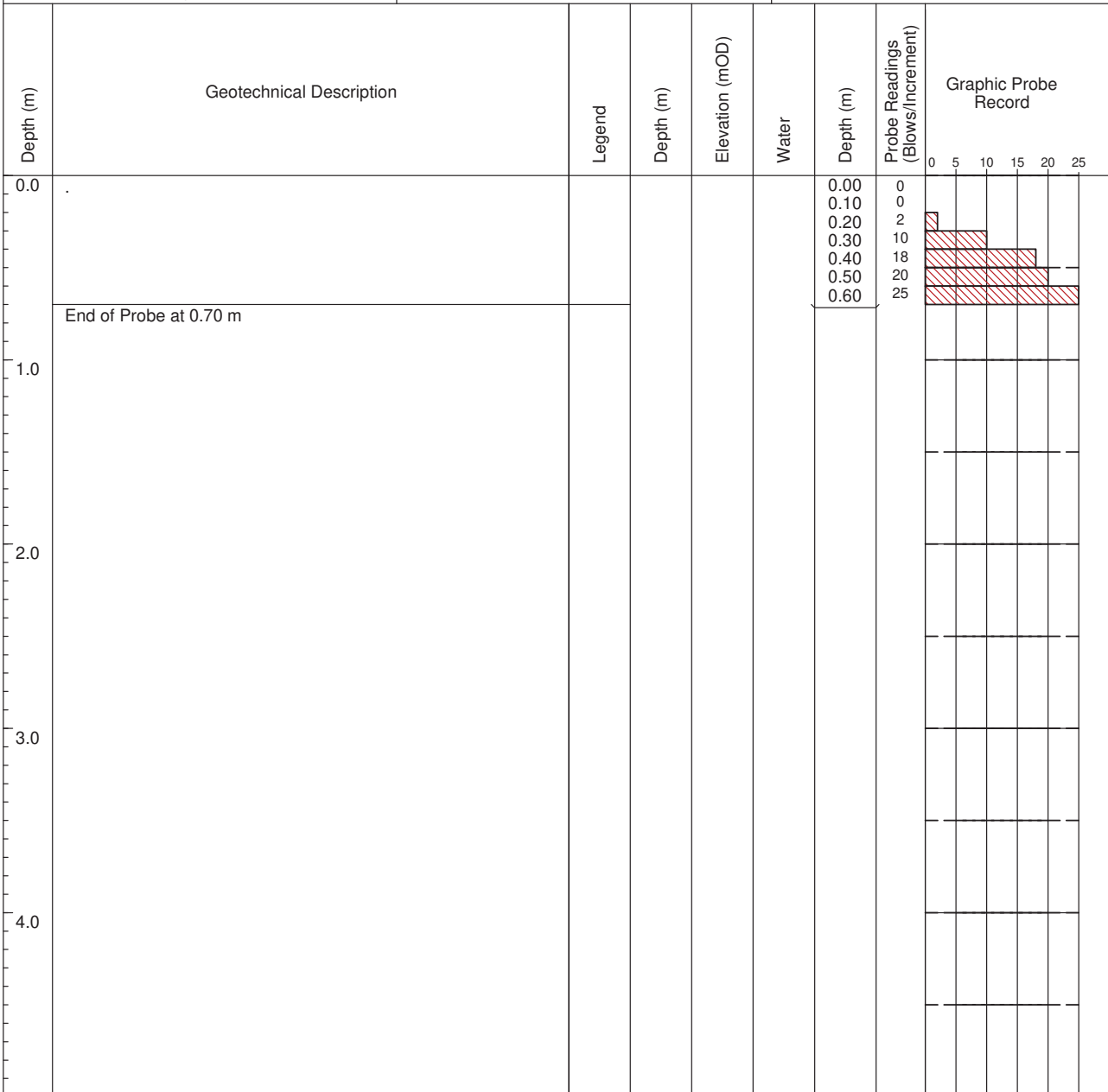
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP63

SHEET Sheet 1 of 1

CO-ORDINATES 591,384.11 E
744,265.30 N

DATE DRILLED 01/02/2021

DATE LOGGED 01/02/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

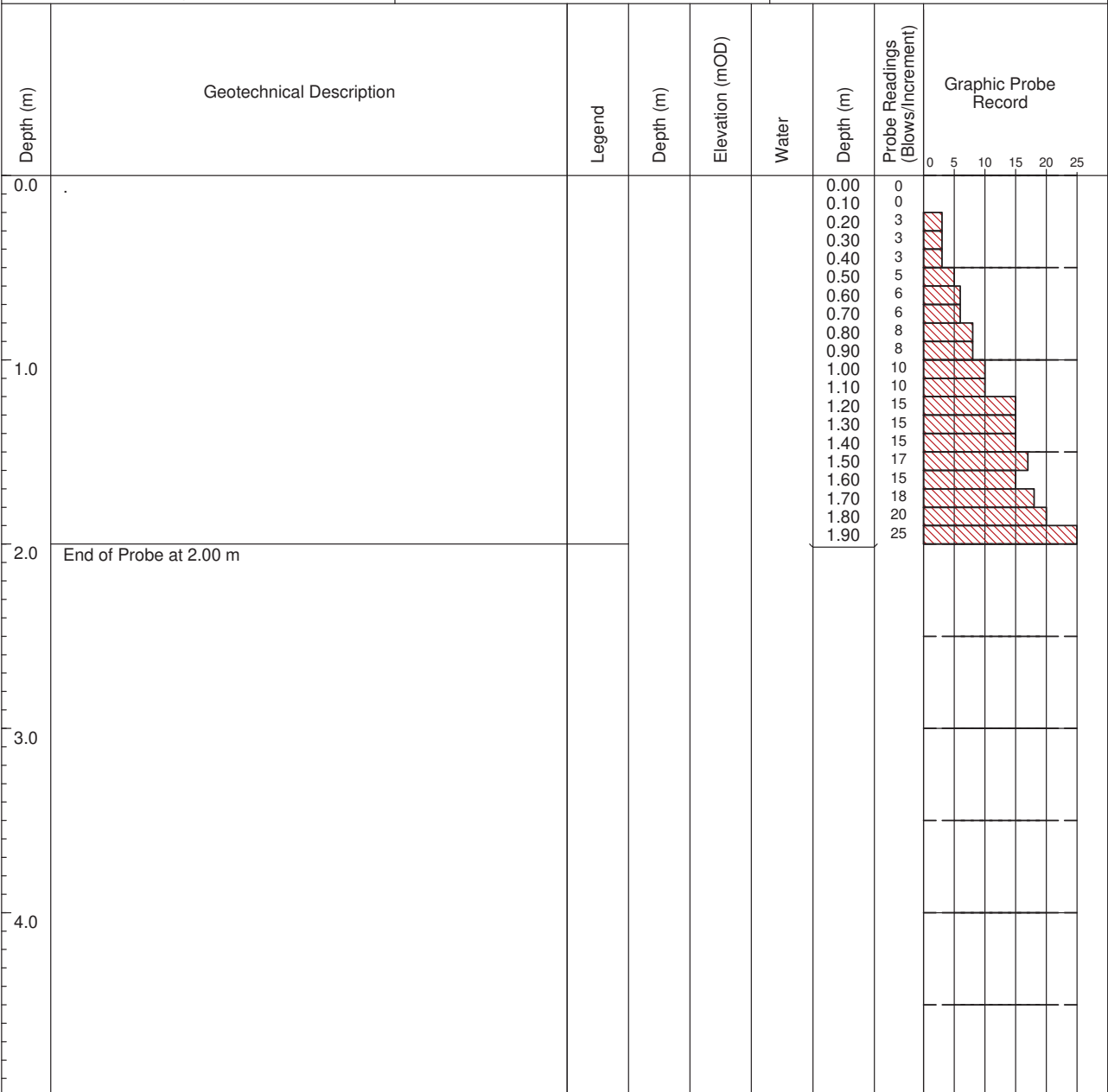
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP64

SHEET Sheet 1 of 1

CO-ORDINATES 591,419.71 E
744,120.57 N

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

DATE DRILLED

DATE LOGGED

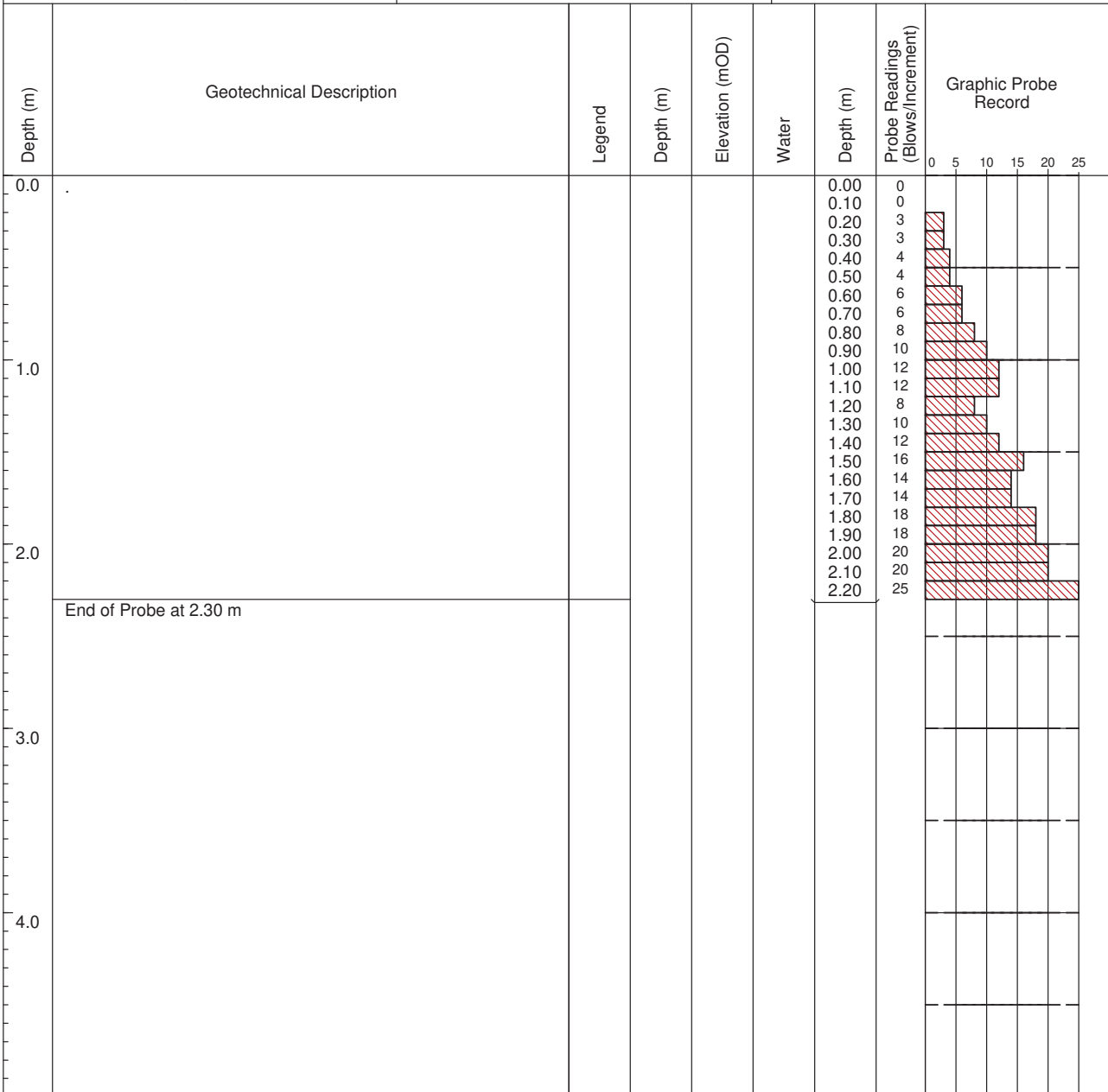
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP65

SHEET Sheet 1 of 1

CO-ORDINATES 590,291.89 E
743,729.39 N

DATE DRILLED 29/01/2021

DATE LOGGED 29/01/2021

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

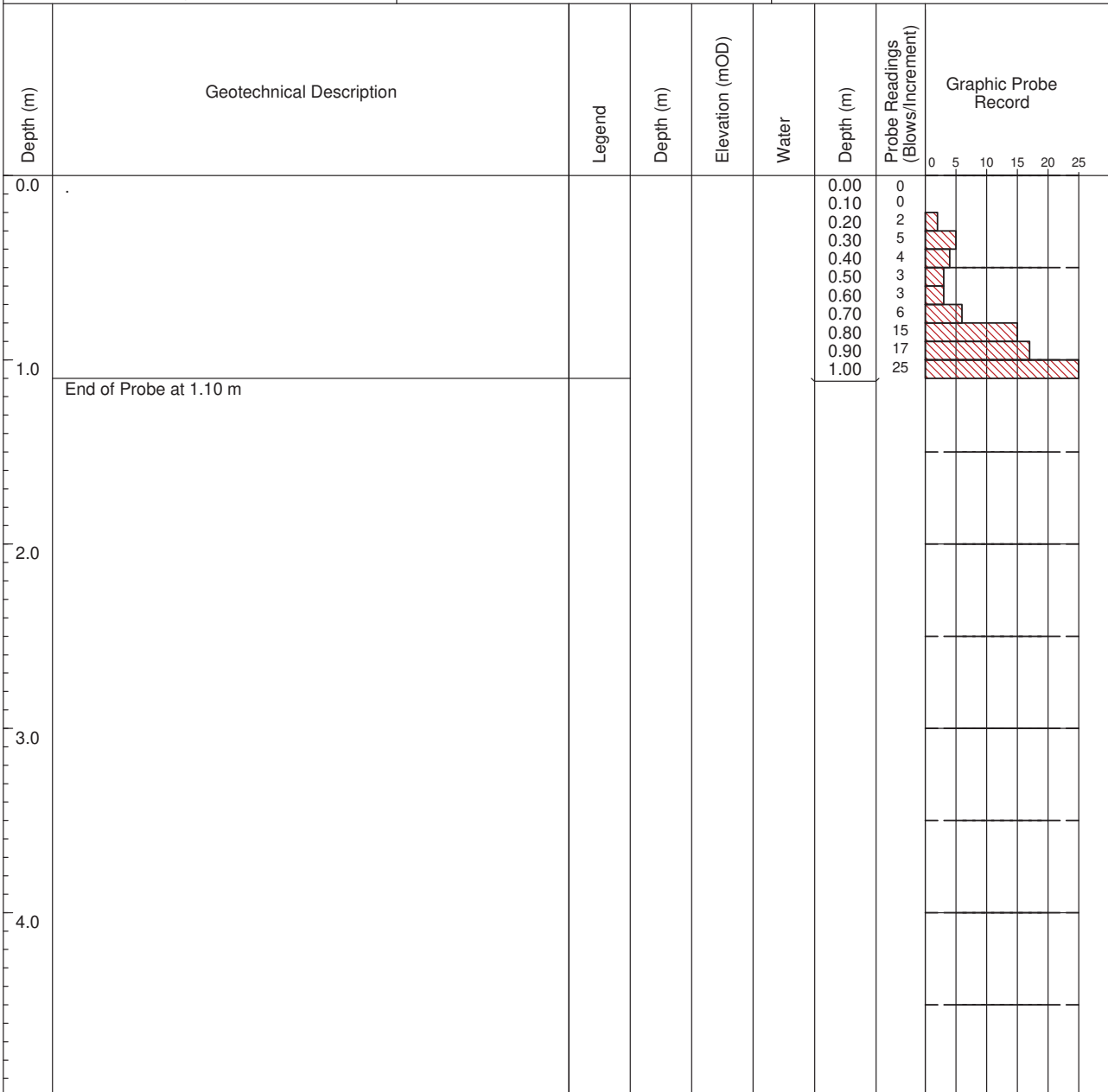
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm			PROBE NO. DP66	
CO-ORDINATES 587,605.00 E 747,078.00 N			SHEET Sheet 1 of 1	
GROUND LEVEL (mOD)			DATE DRILLED 02/12/2020	
CLIENT Energia			DATE LOGGED 02/12/2020	
ENGINEER Malachy Walsh and Partners			PROBE TYPE DPH	
HAMMER MASS (kg) 50				
INCREMENT SIZE (mm) 100				
FALL HEIGHT (mm) 500				

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0	End of Probe at 0.80 m					0.00	0	
0.1						0.10	2	
0.2						0.20	1	
0.3						0.30	2	
0.4						0.40	1	
0.5						0.50	6	
0.6						0.60	15	
0.7						0.70	25	
1.0								
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

Main access road Northern Section



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO.

DP67

CO-ORDINATES 587,705.00 E
746,919.00 N

SHEET

Sheet 1 of 1

GROUND LEVEL (mOD)

HAMMER MASS (kg)

50

DATE DRILLED

02/12/2020

DATE LOGGED

02/12/2020

CLIENT Energia

INCREMENT SIZE (mm)

100

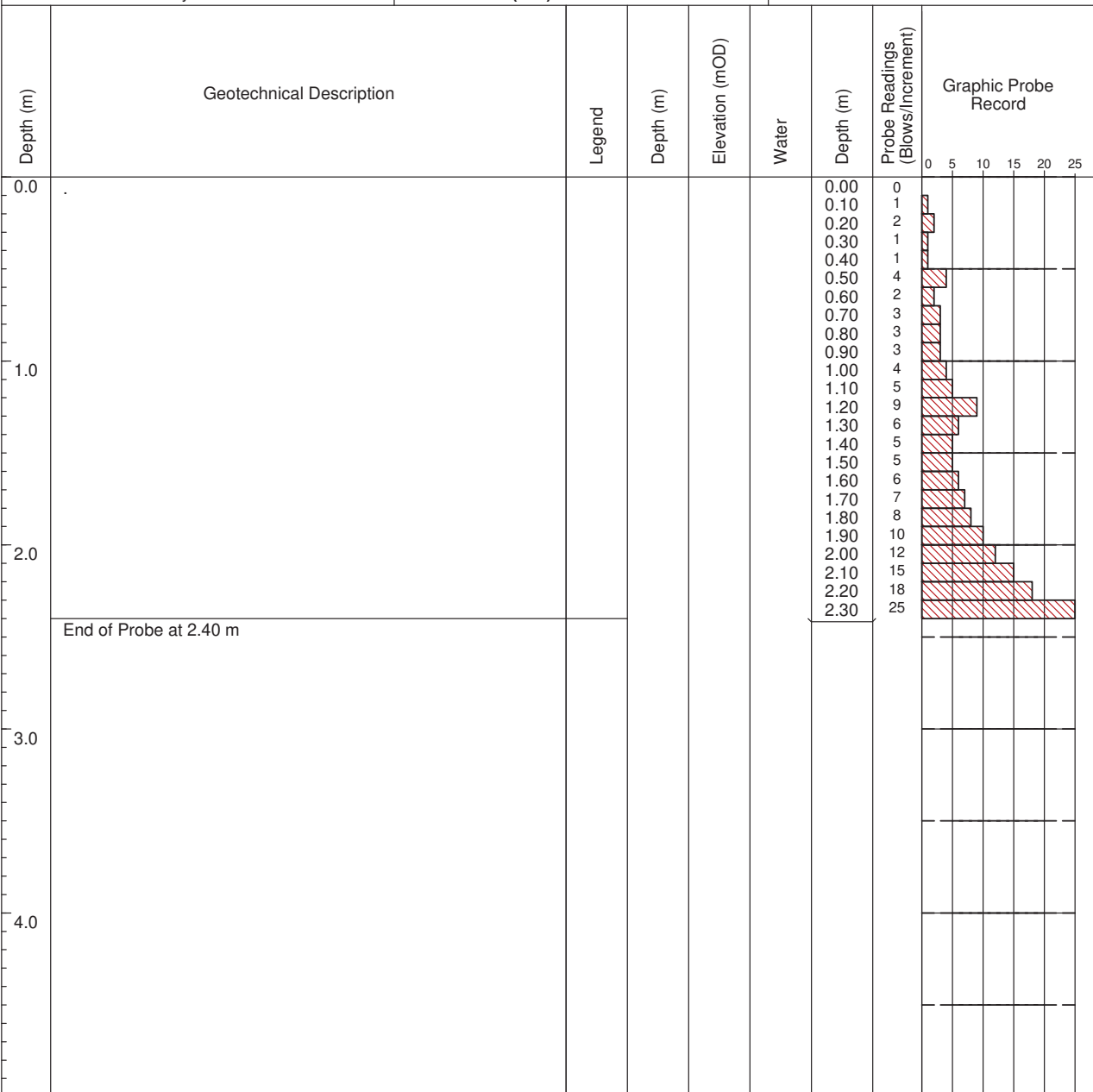
ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm)

500

PROBE TYPE

DPH



GROUNDWATER OBSERVATIONS

REMARKS

Main access road Northern Section



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm			PROBE NO. DP68	
CO-ORDINATES 587,819.00 E 746,726.00 N			SHEET Sheet 1 of 1	
GROUND LEVEL (mOD)			DATE DRILLED 02/12/2020	
CLIENT Energia			DATE LOGGED 02/12/2020	
ENGINEER Malachy Walsh and Partners			PROBE TYPE DPH	
HAMMER MASS (kg) 50				
INCREMENT SIZE (mm) 100				
FALL HEIGHT (mm) 500				

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0						0.00	0	
						0.10	1	
						0.20	1	
						0.30	1	
						0.40	2	
						0.50	1	
						0.60	1	
						0.70	3	
						0.80	2	
						0.90	3	
1.0						1.00	2	
						1.10	2	
						1.20	2	
						1.30	2	
						1.40	2	
						1.50	1	
						1.60	6	
						1.70	4	
						1.80	4	
						1.90	8	
2.0						2.00	10	
						2.10	12	
						2.20	17	
						2.30	25	
	End of Probe at 2.40 m							
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

Main access road Northern Section



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP69

SHEET Sheet 1 of 1

CO-ORDINATES 587,819.00 E
746,559.00 N

DATE DRILLED 02/12/2020

DATE LOGGED 02/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

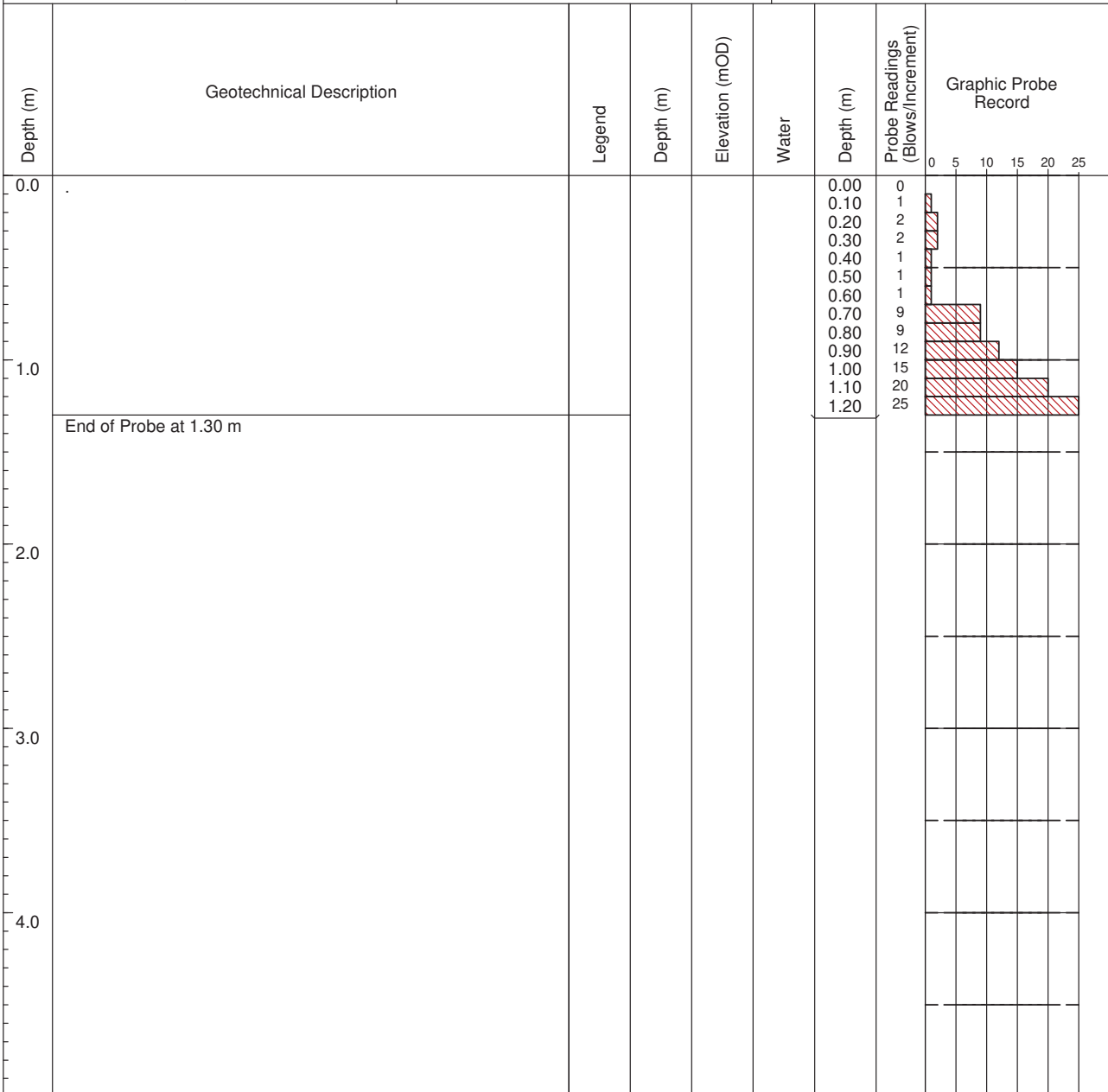
CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH



GROUNDWATER OBSERVATIONS

REMARKS

Main access road Northern Section



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm				PROBE NO. DP70	
CO-ORDINATES 587,635.00 E 746,459.00 N				SHEET Sheet 1 of 1	
GROUND LEVEL (mOD)				DATE DRILLED 02/12/2020	
CLIENT Energia				DATE LOGGED 02/12/2020	
ENGINEER Malachy Walsh and Partners				PROBE TYPE DPH	
HAMMER MASS (kg) 50					
INCREMENT SIZE (mm) 100					
FALL HEIGHT (mm) 500					

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0						0.00	0	
1.0	End of Probe at 0.90 m					0.10	2	
						0.20	3	
						0.30	2	
						0.40	2	
						0.50	3	
						0.60	8	
						0.70	15	
						0.80	25	

GROUNDWATER OBSERVATIONS

REMARKS

Main access road Northern Section



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm

PROBE NO. DP71

SHEET Sheet 1 of 1

CO-ORDINATES 587,542.00 E
746,352.00 N

DATE DRILLED 02/12/2020

DATE LOGGED 02/12/2020

GROUND LEVEL (mOD)

HAMMER MASS (kg) 50

CLIENT Energia

INCREMENT SIZE (mm) 100

ENGINEER Malachy Walsh and Partners

FALL HEIGHT (mm) 500

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0						0.00	2	
						0.10	2	
						0.20	10	
						0.30	15	
						0.40	25	
	End of Probe at 0.50 m							
1.0								
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

Main access road Northern Section



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm			PROBE NO. DP72	
CO-ORDINATES 587,431.00 E 746,207.00 N			SHEET Sheet 1 of 1	
GROUND LEVEL (mOD)			DATE DRILLED 02/12/2020	
CLIENT Energia			DATE LOGGED 02/12/2020	
ENGINEER Malachy Walsh and Partners			PROBE TYPE DPH	
HAMMER MASS (kg) 50				
INCREMENT SIZE (mm) 100				
FALL HEIGHT (mm) 500				

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0	End of Probe at 0.80 m					0.00	0	
0.1						0.10	1	
0.2						0.20	1	
0.3						0.30	2	
0.4						0.40	4	
0.5						0.50	12	
0.6						0.60	16	
0.7						0.70	25	
1.0								
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

Main access road Northern Section



DYNAMIC PROBE RECORD

REPORT NUMBER

23000

CONTRACT Seven Hills Wind Farm			PROBE NO. DP74	
CO-ORDINATES 587,274.00 E 745,902.00 N			SHEET Sheet 1 of 1	
GROUND LEVEL (mOD)			DATE DRILLED 02/12/2020	
CLIENT Energia			DATE LOGGED 02/12/2020	
ENGINEER Malachy Walsh and Partners			PROBE TYPE DPH	
HAMMER MASS (kg) 50				
INCREMENT SIZE (mm) 100				
FALL HEIGHT (mm) 500				

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record
0.0	End of Probe at 0.80 m					0.00	0	
0.1						0.10	1	
0.2						0.20	2	
0.3						0.30	8	
0.4						0.40	10	
0.5						0.50	15	
0.6						0.60	15	
0.7						0.70	25	
1.0								
2.0								
3.0								
4.0								

GROUNDWATER OBSERVATIONS

REMARKS

Main access road Northern Section

Appendix 4

APEX Geophysical Report

AGP20192_03

**REPORT
ON THE
GEOPHYSICAL INVESTIGATION
AT
SEVEN HILLS WIND FARM
Co. ROSCOMMON
FOR
IGSL LIMITED**



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05TH MAY 2022

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	AGP20192		
AUTHOR	CHECKED	REPORT STATUS	DATE
TONY LOMBARD M.Sc (GEOPHYSICS)	IAN SHARKEY (DIP. MIN. ENG.)	V.01	31 ST MARCH 2021
TONY LOMBARD M.Sc (GEOPHYSICS)	IAN SHARKEY (DIP. MIN. ENG.)	V.02	11 TH MARCH 2022
TONY LOMBARD M.Sc (GEOPHYSICS)	IAN SHARKEY (DIP. MIN. ENG.)	V.03	05 TH MAY 2022

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1. EXECUTIVE SUMMARY

APEX Geophysics Limited was requested by IGSL Limited to carry out a geophysical survey at the Seven Hills Wind Farm, County Roscommon. The proposed development consists of 20 wind turbines and the geophysical investigation is required to assess the subsoils conditions.

The objectives of the survey to estimate the overburden thickness, type and stiffness, assess the depth to bedrock and the weathering and excavatability of the bedrock and provide information on the type of bedrock and the presence of any faults or fissure zones.

The Geological Survey of Ireland (GSI) Quaternary Sediments map for the area indicates that the site is in an area of till derived from limestone with subcropping/outcropping rock in the northwest of the site, close to T01, T05 and T06. The bedrock geology map indicates that the site is underlain by undifferentiated Viséan Limestones. Several karst features, including springs, swallow holes, enclosed depressions and Turloughs are shown on the GSI karst database in the vicinity of the site.

The survey was carried out between the 2nd of December 2020 and 5th of March 2021 and involved the collection of 45 ERT profiles, 44 seismic refraction profiles and 1D MASW soundings at the centre of each seismic refraction profile and at sections of access roads.

The results of the investigation are shown on the maps, sections and tables and each turbine base is summarised in **Appendix D**.

The geophysical datasets in conjunction with client trial pit and borehole data indicate three main soils layers;

- Sandy gravelly CLAY
- Clayey sandy GRAVEL
- Slightly clayey sandy GRAVEL/BOULDERS

The soil layers overlie rock at depths ranging from < 1.0m to c. 23m below ground level. Three main rock types are interpreted across the site;

- Completely to highly weathered LIMESTONE
- Highly to moderately weathered LIMESTONE
- Slightly weathered to fresh LIMESTONE

Completely to highly weathered/karstified LIMESTONE is indicated at T11, T13 and the access road to T12. Possible karstified rock is indicated at a number of locations.

Where bedrock excavation is proposed, a detailed assessment of excavatability should be carried out.

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 IGSL Limited to carry out a geophysical survey at the Seven Hills Wind Farm, County Roscommon. The proposed development consists of 20 wind turbines and the geophysical investigation is required to assess the subsoils conditions.

2.1 Survey Objectives

The objectives of the survey are as follows:

- estimate the overburden thickness, type and stiffness,
- assess the depth to bedrock and the weathering and excavatability of the bedrock,
- provide information on the type of bedrock and the presence of any faults or fissure zones.

2.2 Site Background

The Seven Hills Wind Farm site is located approximately 12.5 km northwest of Athlone. The proposed development consists of 20 wind turbines. Site topography is undulating and varies between 70 – 112 mOD.

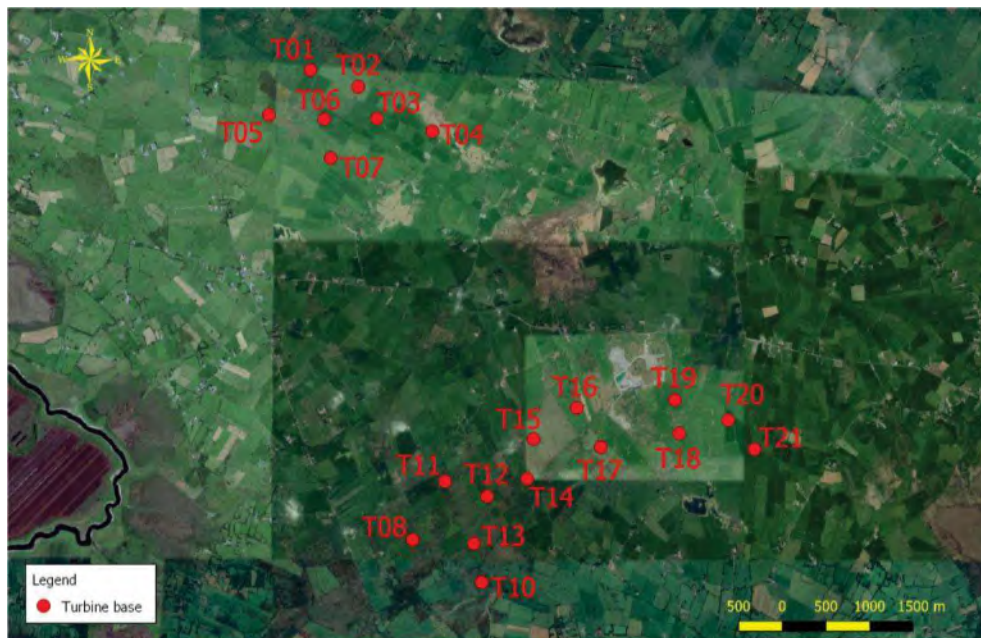


Fig 2.1: Site location.

2.2.1 Soils

The Geological Survey of Ireland (GSI) Quaternary Sediments map for the area (Fig. 2.2) indicates that the site is in an area of till derived from limestone with subcropping/outcropping rock in the northwest of the site, close to T01, T05 and T06.

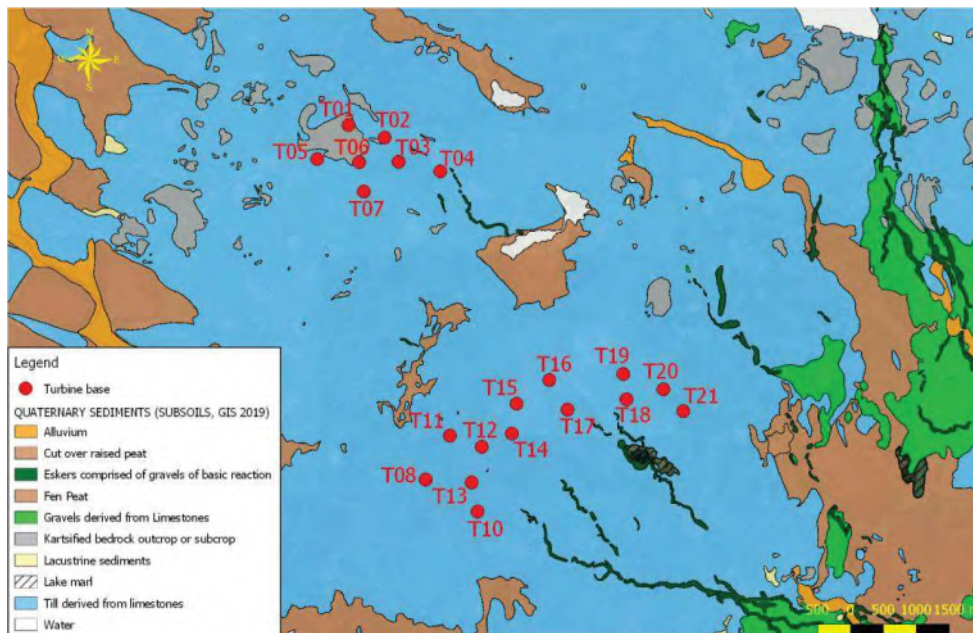


Fig 2.2: Quaternary sediments.

2.2.2 Geology and Karst

The GSI 1:100k Bedrock Geology map for the area (Figure 2.3) indicates that the site is underlain by undifferentiated Visean Limestones.

Several karst features, including springs, swallow holes, enclosed depressions and Turloughs are shown on the GSI karst database in the vicinity of the site. The closest karst features are indicated c. 500 m to the south of the site.

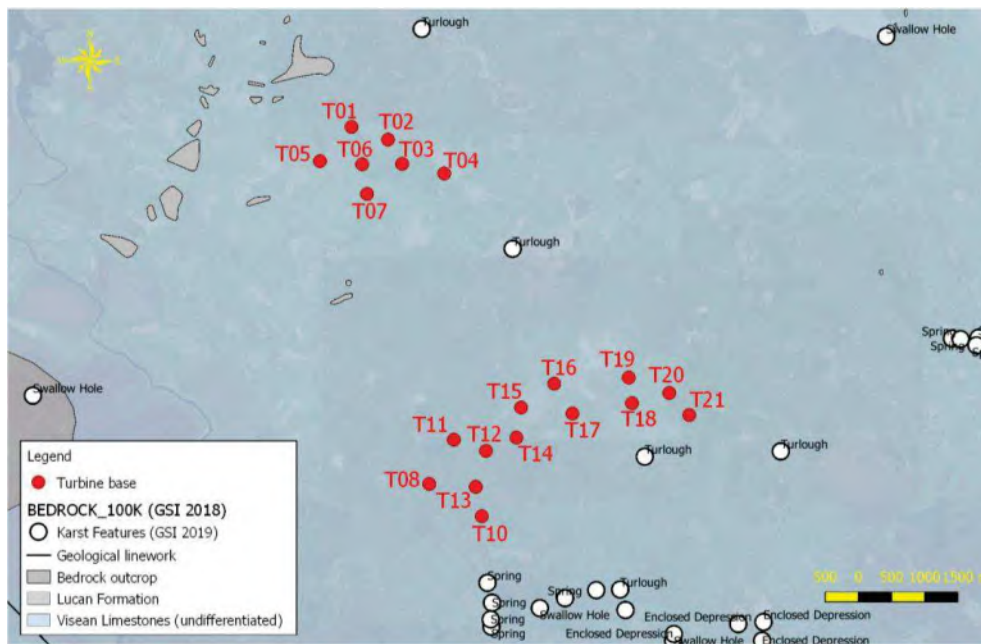


Fig 2.3: Bedrock geology.

2.2.3 Vulnerability and Aquifer Classification

The groundwater vulnerability rating for the site (Fig. 2.4) is classified as predominantly high in the southeast (turbines T08 to T21) and extreme to rock at or near surface or karst, in the northwest of the site (T01 to T07).

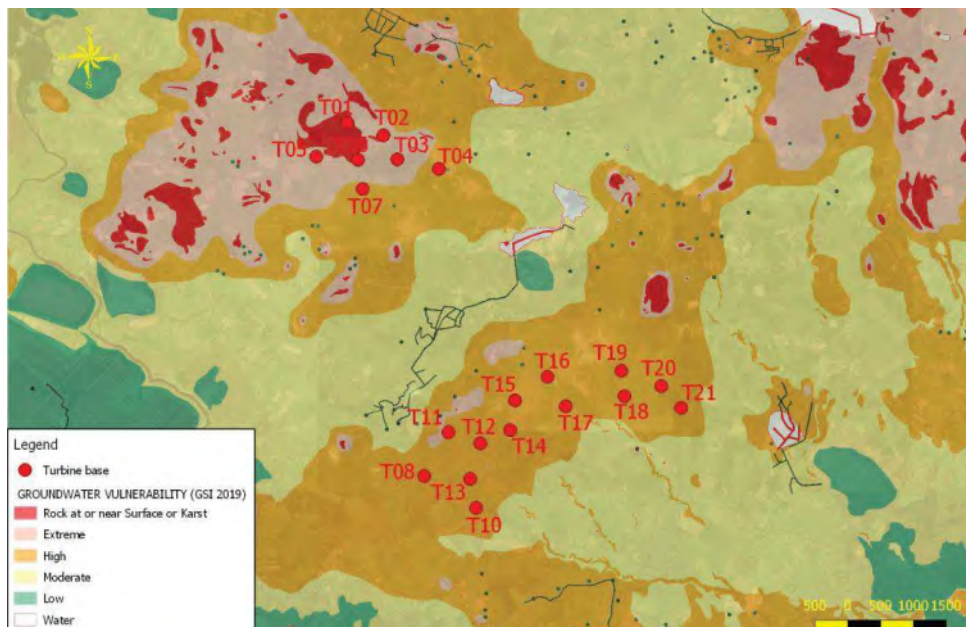


Fig 2.4: Groundwater vulnerability.

The Visean limestone is classified as a 'Regionally Important aquifer – karstified (conduit)' (GSI).'

2.2.4 Historical Data

The historical 6 inch sheet for the area (Fig. 2.5) indicates outcropping limestone in the northwest of the survey area.

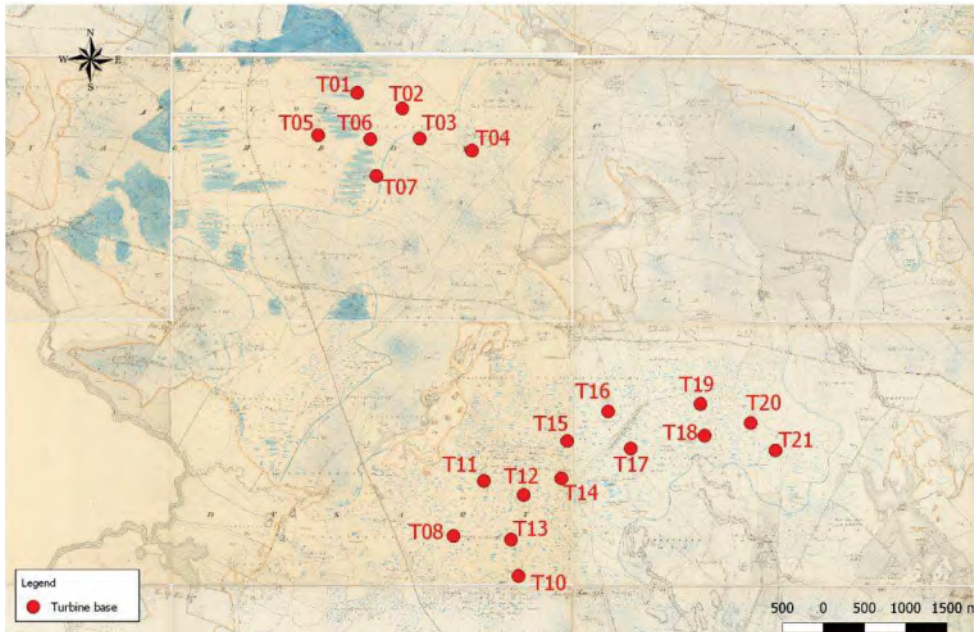


Fig 2.5: The historical 6inch map.

2.2.5 Direct Investigation Data

A suite of trial pits were completed across the site and generally encountered a sequence of soft-firm gravelly clay and loose to medium dense to dense clayey sandy gravel and cobbles to termination depths of up to 3.5m bgl.

Forty-six boreholes were completed at the site. Two boreholes were drilled at each turbine location, except for turbine T11, where four boreholes were completed. The borehole logs show the following general stratigraphy: overburden (sandy gravelly clay, clayey cobbly gravel, sandy cobbly gravel, clayey sandy cobbly gravel, sandy clay, gravelly sand and gravelly cobbles) over rock.

The depth to rock ranges from 1.3 to 9.6m bgl and the rock is described as strong to very strong, thickly to thinly bedded, dark grey/blueish grey, fine to medium grained limestone.

Rock was not encountered in the following boreholes: T02RC01, T03RC01 & RC02, T04RC02, T07RC01, T09RC01 & RC02, T20RC01 & RC02, T21 RC01 & RC02.

Borehole T11RC03 indicates possible karst infill at 12.3 m and 13.8m described as - returns of firm to stiff dark

brown sandy slightly gravelly clay and returns of very dark brown clayey sandy gravel, respectively.

Relevant borehole and trial pit data have been incorporated into the geophysical interpretation presented in this report. The location of the boreholes and trial pits are shown on the Drawings in Appendix C.

2.3 Survey Rationale

The investigation consisted of Electrical Resistivity Tomography (ERT), Seismic Refraction profiling and MASW:

ERT soundings image the resistivity of the materials in the subsurface along a profile to produce a pseudo-section showing the variation in resistivity to depths dependent on the length of the profile. Each pseudo-section is interpreted to determine the material type along the profile based on the typical resistivities returned for Irish ground materials.

Seismic Refraction Profiling measures the P-wave velocity 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 fractured materials have lower velocities. This method profiles the depth to the top of the stiff soils and bedrock and provides information on the quality/strength of the bedrock.

The **MASW** method is used to estimate shear-wave velocities (V_s) in the ground material. Overburden material with a $V_s < 175$ m/s is generally classified as soft/loose.

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 between the 2nd of December 2020 and 5th of March 2021 and involved the collection of 45 ERT profiles, 44 seismic refraction profiles and 1D MASW soundings at the centre of each seismic refraction profile. The geophysical survey locations are indicated on Drawings AGP20192_01_T01 to AGP20192_01_T12AR (Appendix D).

3.1 ERT

Two orthogonal resistivity profiles were recorded at each turbine location. Additional resistivity profiles (R1, R3, R4, R5) were recorded along sections of the access roads, indicated by the client. The locations are shown on Drawings AGP20192_01_T01 to AGP20192_01_T12AR (Appendix D).

The modelled resistivity values have been broadly interpreted in conjunction with the trial pit and borehole data on the following basis:

Resistivity (Ohm-m) *	Interpretation
<250	Sandy gravelly CLAY
250 – 500	Clayey sandy GRAVEL
500 – 1,100	Slightly clayey sandy GRAVEL/BOULDERS
300 - 500	Completely to highly weathered/karstified LIMESTONE**
500 – 1,100	Highly to moderately weathered/karstified LIMESTONE**
1,100 – 7,000	Slightly weathered to fresh LIMESTONE **

*While these ranges are a little broader than normal they allow for a good correlation with the client borehole data.

** While three rock types are interpreted across the site as a whole not all three types are present at all turbines. Specific interpreted rock types at each turbine are displayed on Drawings AGP20192_01_T01 to AGP20192_01_T12AR (Appendix D).

3.2 Seismic refraction profiling

Two seismic refraction spreads were recorded at each of the turbine locations and on the access roads. The profiles have been processed using tomographic inversion techniques to produce 2D P-wave seismic velocity (Vp) distribution profiles (presented in Appendix B) which were also converted into Vp layered models (used in the A4 summary sheets presented in Appendix D).

The range of Vp seismic velocities in the layered models have been interpreted in conjunction with the trial pit and borehole data as follows:

Seismic Velocity (m/s) *	Interpretation	Stiffness/ Rock Quality	Excavatability**
276 – 500	Soil	Soft / Loose	Diggable
500 – 1,000	Soil	Firm / Medium Dense	Diggable
1,000 – 1,800	Soil	Stiff/Dense	Diggable
1,800 – 2352	Soil	Very stiff/very dense	Diggable
800 – 1,051	Completely – Highly weathered ROCK	Poor	Rippable
1,051 – 2,480	Highly to moderately weathered ROCK	Fair to Good	Marginally Rippable - Break/Blast
2,480 – 5,786	Slightly weathered to fresh ROCK	Good - Excellent	Break/Blast – Heavy Break/Blast

*While these ranges are broader than normal for soil layers they allow for a good correlation with the client borehole data where the boreholes encountered thick overburden, while the seismic velocity may indicate shallower rock. This is addressed in more detail in Appendix D.

** The cut-off velocity for excavatability will be lower where excavation is in trenches.

3.3 MASW

Two MASW datasets were recorded at the centre of each seismic refraction spread and on the access roads. A 1D shear-wave velocity (V_s) profile of the soil was derived for each MASW dataset. The V_s values are indicative of the soil stiffness and material with a V_s value <175 m/s generally classified as indicating soft/loose material. V_s values and corresponding soil cohesion ranges are shown in Fig. 3.1.

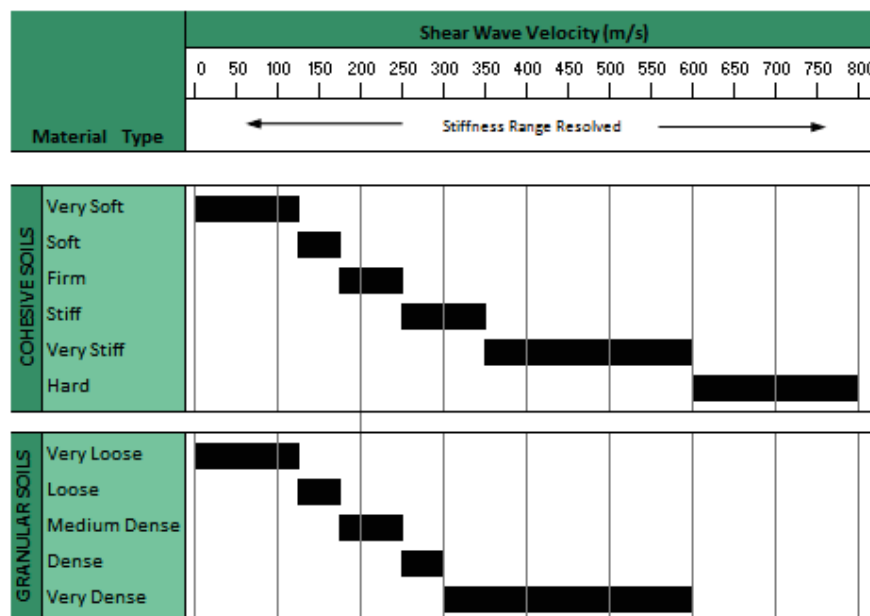


Fig.3.1. V_s velocity and corresponding soil cohesion.

A 1D Gmax profile was calculated (from the Vs values) for each turbine centre location using a soil density of 2000 kg/m³. The Vs and Gmax values are presented in Appendix D. The Vs values recorded across the site ranged from 198 – 546 indicating firm to stiff to very stiff cohesive soils or medium dense to dense to very dense granular soil.

4. RECOMMEDATIONS

Where 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. A more detailed discussion of velocity and excavatability is contained in Appendix C.

The findings of the geophysical investigation should be reviewed following any further direct investigations.

The normal mitigation measures applying to construction over karstic limestones, such as sealed drainage, and foundations capable of spanning voids that may come to the surface, should therefore be incorporated into any works.

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 GEOPHYSICAL 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)

Electrical Resistivity Tomography 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 Wenner resistivity array. The 2D-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 a Tigre resistivity meter, imaging software, two 32 takeout multicore cables and up to 64 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.

Seismic Refraction Profiling

Principles

This method measures the velocity 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 fractured materials have lower velocities.

Seismic profiling measures the p-wave velocity (V_p) 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 V_p velocities while soft, loose or fractured materials have lower V_p 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 10HZ vertical geophones and a 10 kg hammer were used to provide first break information, with a 24 take-out cable. Equipment was carried and 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.(eg. 69m profile ~23m depth, 33m profile ~ 11m depth).

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) traveltimes 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 may also occur (Soske, 1959).

Multichannel Analysis of Surface Waves (MASW)

Principles

The Multi-channel Analysis of Surface Waves (MASW) (Park et al., 1998, 1999) utilizes Surface waves (Rayleigh waves) to determine the elastic properties of the shallow subsurface (<15m). Surface waves carry up to two-thirds of the seismic energy but are usually considered as noise in conventional body wave reflection and refraction seismic surveys. The penetration depth of surface waves changes with wavelength, i.e. longer wavelengths penetrate deeper. When the elastic properties of near surface materials vary with depth, surface waves then become dispersive, i.e. propagation velocity changes with frequency. The propagation (or phase) velocity is determined by the average elastic property of the medium within the penetration depth. Therefore the dispersive nature of surface waves may be used to investigate changes in elastic properties of the shallow subsurface. The MASW method employs multi-channel recording and processing techniques (Sheriff and Geldart, 1982) that have similarities to those used in a seismic reflection survey and which allow better waveform analysis and noise elimination.

To produce a shear wave velocity (Vs) profile and a stiffness profile of the subsurface using Surface waves the following basic procedure is followed:

- (i) A point source (eg. a sledgehammer) is used to generate vertical ground motions,

- (ii) The ground motions are measured using low frequency geophones, which are disposed along a straight line directed toward the source,
- (iii) the ground motions are recorded using either a conventional seismograph, oscilloscope or spectrum analyzer,
- (iv) a dispersion curve is produced from a spectral analysis of the data showing the variation of Surface wave velocity with wavelength,
- (iv) the dispersion curve is inverted using a modelling and least squares minimization process to produce a subsurface profile of the variation of Surface wave and shear wave velocity with depth.

Data Collection

The recording equipment consisted of a Geode 24 channel digital seismograph, 24 no. 10HZ vertical geophones, hammer energy source with mounted trigger and a 24 take-out cable.

Data Processing

MASW processing was carried out using the SURFSEIS processing package developed by Kansas Geological Survey (KGS, 2000). SURFSEIS is designed to generate a shear wave (Vs) velocity profile.

SURFSEIS data processing involves three steps:

- (i) Preparation of the acquired multichannel record. This involves converting data file into the processing format.
- (ii) Production of a dispersion curve from a spectral analysis of the data showing the variation of Raleigh wave phase velocity with wavelength. Confidence in the dispersion curve can be estimated through a measure of signal to noise ratio (S/N), which is obtained from a coherency analysis. Noise includes both body waves and higher mode surface waves. To obtain an accurate dispersion curve the spectral content and phase velocity characteristics are examined through an overtone analysis of the data.
- (iii) Inversion of the dispersion curve is then carried out to produce a subsurface profile of the variation of shear wave velocity with depth.
- (iv) The Gmax values are calculated at each S-wave location using an soil density of 2,000Kg/m³. The Gmax calculation is:

$$G_{max} \text{ (Mpa)} = V_s^2 * (\rho / 1000000),$$

where; Vs = Shear Wave (S-wave) Velocity (m/s) and ρ = Density (kg/m³).

Spatial Relocation

All the geophysical investigation locations were acquired using a Trimble Geo 7X high-accuracy GNSS handheld system using the settings listed below. This system allows collection of GPS data with c.20mm accuracy.

Coordinate zone:	Irish Transverse Mercator (ITM)
Datum:	Ordnance
Coordinate units:	Metres
Altitude units:	Metres
Survey altitude reference:	MSL
Geoid model:	Republic of Ireland

APPENDIX B: SEISMIC REFRACTION TOMOGRAPHIC DATA

The seismic refraction tomographic plates used in preparation of the turbine A4 summary sheets are shown below.

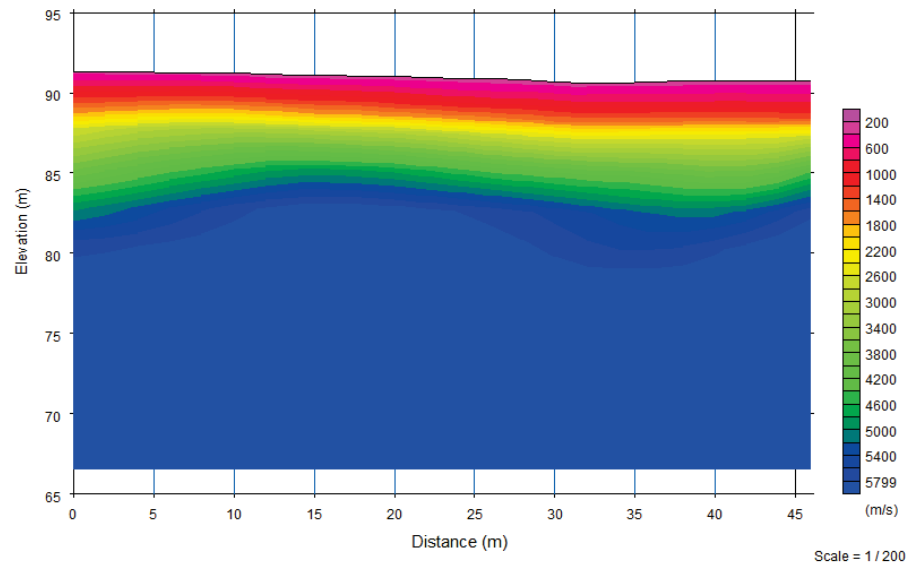


Fig B.1: Turbine T01 tomographic inversion for T01_S01.

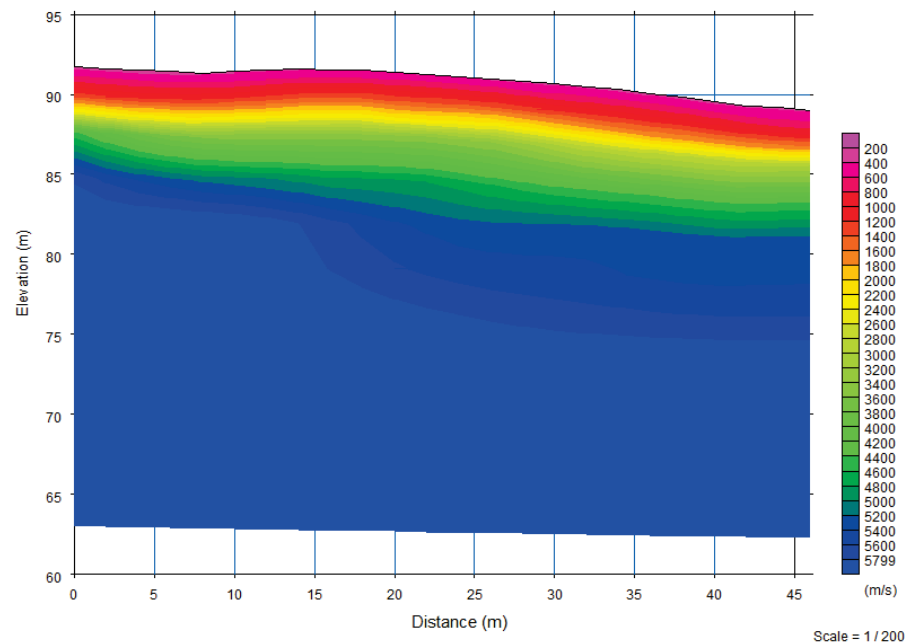


Fig B.2: Turbine T01 tomographic inversion for T01_S02.

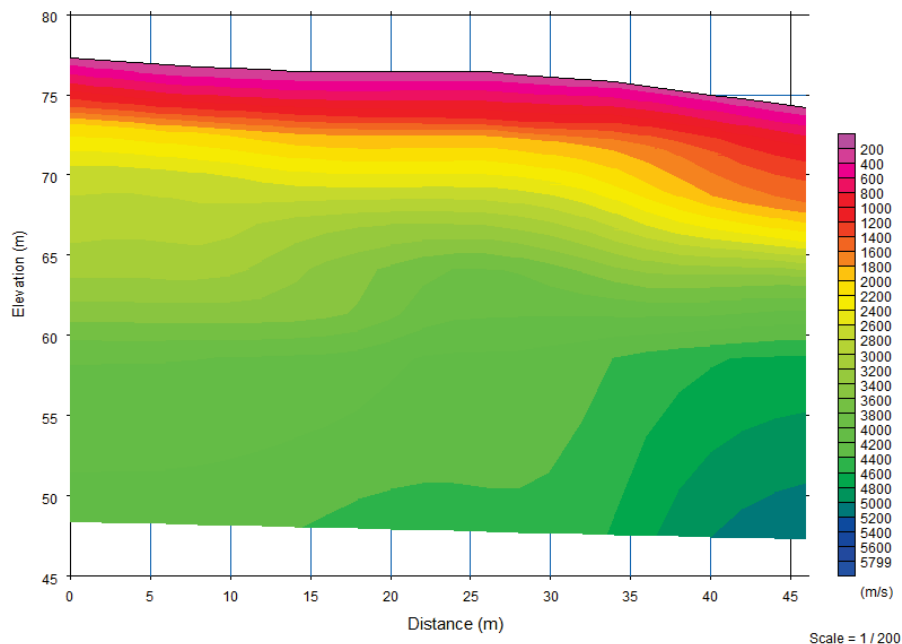


Fig B.3: Turbine T02 tomographic inversion for T02_S01.

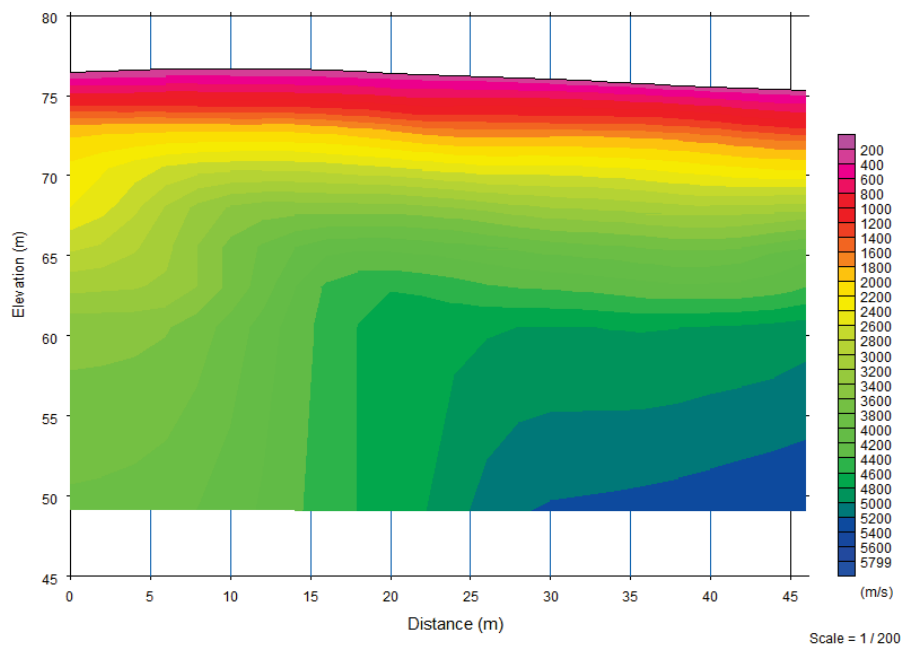


Fig B.4: Turbine T02 tomographic inversion for T02_S02.

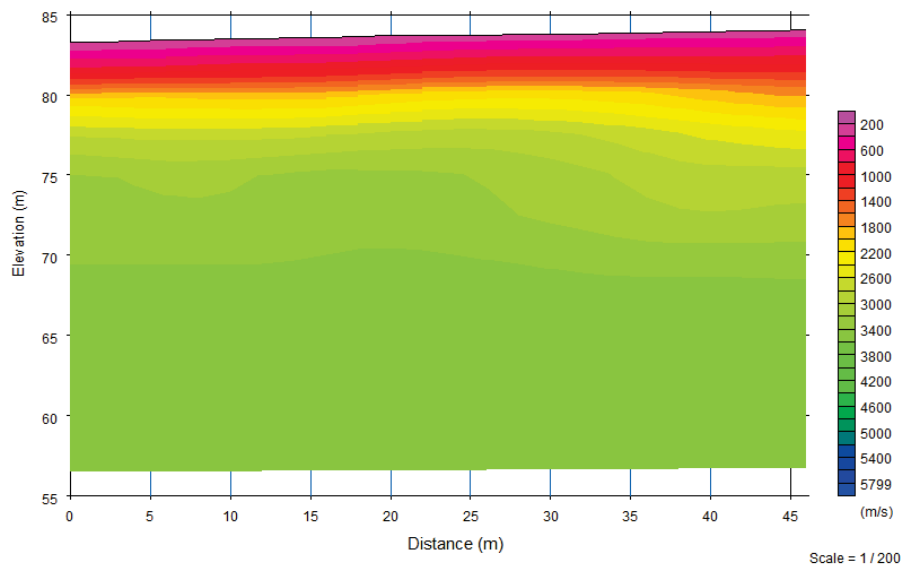


Fig B.5: Turbine T03 tomographic inversion for T03_S01.

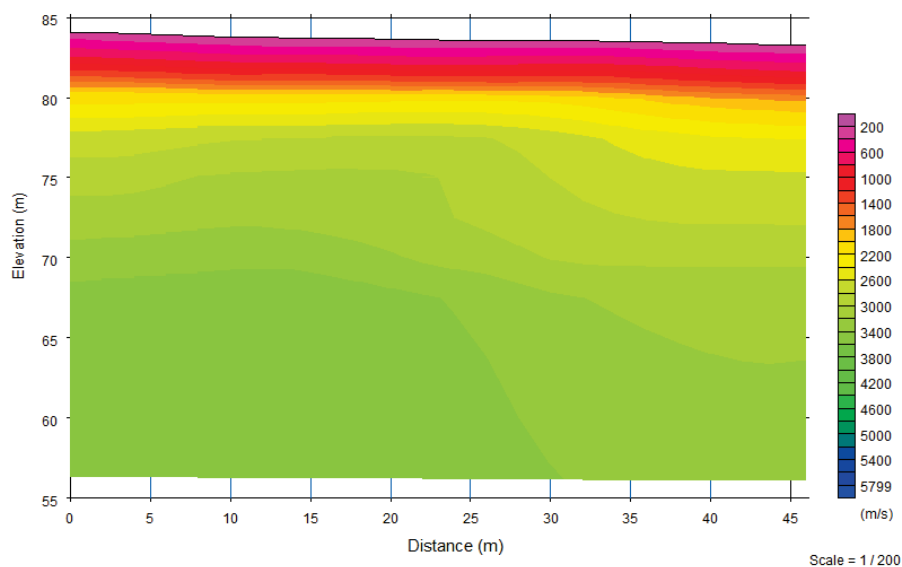


Fig B.6: Turbine T03 tomographic inversion for T03_S02.

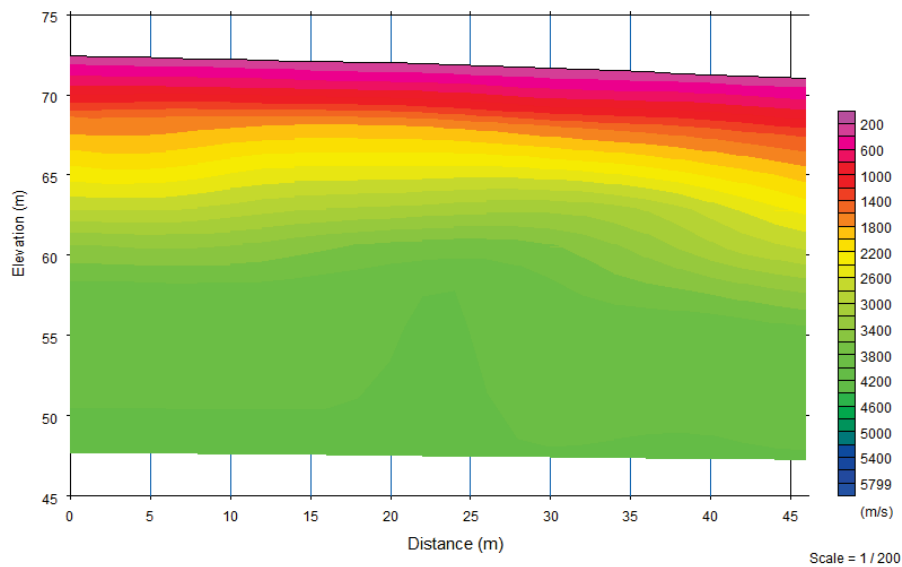


Fig B.7: Turbine T04 tomographic inversion for T04_S01.

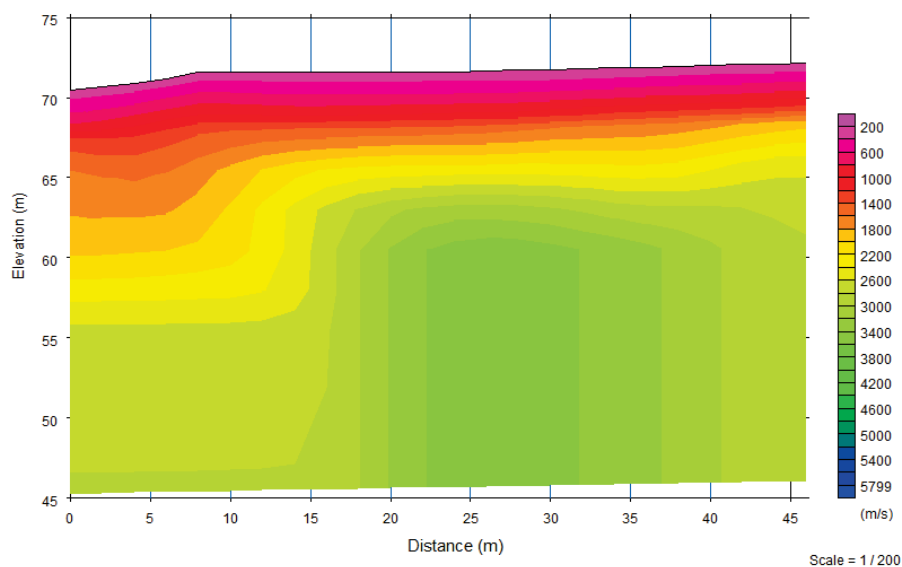


Fig B.8: Turbine T04 tomographic inversion for T04_S02.

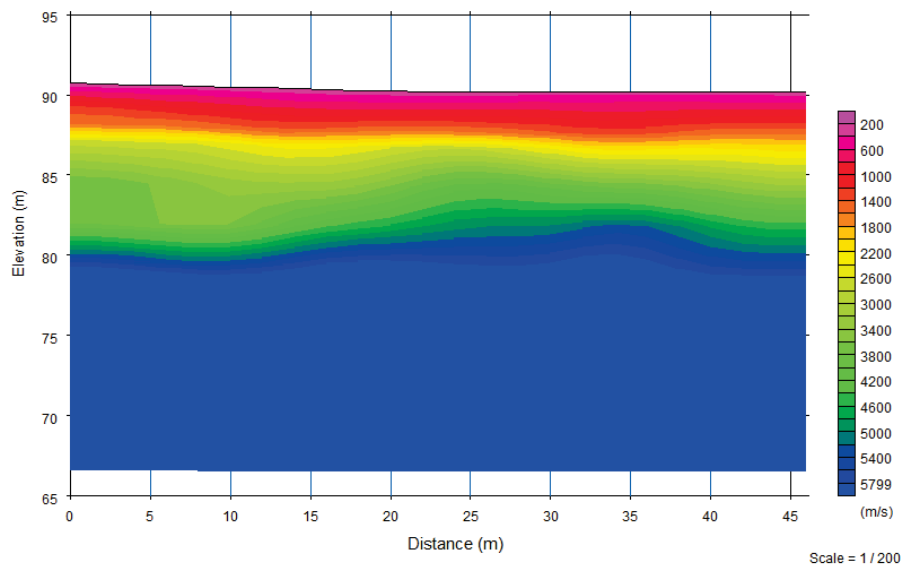


Fig B.9: Turbine T05 tomographic inversion for T05_S01.

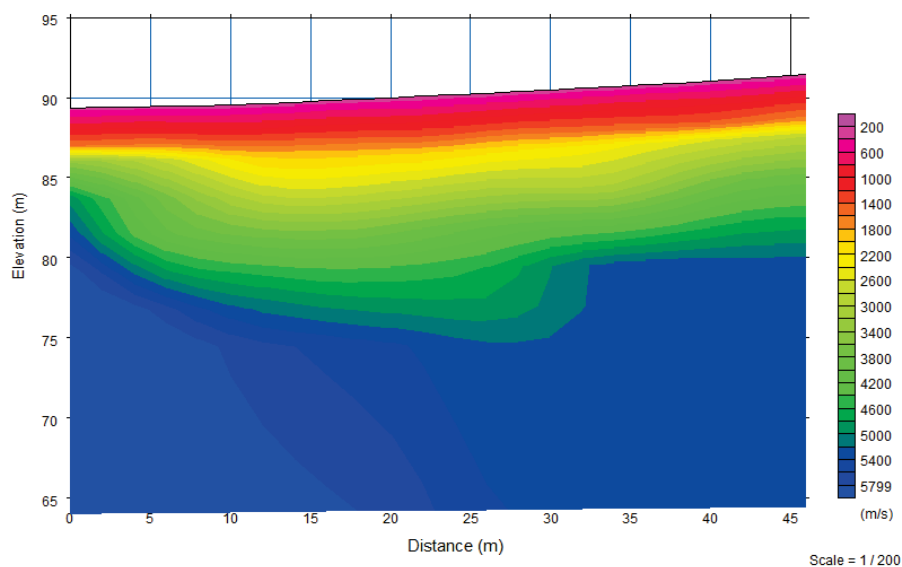


Fig B.10: Turbine T05 tomographic inversion for T05_S02.

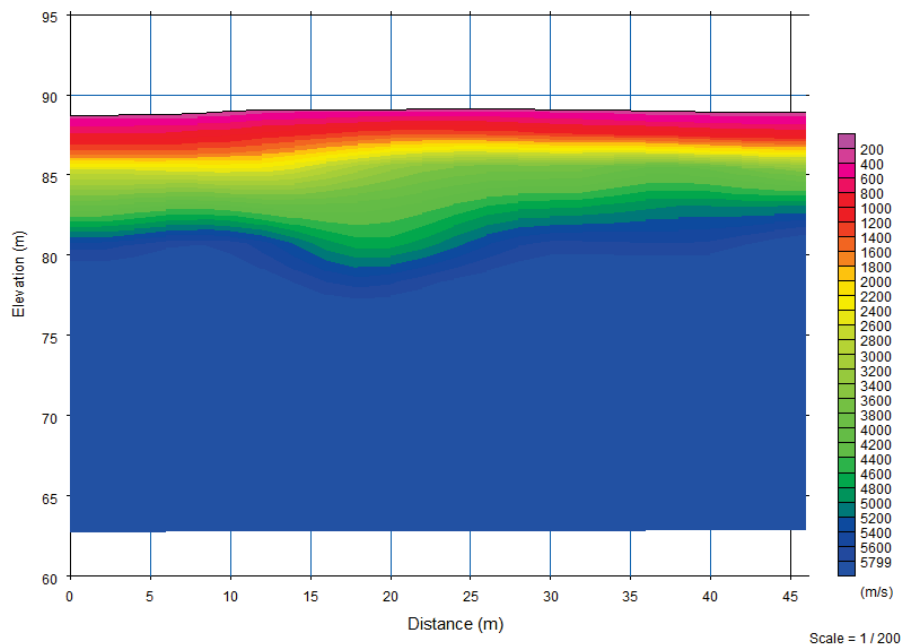


Fig B.11: Turbine T06 tomographic inversion for T06_S01.

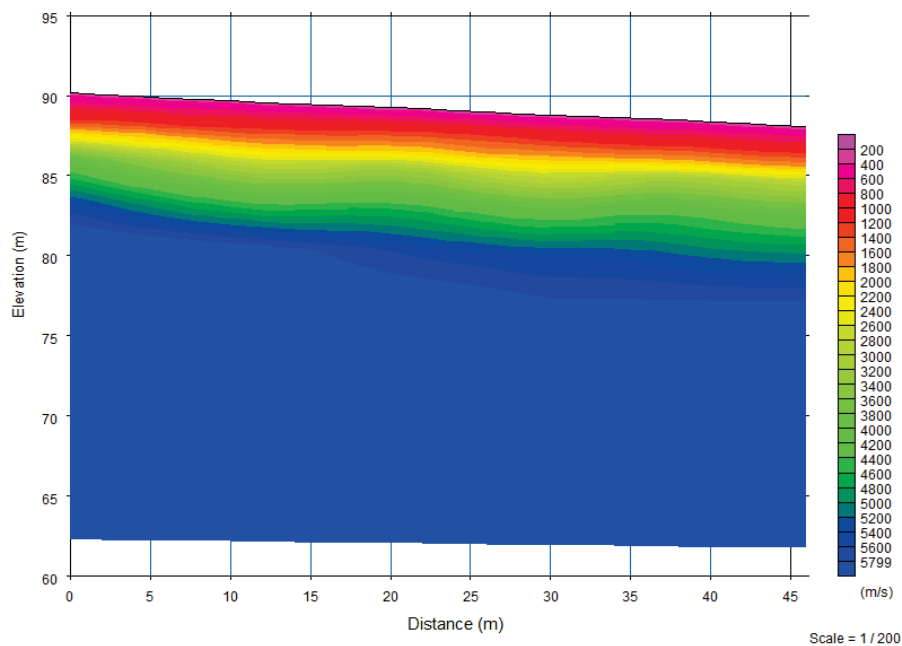


Fig B.12: Turbine T06 tomographic inversion for T06_S02.

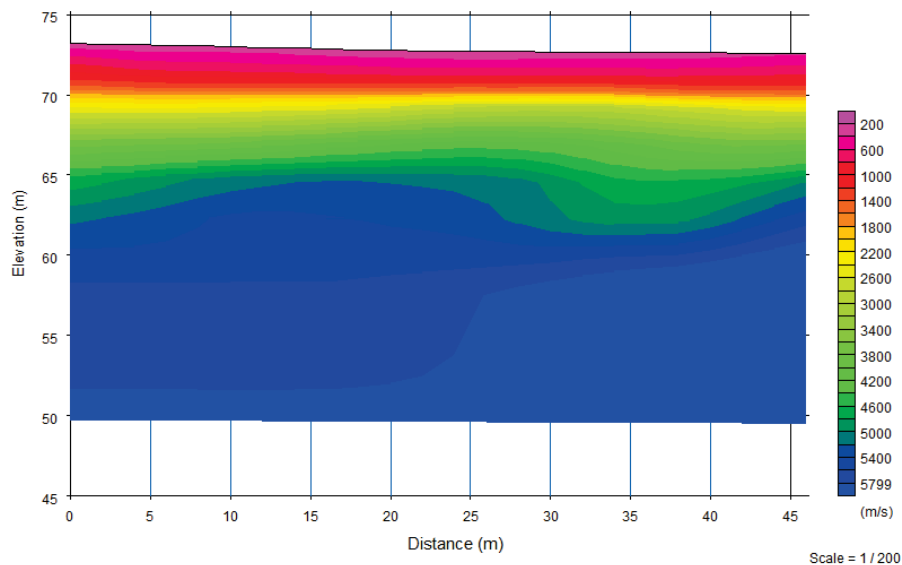


Fig B.13: Turbine T07 tomographic inversion for T07_S01.

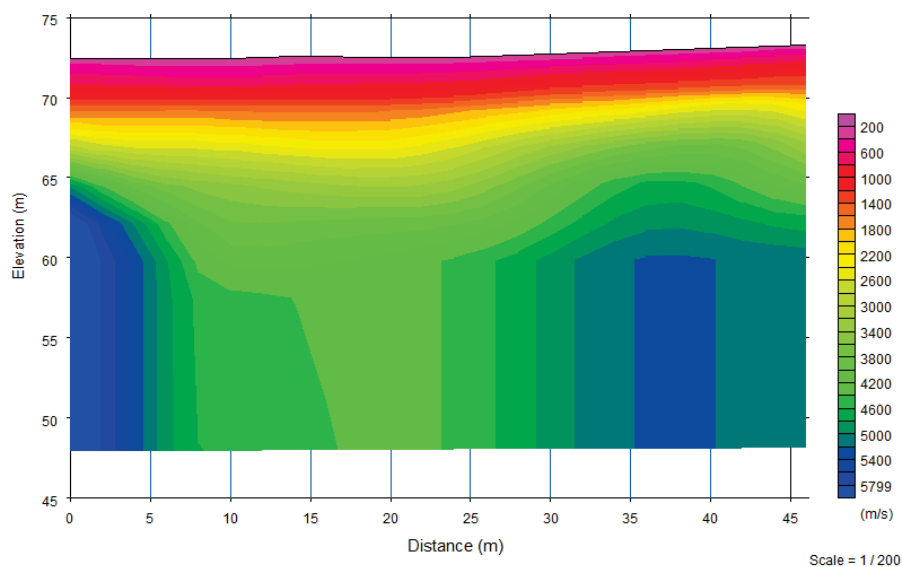


Fig B.14: Turbine T07 tomographic inversion for T07_S02.

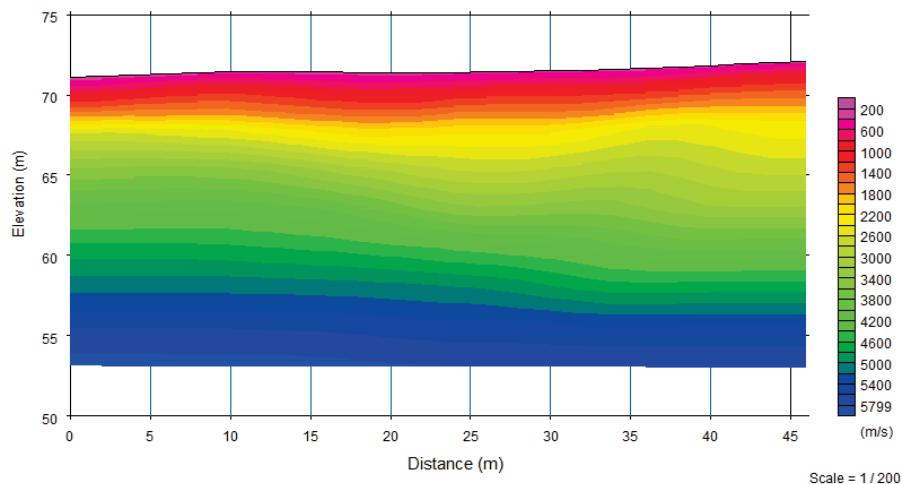


Fig B.15: Turbine T08 tomographic inversion for T08_S01.

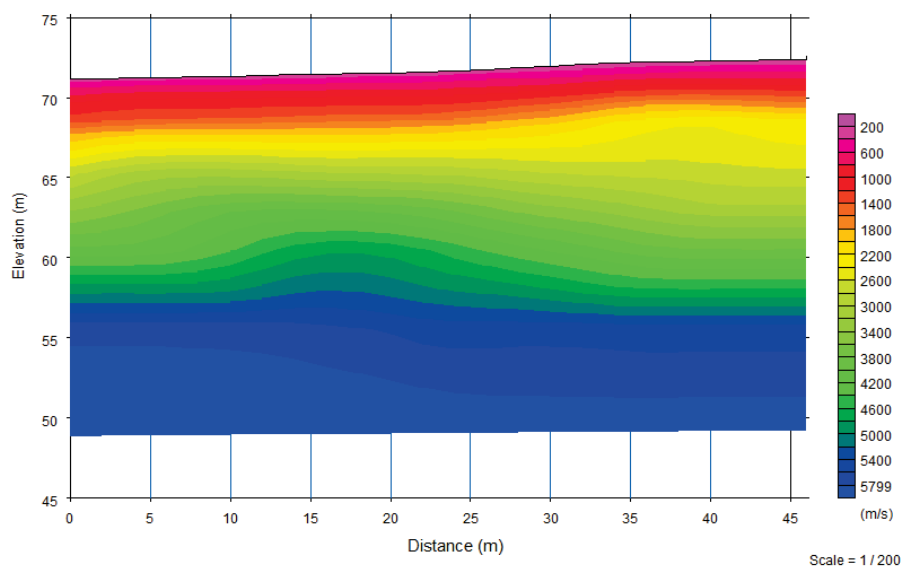


Fig B.16: Turbine T08 tomographic inversion for T08_S02.

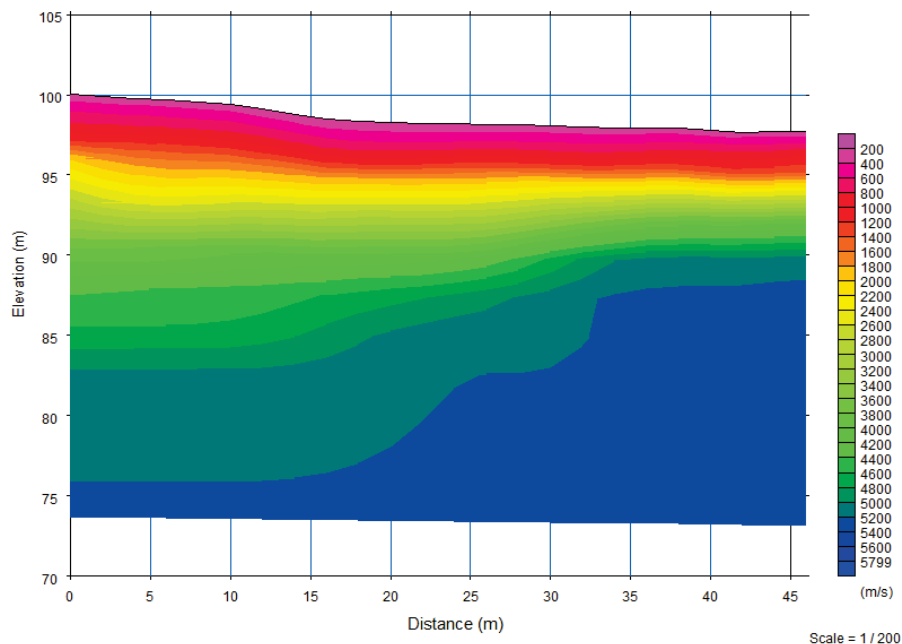


Fig B.17: Turbine T10 tomographic inversion for T10_S01.

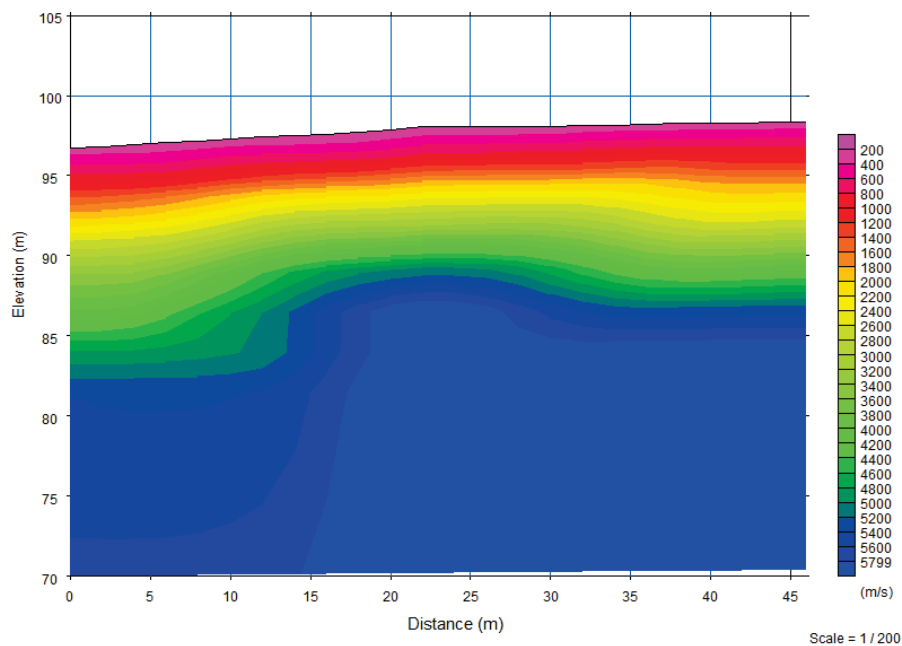


Fig B.18: Turbine T10 tomographic inversion for T10_S02.

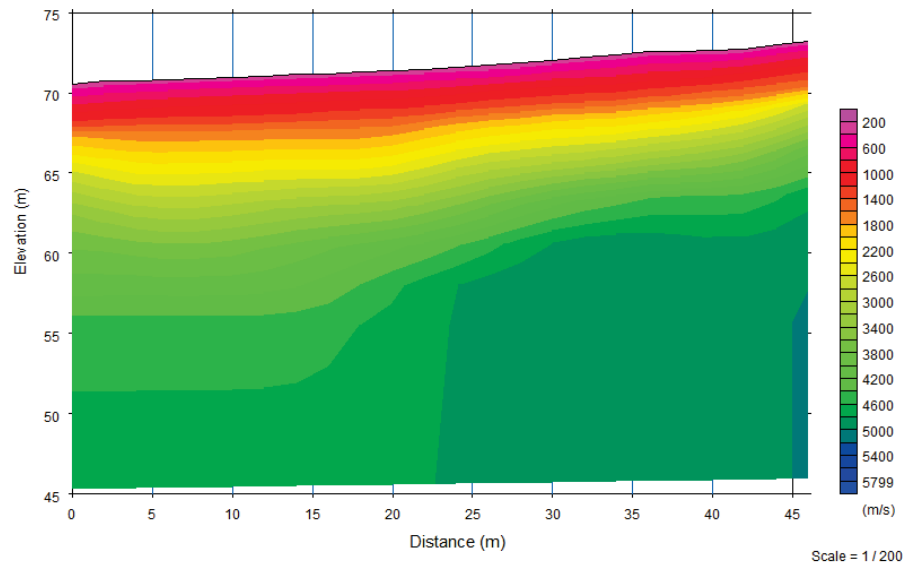


Fig B.19: Turbine T11 tomographic inversion for T11_S01.

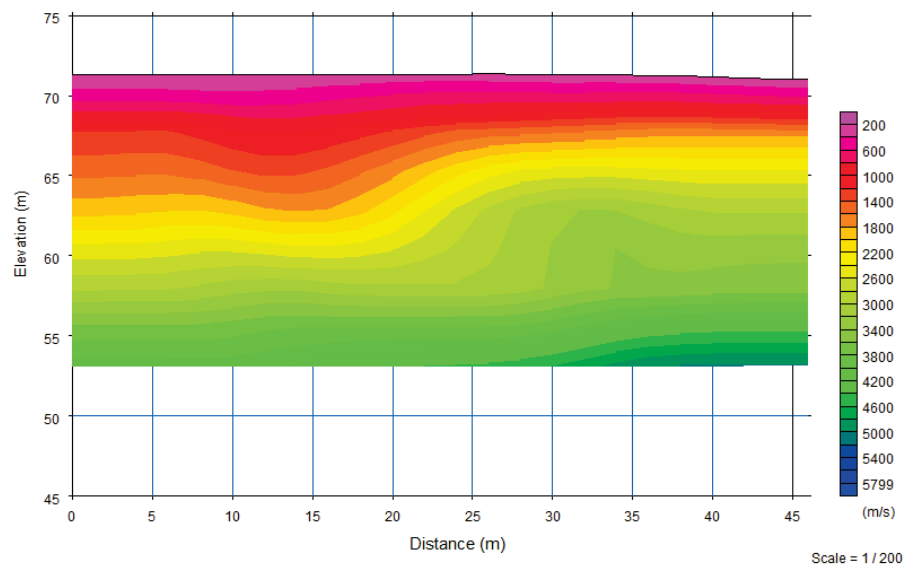


Fig B.20: Turbine T11 tomographic inversion for T11_S02.

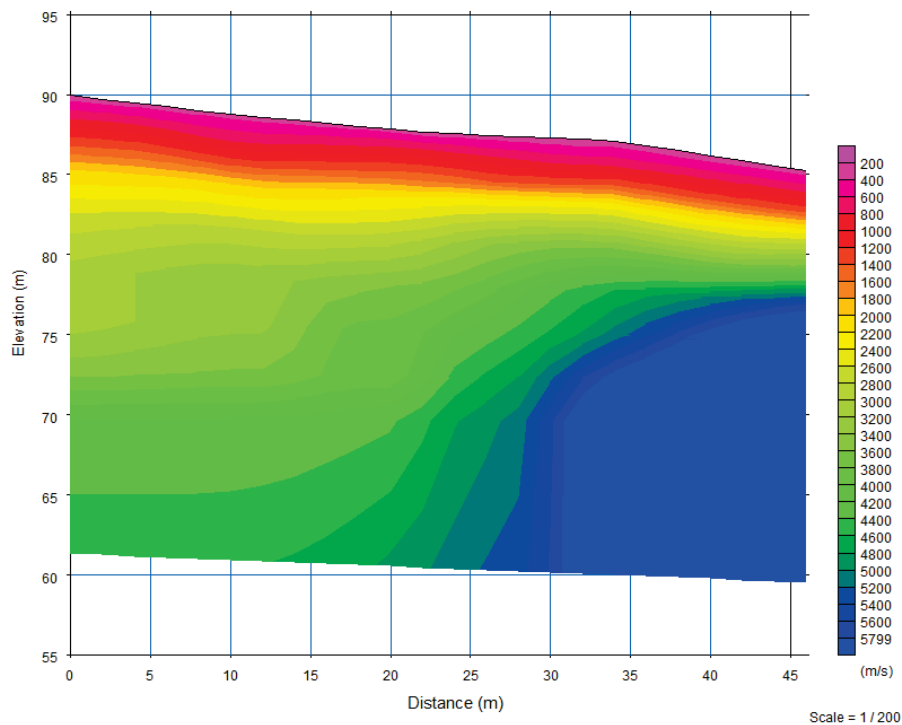


Fig B.21: Turbine T12 tomographic inversion for T12_S01.

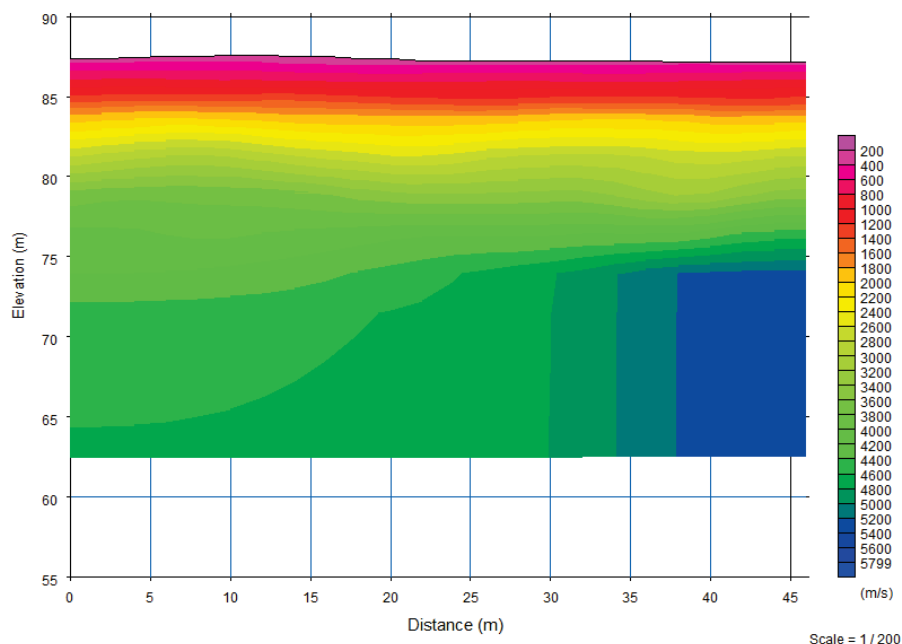


Fig B.22: Turbine T12 tomographic inversion for T12_S02.

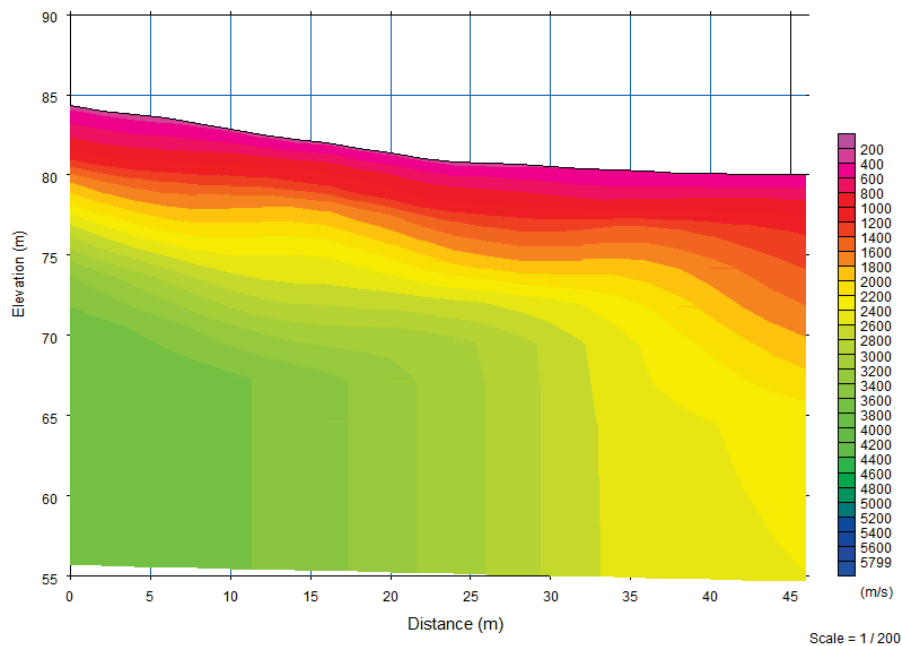


Fig B.23: Turbine T13 tomographic inversion for T13_S01.

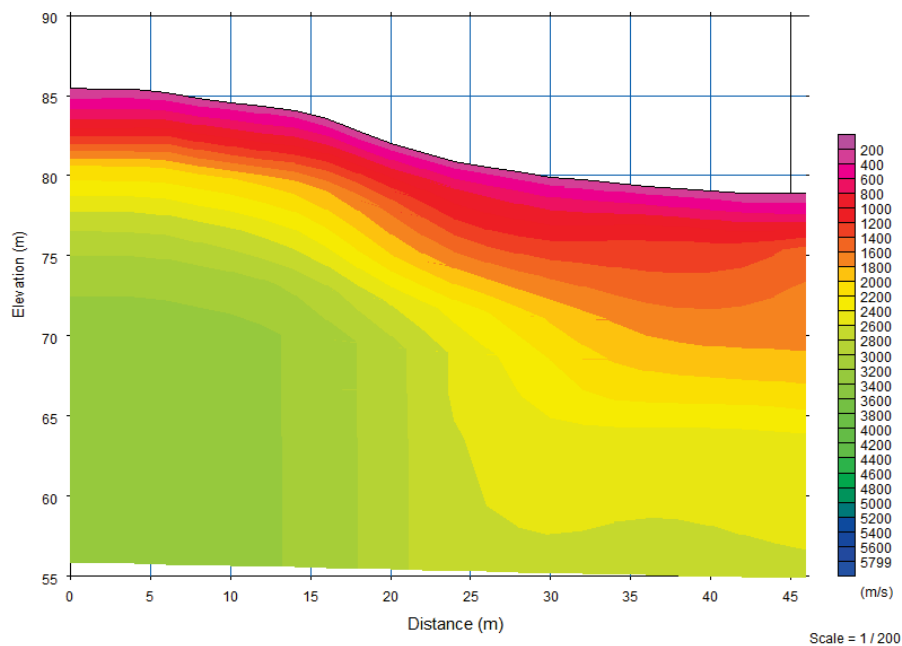


Fig B.24: Turbine T13 tomographic inversion for T13_S02.

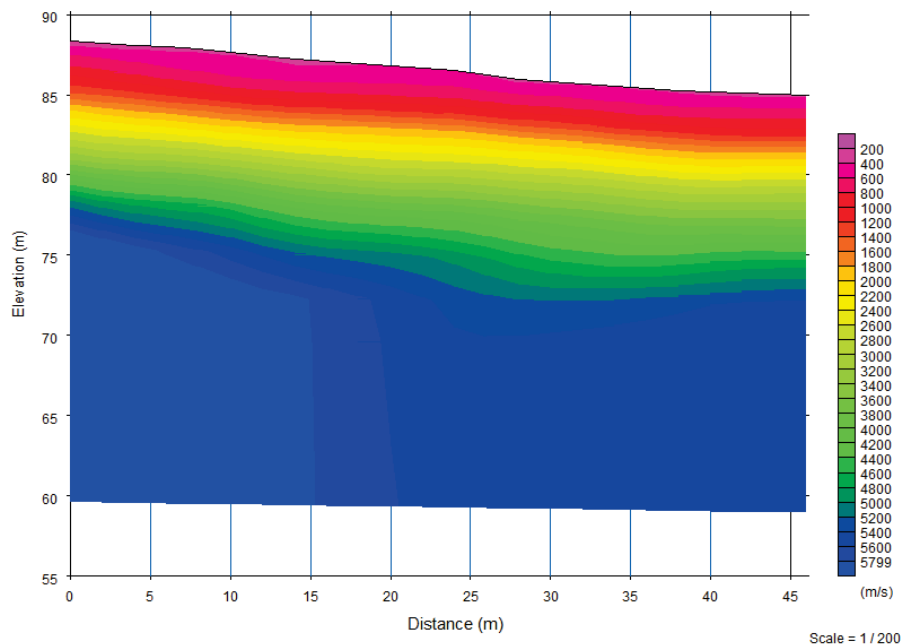


Fig B.25: Turbine T14 tomographic inversion for T14_S01.

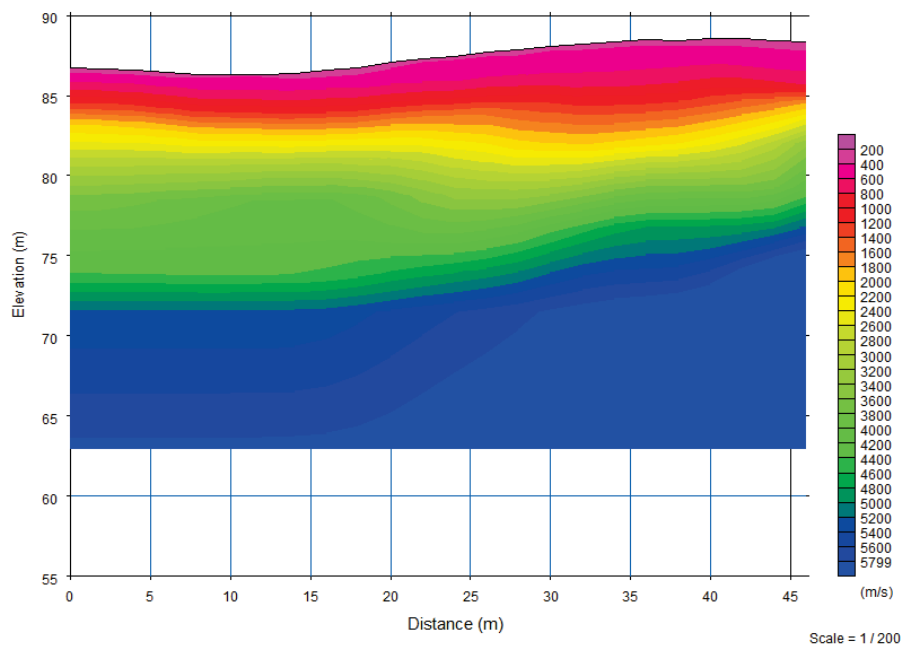


Fig B.26: Turbine T14 tomographic inversion for T14_S02.

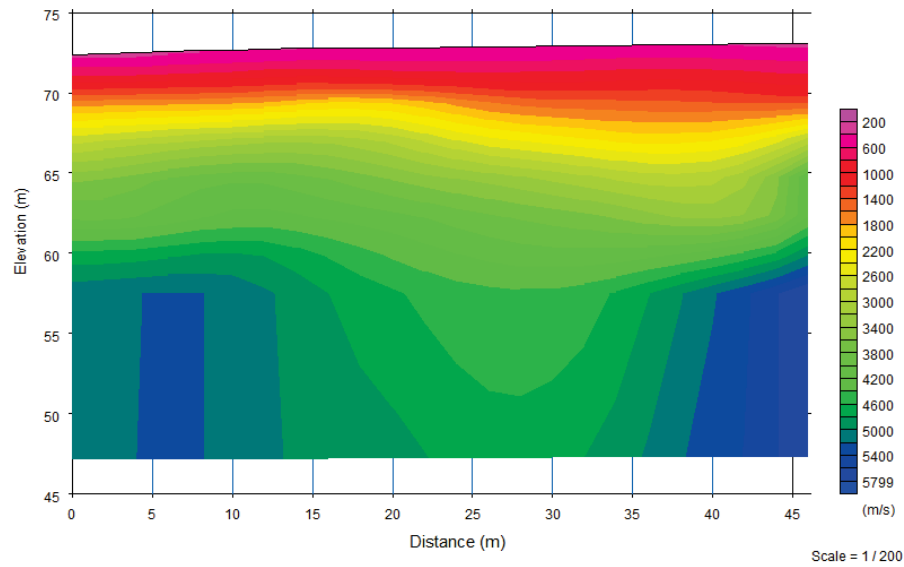


Fig B.27: Turbine T15 tomographic inversion for T15_S01.

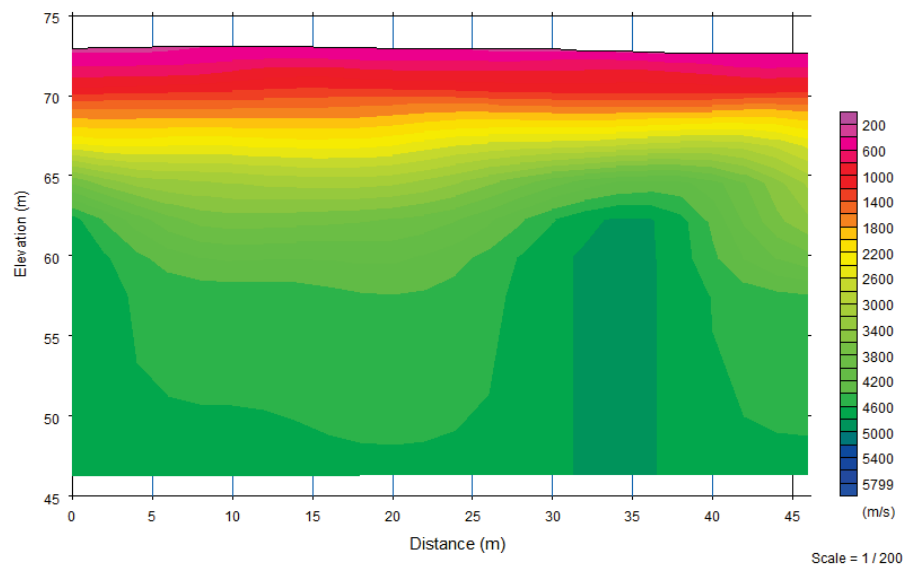


Fig B.28: Turbine T15 tomographic inversion for T15_S02.

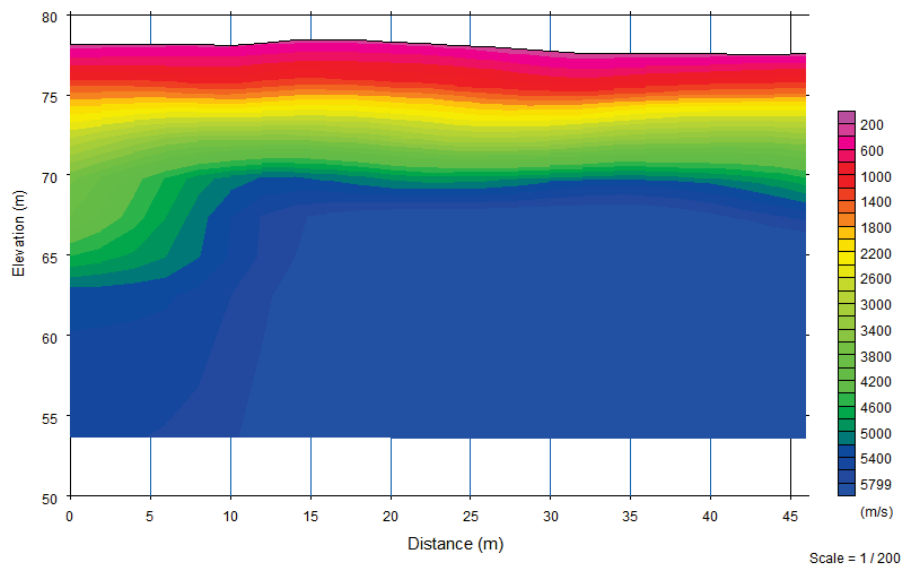


Fig B.29: Turbine T16 tomographic inversion for T16_S01.

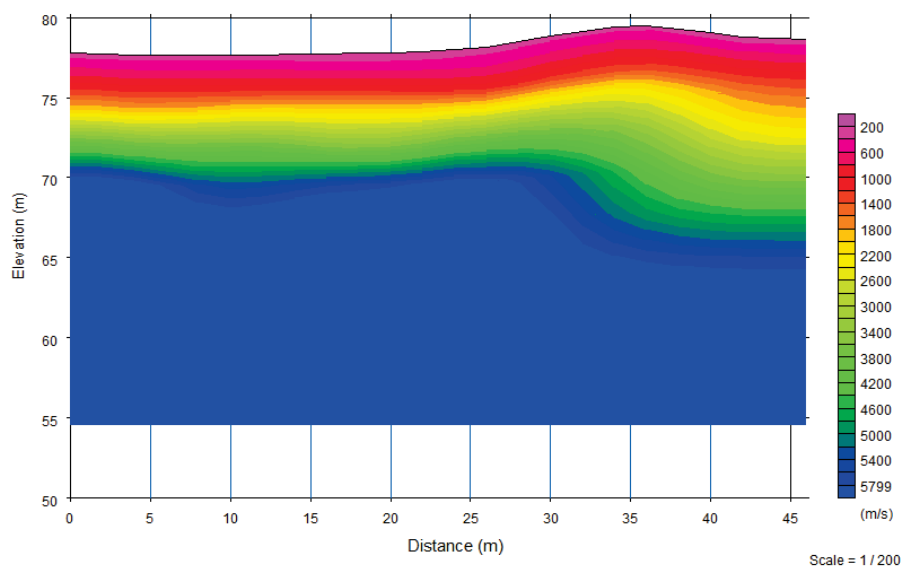


Fig B.30: Turbine T16 tomographic inversion for T16_S02.

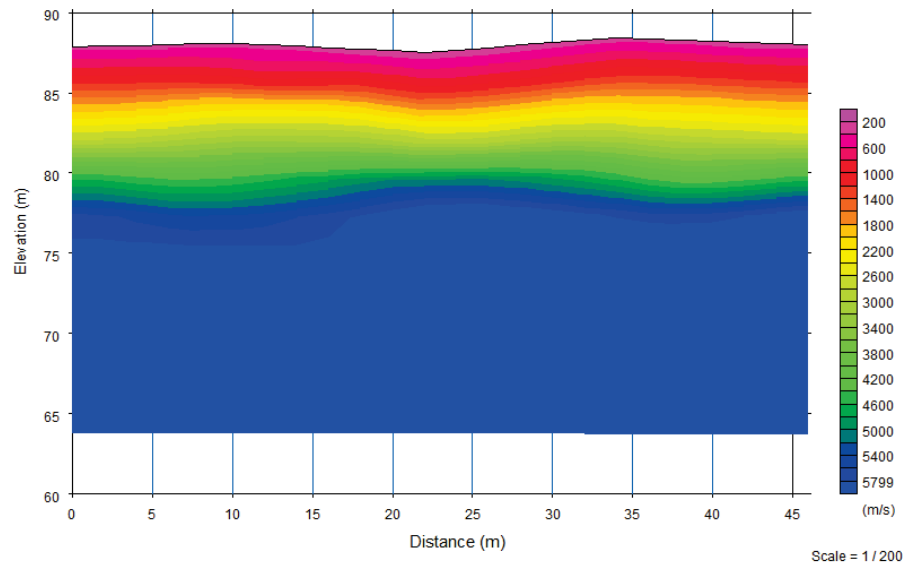


Fig B.31: Turbine T17 tomographic inversion for T17_S01.

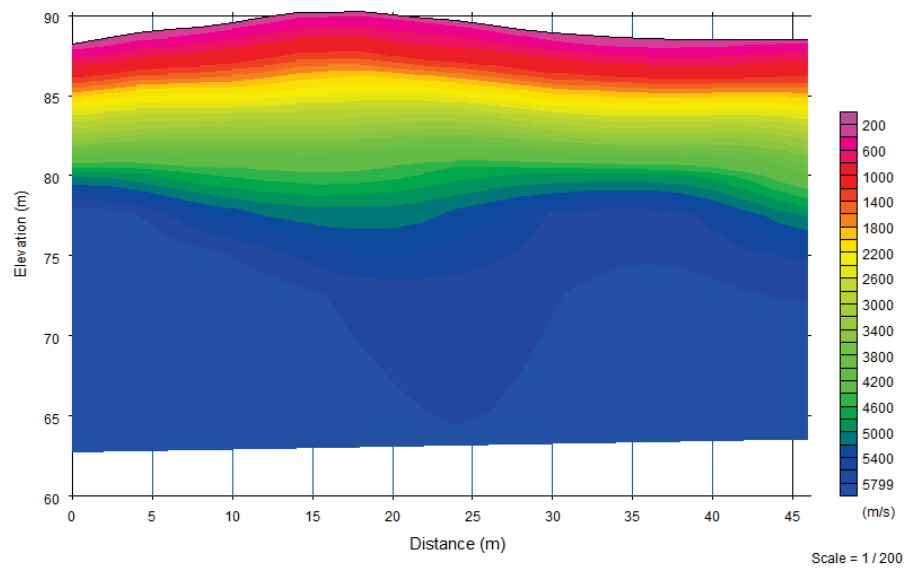


Fig B.32: Turbine T17 tomographic inversion for T17_S02.

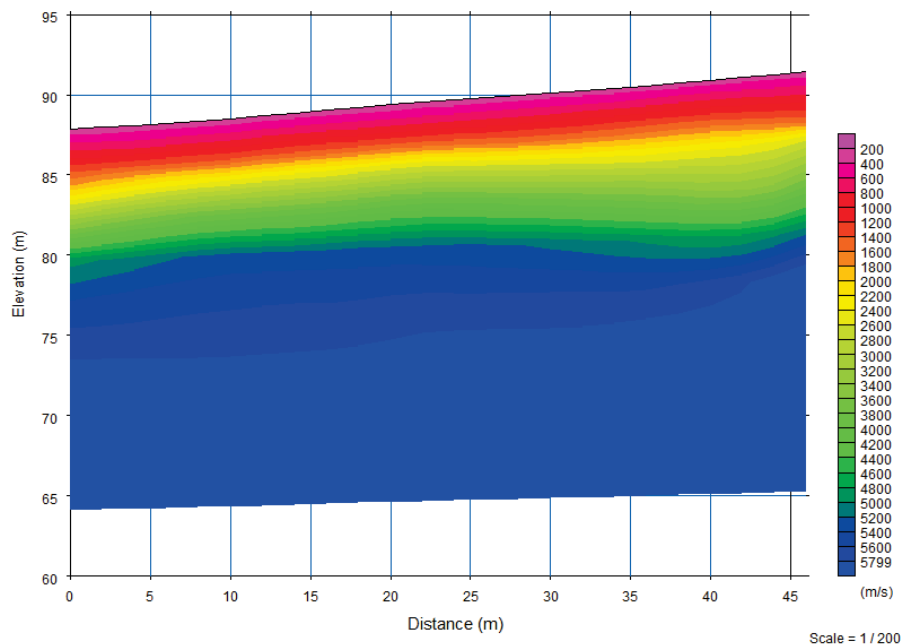


Fig B.33: Turbine T18 tomographic inversion for T18_S01.

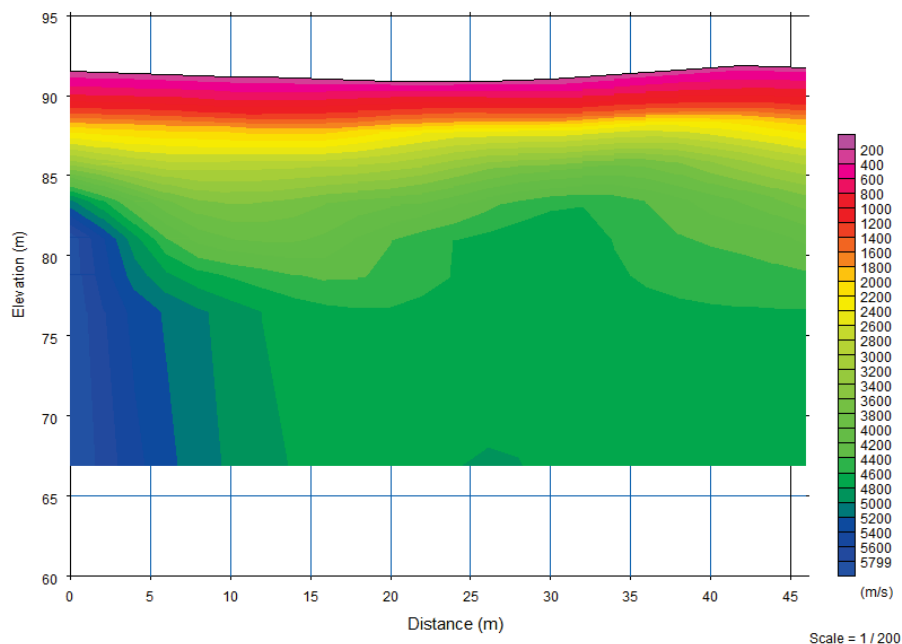


Fig B.34: Turbine T18 tomographic inversion for T18_S02.

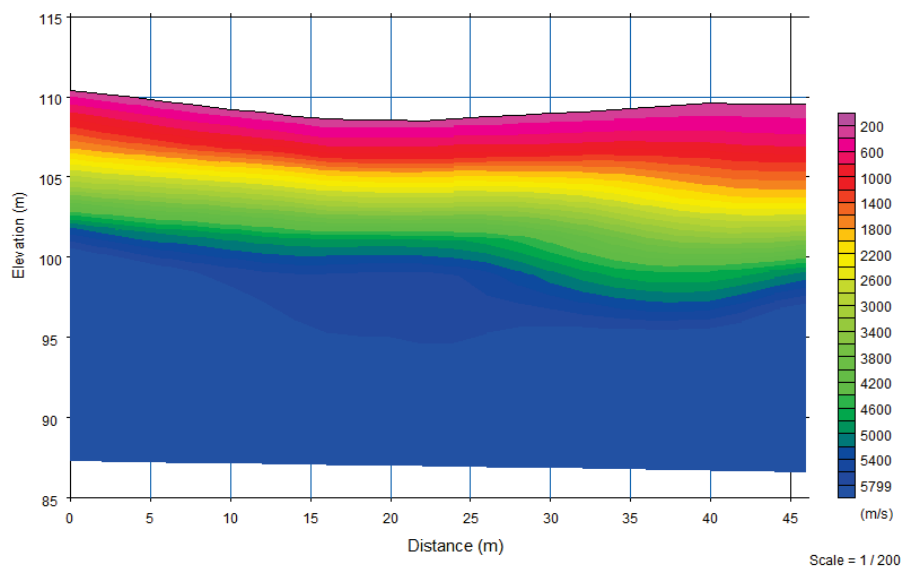


Fig B.35: Turbine T19 tomographic inversion for T19_S01.

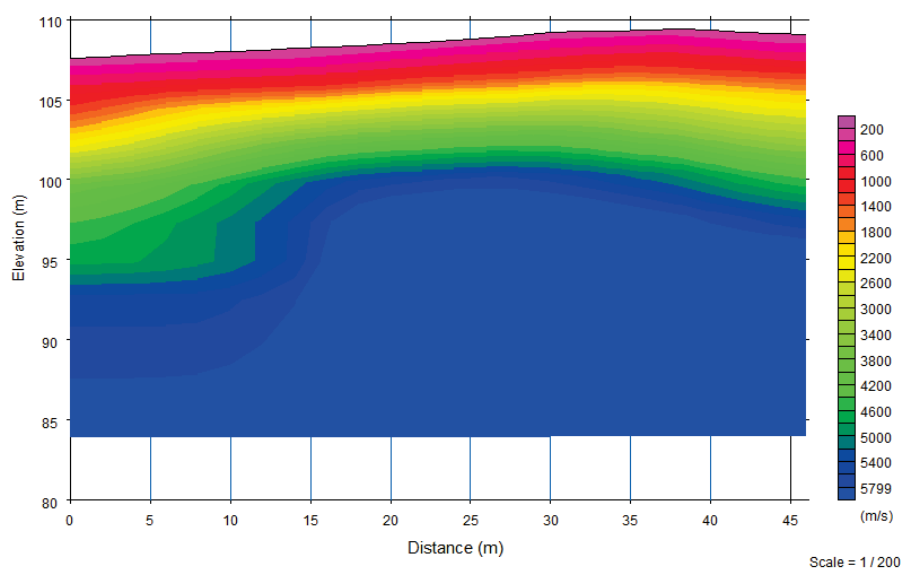


Fig B.36: Turbine T19 tomographic inversion for T19_S02.

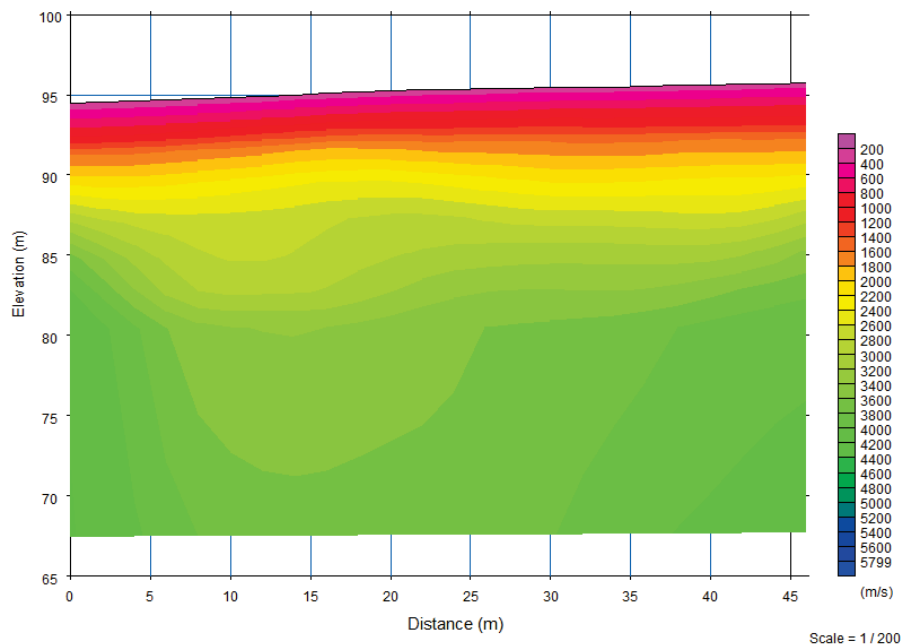


Fig B.37: Turbine T20 tomographic inversion for T20_S01.

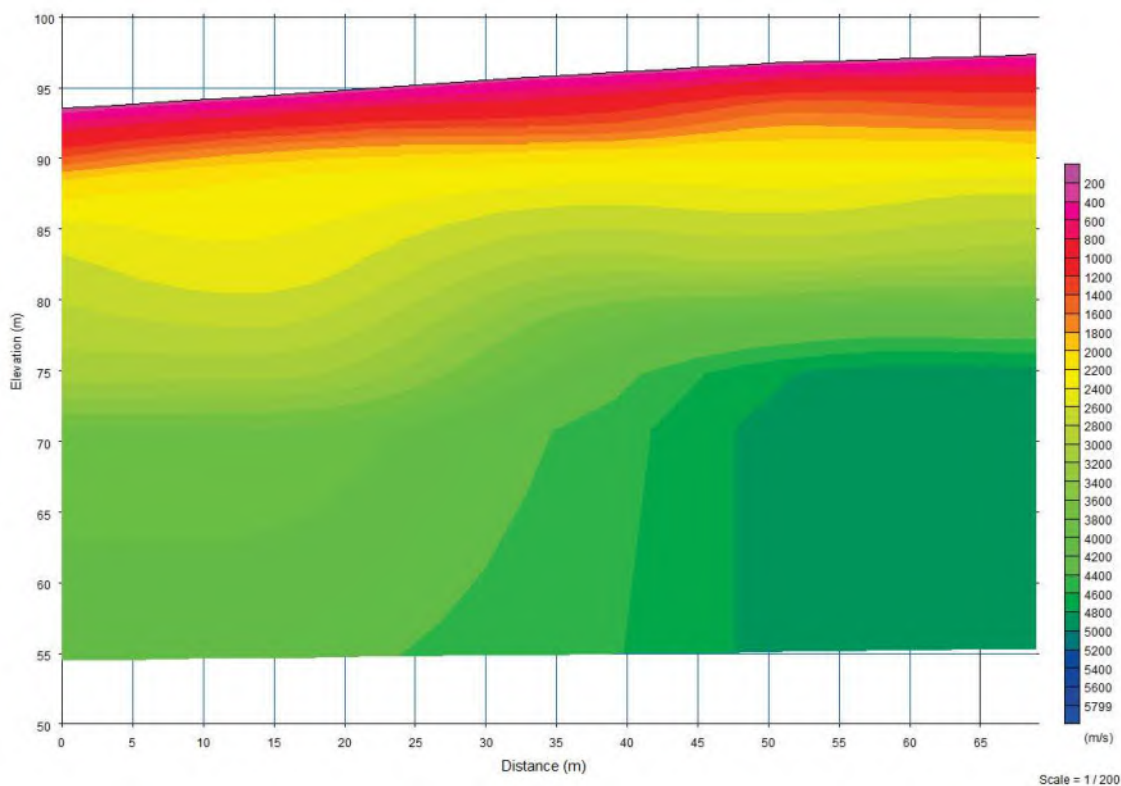


Fig B.38: Turbine T20 tomographic inversion for T20_S02.

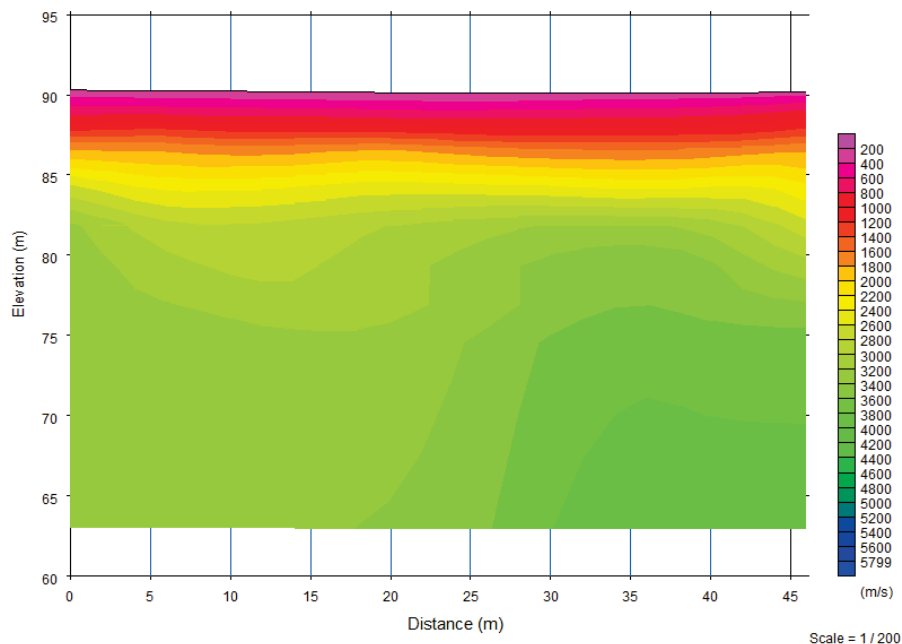


Fig B.39: Turbine T21 tomographic inversion for T21_S01.

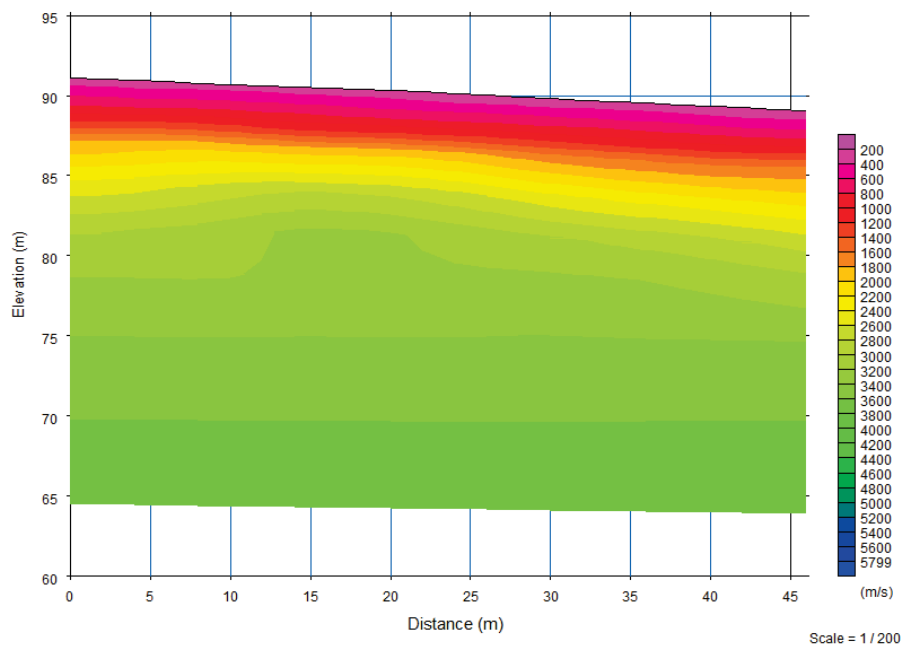


Fig B.40: Turbine T21 tomographic inversion for T21_S02.

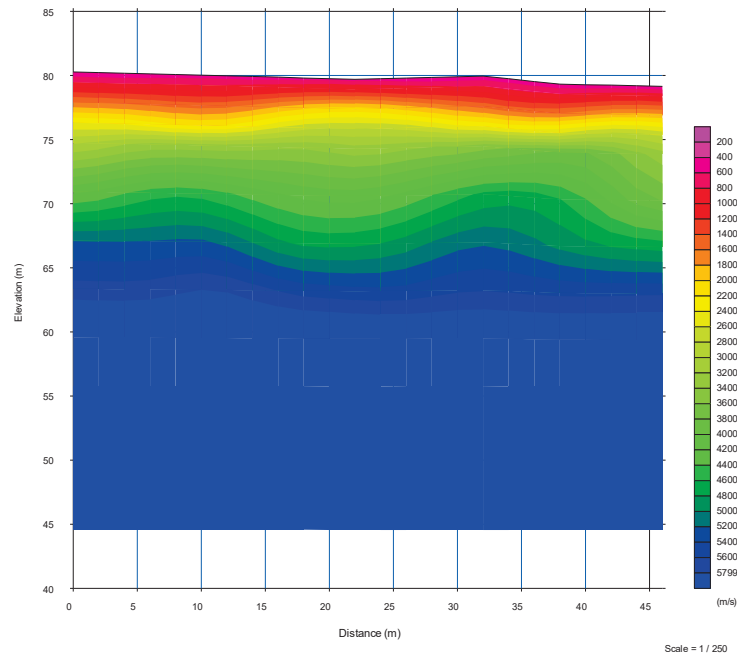


Fig B.41: Tomographic inversion for S01.

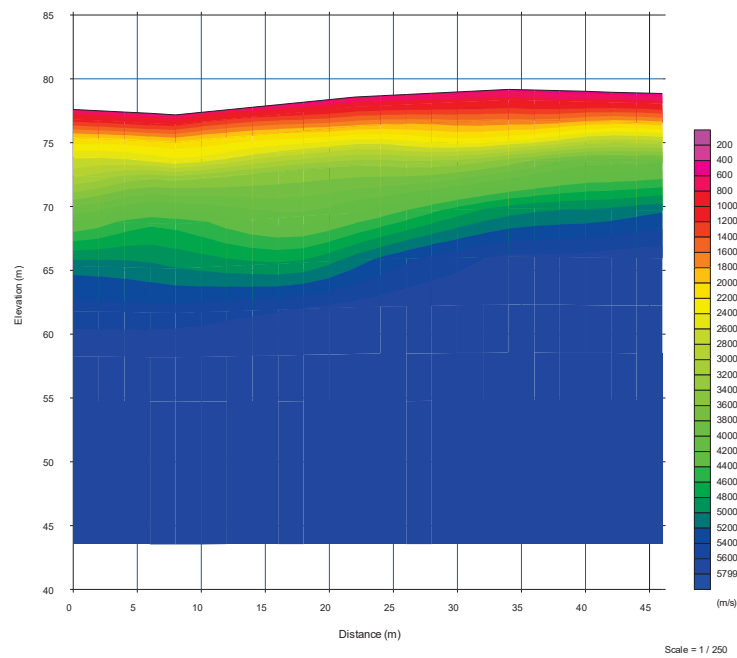


Fig B.42: Tomographic inversion for S02.

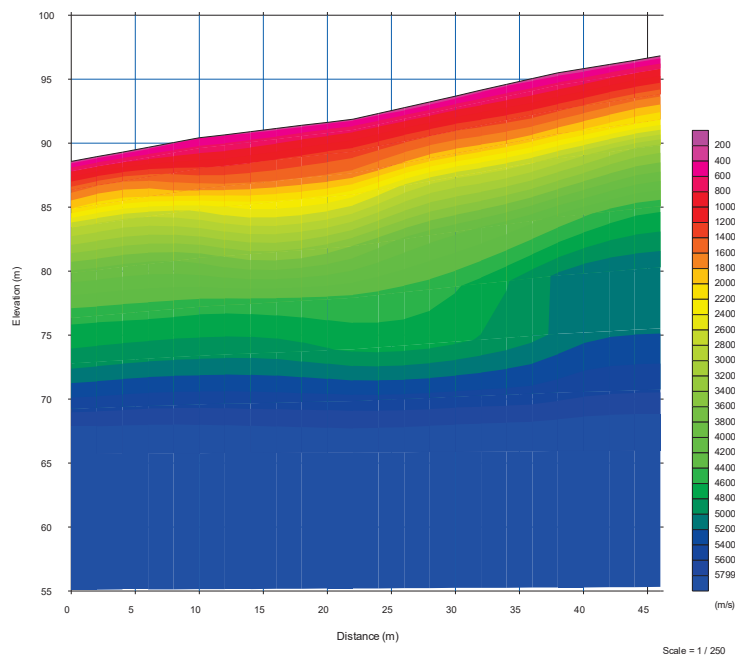


Fig B.43: Tomographic inversion for S03.

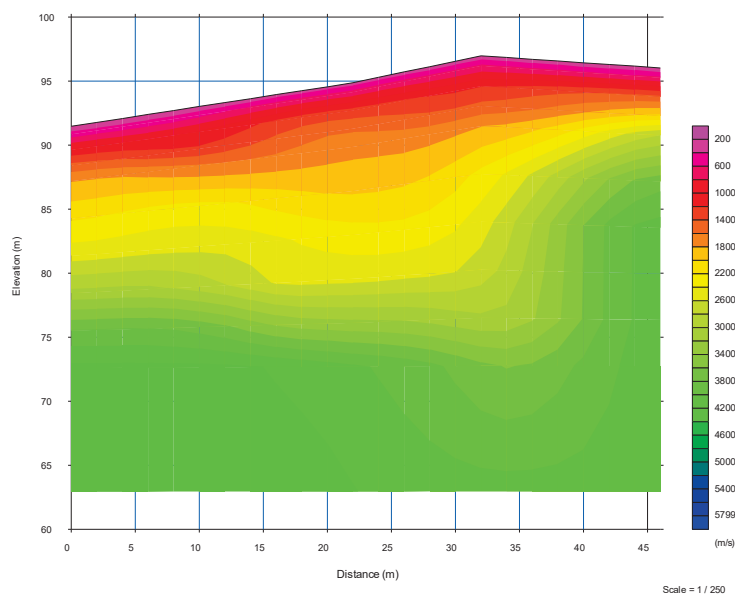


Fig B.44: Tomographic inversion for S04.

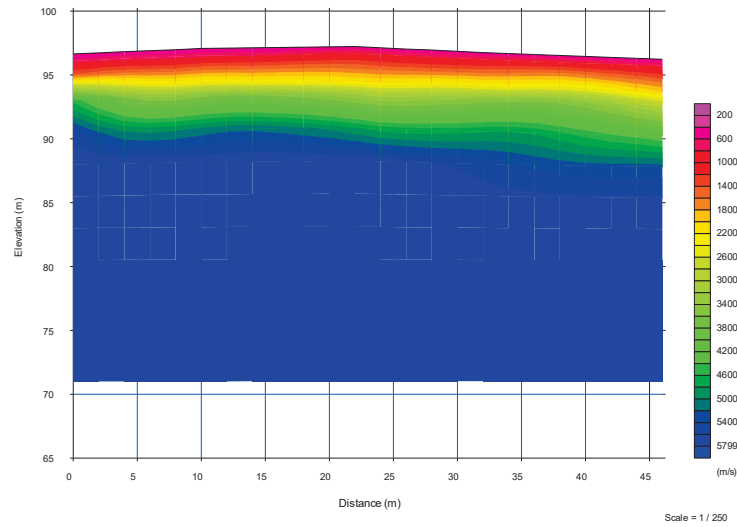


Fig B.45: Tomographic inversion for S05.

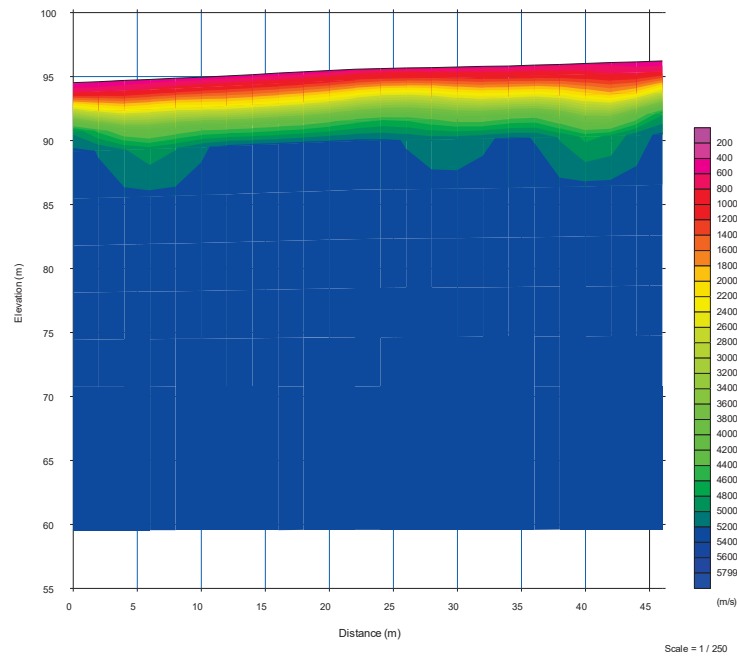


Fig B.46: Tomographic inversion for S06.

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

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:

AGP20192_01_T01	Fig.1 Turbine base T01 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T01 Results and Interpretation	1:750	@A3
AGP20192_02_T01	Summary Interpretation		
AGP20192_01_T02	Fig.1 Turbine base T02 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T02 Results and Interpretation	1:750	@A3
AGP20192_02_T02	Summary Interpretation		
AGP20192_01_T03	Fig.1 Turbine base T03 Geophysical Locations	1:2000	@A3
	Fig.2 Turbine base T03 Results and Interpretation	1:1000	@A3
AGP20192_02_T03	Summary Interpretation		
AGP20392_01_T04	Fig.1 Turbine base T04 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T04 Results and Interpretation	1:750	@A3
AGP20192_02_T04	Summary Interpretation		
AGP20392_01_T05	Fig.1 Turbine base T05 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T05 Results and Interpretation	1:750	@A3
AGP20192_02_T05	Summary Interpretation		
AGP20392_01_T06	Fig.1 Turbine base T06 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T06 Results and Interpretation	1:750	@A3
AGP20192_02_T06	Summary Interpretation		
AGP20392_01_T07	Fig.1 Turbine base T07 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T07 Results and Interpretation	1:750	@A3
AGP20192_02_T07	Summary Interpretation		
AGP20392_01_T08	Fig.1 Turbine base T08 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T08 Results and Interpretation	1:750	@A3
AGP20192_02_T08	Summary Interpretation		
AGP20392_01_T10	Fig.1 Turbine base T10 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T10 Results and Interpretation	1:750	@A3
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AGP20392_01_T11	Fig.1 Turbine base T11 Geophysical Locations	1:1250	@A3
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AGP20392_01_T14	Fig.1 Turbine base T14 Geophysical Locations	1:1250	@A3
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AGP20192_02_T14	Summary Interpretation		
AGP20392_01_T15	Fig.1 Turbine base T15 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T15 Results and Interpretation	1:750	@A3
AGP20192_02_T15	Summary Interpretation		
AGP20392_01_T16	Fig.1 Turbine base T16 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T16 Results and Interpretation	1:750	@A3
AGP20192_02_T16	Summary Interpretation		

AGP20392_01_T17	Fig.1 Turbine base T17 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T17 Results and Interpretation	1:750	@A3
AGP20192_02_T17	Summary Interpretation		
AGP20392_01_T18	Fig.1 Turbine base T18 Geophysical Locations	1:1250	@A3
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AGP20192_02_T18	Summary Interpretation		
AGP20392_01_T19	Fig.1 Turbine base T19 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T19 Results and Interpretation	1:750	@A3
AGP20192_02_T19	Summary Interpretation		
AGP20392_01_T20	Fig.1 Turbine base T20 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T20 Results and Interpretation	1:1000	@A3
AGP20192_02_T20	Summary Interpretation		
AGP20392_01_T21	Fig.1 Turbine base T21 Geophysical Locations	1:1250	@A3
	Fig.2 Turbine base T21 Results and Interpretation	1:750	@A3
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AGP20192_02_S3	Summary Interpretation		
AGP20192_02_S4	Summary Interpretation		
AGP20392_01_T01AR	Fig.1 T11 Access Road Geophysical Locations	1:1250	@A3
	Fig.2 11 Access Road Results and Interpretation	1:750	@A3
AGP20192_02_S5	Summary Interpretation		
AGP20192_02_S6	Summary Interpretation		

FIG.1 - TURBINE BASE T01 GEOPHYSICAL LOCATION
SCALE 1:1250

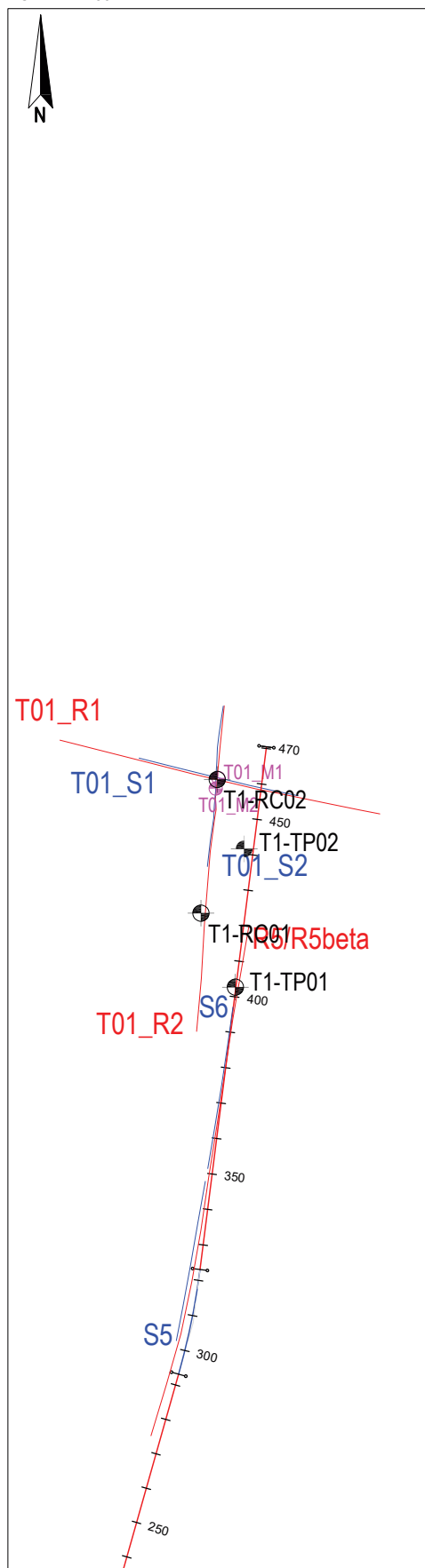
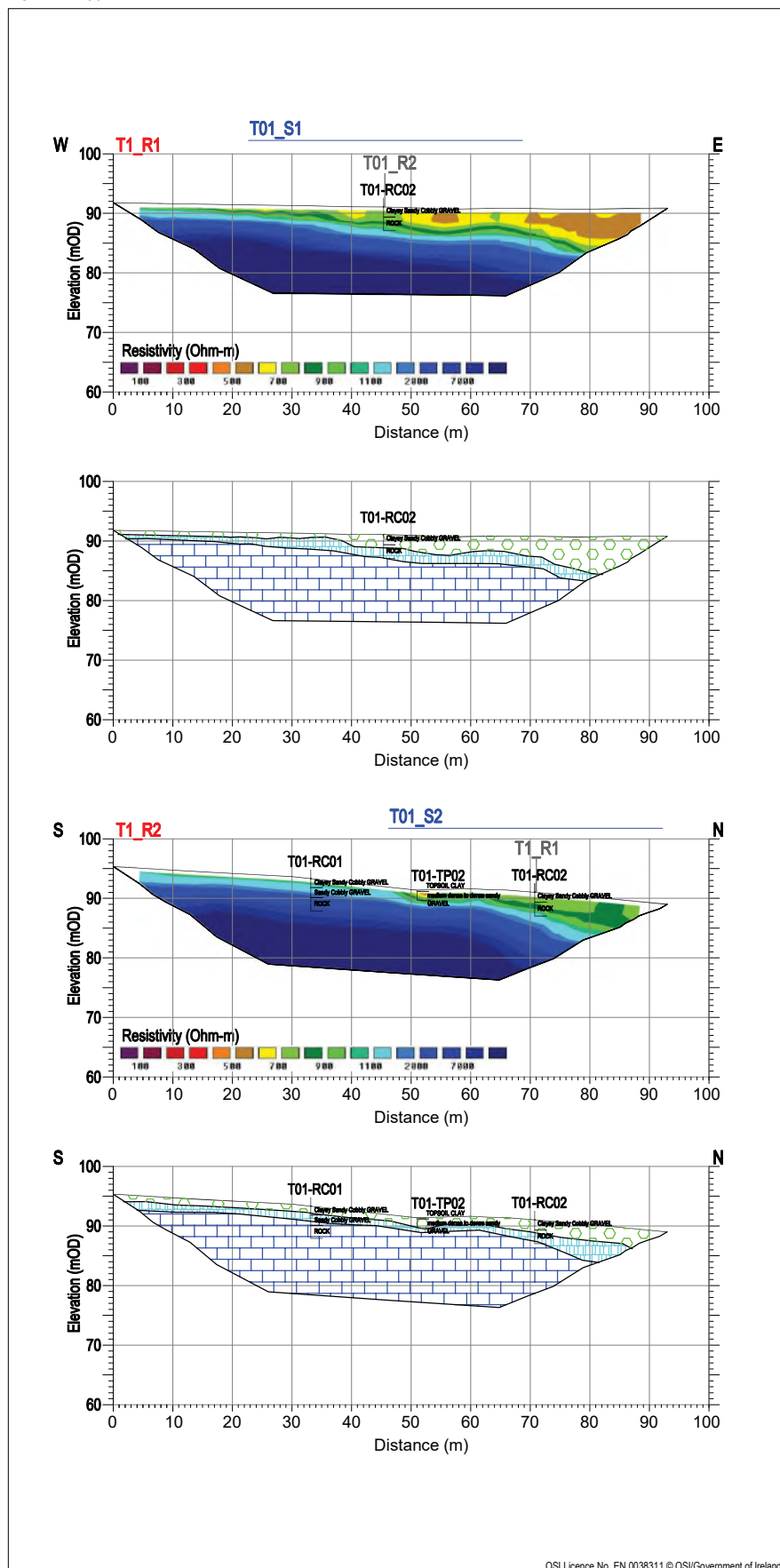


FIG.2 - TURBINE BASE T01 RESULTS AND INTERPRETATION
SCALE 1:750



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T01



Site	Seven Hills Wind Farm
Turbine Base	T01

T01	
ITM Easting	586354
ITM Northing	748365

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density kg/m ³	Poissons Ratio	Shear Mod MPa Dynamic	Youngs Mod GPa Dynamic	Youngs Mod MPa Static*	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
		S Wave	P Wave								
0.0	0.5	-	356	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.5	1.5	-	805	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
1.5	2.2	350	1554	2000	0.47	244.76	0.72	23.33	Slightly clayey sandy GRAVEL/BOULDERS	DENSE-VERY DENSE	Diggable
2.2	4.0	-	1974	2500	-	-	-	-	Moderately Weathered LIMESTONE	VERY POOR	Break / Blast
4.0	6.3	-	3913	2700	-	-	-	-	Slightly Weathered to Fresh LIMESTONE	EXCELLENT	Heavy Break / Blast
6.3	10.0	-	5578	2700	-	-	-	-	Slightly Weathered to Fresh LIMESTONE	EXCELLENT	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T01 is characterised by c. 2.2m of loose becoming medium dense to dense slightly clayey sandy GRAVEL/BOULDERS over moderately weathered LIMESTONE over slightly weathered to fresh LIMESTONE at a depth of 4.0m bgl. Depth to LIMESTONE bedrock increases to c 6.0m to the east of the turbine centre.
Vp seismic velocities indicate that any excavation of the moderately weathered and slightly weathered to fresh LIMESTONE will require breaking/blasting. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T02 GEOPHYSICAL LOCATION
SCALE 1:1250

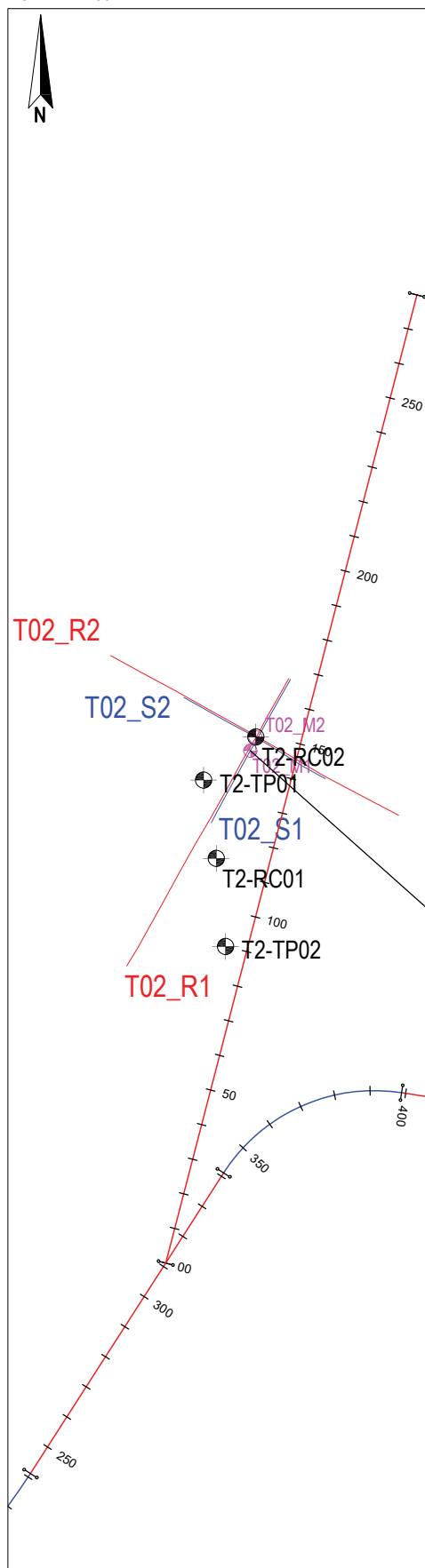
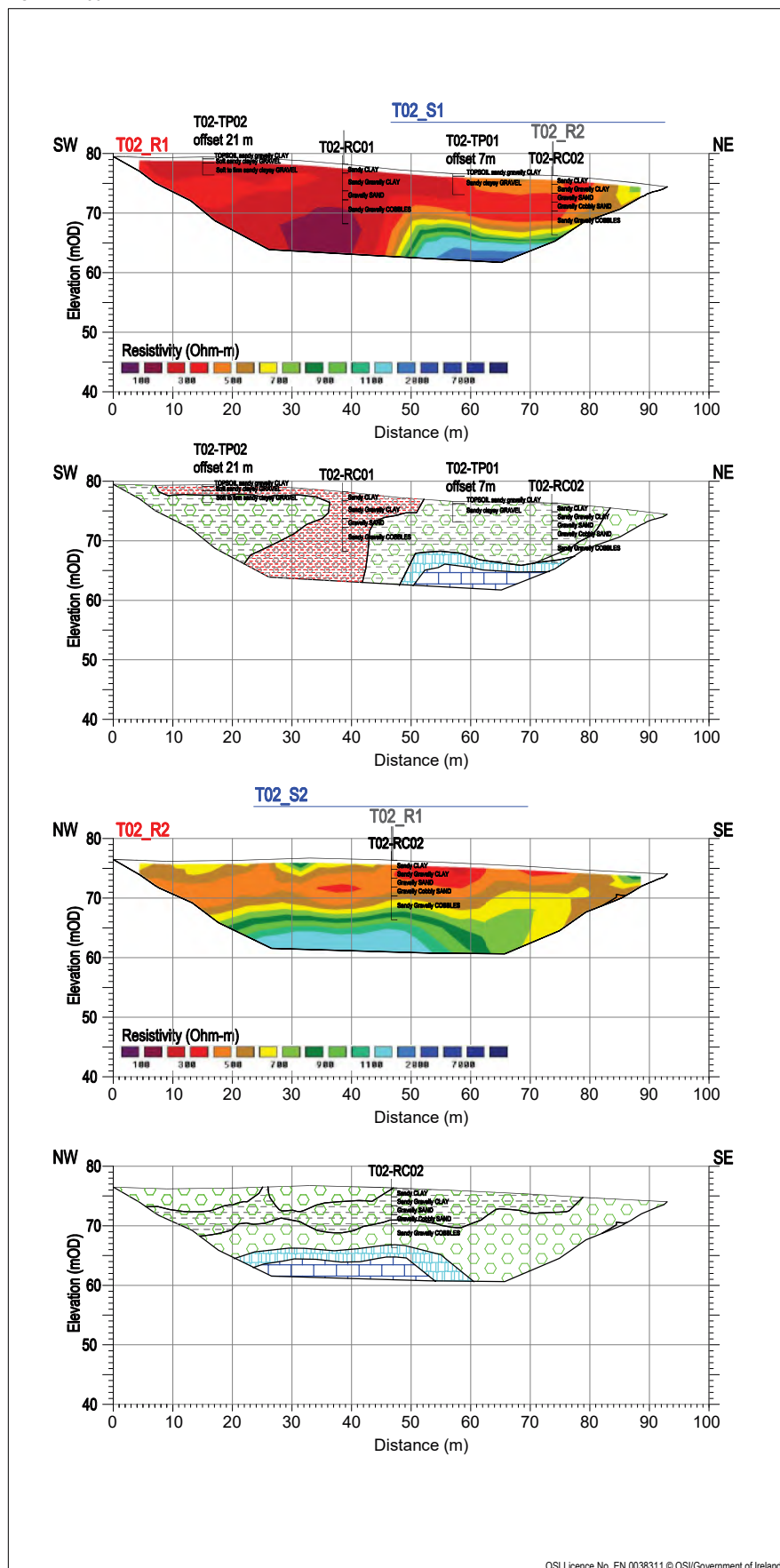


FIG.2 - TURBINE BASE T02 RESULTS AND INTERPRETATION
SCALE 1:750



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_01_T02



Site	Seven Hills Wind Farm
Turbine Base	T02

T02	
ITM Easting	586907
ITM Northing	748181

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	276	2000	-	-	-	-	Clayey sandy GRAVEL	LOOSE	Diggable
0.5	1.6	202	588	2000	0.43	81.93	0.23	3.66	Clayey sandy GRAVEL	MEDIUM DENSE	Diggable
1.6	2.7	198	1007	2000	0.48	78.03	0.23	3.56	Clayey sandy GRAVEL	MEDIUM DENSE	Diggable
2.7	3.8	253	1397	2000	0.48	128.51	0.38	8.14	Clayey sandy GRAVEL	MEDIUM DENSE to DENSE	Diggable
3.8	6.0	332	2097	2000	0.49	220.11	0.65	19.88	Clayey sandy GRAVEL	VERY DENSE	Diggable
6.0	9.5	-	2350	2500	-	-	-	-	Slightly clayey GRAVEL/BOULDERS	VERY DENSE	Diggable
9.5	11.6	-	3716	2700	-	-	-	-	Moderately to slightly weathered LIMESTONE	GOOD	Break / Blast
11.6	14.2	-	4218	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T02 is characterised by c. 6.0 m of loose becoming medium dense to dense to very dense clayey sandy GRAVEL over c. 3.5m of slightly clayey GRAVEL/BOULDERS . Depth to moderately to slightly weathered LIMESTONE is 9.5 m bgl and it overlies slightly weathered to fresh LIMESTONE at 11.6m bgl. The data indicates an increase in depth to LIMESTONE bedrock to the south of the turbine centre to more than 14.8m bgl where there is an increase in thickness of slightly clayey sandy GRAVEL/BOULDERS.
Vp seismic velocities indicate that any excavation of the moderately weathered/karstified and slightly weathered to fresh LIMESTONE will require breaking/blasting. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T03 GEOPHYSICAL LOCATION
SCALE 1:2000

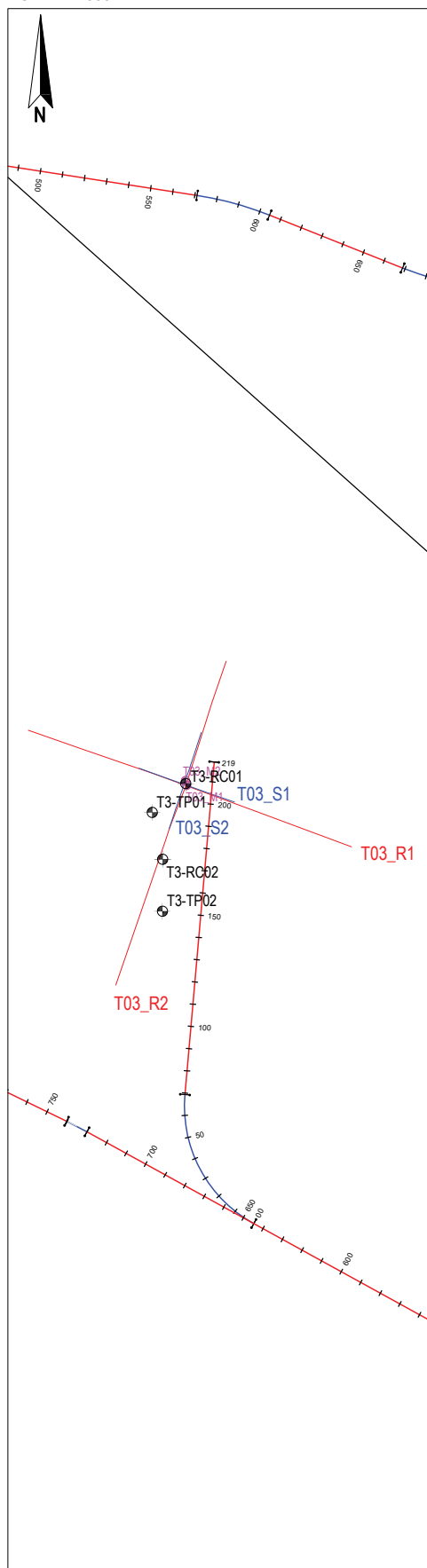
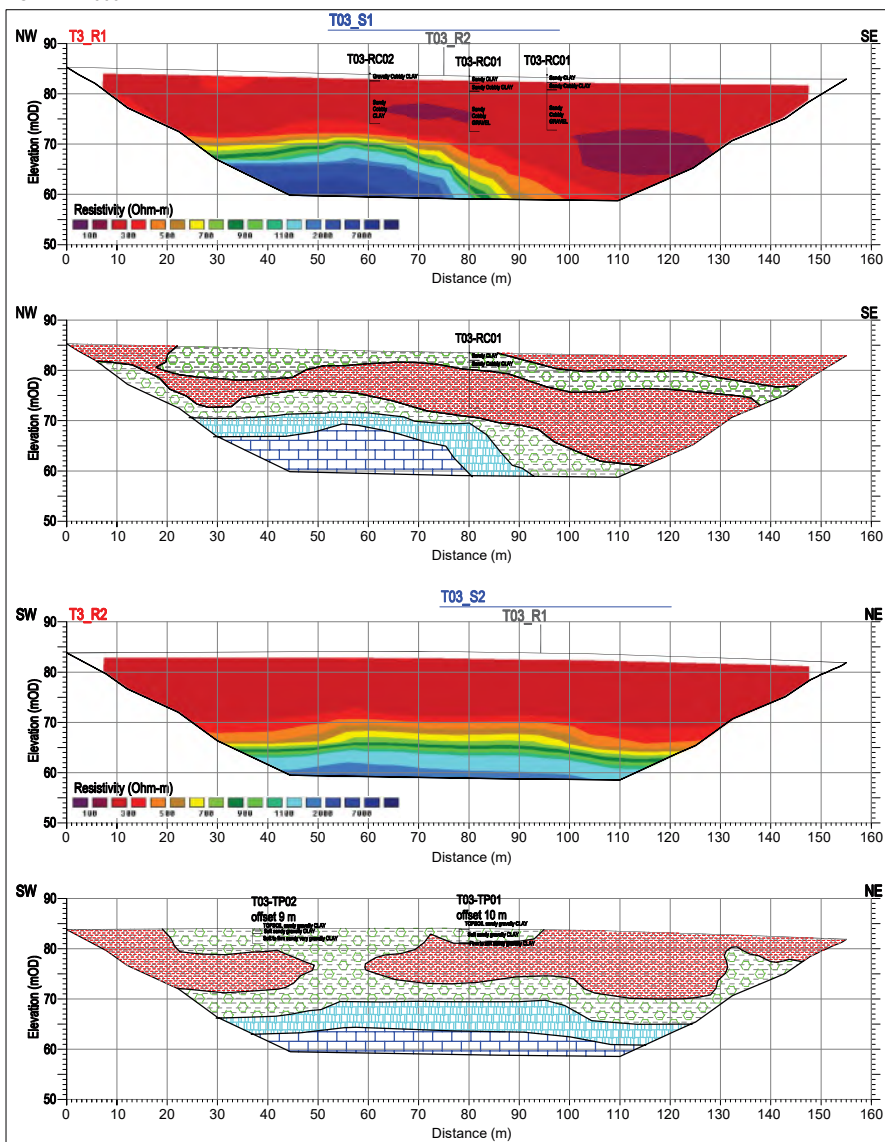


FIG.2 - TURBINE BASE T03 RESULTS AND INTERPRETATION
SCALE 1:1000



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T03



Site	Seven Hills Wind Farm
Turbine Base	T03

T03	
ITM Easting	587112
ITM Northing	747791

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 ch. @ 3m & 5m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	306	2000	-	-	-	-	Clayey sandy GRAVEL	LOOSE	Diggable
0.5	1.6	-	519	2000	-	-	-	-	Clayey sandy GRAVEL	MEDIUM DENSE	Diggable
1.6	2.6	264	1112	2000	0.47	139.40	0.41	9.18	Clayey sandy GRAVEL	DENSE	Diggable
2.6	3.7	274	1612	2000	0.49	149.65	0.44	10.50	Sandy Gravelly CLAY	STIFF	Diggable
3.7	6.1	-	2093	2000	-	-	-	-	Sandy Gravelly CLAY	VERY STIFF	Diggable
6.1	8.2	-	2401	2000	-	-	-	-	Sandy Gravelly CLAY	VERY STIFF	Diggable
8.2	12.1	-	2491	2000	-	-	-	-	Sandy Gravelly CLAY	VERY STIFF	Diggable
12.1	13.8	-	2491	2000	-	-	-	-	Clayey sandy GRAVEL	VERY DENSE	Diggable
13.8	16.0	-	2428	2700	-	-	-	-	Moderately to slightly weathered LIMESTONE	POOR	Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T03 is characterised by c.2.6m of loose to medium dense to dense clayey sandy GRAVEL over sandy gravelly CLAY which is stiff becoming very stiff with depth over very dense clayey sandy GRAVEL. Depth to moderately weathered LIMESTONE is 13.8m bgl. Depth to top of LIMESTONE bedrock increases to the SE of the turbine centre.
While the borehole data did not encounter rock to 11 and 10.0 m bgl in T3-RC01 and T3-RC02 respectively the geophysical data indicates weathered rock may be present from 6.1 mbgl as the seismic Vp velocities of 2401 - 2491m/s at depths of 6.1m to 13.8m are higher than normally expected for sandy gravelly CLAY and clayey sandy GRAVEL.
Vp seismic velocities indicate that any excavation of the moderately weathered LIMESTONE will require breaking/blasting. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T04 GEOPHYSICAL LOCATION
SCALE 1:1250

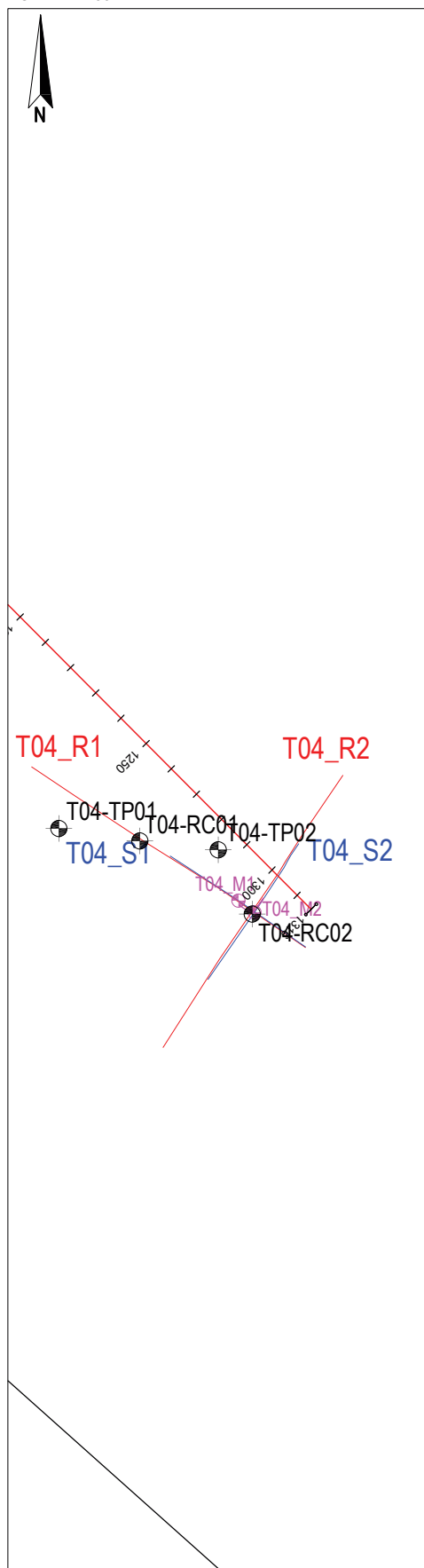
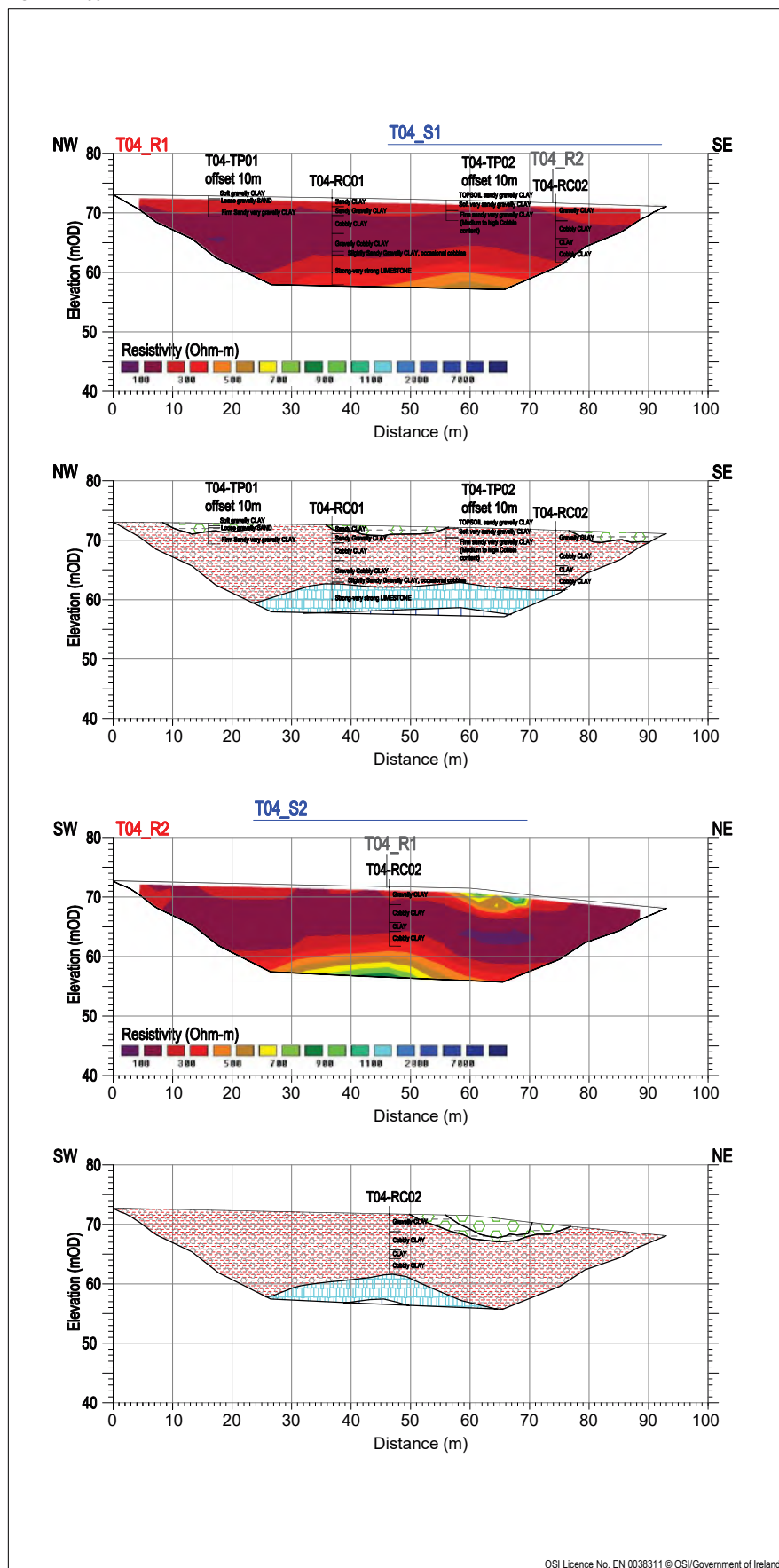


FIG.2 - TURBINE BASE T04 RESULTS AND INTERPRETATION
SCALE 1:750



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INDEX MAP

LEGEND:

- T04_R1 2D resistivity profile
- T04_S1 Seismic refraction profile
- T1-RC01 Trial Pit/Borehole
- T1-TP01 Trial Pit/Borehole
- Sandy Gravelly CLAY
- Clayey Sandy GRAVEL
- Slightly Clayey Sandy GRAVEL/BOULDERS
- Highly - moderately weathered/pos. karstified LIMESTONE
- Slightly weathered - fresh LIMESTONE

The information displayed here is to be used in conjunction with AGP20192_01 Report on the Geophysical Investigation at Seven Hills Wind Farm, Co. Roscommon for IGSL Limited, APEX Geophysics Ltd. 11th March 2022

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PROJECT: SEVEN HILLS WIND FARM GEOPHYSICAL INVESTIGATION			
CLIENT: IGSL LIMITED			
DRAWING NO: AGP20192_01_T04			
SCALE: AS INDICATED @ A3			
DATE: 29-03-2021			
Version	Date	Drawn By	Checked
01	29-03-2021	FP	TL
02	11-03-2022	FP	TL

Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T04



Site	Seven Hills Wind Farm
Turbine Base	T04

T04	
ITM Easting	587702
ITM Northing	747658

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	306	2000	-	-	-	-	Sandy gravelly CLAY	SOFT	Diggable
0.5	1.6	-	463	2000	-	-	-	-	Sandy gravelly CLAY	FIRM	Diggable
1.6	2.7	420	924	2000	0.37	352.76	0.97	37.81	Sandy gravelly CLAY	FIRM-STIFF	Diggable
2.7	3.7	391	1084	2000	0.43	305.75	0.87	31.88	Sandy gravelly CLAY	VERY STIFF	Diggable
3.7	6.3	483	1981	2000	0.47	465.77	1.37	67.08	Sandy gravelly CLAY	VERY STIFF	Diggable
6.3	9.9	-	2230	2000	-	-	-	-	Sandy gravelly CLAY	VERY STIFF	Diggable
9.9	11.2	-	3424	2700	-	-	-	-	Moderately weathered/pos. karstified to slightly weaterede LIMESTONE	GOOD	Break / Blast
11.2	13.7	-	3728	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T04 is characterised by c. 9.9m of sandy gravelly CLAY which is soft to firm becoming stiff to very stiff with depth. Depth to moderately weathered/possible karstified LIMESTONE to slightly weathered to fresh LIMESTONE is c.9.9m bgl, this overlies slightly weathered to fresh LIMESTONE at 11.2m bgl.
While the borehole data did not encounter rock to termination depth the geophysical data indicates weathered/possible karstified rock may be present from 6.3 mbgl as the seismic Vp velocities of 2230m/s at depths of 6.3m to 9.9m are high for sandy gravelly CLAY.
Vp seismic velocities indicate that any excavation of the LIMESTONE layers will require breaking/blasting. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T05 GEOPHYSICAL LOCATION
SCALE 1:1250

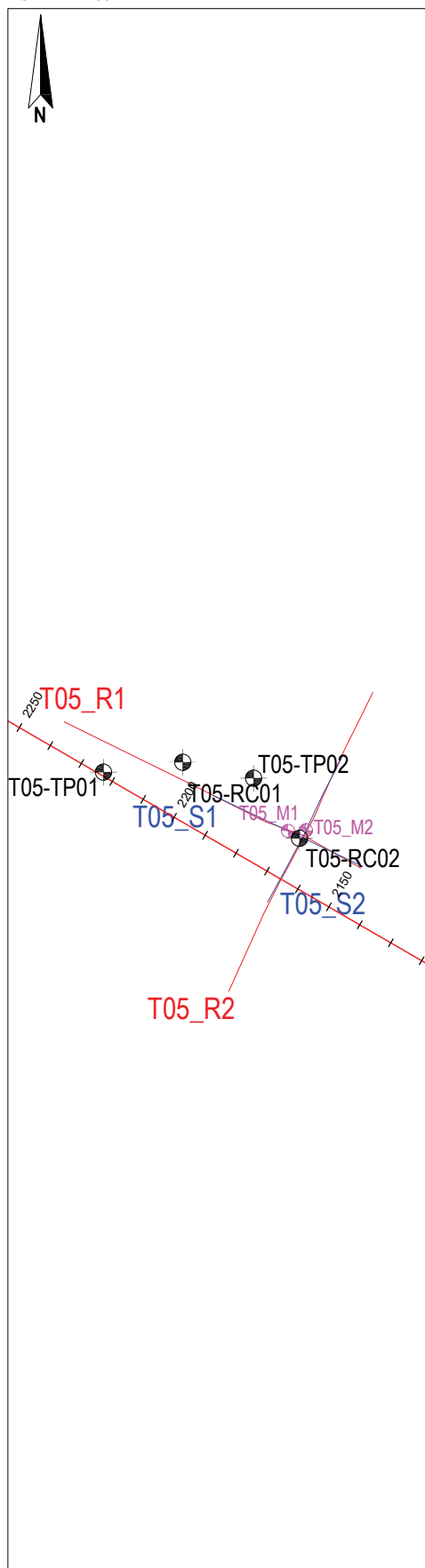
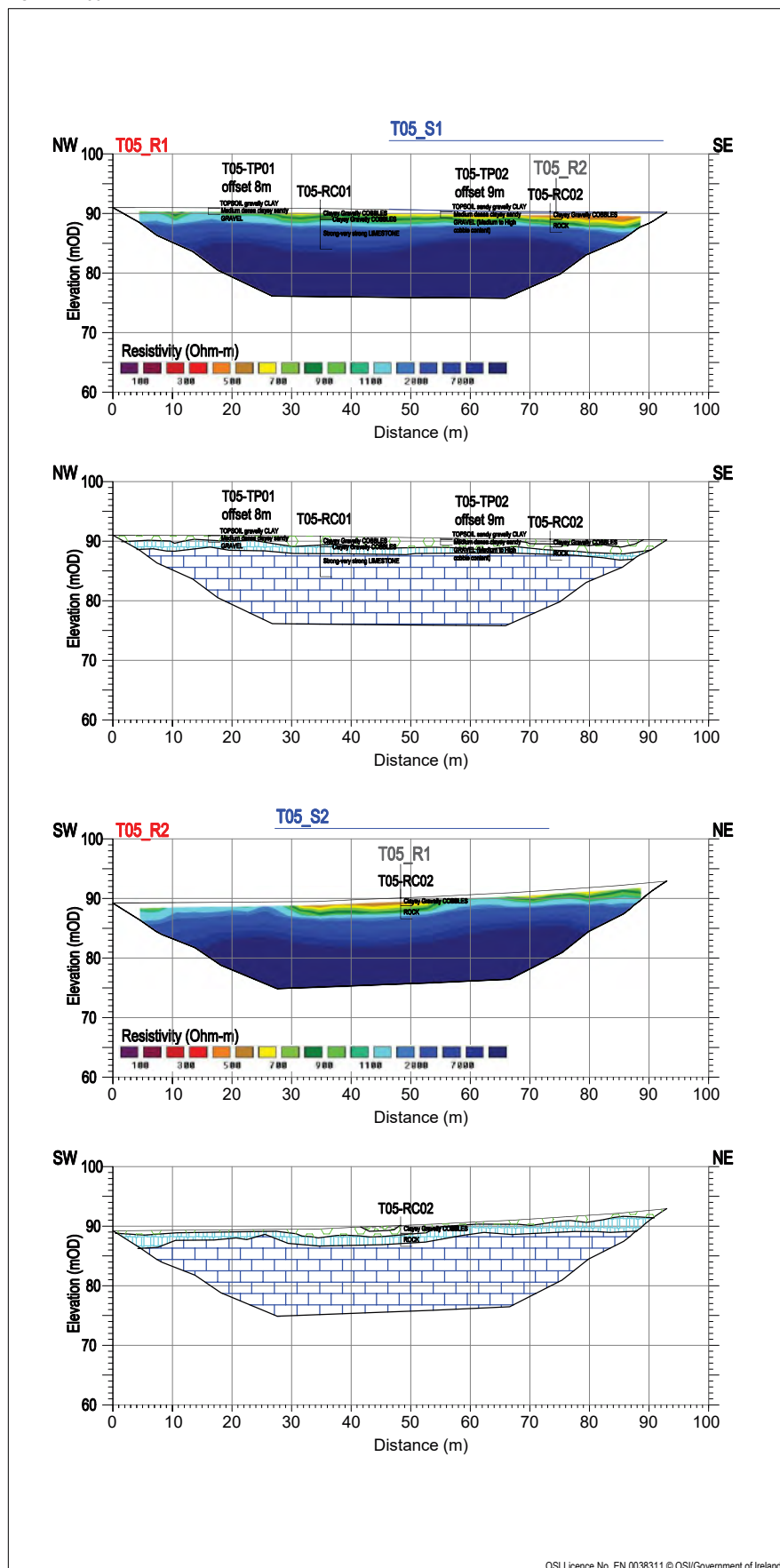


FIG.2 - TURBINE BASE T05 RESULTS AND INTERPRETATION
SCALE 1:750



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Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T05



Site	Seven Hills Wind Farm
Turbine Base	T05

T05	
ITM Easting	585787
ITM Northing	747871

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	1.0	-	588	2000	-	-	-	-	Slightly clayey sandy GRAVELS/BOULDERS	MEDIUM DENSE	Diggable
1.0	1.5	257	1007	2000	0.47	132.08	0.39	8.35	Slightly clayey sandy GRAVELS/BOULDERS	DENSE	Diggable
1.5	2.3	236	1232	2500	0.48	138.92	0.41	9.24	Highly weathered/pos. karstified LIMESTONE	VERY POOR	Rippable
2.3	3.0	-	1831	2500	-	-	-	-	Moderately weathered/pos. karstified LIMESTONE	POOR-FAIR	Break / Blast
3.0	5.7	-	2967	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Break / Blast
5.7	8.0	-	3985	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast
8.0	10.5	-	4746	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T05 is characterised by c. 1.5m of medium dense to dense slightly clayey sandy GRAVEL/BOULDERS over very poor highly weathered/ possible karstified LIMESTONE over moderately weathered/possible karstified LIMESTONE. Depth to slightly weathered to fresh LIMESTONE is 3.0m bgl.
Vp seismic velocities indicate that any excavation of the moderately weathered/possible karstified and slightly weathered to fresh LIMESTONE will require breaking/blasting to heavy breaking/blasting respectively. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T06 GEOPHYSICAL LOCATION
SCALE 1:1250

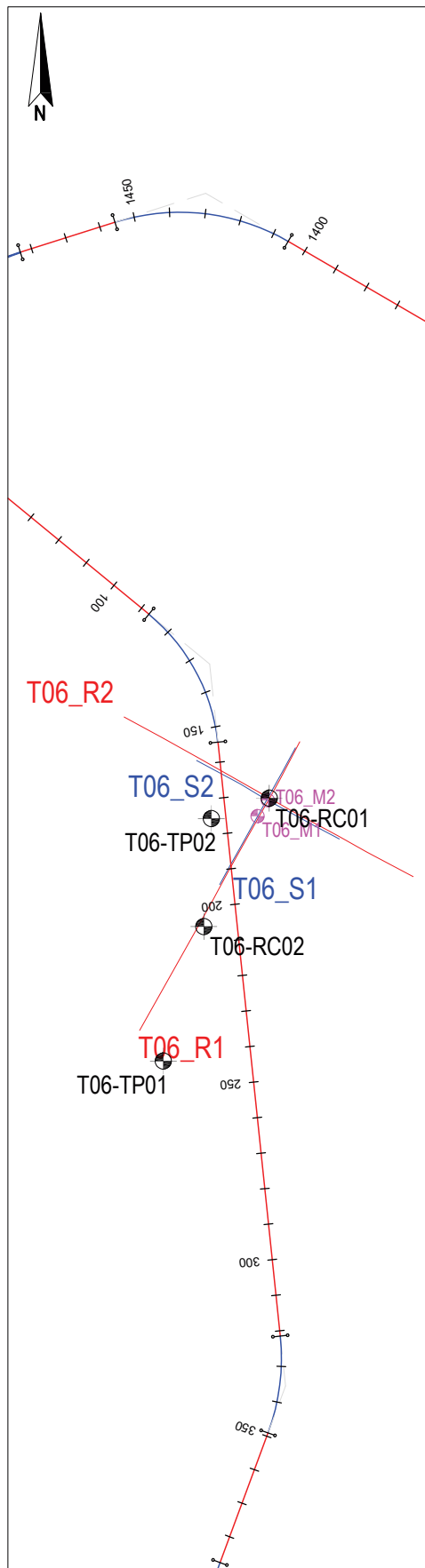
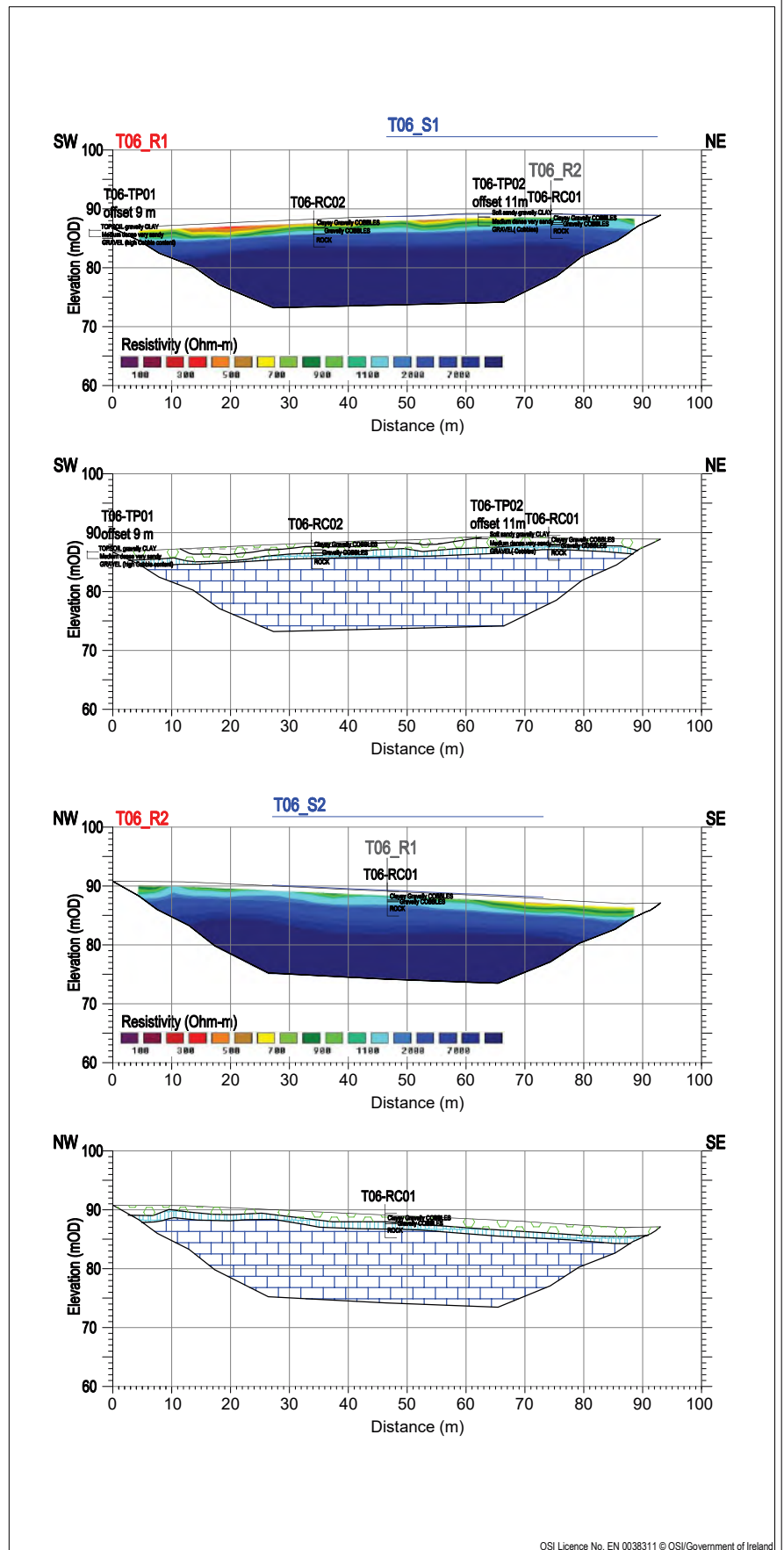


FIG.2 - TURBINE BASE T06 RESULTS AND INTERPRETATION
SCALE 1:750



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_01_T06



Site	Seven Hills Wind Farm
Turbine Base	T06

T06	
ITM Easting	586467
ITM Northing	747796

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	312	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.5	1.2	-	933	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
1.2	2.4	-	1730	2500	-	-	-	-	Highly-moderately weathered/pos. karstified LIMESTONE	POOR	Rippable
2.4	3.6	-	2621	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	FAIR	Break / Blast
3.6	6.1	-	3919	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast
6.1	8.6	-	4906	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast
8.6	11.1	-	5586	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations , including soft ground probes, and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T06 is characterised by c. 1.2 m of loose to medium dense slightly clayey sandy GRAVEL/BOULDERS over highly to moderately weathered/possible karstified LIMESTONE over slightly weathered to fresh LIMESTONE at 3.6m bgl.
Vp seismic velocities indicate that any excavation of the LIMESTONE will require breaking/blasting to heavy breaking/blasting. More information on excavatability in given in Appendix C.

FIG.1 - TURBINE BASE T07 GEOPHYSICAL LOCATION
SCALE 1:1250

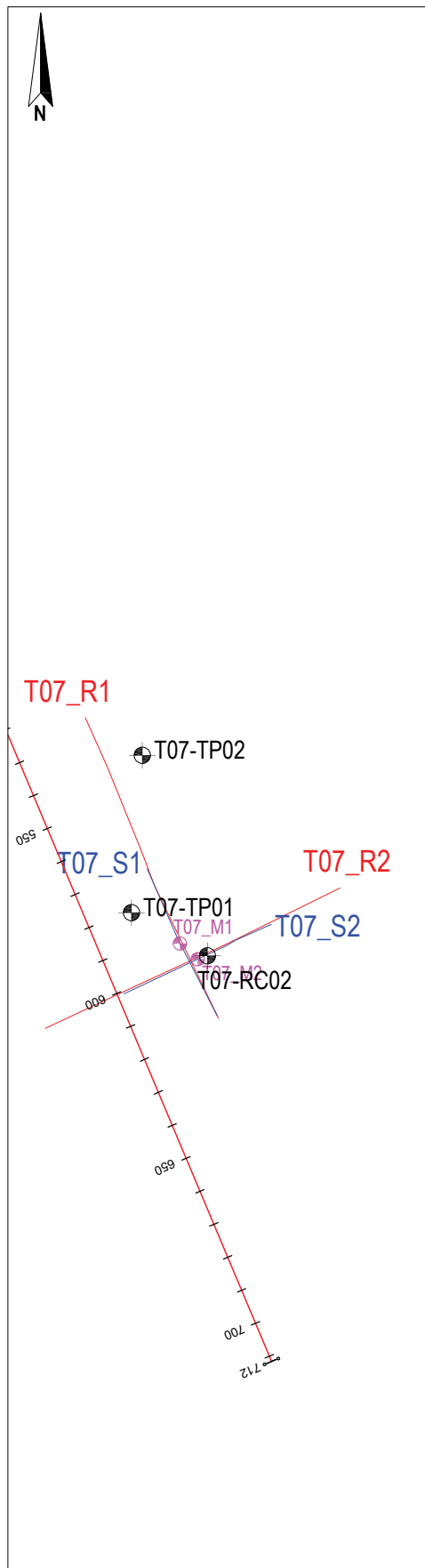
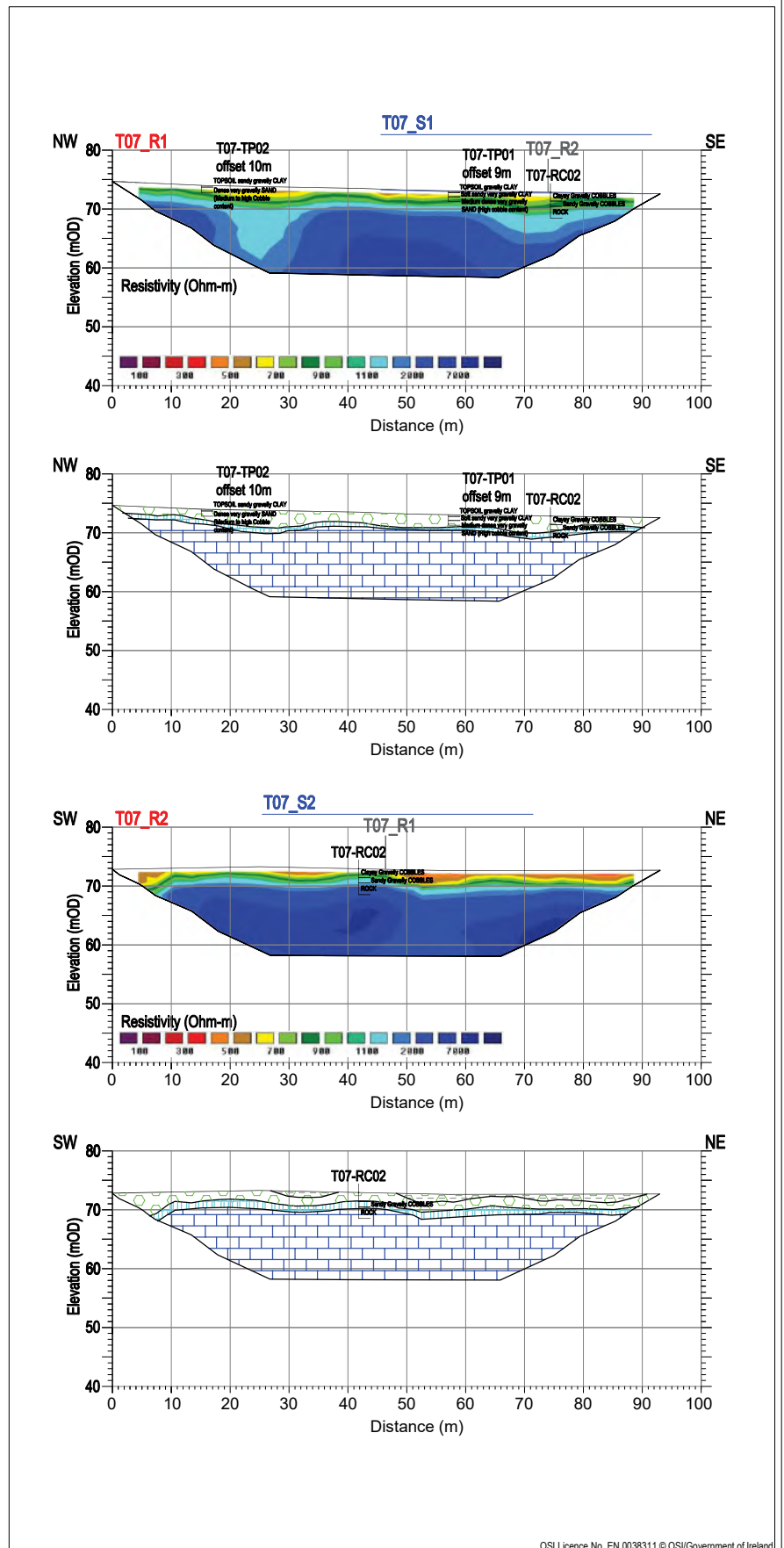


FIG.2 - TURBINE BASE T07 RESULTS AND INTERPRETATION
SCALE 1:750



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T07



Site	Seven Hills Wind Farm
Turbine Base	T07

T07	
ITM Easting	586540
ITM Northing	747394

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	335	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.5	1.5	-	456	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
1.5	2.5	284	1051	2500	0.46	201.16	0.59	16.64	Highly weathered LIMESTONE	POOR	Rippable
2.5	3.0	304	1983	2500	0.49	231.44	0.69	21.62	Moderately weathered LIMESTONE	FAIR	Break / Blast
3.0	5.8	-	3393	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Heavy Break / Blast
5.8	10.5	-	5172	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T07 is characterised by c. 1.5m of loose slightly clayey sandy GRAVEL/BOULDERS over highly weathered LIMESTONE. Depth to top of slightly weathered to fresh LIMESTONE is 3.0m bgl.
Vp seismic velocities indicate that any excavation of the moderately weathered and slightly weathered to fresh LIMESTONE will require breaking/blasting to heavy breaking/blasting. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T08 GEOPHYSICAL LOCATION
SCALE 1:1250

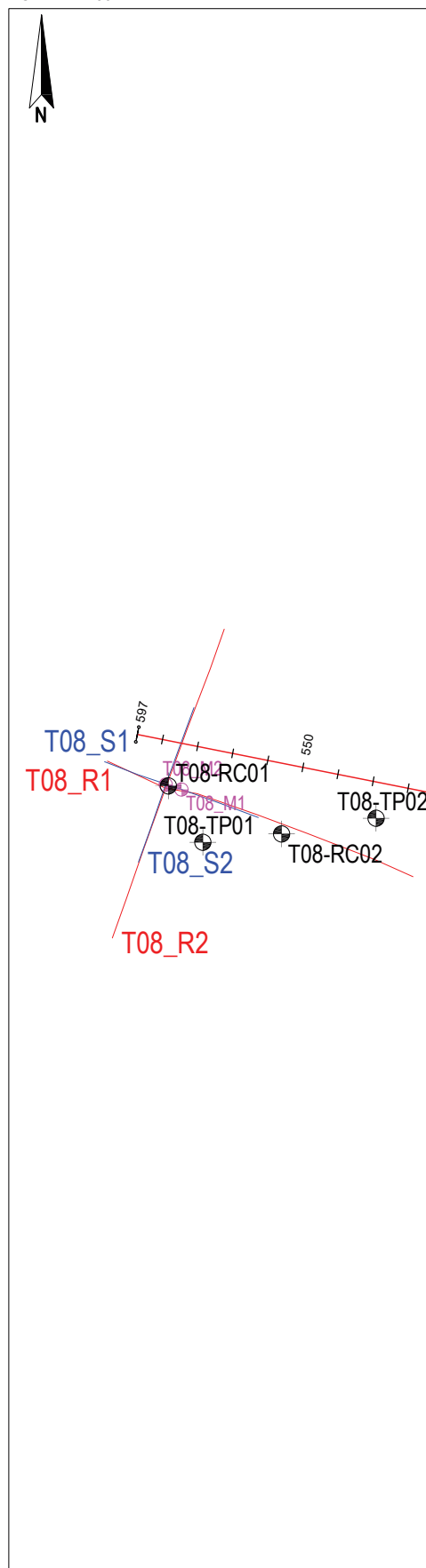
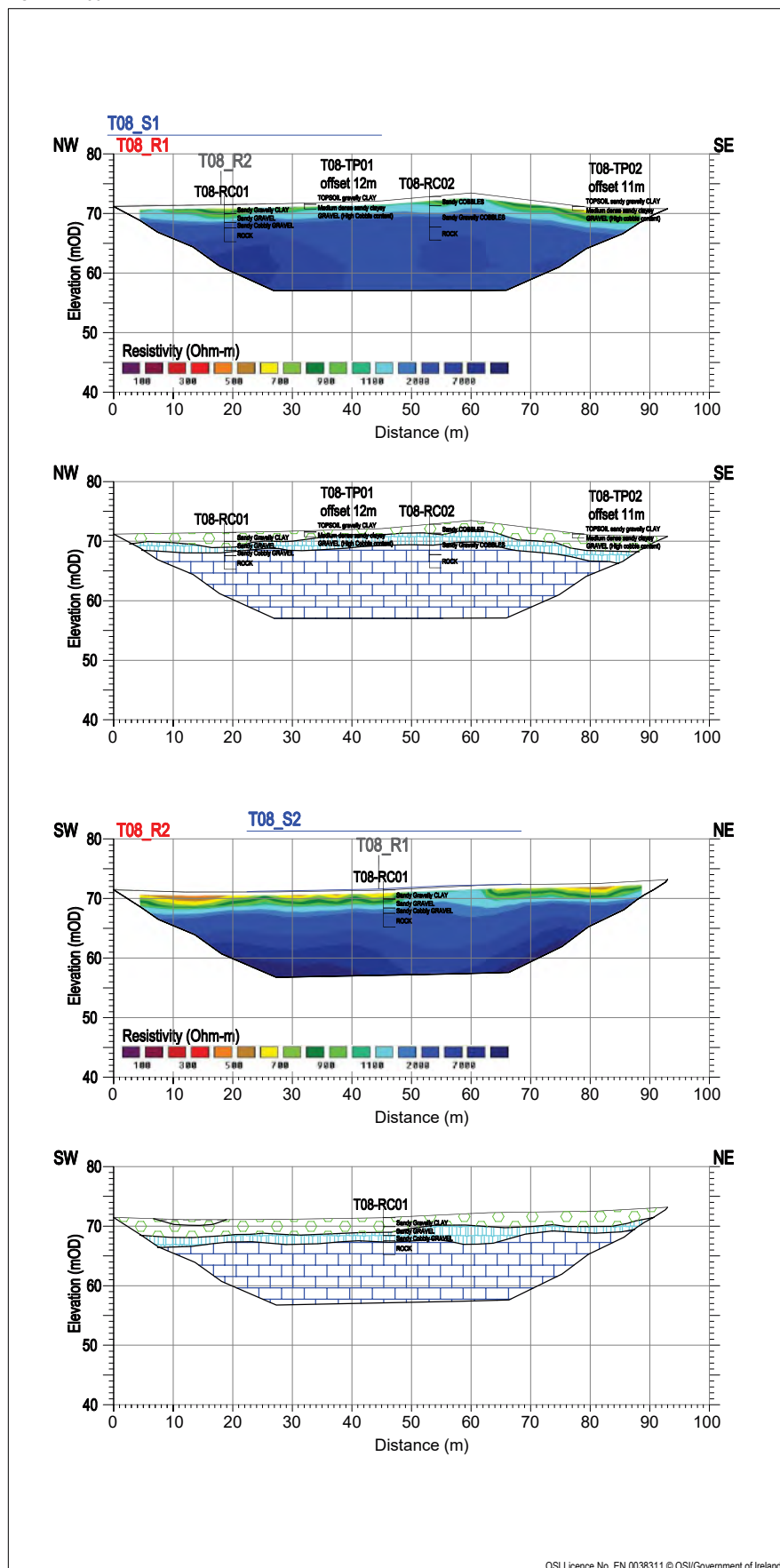


FIG.2 - TURBINE BASE T08 RESULTS AND INTERPRETATION
SCALE 1:750



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Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T08



Site	Seven Hills Wind Farm
Turbine Base	T08

T07	
ITM Easting	587538
ITM Northing	743028

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	299	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.5	1.5	234	831	2000	0.46	109.74	0.32	6.10	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
1.5	2.5	293	1315	2000	0.47	171.48	0.51	12.98	Slightly clayey sandy GRAVEL/BOULDERS	DENSE to VERY DENSE	Diggable
2.5	3.7	-	1661	2500	-	-	-	-	Highly weathered/pos. karstified LIMESTONE	POOR	Rippable
3.7	6.1	-	2254	2500	-	-	-	-	Moderately weathered/pos. karstified LIMESTONE	FAIR	Break / Blast
6.1	11.0	-	3682	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T08 1.5m of loose to medium dense slightly clayey sandy GRAVEL/BOULDERS becoming dense to very dense to 2.5m bgl. Highly to moderately weathered/possible karstified LIMESTONE overlies slightly weathered to fresh LIMESTONE at 6.1m bgl.
Vp seismic velocities indicate that any excavation of the moderately weathered/possible karstified and slightly weathered to fresh LIMESTONE will require breaking/blasting to heavy breaking/blasting. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T10 GEOPHYSICAL LOCATION

SCALE 1:1250

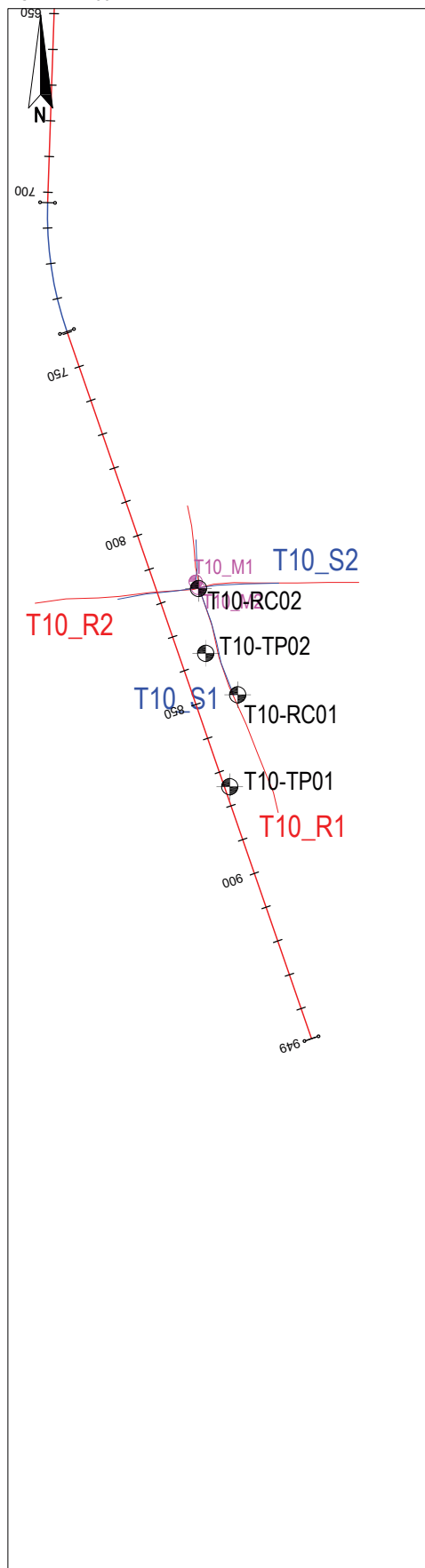
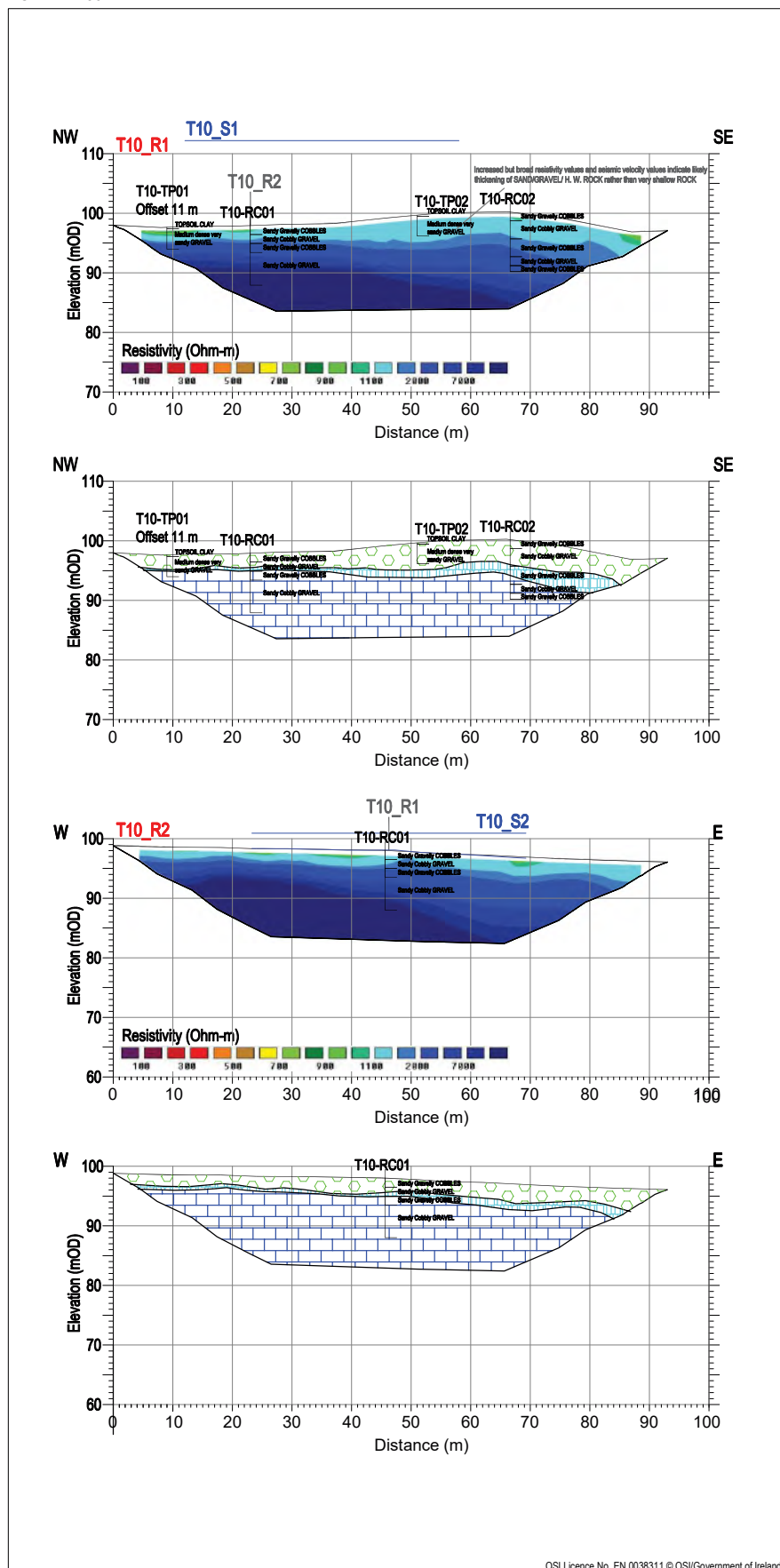


FIG.2 - TURBINE BASE T10 RESULTS AND INTERPRETATION

SCALE 1:750



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T10



Site	Seven Hills Wind Farm
Turbine Base	T10

T07	
ITM Easting	588273
ITM Northing	742496

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	290	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.5	1.5	390	485	2000	-0.41	304.08	0.36	7.27	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE to DENSE	Diggable
1.5	2.5	372	1005	2000	0.42	276.62	0.79	26.88	Slightly clayey sandy GRAVEL/BOULDERS	VERY DENSE	Diggable
2.5	3.5	362	1495	2500	0.47	328.26	0.96	37.67	Highly - Moderately weathered/pos. karstified LIMESTONE	POOR	Rippable
3.5	6.0	-	2382	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Break / Blast
6.0	8.6	-	3896	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast
8.6	11.1	-	5272	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T10 is characterised by c.2.5m of loose to medium dense becoming dense to very dense slightly clayey sandy GRAVEL/BOULDERS over highly to moderately weathered/possible karstified LIMESTONE. Depth to top of slightly weathered to fresh LIMESTONE is 3.5m bgl.
Vp seismic velocities indicate that any excavation of the slightly weathered to fresh LIMESTONE will require breaking/blasting to heavy breaking/blasting. More information on excavatability is provided in Appendix C.
While the boreholes did not encountered rock to termination depth of 10.0m bgl the seismic Vp velocities of 1495m/s indicate LIMESTONE at 2.5m bgl.

FIG.1 - TURBINE BASE T11 GEOPHYSICAL LOCATION
SCALE 1:1250

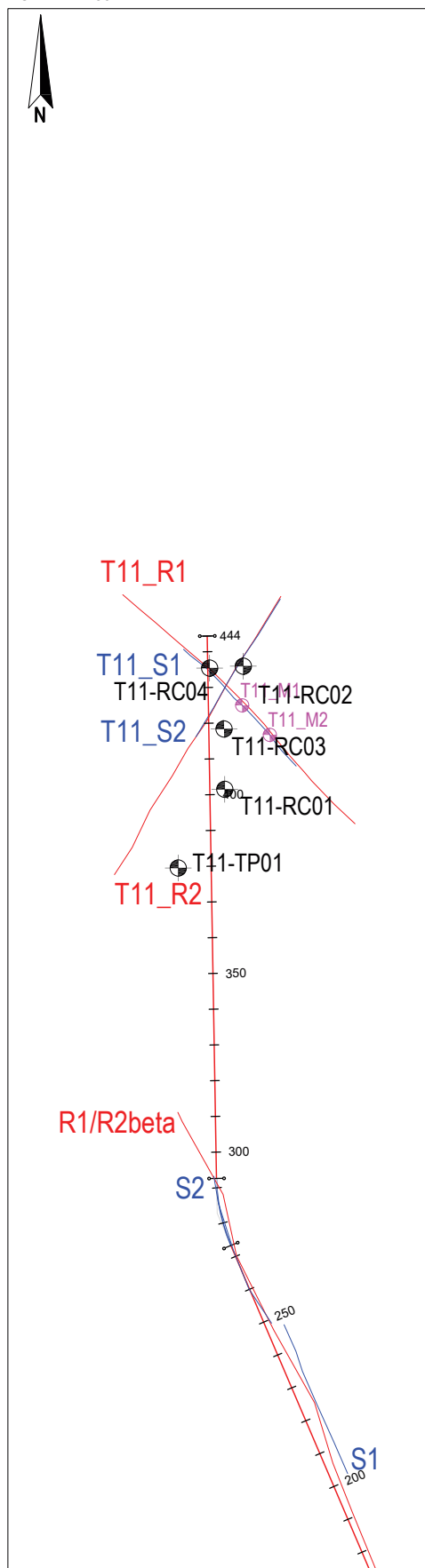
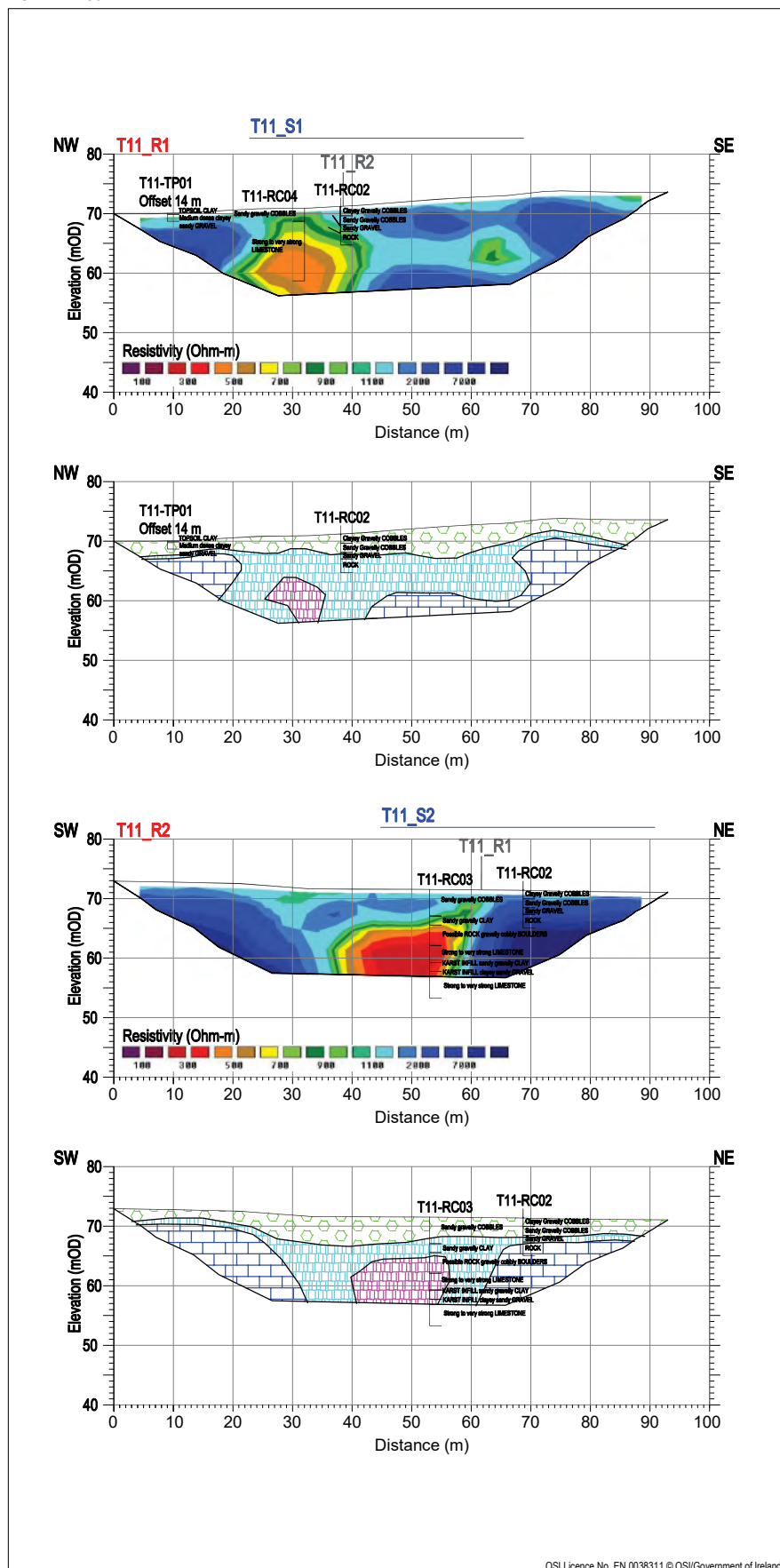


FIG.2 - TURBINE BASE T11 RESULTS AND INTERPRETATION
SCALE 1:750



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_01_T11



Site	Seven Hills Wind Farm
Turbine Base	T11

T07	
ITM Easting	587895
ITM Northing	743644

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	505	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
0.5	1.3	-	849	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
1.3	3.2	207	1407	2000	0.49	85.37	0.25	4.18	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
3.2	5.7	349	2092	2500	0.49	303.87	0.90	33.80	Highly to moderately weathered/karstified LIMESTONE	FAIR	Break / Blast
5.7	8.0	-	3045	2500	-	-	-	-	Moderately weathered to slightly weathered to fresh LIMESTONE	GOOD	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations, including soft ground probes, and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T11 is characterised by c. 1.3 m of medium dense to dense slightly clayey sandy GRAVEL/BOULDERS over highly to moderately weathered/karstified LIMESTONE at 3.2m bgl. To the west of the turbine centre the highly to moderately weathered/karstified LIMESTONE overlies completely to highly weathered/karstified LIMESTONE at a depth of 6.6m. This karstified zone is also encountered in borehole T11-RC03.

FIG.1 - TURBINE BASE T12 GEOPHYSICAL LOCATION
SCALE 1:1250

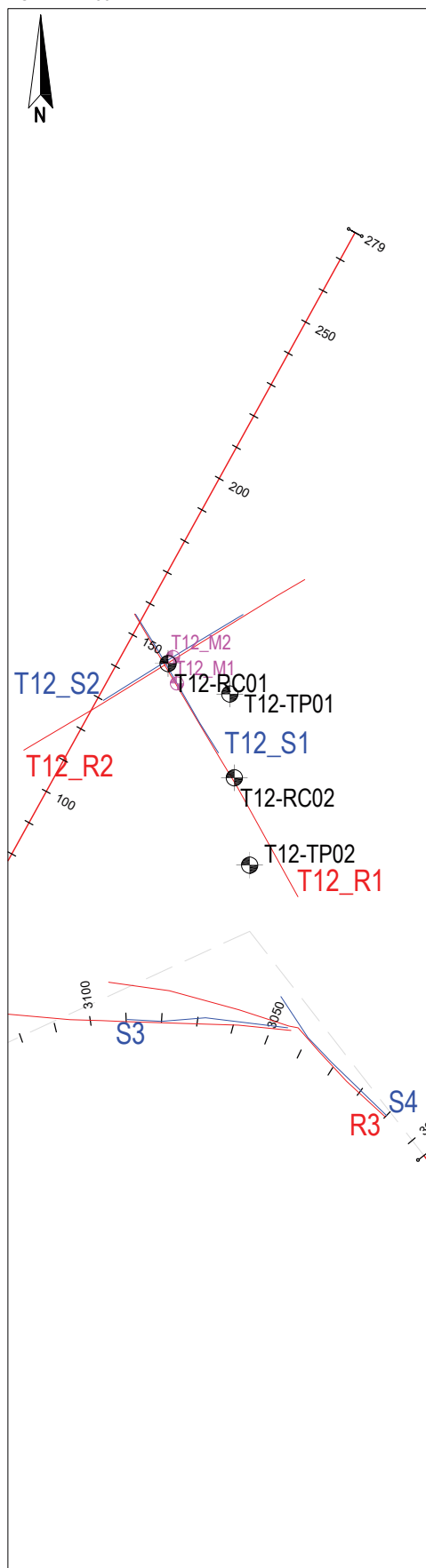
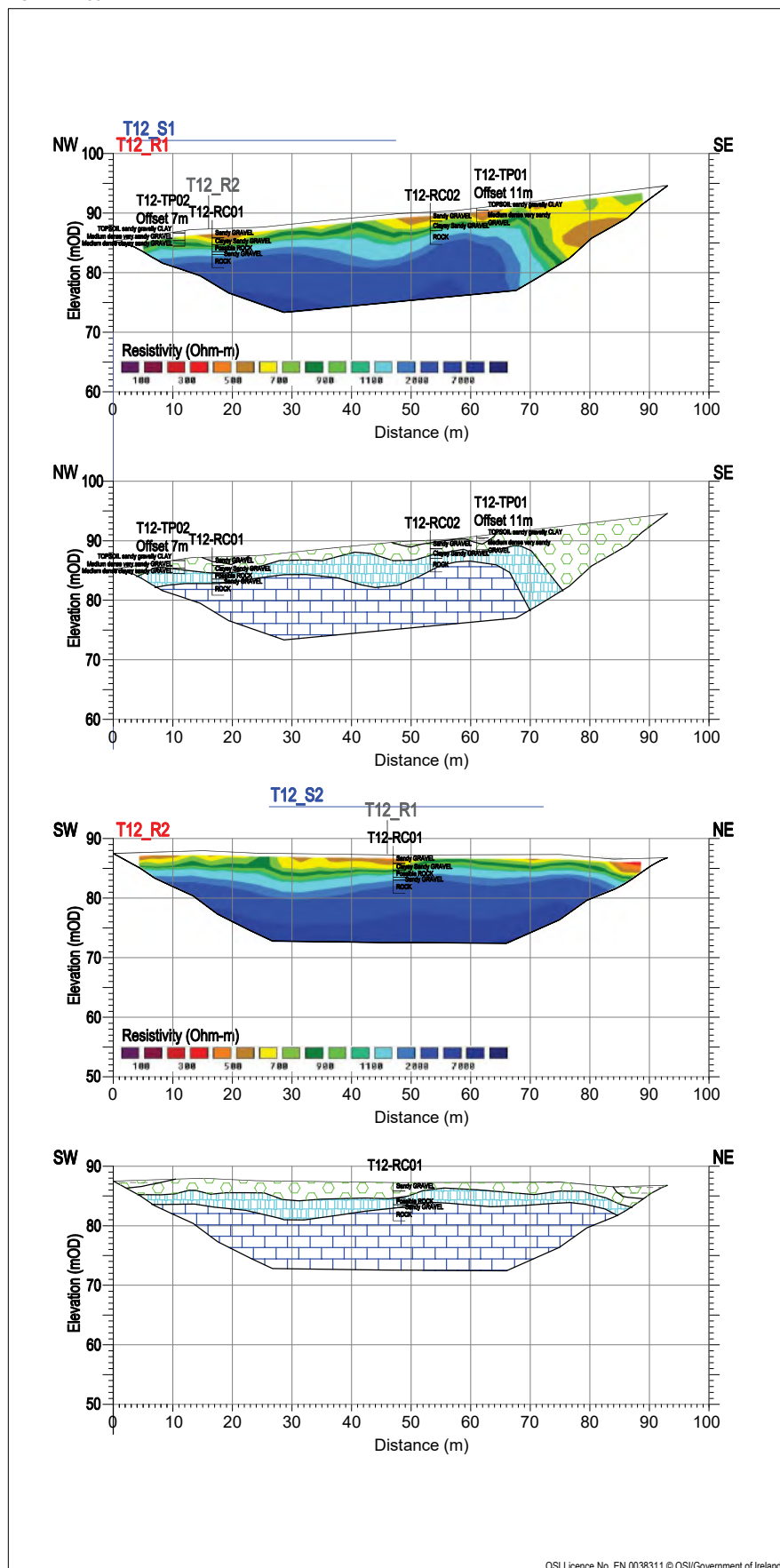


FIG.2 - TURBINE BASE T12 RESULTS AND INTERPRETATION
SCALE 1:750



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T12



Site	Seven Hills Wind Farm
Turbine Base	T12

T07	
ITM Easting	588338
ITM Northing	743476

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	308	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.5	1.7	321	739	2000	0.38	206.48	0.57	15.88	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
1.7	2.6	360	1218	2000	0.45	259.34	0.75	25.06	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
2.6	4.3	-	1812	2500	-	-	-	-	Moderately weathered LIMESTONE	FAIR	Break / Blast
4.3	6.9	-	2721	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Break / Blast
6.9	9.6	-	3252	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Heavy Break / Blast
9.6	12.5	-	4192	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T12 is characterised by c. 2.6m of loose to medium dense to dense slightly clayey sandy GRAVEL/BOULDERS over moderately weathered LIMESTONE. Depth to slightly weathered to fresh LIMESTONE is 4.3m bgl. Depth to top of LIMESTONE bedrock increases to > 10m to the SE of the turbine centre.
Vp seismic velocities indicate that any excavation of the moderately weathered LIMESTONE and slightly weathered to fresh LIMESTONE will require breaking/blasting to heavy breaking/blasting. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T13 GEOPHYSICAL LOCATION
SCALE 1:1250

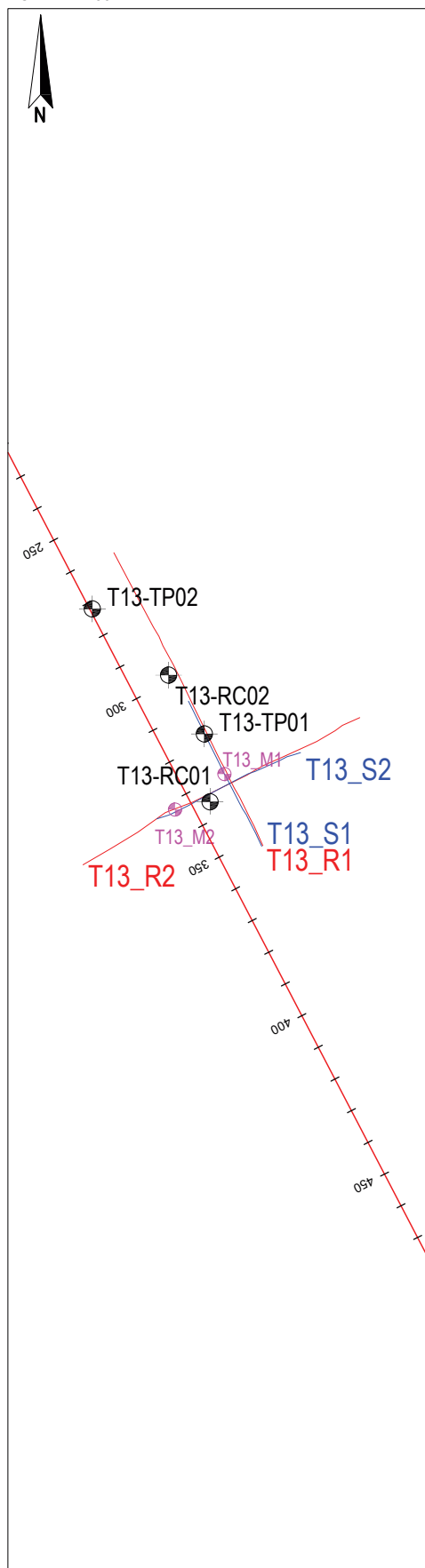
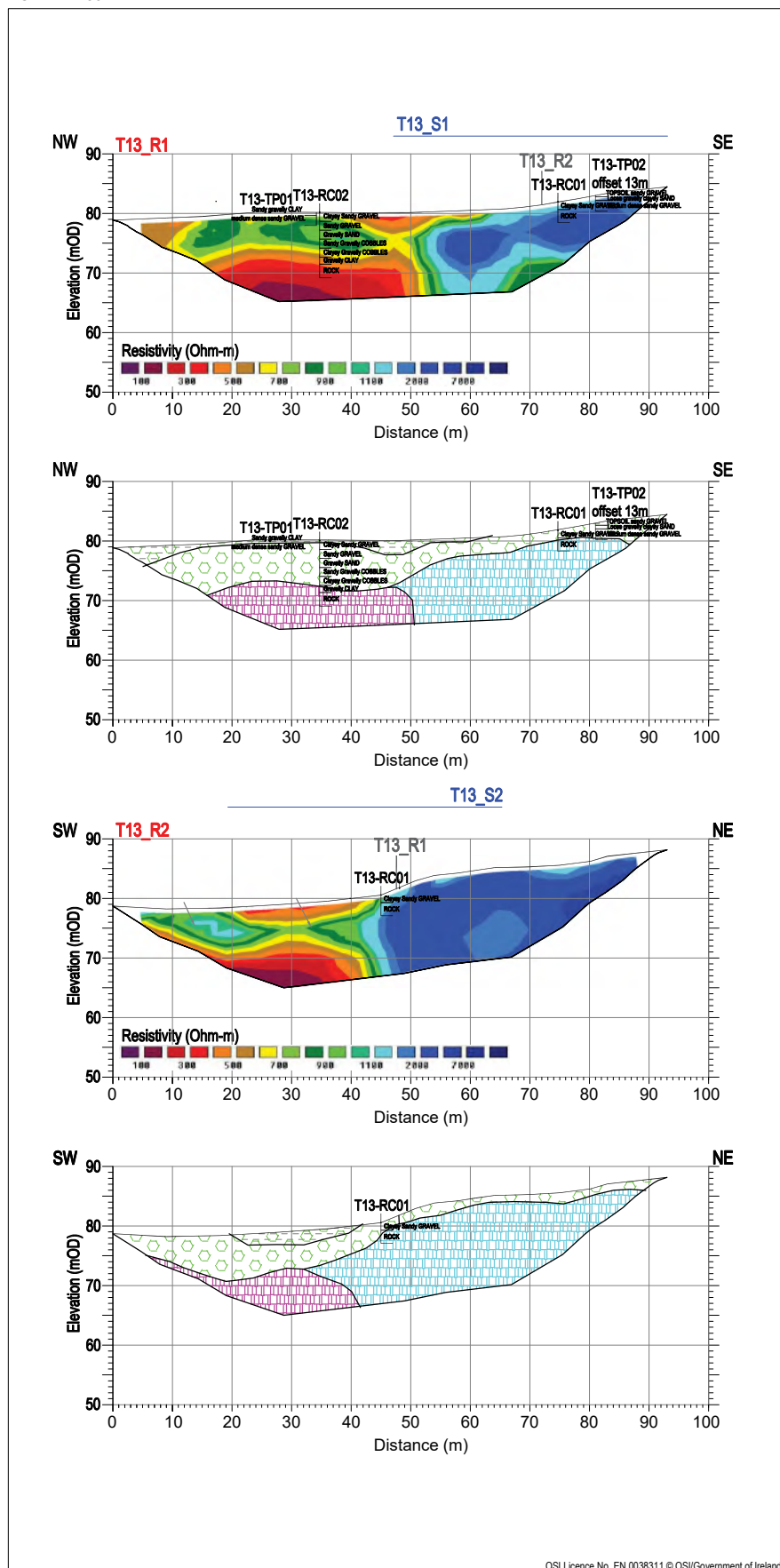


FIG.2 - TURBINE BASE T13 RESULTS AND INTERPRETATION
SCALE 1:750



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Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_01_T13



Site	Seven Hills Wind Farm
Turbine Base	T13

T07	
ITM Easting	588175
ITM Northing	742949

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Res.	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	Ohm-m	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	-	351	1300	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.5	1.4	1625	-	701	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
1.4	3.5	1700	-	1300	2000	-	-	-	-	Highly to moderately weathered/karstified LIMESTONE	POOR	Rippable
3.5	6.2	1700	-	1770	2000	-	-	-	-	Highly to moderately weathered/karstified LIMESTONE	FAIR	Rippable
6.2	8.8	1600	-	2260	2000	-	-	-	-	Highly to moderately weathered/karstified LIMESTONE	FAIR	Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T13 is characterised by c. 1.4 m of loose to medium dense slightly clayey sandy GRAVEL/BOULDERS over highly to moderately weathered/karstified LIMESTONE at 1.4m bgl. To the west of the turbine centre thickness of the slightly clayey sandy GRAVEL/BOULDERS increases to 8.3m bgl where it overlies completely to highly weathered/karstified LIMESTONE.
No MASW dispersion curve was resolved due to the presence of shallow rock.

FIG.1 - TURBINE BASE T14 GEOPHYSICAL LOCATION
SCALE 1:1250

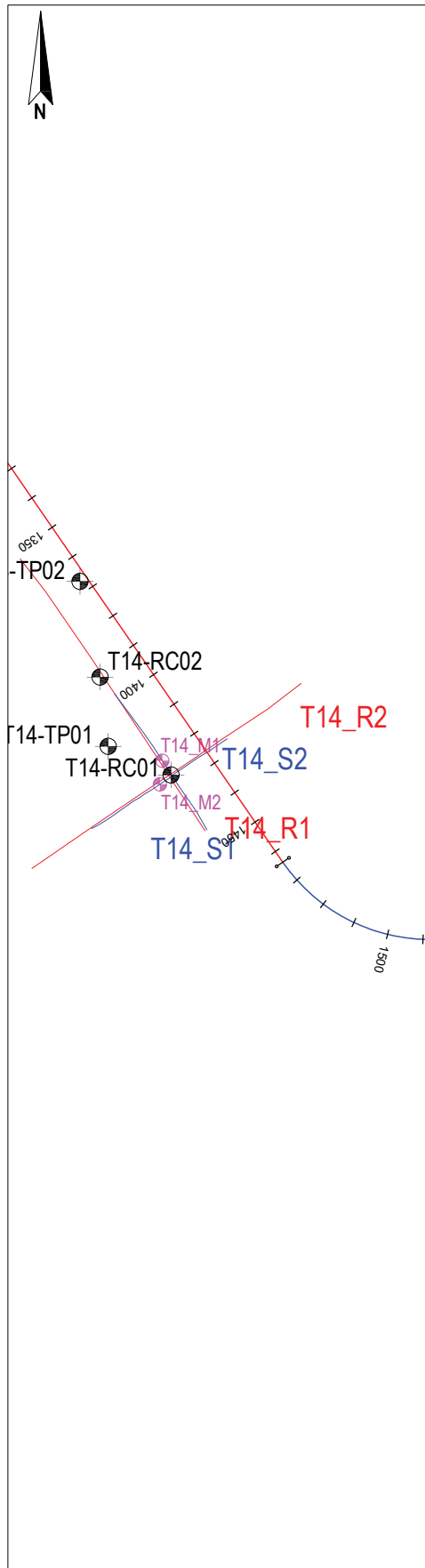
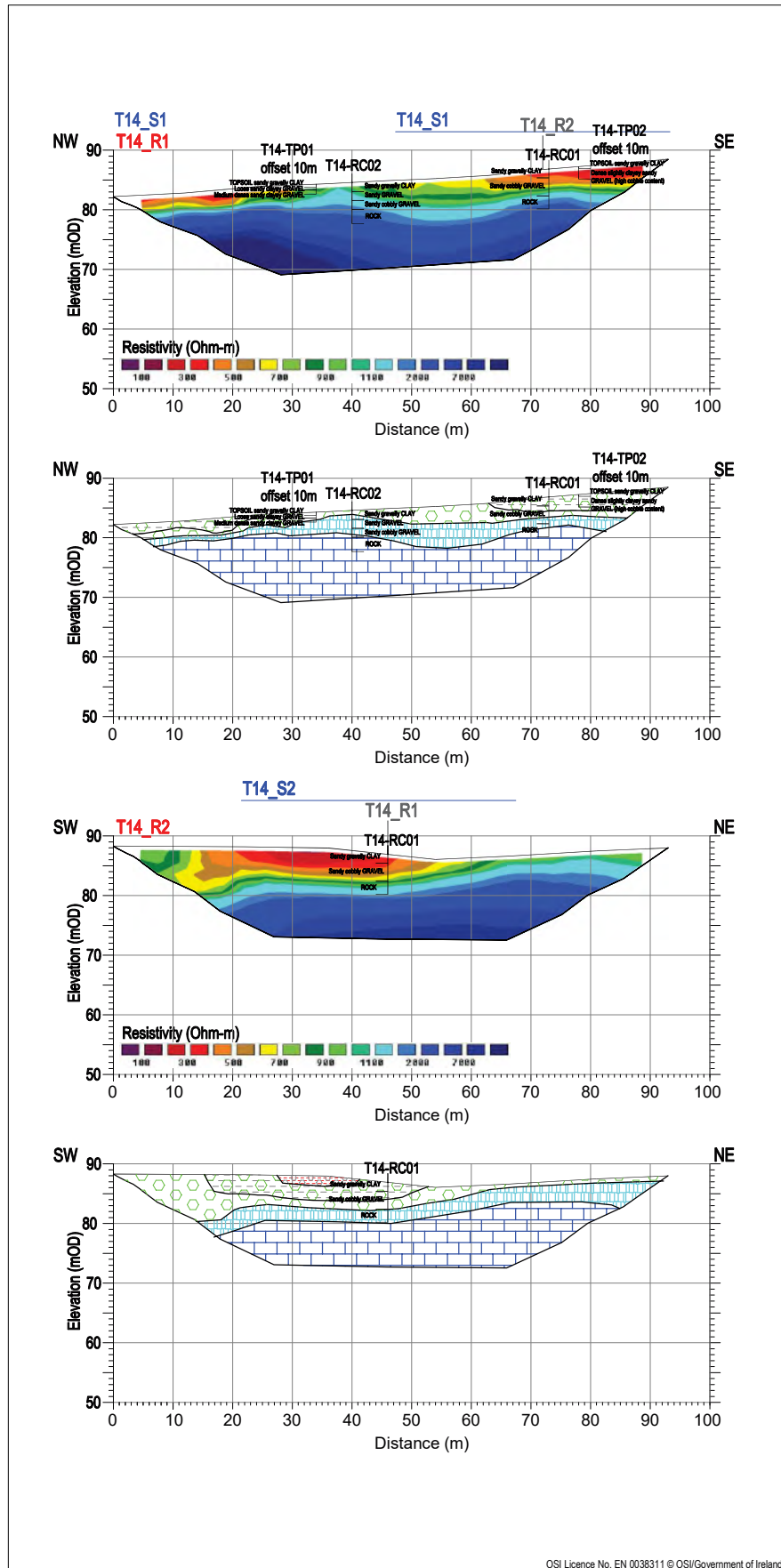


FIG.2 - TURBINE BASE T14 RESULTS AND INTERPRETATION
SCALE 1:750



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T14



Site	Seven Hills Wind Farm
Turbine Base	T14

T07	
ITM Easting	588836
ITM Northing	743739

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	404	2000	-	-	-	-	Clayey sandy GRAVEL	LOOSE	Diggable
0.5	1.6	313	524	2000	0.22	196.41	0.48	11.91	Clayey sandy GRAVEL	MEDIUM DENSE	Diggable
1.6	2.4	314	828	2000	0.42	197.01	0.56	15.28	Clayey sandy GRAVEL	MEDIUM DENSE	Diggable
2.4	3.3	282	1347	2000	0.48	159.10	0.47	11.51	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
3.3	5.2	245	2071	2500	0.49	149.68	0.45	10.59	Moderately weathered/pos. karstified LIMESTONE	FAIR	Break / Blast
5.2	9.9	-	3462	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Heavy Break / Blast
9.9	12.4	-	4514	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations , including soft ground probes, and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T14 is characterised by c. 2.4 m of loose to medium dense clayey sandy GRAVEL over dense slightly clayey sandy GRAVEL/BOULDERS over moderately weathered/possible karstified LIMESTONE at 3.3 m bgl. Depth to slightly weathered to fresh LIMESTONE is 5.2m bgl.
Vp seismic velocities indicate that any excavation of the moderately weathered/possible karstified LIMESTONE and slightly weathered to fresh LIMESTONE will require breaking/blasting to heavy breaking/blasting. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T15 GEOPHYSICAL LOCATION
SCALE 1:1250

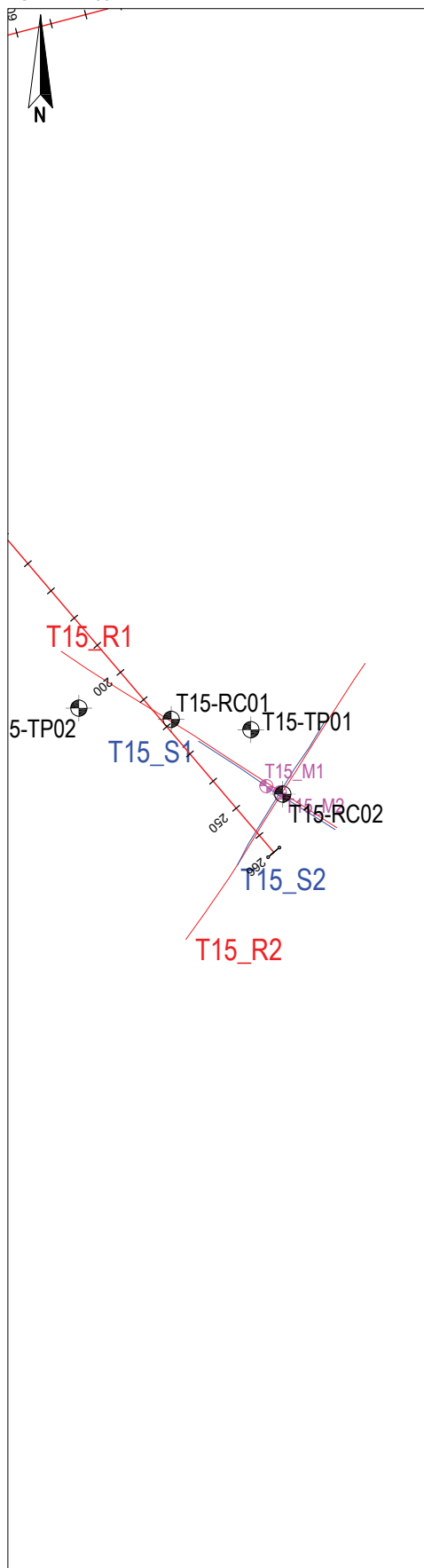
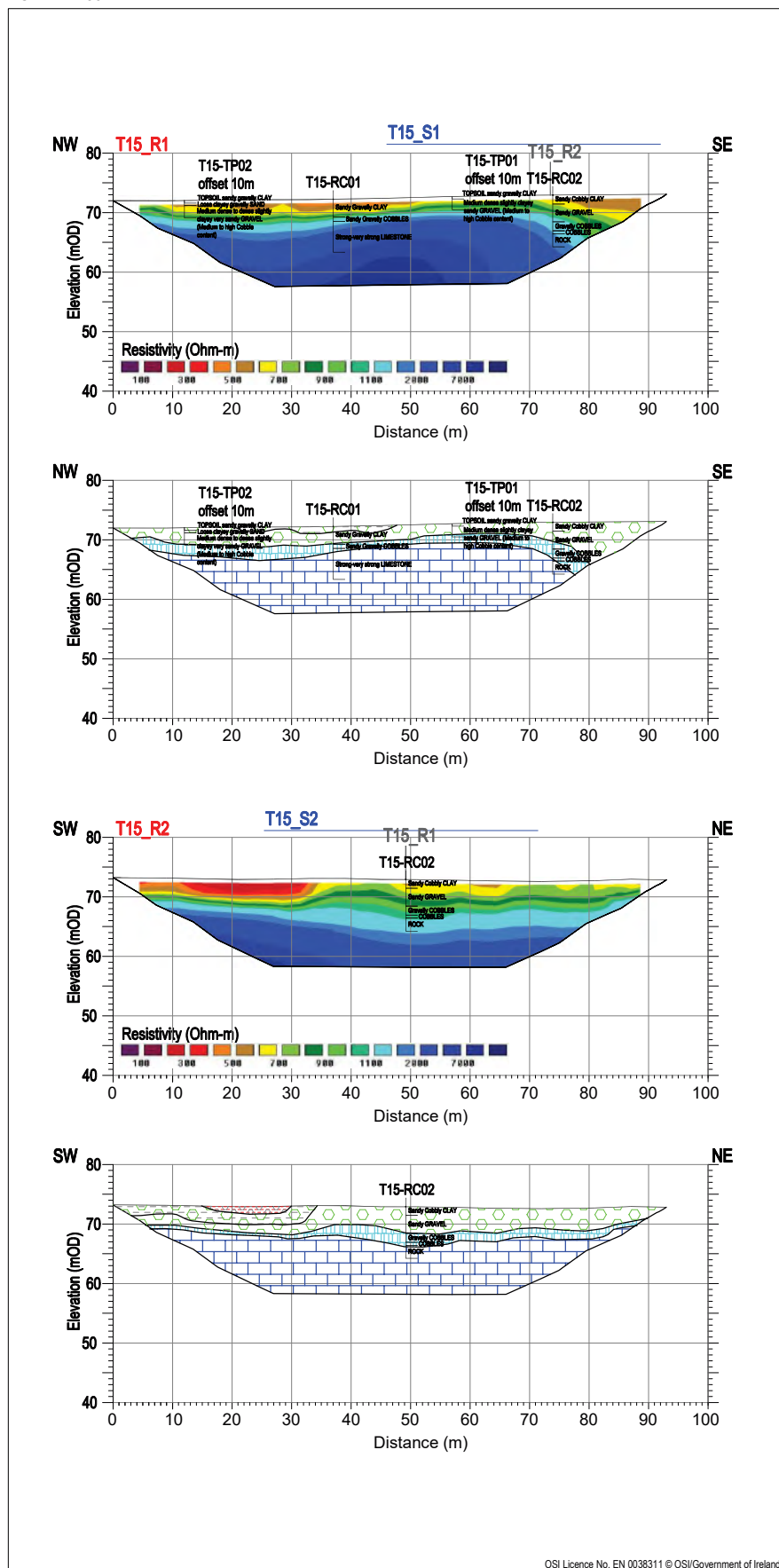


FIG.2 - TURBINE BASE T15 RESULTS AND INTERPRETATION
SCALE 1:750



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T15



Site	Seven Hills Wind Farm
Turbine Base	T15

T07	
ITM Easting	588861
ITM Northing	744153

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	426	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.5	1.5	289	593	2000	0.34	166.82	0.45	10.66	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
1.5	2.5	382	1020	2000	0.42	292.47	0.83	29.39	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
2.5	4.2	546	1349	2000	0.40	595.93	1.67	93.33	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
4.2	6.6	-	2094	2500	-	-	-	-	Moderately weathered LIMESTONE	FAIR	Break / Blast
6.6	8.2	-	3002	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Heavy Break / Blast
8.2	10.5	-	3616	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Break / Blast
10.5	12.9	-	4246	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations , including soft ground probes, and client supplied borehole information.

Discussion	
The geophysical data indicates the centre of Turbine T15 is characterised by c. 4.2 m of loose to medium dense becoming dense slightly clayey sandy GRAVEL/BOULDERS over moderately weathered LIMESTONE. Depth to top of slightly weathered to fresh LIMESTONE is 6.6m bgl.	
Vp seismic velocities indicate that any excavation of the moderately weathered LIMESTONE and slightly weathered to fresh LIMESTONE will require breaking/blasting to heavy breaking/blasting. More information on excavatability is provided in Appendix C.	

FIG.1 - TURBINE BASE T16 GEOPHYSICAL LOCATION
SCALE 1:1250

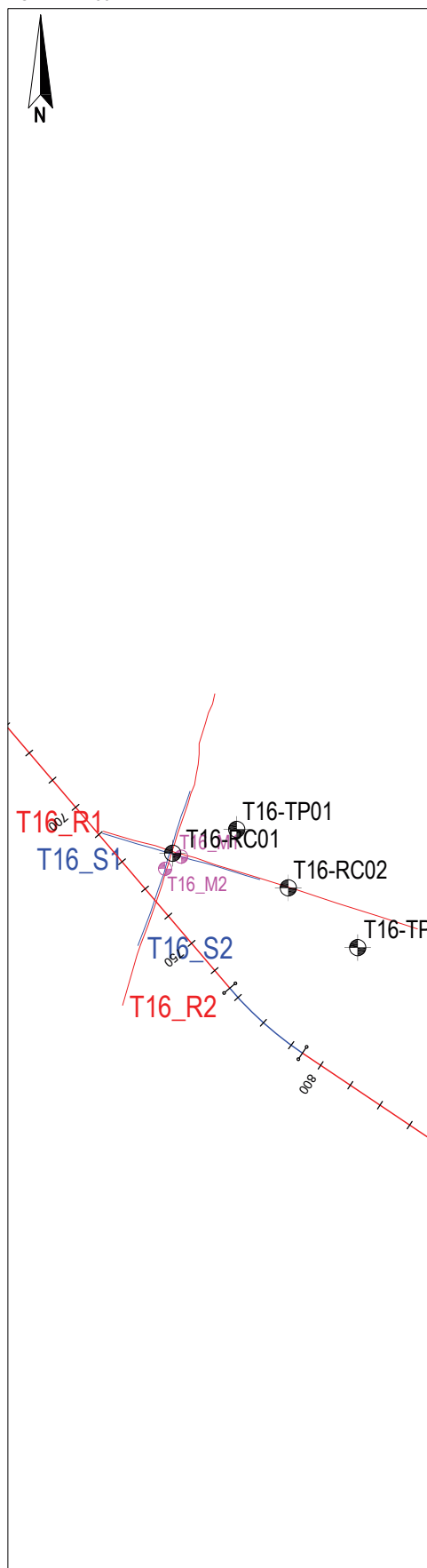
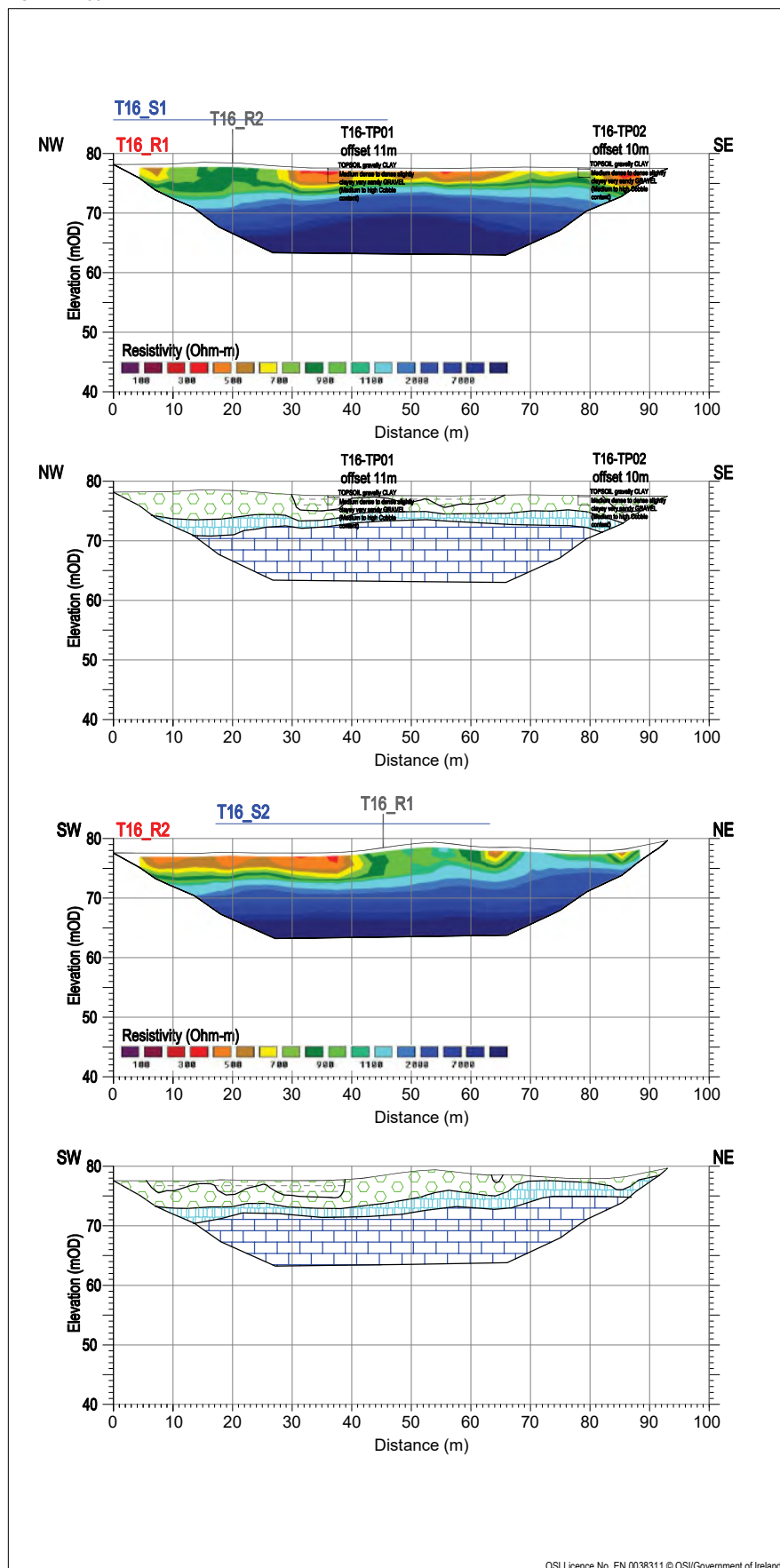


FIG.2 - TURBINE BASE T16 RESULTS AND INTERPRETATION
SCALE 1:750



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Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T16



Site	Seven Hills Wind Farm
Turbine Base	T16

T07	
ITM Easting	589367
ITM Northing	744490

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	329	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.5	1.5	250	603	2000	0.40	125.03	0.35	7.05	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
1.5	2.5	353	999	2000	0.43	249.51	0.71	22.88	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
2.5	4.7	449	1377	2000	0.44	403.76	1.16	51.33	Slightly clayey sandy GRAVEL/BOULDERS	VERY DENSE	Diggable
4.7	6.9	-	2330	2500	-	-	-	-	Moderately weathered/pos. karstified LIMESTONE	GOOD	Break / Blast
6.9	8.3	-	4517	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast
8.3	10.7	-	5786	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations , including soft ground probes, and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T16 is characterised by c. 4.7 m of loose to medium dense becoming dense to very dense slightly clayey sandy GRAVEL/BOULDERS over moderately weathered/possible karstified LIMESTONE. Depth to slightly weathered to fresh LIMESTONE is 6.9 m bgl.
Vp seismic velocities indicate that any excavation of the moderately weathered/possible karstified LIMESTONE and slightly weathered to fresh LIMESTONE will require breaking/blasting to heavy breaking/blasting. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T17 GEOPHYSICAL LOCATION
SCALE 1:1250

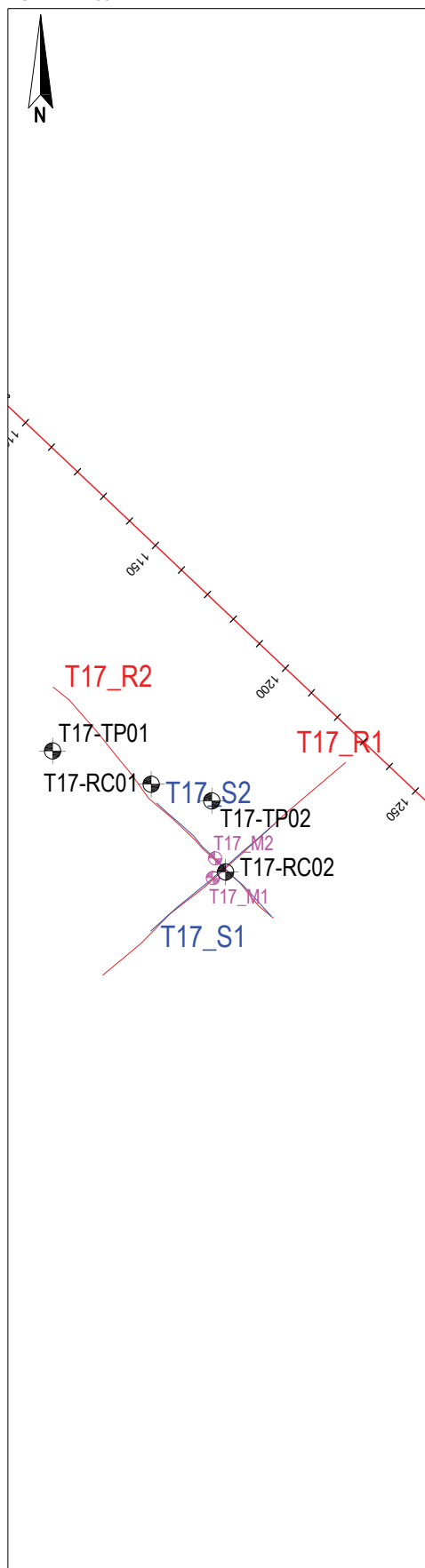
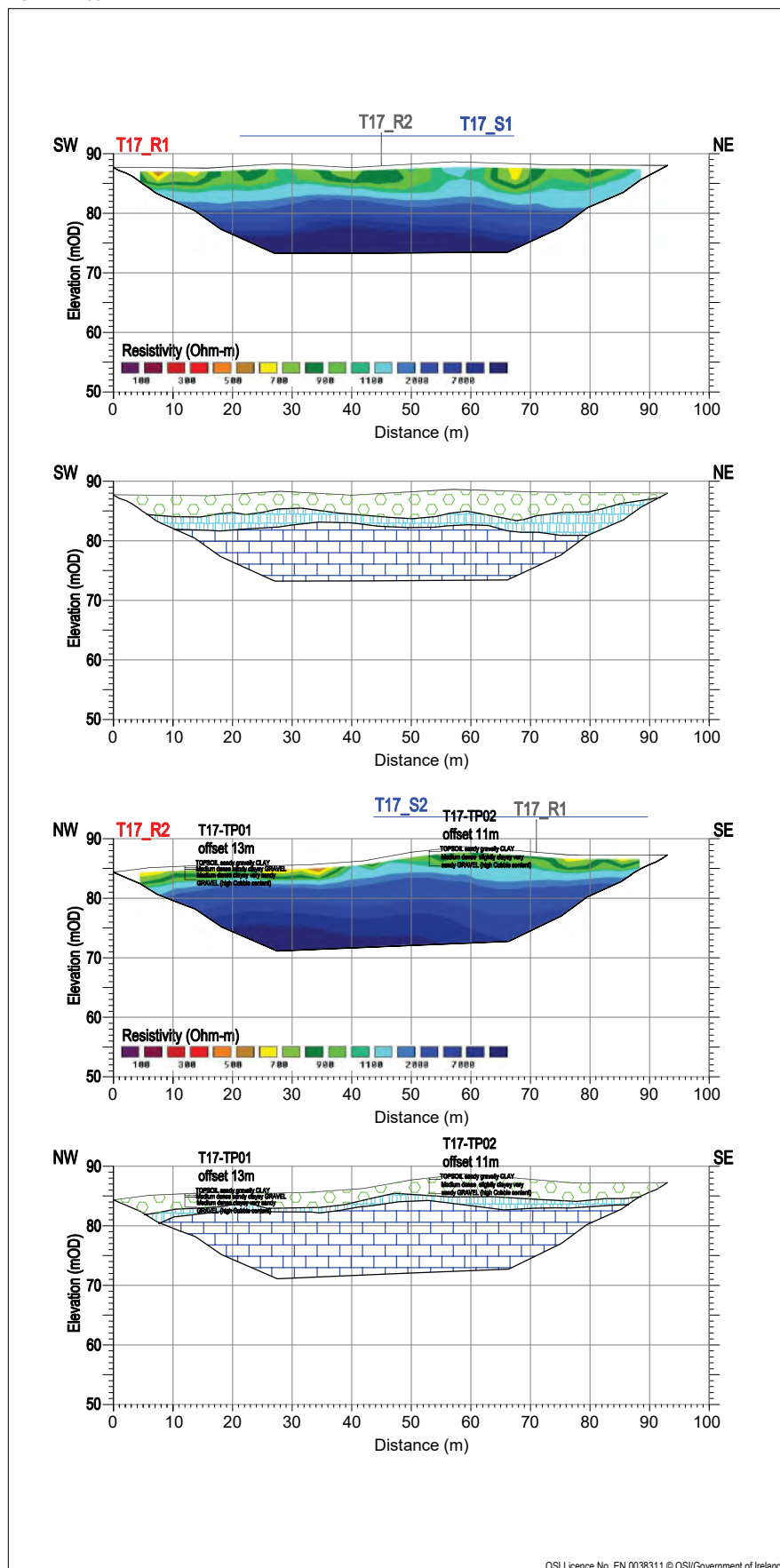


FIG.2 - TURBINE BASE T17 RESULTS AND INTERPRETATION
SCALE 1:750



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T17



Site	Seven Hills Wind Farm
Turbine Base	T17

T07	
ITM Easting	589678
ITM Northing	744107

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	304	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.5	1.5	242	572	2000	0.39	117.25	0.33	6.30	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE to DENSE	Diggable
1.5	2.5	408	937	2000	0.38	332.63	0.92	34.86	Slightly clayey sandy GRAVEL/BOULDERS	VERY DENSE	Diggable
2.5	3.8	423	1413	2000	0.45	357.07	1.04	42.41	Slightly clayey sandy GRAVEL/BOULDERS	VERY DENSE	Diggable
3.8	6.1	-	2221	2500	-	-	-	-	Moderately weathered/pos. karstified LIMESTONE	POOR	Break / Blast
6.1	9.3	-	4007	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T17 is characterised by c. 3.8m of loose to medium dense becoming dense over moderately wethered/possible karstified LIMESTONE. Depth to slightly weathered to fresh LIMESTONE is 6.1m bgl.
Vp seismic velocities indicate that any excavation of the moderately weathered/possible karstified LIMESTONE and slightly weathered to fresh LIMESTONE will require breaking/blasting and heavy breaking/blasting. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T18 GEOPHYSICAL LOCATION
SCALE 1:1250

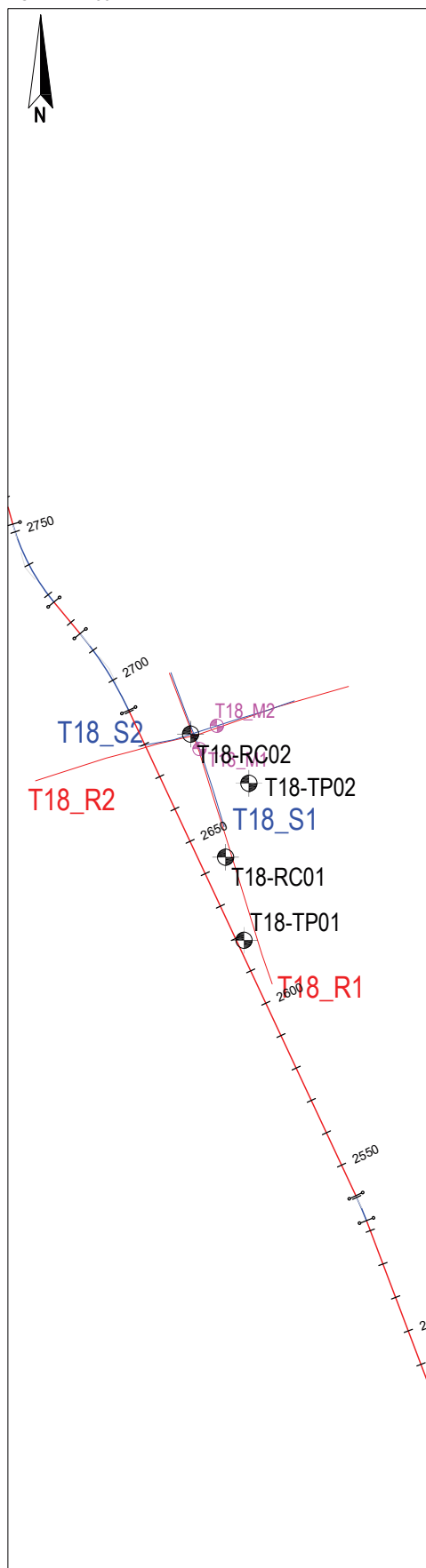
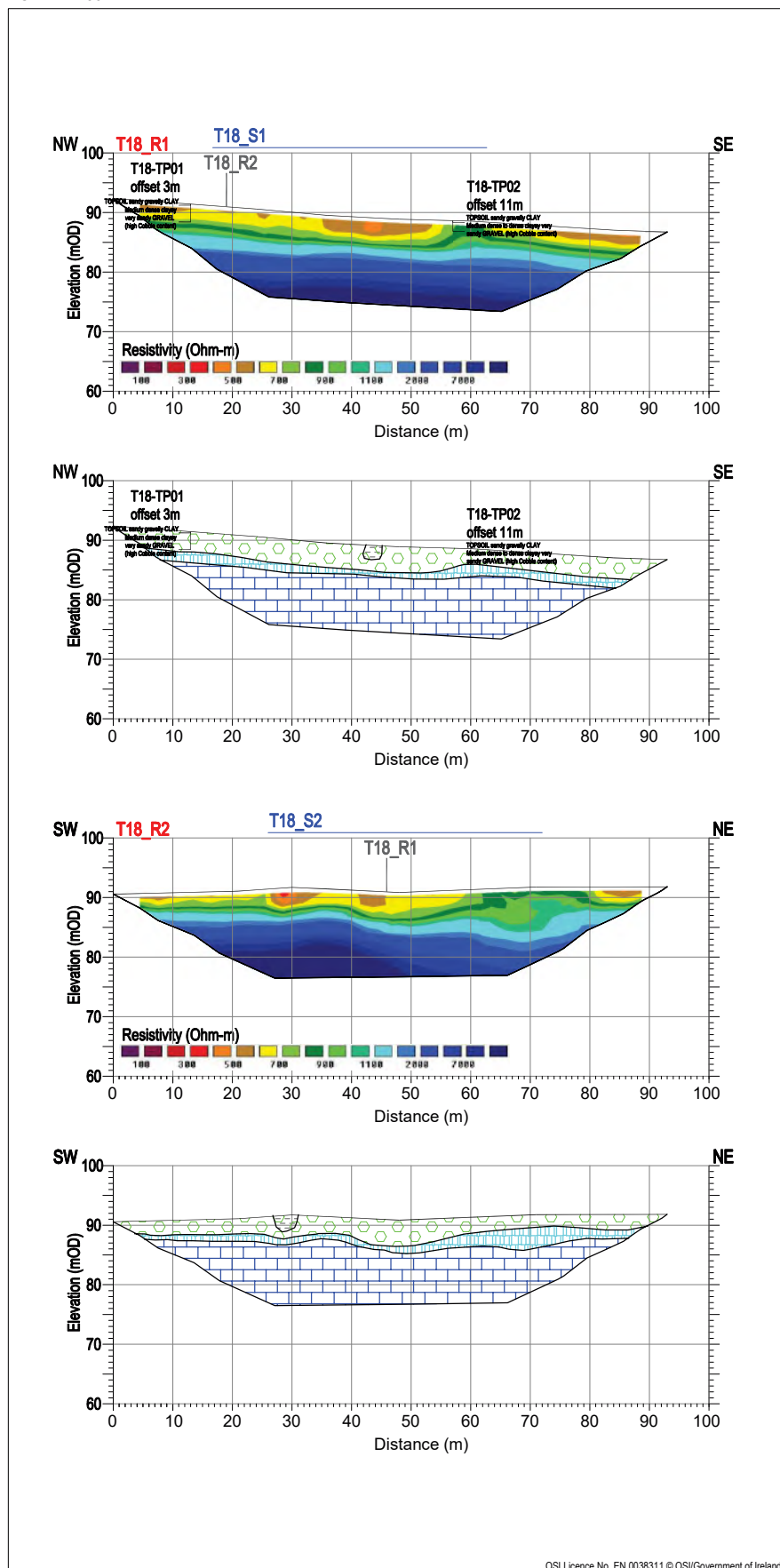


FIG.2 - TURBINE BASE T18 RESULTS AND INTERPRETATION
SCALE 1:750



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Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T18



Site	Seven Hills Wind Farm
Turbine Base	T18

T07	
ITM Easting	590521
ITM Northing	744202

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	284	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.5	1.5	486	681	2000	-0.02	472.42	0.93	35.37	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
1.5	2.5	383	1295	2000	0.45	292.79	0.85	30.61	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
2.5	4.5	527	1874	2000	0.46	554.57	1.62	88.32	Slightly clayey sandy GRAVEL/BOULDERS	VERY DENSE	Diggable
4.5	6.0	-	2064	2500	-	-	-	-	Moderately weathered/pos. karstified LIMESTONE	FAIR	Break / Blast
6.0	7.7	-	2644	2500	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Break / Blast
7.7	9.9	-	4574	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations , including soft ground probes, and client supplied borehole information.

Discussion
The geophysical data indicates the centre of TurbineT18 is characterised by c. 4.5m of loose to medium dense becoming dense to very dense slightly clayey sandy GRAVEL/BOULDERS over moderately weathered/possible karstified LIMESTONE. Depth to slightly weathered to fresh LIMESTONE is 6.0m bgl.
Vp seismic velocities indicate that any excavation of the moderately weathered/possible karstified LIMESTONE and slightly weathered to fresh LIMESTONE will require breaking/blasting and heavy breaking/blasting. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T19 GEOPHYSICAL LOCATION

SCALE 1:1250

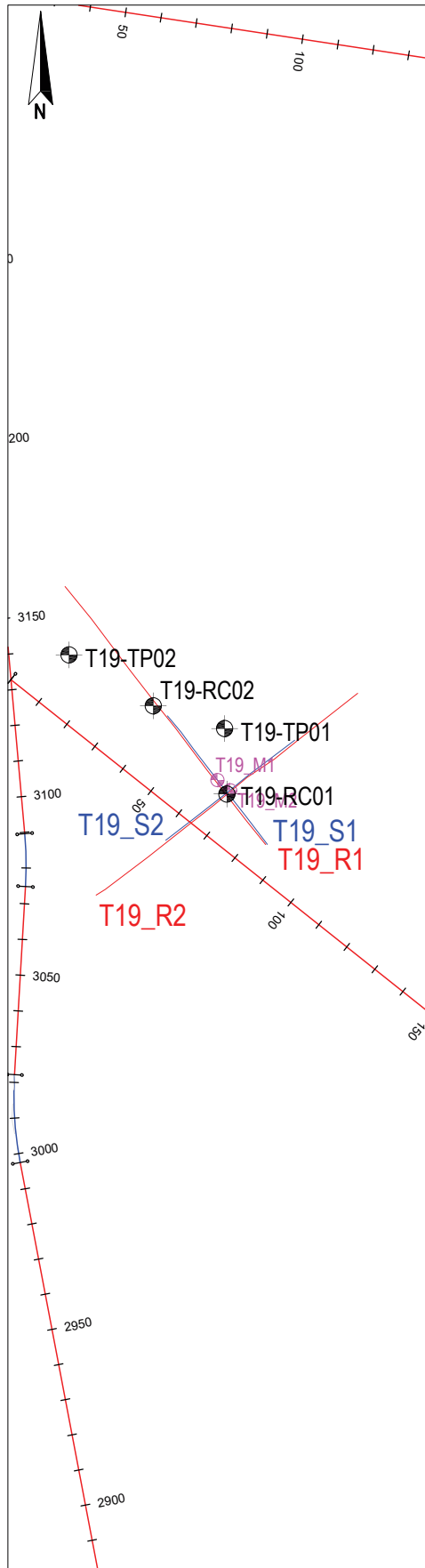
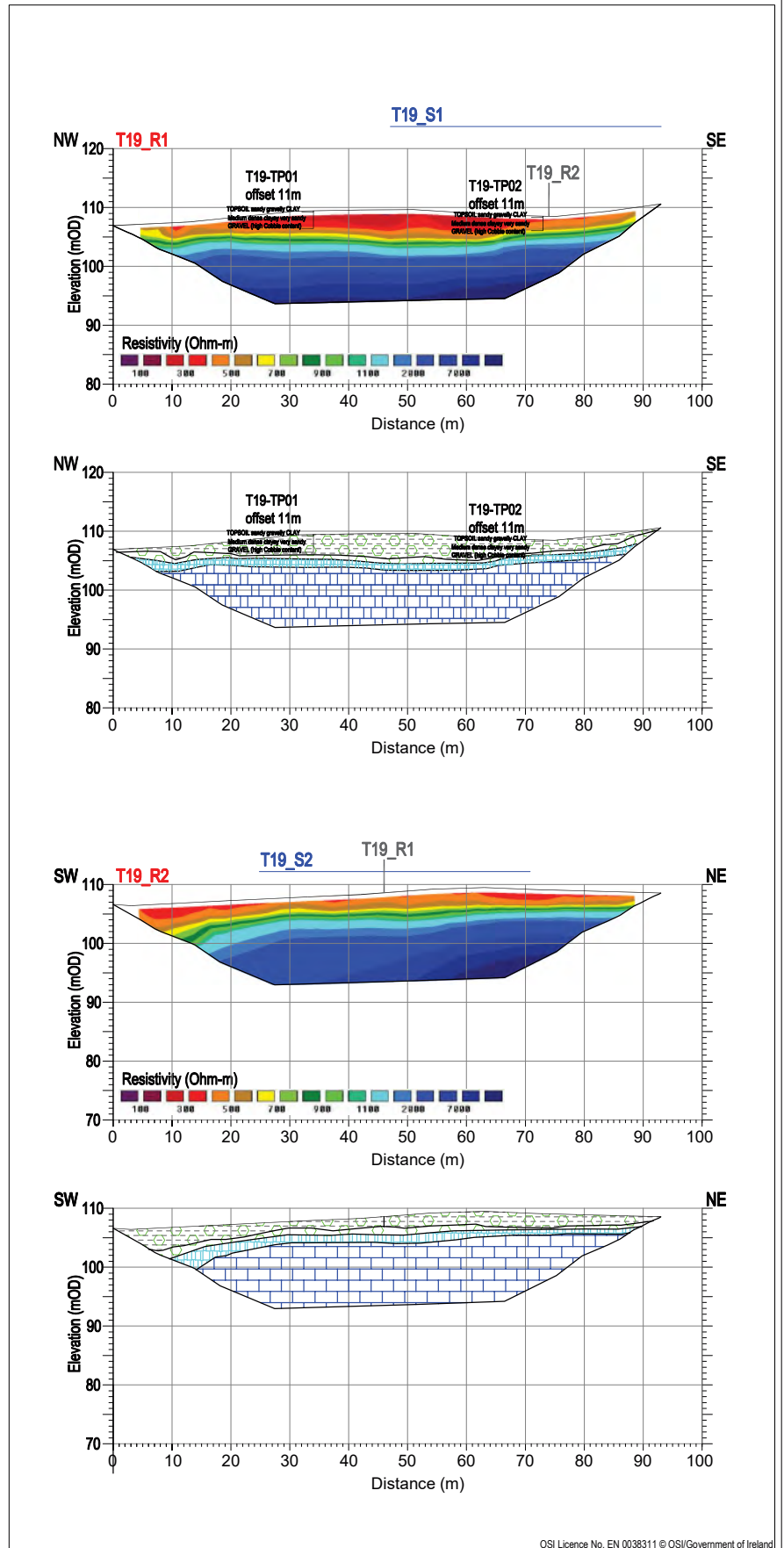


FIG.2 - TURBINE BASE T19 RESULTS AND INTERPRETATION

SCALE 1:750



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Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_T19



Site	Seven Hills Wind Farm
Turbine Base	T19

T07	
ITM Easting	590475
ITM Northing	744603

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	276	2000	-	-	-	-	Clayey sandy GRAVEL	LOOSE	Diggable
0.5	1.5	315	553	2000	0.26	198.11	0.50	12.71	Clayey sandy GRAVEL	MEDIUM DENSE	Diggable
1.5	2.3	261	984	2000	0.46	136.36	0.40	8.77	Slightly wclayey sandy GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
2.3	3.0	396	1520	2000	0.46	313.73	0.92	34.76	Slightly wclayey sandy GRAVEL/BOULDERS	DENSE	Diggable
3.0	5.0	-	2211	2500	-	-	-	-	Moderately weathered/pos. karstified LIMESTONE	FAIR-GOOD	Break / Blast
5.0	7.5	-	4042	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast
7.5	9.7	-	5664	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations , including soft ground probes, and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T18 is characterised by c. 1.5m of loose to medium dense clayey sandy GRAVEL over 1.5m of medium dense to dense slightly clayey sandy GRAVEL/BOULDERS over moderately weathered/possible karstified LIMESTONE. Depth to slightly weathered to fresh LIMESTONE is 5.0m bgl.
Vp seismic velocities indicate that any excavation of the moderately weathered/possible karstified LIMESTONE and slightly weathered to fresh LIMESTONE will require breaking/blasting and heavy breaking/blasting. More information on excavatability is provided in Appendix C.

FIG.1 - TURBINE BASE T20 GEOPHYSICAL LOCATION
SCALE 1:1250

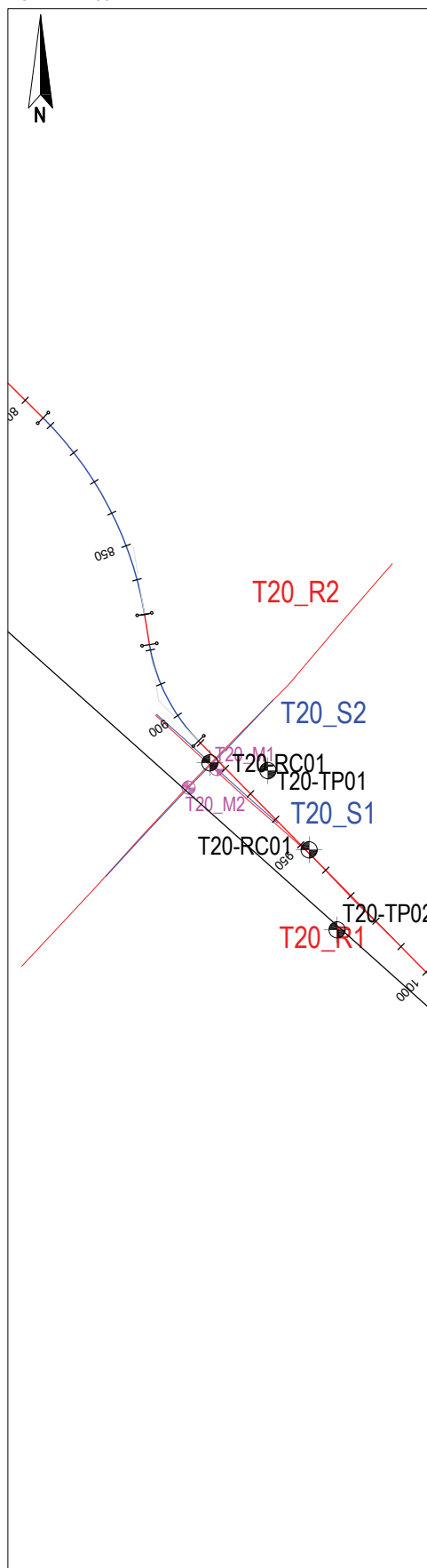
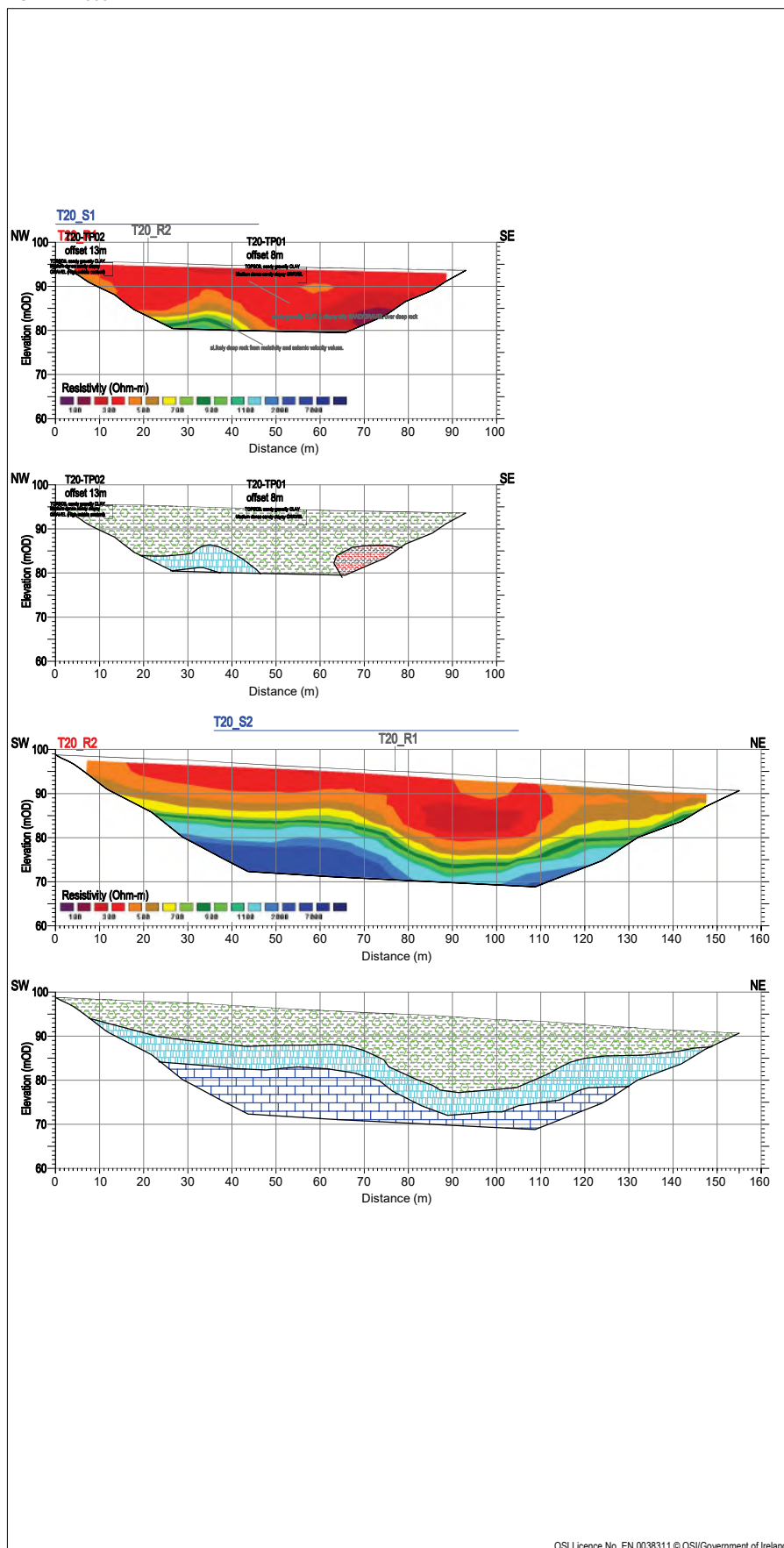


FIG.2 - TURBINE BASE T20 RESULTS AND INTERPRETATION
SCALE 1:1000



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_01_T20



Site	Seven Hills Wind Farm
Turbine Base	T20

T07	
ITM Easting	591157
ITM Northing	744396

Methodology	
Seismic Refraction	24 ch. @ 3m geophone spacing
MASW	24 ch. @ 1.5m geophone spacing
ERT	32 el. @ 5m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	276	2000	-	-	-	-	Clayey sandy GRAVEL	LOOSE	Diggable
0.5	1.4	-	617	2000	-	-	-	-	Clayey sandy GRAVEL	MEDIUM DENSE	Diggable
1.4	2.4	198	1016	2000	0.48	78.45	0.23	3.60	Clayey sandy GRAVEL	MEDIUM DENSE	Diggable
2.4	3.3	227	1343	2000	0.49	103.23	0.31	5.69	Clayey sandy GRAVEL	DENSE	Diggable
3.3	5.6	259	1937	2000	0.49	133.91	0.40	8.79	Clayey sandy GRAVEL	VERY DENSE	Diggable
5.6	7.9	288	2186	2000	0.49	165.76	0.49	12.51	Clayey sandy GRAVEL	VERY DENSE	Diggable
7.9	10.2	-	2349	2000	-	-	-	-	Clayey sandy GRAVEL	VERY DENSE	Diggable

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations , including soft ground probes, and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T20 is characterised by a thick sequence of loose to medium dense becoming dense to very dense clayey sandy GRAVEL to a depth of of 10.2m bgl. The ERT data indicates depth to top of highly to moderately weatyhered/possible karstified LIMESTONE is 12.4m bgl. To the east of the turbine centre depth to LIMESTONE rock increases to 17.0m bgl.

FIG.1 - TURBINE BASE T21 GEOPHYSICAL LOCATION
SCALE 1:1250

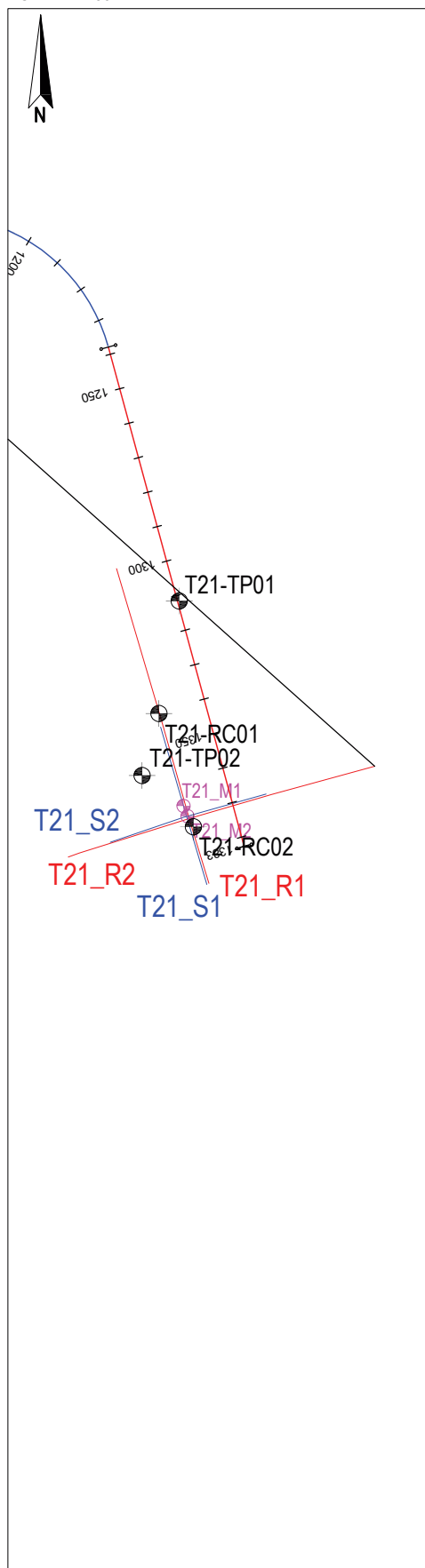
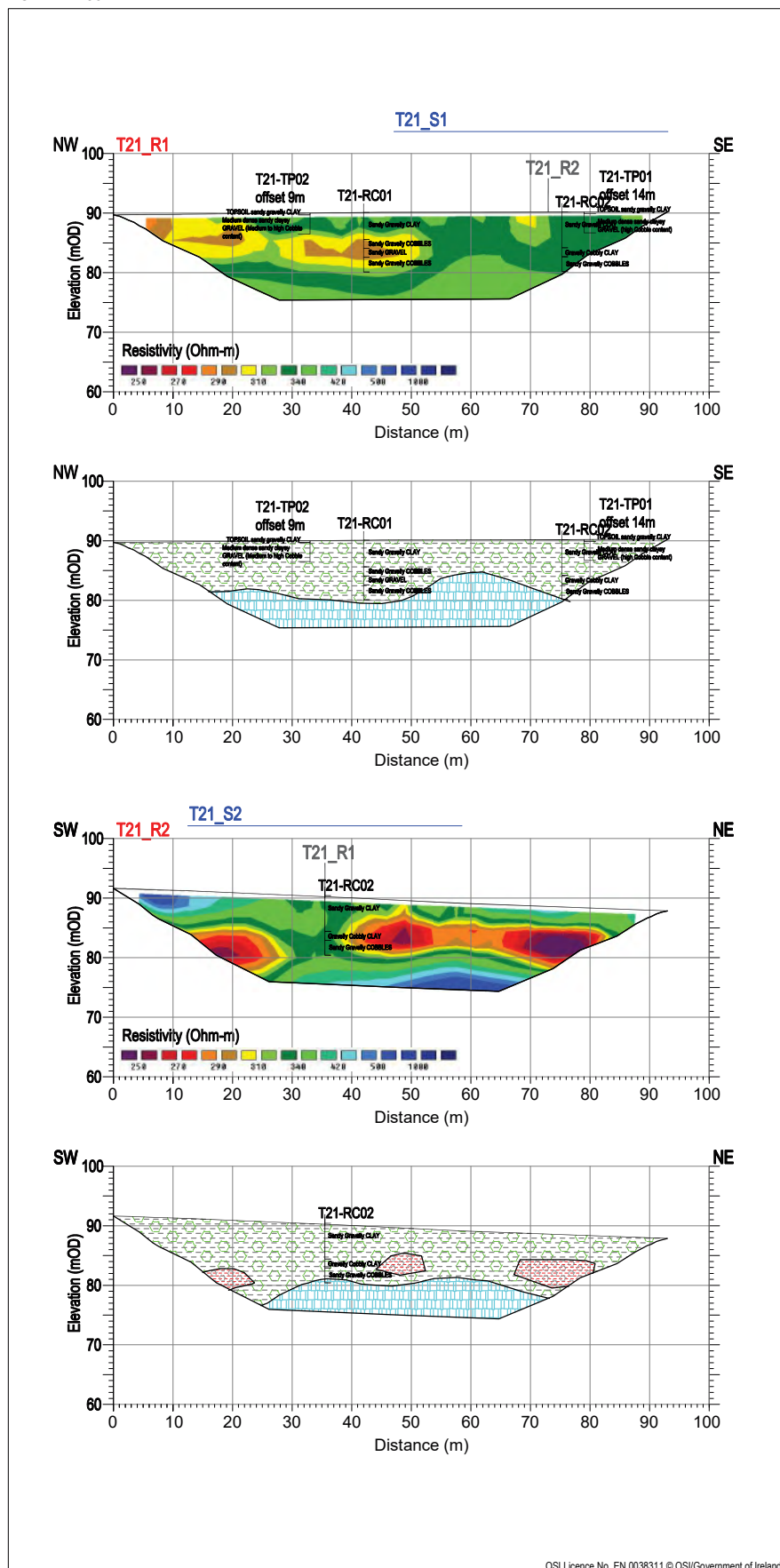


FIG.2 - TURBINE BASE T21 RESULTS AND INTERPRETATION
SCALE 1:750



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Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_01_T21



Site	Seven Hills Wind Farm
Turbine Base	T21

T07	
ITM Easting	591432
ITM Northing	744076

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	286	1300	-	-	-	-	Clayey sandy GRAVEL	LOOSE	Diggable
0.5	1.5	-	500	2000	-	-	-	-	Clayey sandy GRAVEL	MEDIUM DENSE	Diggable
1.5	2.5	-	1004	2000	-	-	-	-	Clayey sandy GRAVEL	DENSE	Diggable
2.5	3.5	-	1382	2000	-	-	-	-	Clayey sandy GRAVEL	DENSE	Diggable
3.5	5.9	-	2074	2000	-	-	-	-	Clayey sandy GRAVEL	VERY DENSE	Diggable
5.9	8.3	-	2352	2500	-	-	-	-	Clayey sandy GRAVEL	VERY DENSE	Diggable
8.3	10.8	-	2570	2700	-	-	-	-	Clayey sandy GRAVEL	VERY DENSE	Diggable

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of Turbine T21 is characterised by a thick sequence of loose to medium dense becoming dense to very dense clayey sandy GRAVEL to 10.5m, overlying highly to moderately weathered/possible karstified LIMESTONE (as indicated by the ERT). While the borehole data did not encounter rock seismic velocities of 2570m/s indicate depth to rock may be shallower at 8.3m bgl.0.7 m
A clear dispersion curve was not generated on the MASW data.

FIG.1 - T11 ACCESS ROAD GEOPHYSICAL LOCATION
SCALE 1:1250

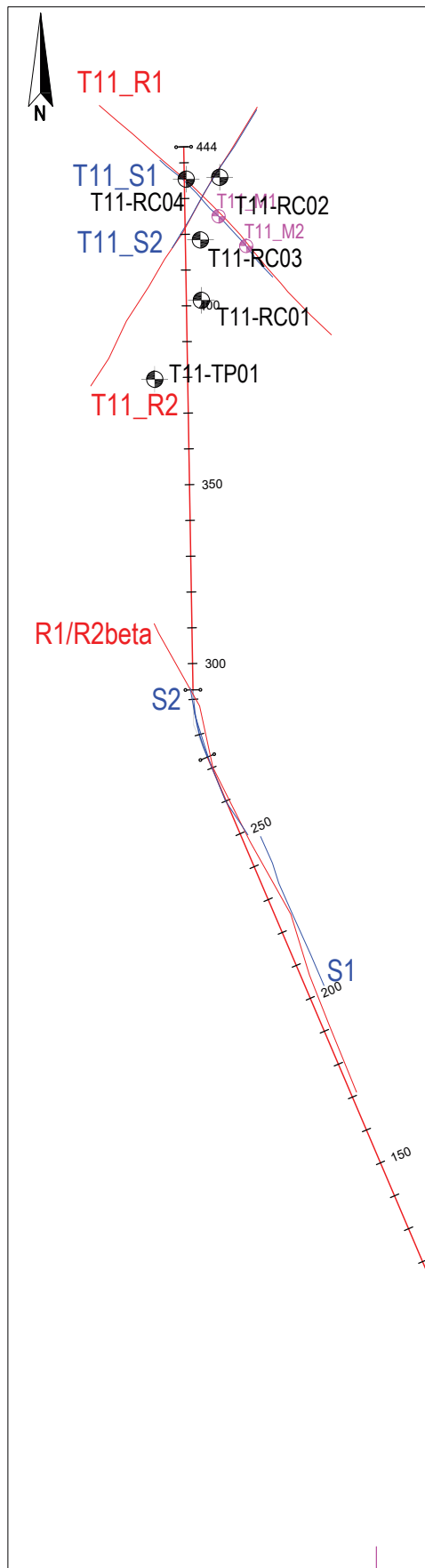
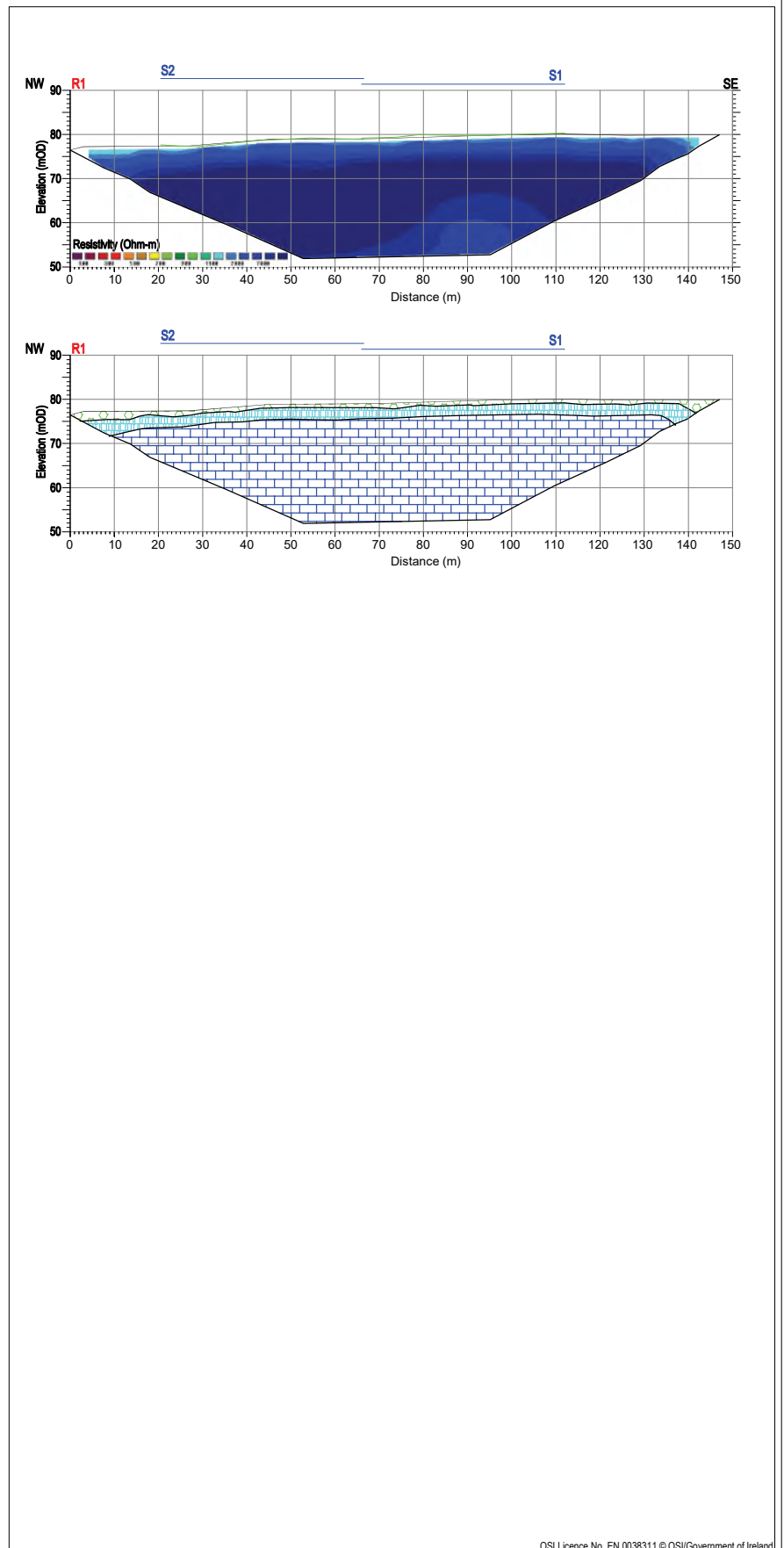


FIG.2 - T11 ACCESS ROAD RESULTS AND INTERPRETATION
SCALE 1: 1000



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_S01



Site	Seven Hills Wind Farm
Location	S01

T06	
ITM Easting	587913
ITM Northing	743440

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.8	-	523	2000	-	-	-	-	Slightly clayey GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
0.8	2.3	-	1521	2500	-	-	-	-	Highly weathered/pos. karstified LIMESTONE	VERY POOR	Rippable
2.3	3.8	-	2358	2500	-	-	-	-	Moderately weathered/pos. karstified LIMESTONE	FAIR	Break / Blast
3.8	5.4	-	2952	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Break / Blast
5.4	9.1	-	3578	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Heavy Break / Blast
9.1	12.8	-	4662	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations , including soft ground probes, and client supplied borehole information.

Discussion
The geophysical data indicates the centre of location S01 is characterised by c. 0.8m of medium dense slightly clayey sandy GRAVEL/BOULDERS over highly weathered/possible karstified LIMESTONE over moderately weathered/karstified LIMESTONE. Depth to slightly weathered to fresh LIMESTONE is 3.8m bgl.
Vp seismic velocities indicate that any excavation of the moderately weathered/possible karstified LIMESTONE and slightly weathered to fresh LIMESTONE will require breaking/blasting and heavy breaking/blasting. More information on excavatability is provided in Appendix C.
For the MASW data a good dispersion curve was not generated due to the presence of shallow rock.

Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_01_S02



Site	Seven Hills Wind Farm
Location	S02

T06	
ITM Easting	587889
ITM Northing	743483

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.7	-	576	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	MEDIUM DENSE	Diggable
0.7	2.2	-	1384	2500	-	-	-	-	Highly weathered/pos. karstified LIMESTONE	VERY POOR	Rippable
2.2	3.8	-	2325	2500	-	-	-	-	Moderately weathered/pos. karstified LIMESTONE	POOR	Break / Blast
3.8	5.4	-	3041	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	FAIR	Heavy Break / Blast
5.4	9.1	-	3744	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Heavy Break / Blast
9.1	12.8	-	4742	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations , including soft ground probes, and client supplied borehole information.

Discussion
The geophysical data indicates the centre of location S02 is characterised by c. 0.7m of medium dense slightly clayey sandy GRAVEL/BOULDERS over highly weathered/possible karstified LIMESTONE over moderately weathered/karstified LIMESTONE. Depth to slightly weathered to fresh LIMESTONE is 3.8m bgl.
Vp seismic velocities indicate that any excavation of the moderately weathered/possible karstified LIMESTONE and slightly weathered to fresh LIMESTONE will require breaking/blasting and heavy breaking/blasting. More information on excavatability is provided in Appendix C.
For the MASW data a good dispersion curve was not generated due to the presence of shallow rock.

FIG.1 - T12 ACCESS ROAD GEOPHYSICAL LOCATION
SCALE 1:1500

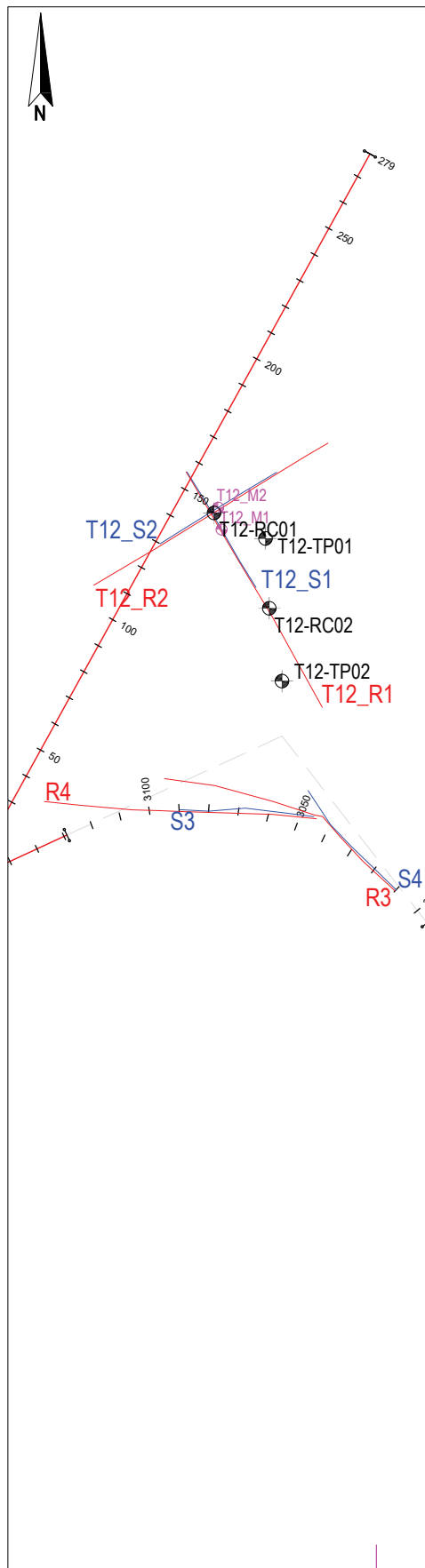
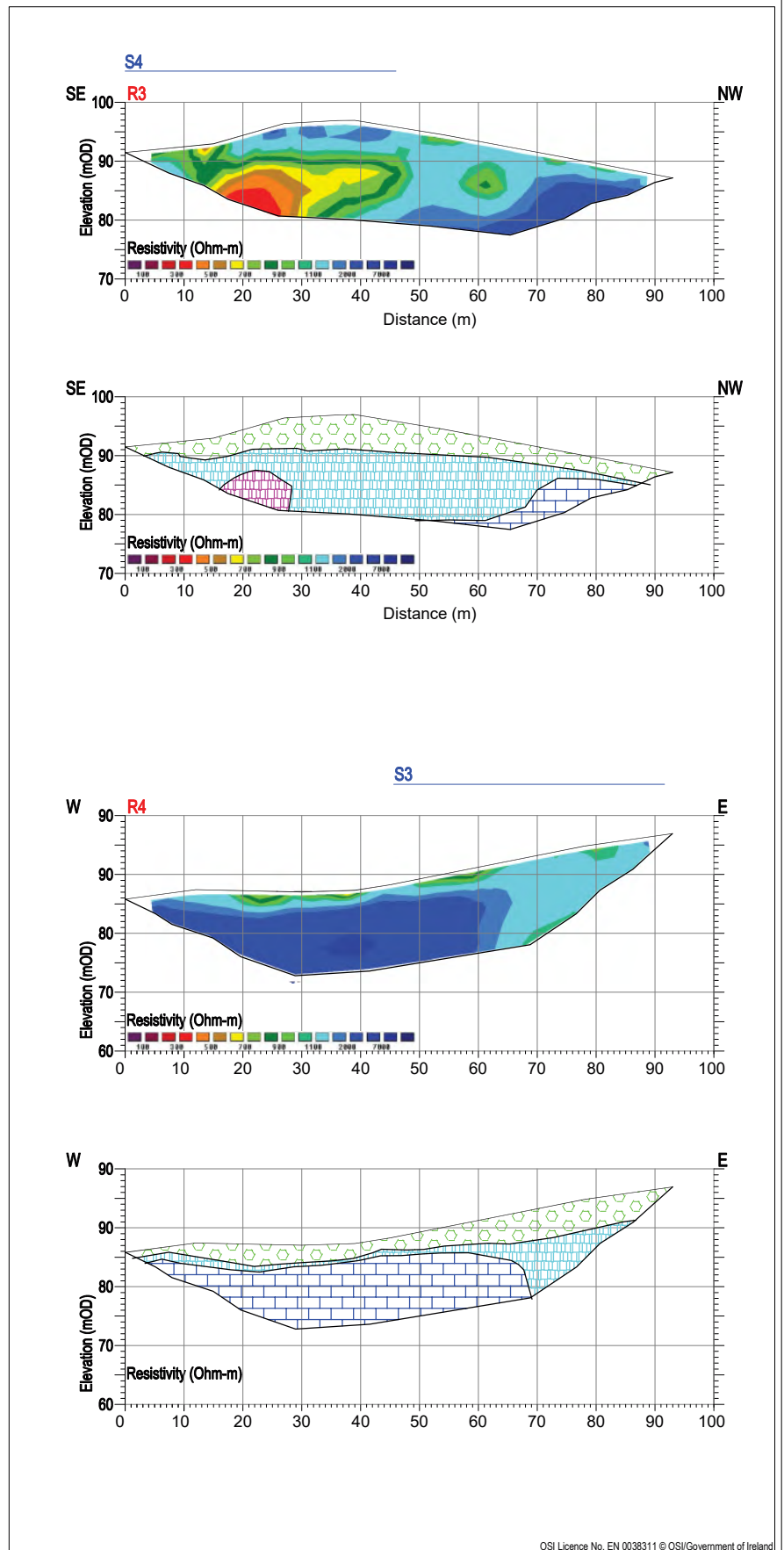


FIG.2 - T12 ACCESS ROAD RESULTS AND INTERPRETATION
SCALE 1:750



Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_S03



Site	Seven Hills Wind Farm
Location	S03

T06	
ITM Easting	588348
ITM Northing	743376

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.8	-	347	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.8	2.5	-	1128	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
2.5	4.2	-	1492	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
4.2	5.8	-	1870	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	VERY DENSE	Diggable
5.8	9.9	-	2404	2500	-	-	-	-	Moderately weathered/karstified LIMESTONE	GOOD	Break / Blast
9.9	14.0	-	4412	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of location S03 is characterised by c. 5.8m of loose to dense becoming very dense slightly clayey sandy GRAVEL/BOULDERS over moderately weathered/karstified LIMESTONE. Depth to slightly weathered to fresh LIMESTONE is 9.9m bgl.
Vp seismic velocities indicate that any excavation of the moderately weathered/karstified LIMESTONE and slightly weathered to fresh LIMESTONE will require breaking/blasting and heavy breaking/blasting. More information on excavatability is provided in Appendix C.
For the MASW data a good dispersion curve was not generated due to the presence of shallow rock.

Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_02_S04



Site	Seven Hills Wind Farm
Location	S04

T06	
ITM Easting	588383
ITM Northing	743364

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.7	-	291	1300	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.7	2.1	244	1041	2000	0.47	118.85	0.35	7.06	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
2.1	3.5	259	1466	2000	0.48	134.19	0.40	8.76	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
3.5	4.0	278	1641	2000	0.49	154.76	0.46	11.10	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
4.0	8.0	-	1820	2000	-	-	-	-	Moderately weathered/karstified LIMESTONE	VERY POOR	Break / Blast
8.0	11.9	-	2121	2500	-	-	-	-	Completely to highly weathered/karstified LIMESTONE	FAIR	Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations , including soft ground probes, and client supplied borehole information.

Discussion
The geophysical data indicates the centre of location S04 is characterised by c. 4.0m of loose to dense slightly clayey sandy GRAVEL/BOULDERS over moderately weathered/karstified LIMESTONE. Depth to highly weathered/karstified LIMESTONE is 8.0m bgl. The interpreted zone of highly weathered/karstified LIMESTONE is indicated by a zone of low resistivity values (<500 Ohm-m) on ERT profile R3 (see Drawing AGP20192_01_S04) and relatively low seismic velocities of 2121m/s.
Vp seismic velocities indicate that any excavation of the moderately weathered/karstified LIMESTONE and slightly weathered to fresh LIMESTONE will require breaking/blasting and heavy breaking/blasting. More information on excavatability is provided in Appendix C.
For the MASW data a good dispersion curve was not generated due to the presence of shallow rock.

FIG.1 - T01 ACCESS ROAD GEOPHYSICAL LOCATION

SCALE 1:1250

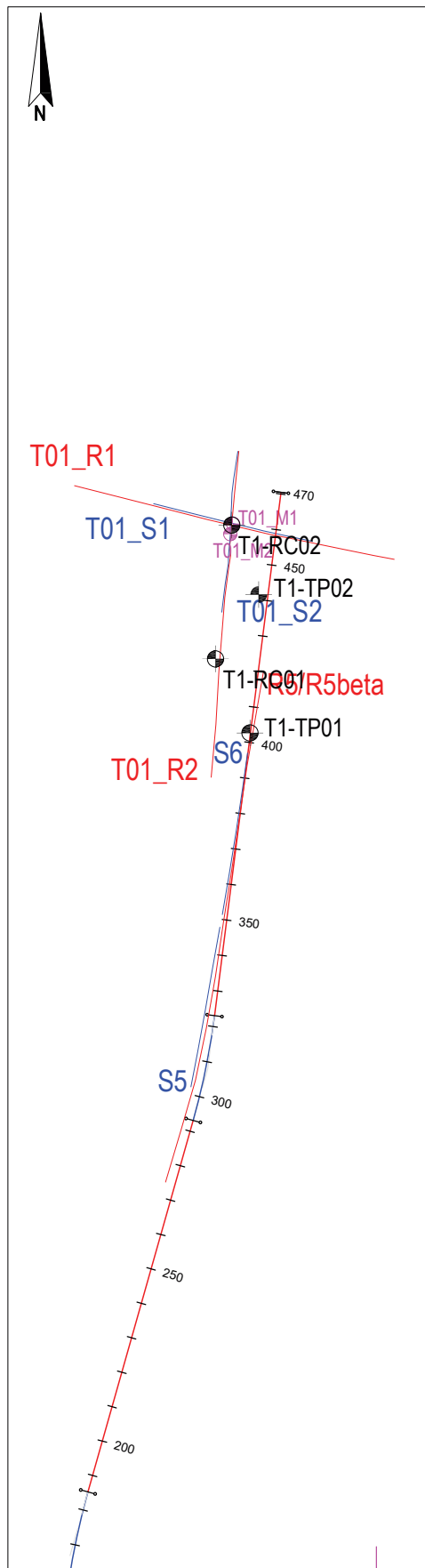
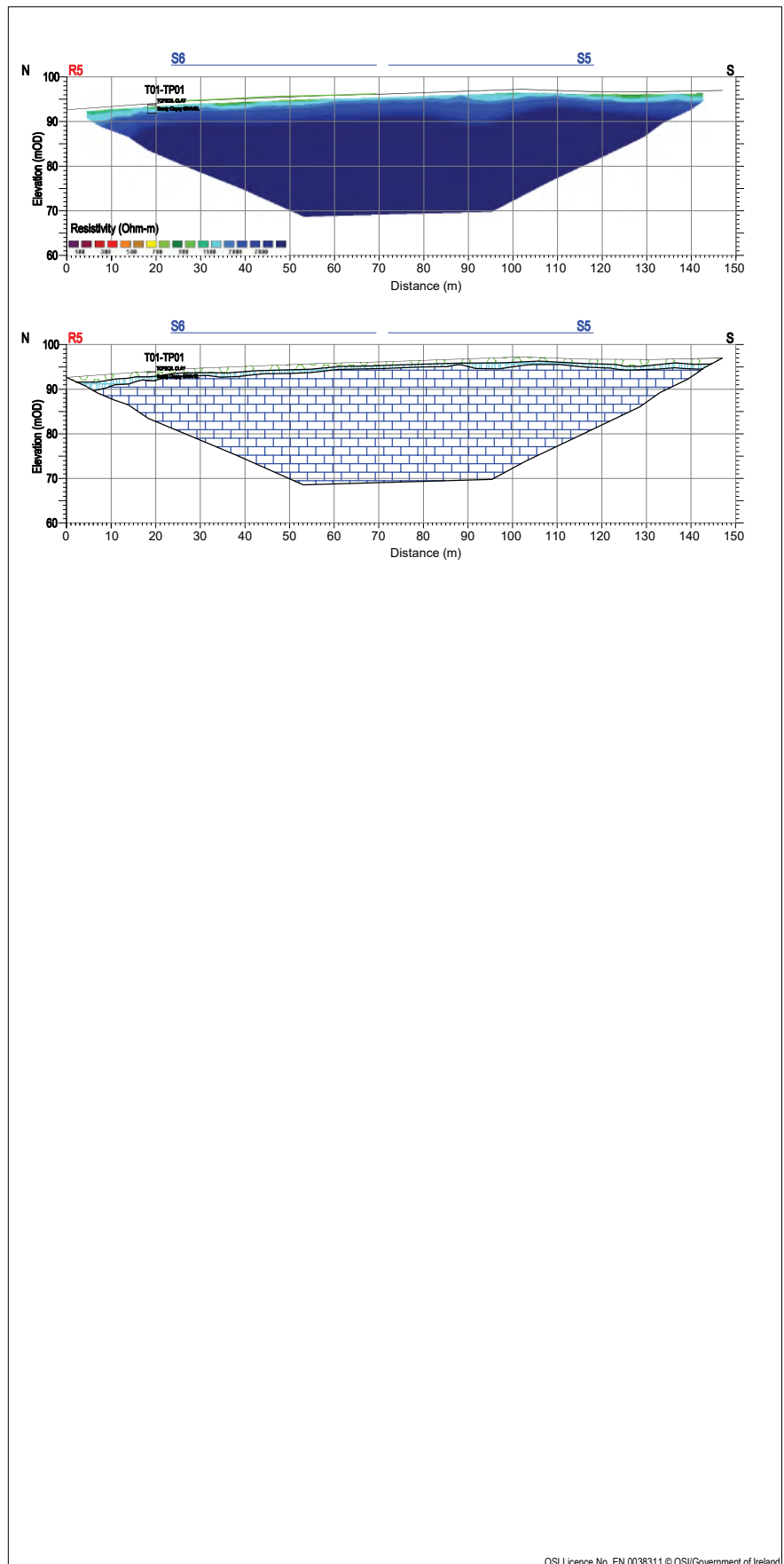


FIG.2 - T01 ACCESS ROAD RESULTS AND INTERPRETATION

SCALE 1:1000



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INDEX MAP

LEGEND:

- 2D resistivity profile
- Seismic refraction profile
- Trial Pit/Borehole
- Slightly Clayey Sandy GRAVEL/BOULDERS
- Highly - moderately weathered LIMESTONE
- Slightly weathered - fresh LIMESTONE

The information displayed here is to be used in conjunction with AGP20192_01 Report on the Geophysical Investigation at Seven Hills Wind Farm, Co. Roscommon for IGSL Limited., APEX Geophysics Ltd. 11th March 2022

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PROJECT: SEVEN HILLS WIND FARM GEOPHYSICAL INVESTIGATION			
CLIENT: IGSL LIMITED			
DRAWING NO: AGP20192_01_T01AR			
SCALE: AS INDICATED @ A3			
DATE: 29-03-2021			
Version	Date	Drawn By	Checked
01	29-03-2021	FP	TL
02	11-03-2022	FP	TL

Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_01_S05



Site	Seven Hills Wind Farm
Location	S05

T06	
ITM Easting	586346
ITM Northing	748229

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	0.5	-	442	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
0.5	1.1	-	1309	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	DENSE	Diggable
1.1	2.6	-	1713	2000	-	-	-	-	Highly-moderately weathered LIMESTONE	FAIR	Rippable
2.6	3.8	-	2546	2000	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Break / Blast
3.8	6.4	-	3721	2000	-	-	-	-	Slightly weathered to fresh LIMESTONE	GOOD	Heavy Break / Blast
6.4	8.9	-	5758	2500	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast
8.9	11.5	-	5776	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations and client supplied borehole information.

Discussion
The geophysical data indicates the centre of location S05 is characterised by c. 1.1m of loose to dense slightly clayey sandy GRAVEL/BOULDERS over highly to moderately weathered LIMESTONE over slightly weathered to fresh LIMESTONE at 2.5m bgl.
Vp seismic velocities indicate that any excavation of the slightly weathered to fresh LIMESTONE will require breaking/blasting and heavy breaking/blasting. More information on excavatability is provided in Appendix C.
For the MASW data a good dispersion curve was not generated due to the presence of shallow rock.

Geophysical Investigation Summary
MASW/Seismic Refraction
Drawing No. AGP20192_01_S06



Site	Seven Hills Wind Farm
Turbine Base	S06

T06	
ITM Easting	586355
ITM Northing	748280

Methodology	
Seismic Refraction	24 ch. @ 2m geophone spacing
MASW	24 ch. @ 1m geophone spacing
ERT	32 el. @ 3m electrode spacing
GPS	GNSS (< 20mm accuracy)

Depth (m)	Depth (m)	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness ** / Rock Quality	Estimated Excavatability
from	to	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*			
0.0	1.0	-	496	2000	-	-	-	-	Slightly clayey sandy GRAVEL/BOULDERS	LOOSE	Diggable
1.0	2.3	-	2098	2500	-	-	-	-	Moderately weathered LIMESTONE	POOR	Break / Blast
2.3	4.0	-	3859	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast
4.0	6.0	-	5728	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast
6.0	13.3	-	5775	2700	-	-	-	-	Slightly weathered to fresh LIMESTONE	EXCELLENT	Heavy Break / Blast

* converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1975

Note: Material type interpretation is based on a combination of field observations , including soft ground probes, and client supplied borehole information.

Discussion
The geophysical data indicates the centre of location S06 is characterised by c. 1.0m of loose slightly clayey sandy GRAVEL/BOULDERS over moderately weathered LIMESTONE over slightly weathered to fresh LIMESTONE at 2.3m bgl.
Vp seismic velocities indicate that any excavation of the moderately weathered LIMESTONE and slightly weathered to fresh LIMESTONE will require breaking/blasting and heavy breaking/blasting. More information on excavatability is provided in Appendix C.
For the MASW data a good dispersion curve was not generated due to the presence of shallow rock.

Appendix 5

Groundwater Monitoring

Groundwater Monitoring - Rotary Drillholes



Site Location Seven Hills Windfarm

Project No. 23000

Client Energia

Engineer Malachy Walsh & Partners

Date of Monitoring


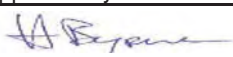
Exploratory Hole No.	Installation Type	10/02/2021			
		m bgl (m OD)	m bgl (m OD)	m bgl (m OD)	m bgl (m OD)
T04 - RC01	50mm SP	7.20 (65.27)	-	-	-
T05 - RC01	50mm SP	Dry	-	-	-
T10 - RC01	50mm SP	Dry	-	-	-
T18 - RC02	50mm SP	5.73 (85.14)	-	-	-
T21 - RC02	50mm SP	9.92 (80.09)	-	-	-

Comments

SP = Standpipe

Appendix 6

Geotechnical Laboratory Test Results - Soil

IGSL Ltd Materials Laboratory Unit J5, M7 Business Park Newhall, Naas Co. Kildare 045 846176				Test Report											
				Determination of Moisture Content, Liquid & Plastic Limits Tested in accordance with BS1377:Part 2:1990, clauses 3.2*, 4.3, 4.4 & 5.3											
<div style="display: flex; justify-content: space-between; padding: 5px;"> Report No. R119268 Contract No. 23000 Contract Name: 7 Hills Windfarm </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> Customer Energia / MWP </div> <div style="display: flex; justify-content: space-between; padding: 5px;"> Samples Received: 18/01/21 Date Tested: 28/01/21 </div>															
BH/TP	Sample No.	Depth (m)	Lab. Ref	Sample Type	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Preparation	Liquid Limit Clause	Classification (BS5930)	Description		
T2 TP01	AA145081	0.5	A21/0537	B	14	31	NP	NP	39	WS	4.4		Brown sandy gravelly SILT		
T3 TP01	AA145073	0.5	A21/0540	B	17	37	22	15	60	WS	4.4	C I	Brown slightly sandy, gravelly, CLAY		
T3 TP01	AA140075	2.9	A21/0541	B	11	22	NP	NP	54	WS	4.4		Brown sandy gravelly SILT		
T3 TP02	AA145076	1.5	A21/0542	B	12	24	13	11	56	WS	4.4	C I	Brown slightly sandy, slightly gravelly, CLAY		
T4 TP02	AA140077	0.5	A21/0543	B	26	43	NP	NP	71	WS	4.4		Brown sandy gravelly SILT		
T4 TP02	AA140078	2.8	A21/0544	B	9.4	24	14	10	62	WS	4.4	C I	Brown slightly sandy, gravelly, CLAY		
T4 TP02	AA140079	1.7	A21/0545	B	12	23	NP	NP	56	WS	4.4		Brown sandy gravelly SILT		
T6 TP02	AA14008	0.4	A21/0549	B	21	44	NP	NP	54	WS	4.4		Brown sandy gravelly SILT		
T7 TP01	AA140080	1.4	A21/0551	B	8.1	20	NP	NP	33	WS	4.4		Brown sandy gravelly SILT		
T13 TP01	AA145099	0.3	A21/0564	B	21	37	26	11	89	WS	4.4	C I	Brown sandy gravelly CLAY		
Notes: Preparation: WS - Wet sieved AR - As received NP - Non plastic Liquid Limit 4.3 Cone Penetrometer definitive method Clause: 4.4 Cone Penetrometer one point method					Sample Type: B - Bulk Disturbed U - Undisturbed					Remarks: Results apply to the sample as received. NOTE: *Clause 3.2 of BS1377 is a "withdrawn" standard due to publication of ISO17892-1:2014 Opinions and interpretations are outside the scope of accreditation. The results relate to the specimens tested. Any remaining material will be retained for one month.					
IGSL Ltd Materials Laboratory					Persons authorized to approve reports H Byrne (Laboratory Manager)					Approved by		Date		Page	
												15/02/21		1 of 1	

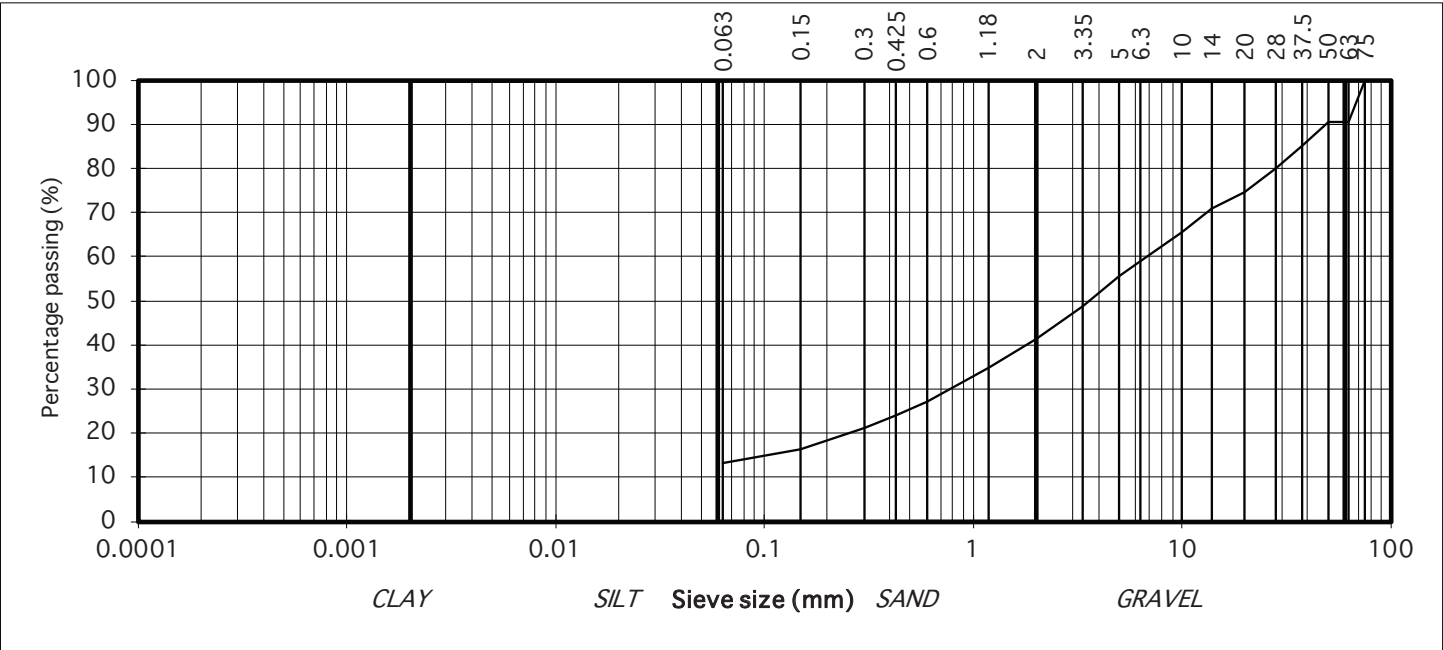
TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 2300	Report No. R118578
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	91		BH/TP : T1 TP01	
50	91		Sample No. AA145084	Lab. Sample No. A21/0534
37.5	85	GRAVEL	Sample Type: B	
28	80		Depth (m) 0.50	Customer: Energia / MWP
20	75		Date Received 18/01/2021	Date Testing started 28/01/2021
14	71		Description: Brown clayey/silty, very sandy, GRAVEL with some cobbles	
10	65			
6.3	59			
5	56			
3.35	49			
2	41	SAND		
1.18	35			
0.6	27			
0.425	24			
0.3	21	SILT/CLAY		
0.15	16			
0.063	13			

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.



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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 2300	Report No. R118579
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T1 TP1	
50	100		Sample No. AA140085	Lab. Sample No. A21/0535
37.5	91	GRAVEL	Sample Type: B	
28	85		Depth (m) 1.50	Customer: Energia / MWP
20	78		Date Received 18/01/2021	Date Testing started 28/01/2021
14	71		Description: Brown clayey/silty, very sandy, GRAVEL	
10	65		Remarks	
6.3	55		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	52			
3.35	44			
2	36			
1.18	30			
0.6	24			
0.425	22			
0.3	20			
0.15	16			
0.063	13			
		SAND		
		SILT/CLAY		

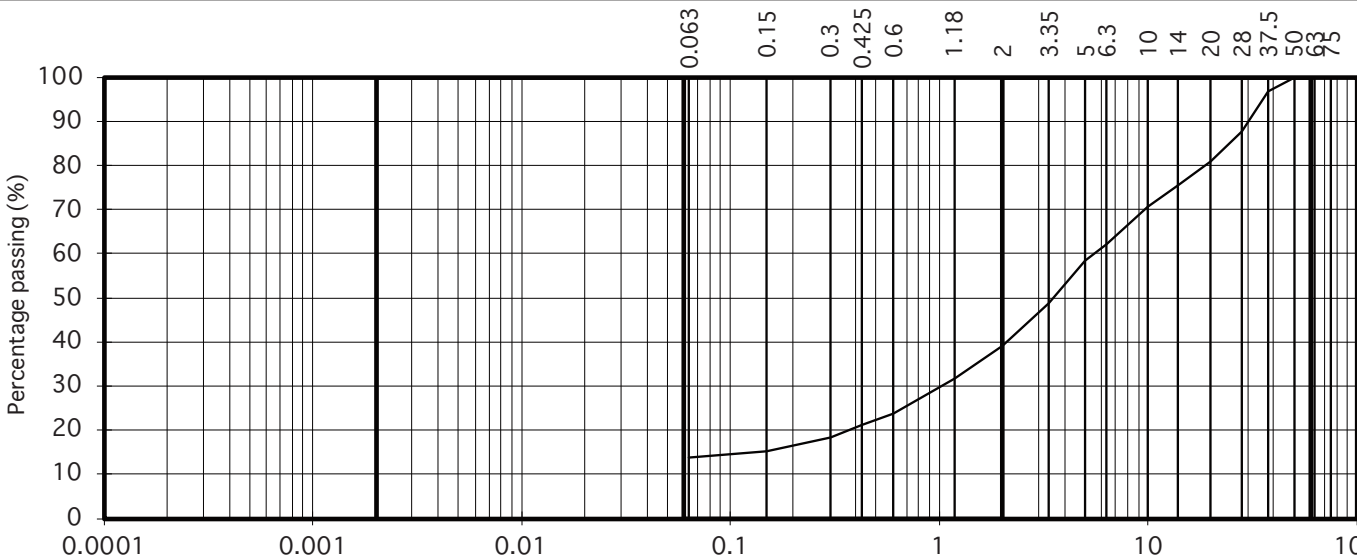
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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	2300	Report No.	R118580	
75	100	COBBLES	Contract Name:	7 Hills Windfarm			
63	100		BH/TP :	T1 TP2			
50	100		Sample No.	AA140086	Lab. Sample No.	A21/0536	
37.5	97	GRAVEL	Sample Type:	B			
28	88		Depth (m)	1.50	Customer:	Energia / MWP	
20	81		Date Received	18/01/2021	Date Testing started	28/01/2021	
14	76		Description:	Brown clayey/silty, very sandy, GRAVEL			
10	71		Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.			
6.3	62						
5	58						
3.35	49						
2	39						
1.18	32						
0.6	24	SAND					
0.425	21						
0.3	18						
0.15	15	SILT/CLAY					
0.063	14						

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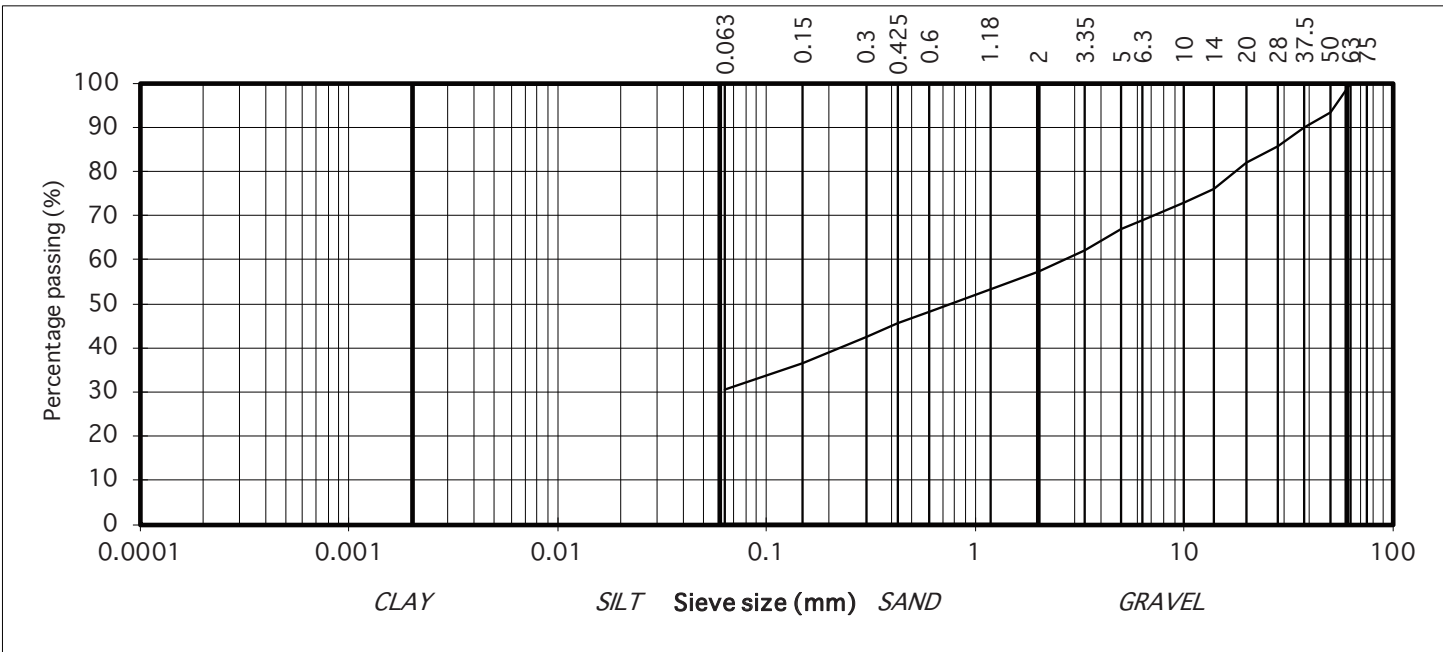
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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 2300	Report No. R119064
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T2 TP01	
50	94		Sample No. AA145082	Lab. Sample No. A21/0538
37.5	90	GRAVEL	Sample Type: B	
28	86		Depth (m) 2.50	Customer: Energia / MWP
20	82		Date Received 18/01/2021	Date Testing started 01/02/2021
14	76		Description: Brown slightly sandy, gravelly, SILT/CLAY	
10	73		Remarks	
6.3	69		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	67			
3.35	62	SAND		
2	57			
1.18	53			
0.6	48			
0.425	46			
0.3	42	SILT/CLAY		
0.15	37			
0.063	31			



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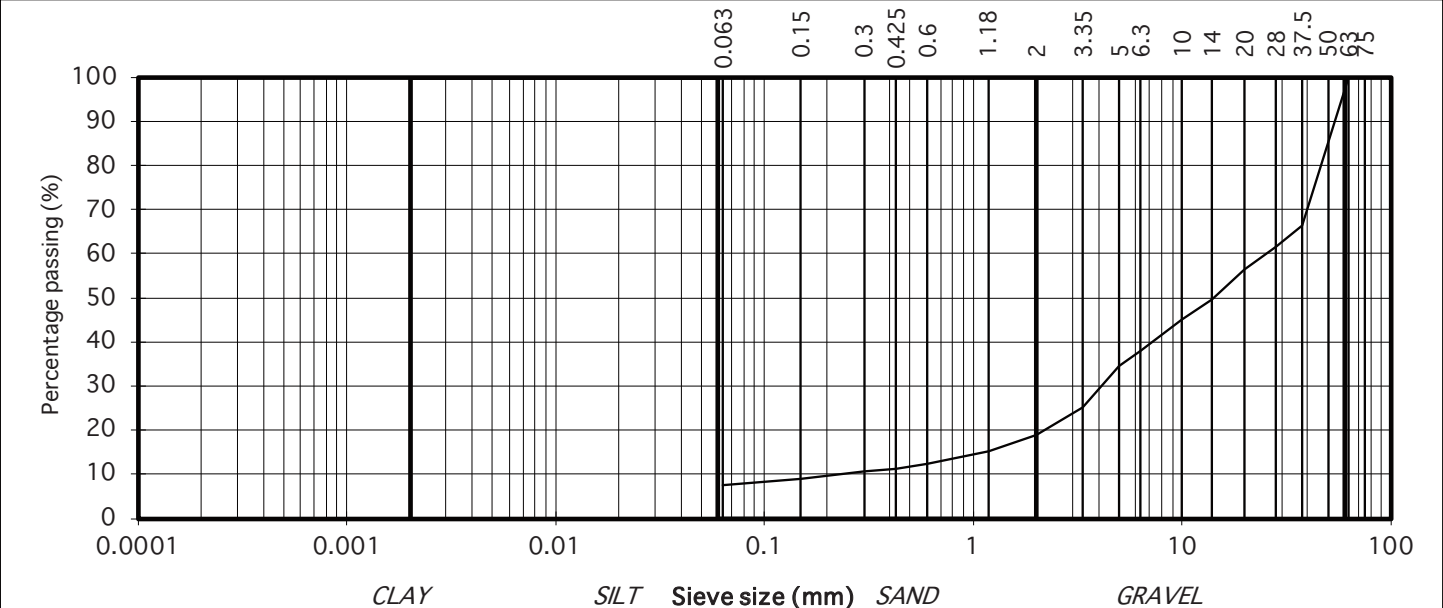
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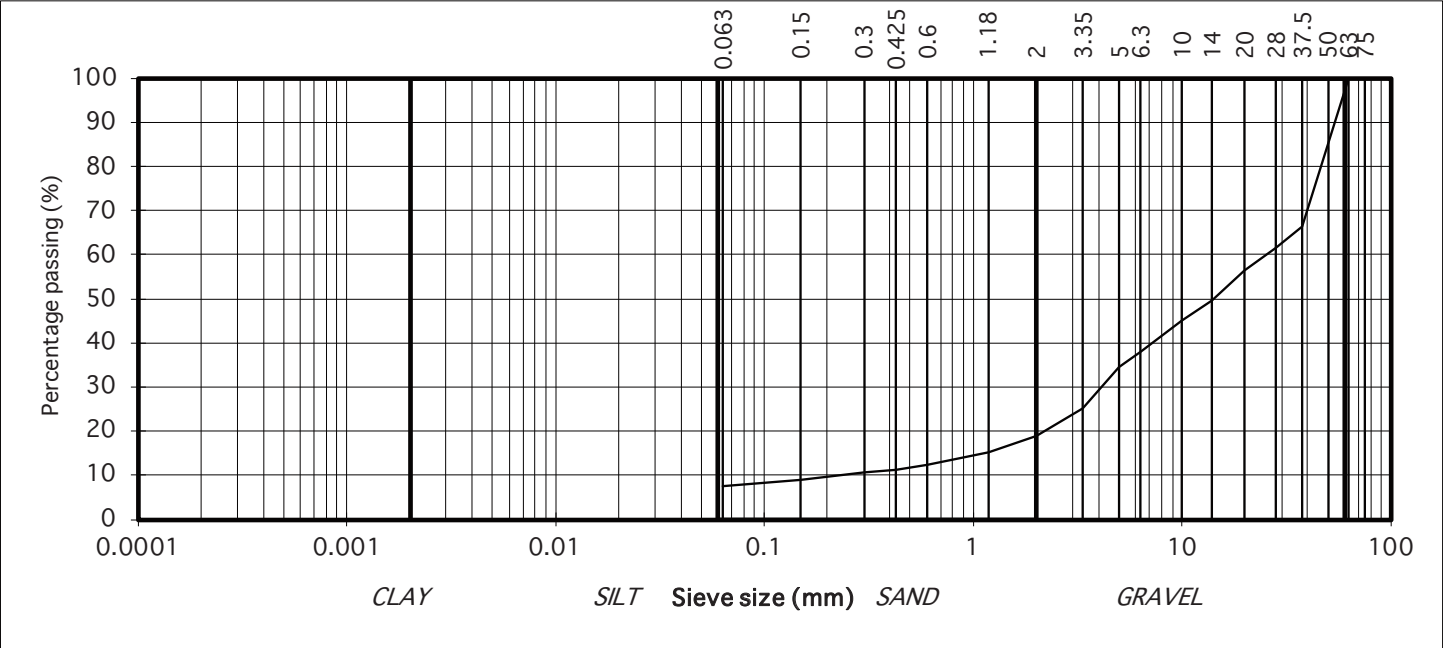
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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	2300	Report No.	R119065	
			Contract Name:	7 Hills Windfarm			
			BH/TP :	T2 TP2			
			Sample No.	AA145083	Lab. Sample No.	A21/0539	
			Sample Type:	B			
			Depth (m)	1.50	Customer:	Energia / MWP	
			Date Received	18/01/2021	Date Testing started	01/02/2021	
			Description:	Brown clayey/silty, sandy, GRAVEL			
			Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received. Sample size did not meet the requirements of BS1377			
75	100	COBBLES					
63	100						
50	85						
37.5	66						GRAVEL
28	62						
20	56						
14	50						
10	45						
6.3	38						
5	35						
3.35	25						
2	19						
1.18	15	SAND					
0.6	12						
0.425	11						
0.3	10						
0.15	9						
0.063	8						
							SILT/CLAY



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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	2300	Report No.	R118581	
75	100	COBBLES	Contract Name:	7 Hills Windfarm			
63	100		BH/TP :	T3 TP1			
50	100		Sample No.	AA145073	Lab. Sample No.	A21/0540	
37.5	94		Sample Type:	B			
28	86		Depth (m)	0.50	Customer:	Energia / MWP	
20	83	GRAVEL	Date Received	18/01/2021	Date Testing started	29/01/2021	
14	80		Description:	Brown slightly sandy, gravelly, CLAY			
10	76		Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.			
6.3	72						
5	69						
3.35	64						
2	58						
1.18	54						
0.6	49						
0.425	46						
0.3	43						
0.15	35						
0.063	28						
0.038	24						
0.027	21						
0.017	19						
0.010	17						
0.007	14						
0.005	13						
0.002	10						

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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	2300	Report No.	R119066	
75	100	COBBLES	Contract Name:	7 Hills Windfarm			
63	100		BH/TP :	T3 TP2			
50	100		Sample No.	AA145076	Lab. Sample No.	A21/0542	
37.5	100		Sample Type:	B			
28	97		Depth (m)	1.50	Customer:	Energia / MWP	
20	93	GRAVEL	Date Received	18/01/2021	Date Testing started	29/01/2021	
14	89		Description:	Brown slightly sandy, slightly gravelly, CLAY			
10	85		Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.			
6.3	79						
5	76						
3.35	70						
2	66						
1.18	62						
0.6	58						
0.425	56						
0.3	53						
0.15	46						
0.063	37						
0.039	31						
0.027	29						
0.018	26						
0.010	22						
0.007	19						
0.005	17						
0.002	11						

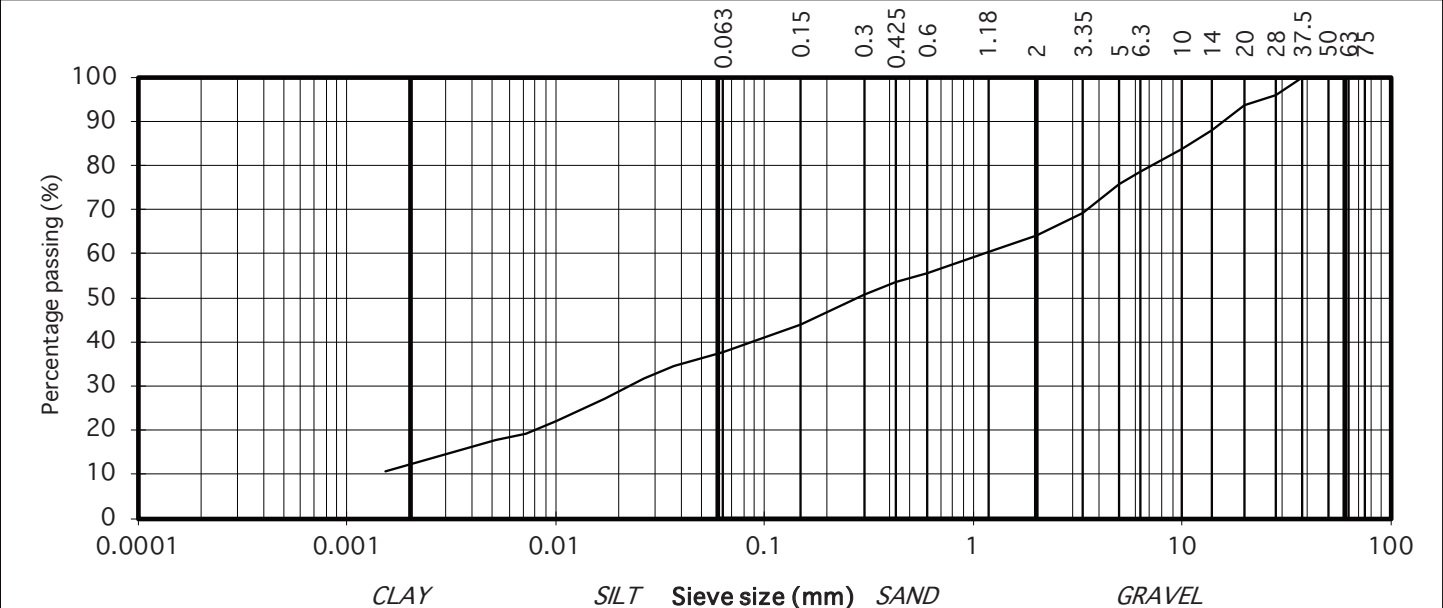
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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	2300	Report No.	R118582	
			Contract Name:	7 Hills Windfarm			
			BH/TP :	T4 TP2			
			Sample No.	AA140078	Lab. Sample No.	A21/0544	
			Sample Type:	B			
			Depth (m)	2.80	Customer:	Energia / MWP	
			Date Received	18/01/2021	Date Testing started	29/01/2021	
			Description:	Brown slightly sandy, gravelly, CLAY			
			Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.			
75	100	COBBLES					
63	100						
50	100						
37.5	100						
28	96						GRAVEL
20	94						
14	88						
10	84						
6.3	79						
5	76						
3.35	69						
2	64						
1.18	60						
0.6	56	SAND					
0.425	54						
0.3	51						
0.15	44						
0.063	38						
0.037	35						
0.027	32						
0.017	27						
0.010	22						
0.007	19						SILT/CLAY
0.005	18						
0.002	11						

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Approved by:	Date:	Page no:
	15/02/21	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	2300	Report No.	R118583																																						
75	100	COBBLES	Contract Name:	7 Hills Windfarm																																								
63	100		BH/TP :	T5 TP02																																								
50	100		Sample No.	AA145086	Lab. Sample No.	A21/0547																																						
37.5	84	GRAVEL	Sample Type:	B																																								
28	76		Depth (m)	0.50	Customer:	Energia / MWP																																						
20	71		Date Received	18/01/2021	Date Testing started	28/01/2021																																						
14	64		Description:	Brown clayey/silty, very sandy, GRAVEL																																								
10	59		Remarks	<div><div>Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.</div><div>Sample size did not meet the requirements of BS1377</div></div>																																								
6.3	52		<div><table><tr><th>Sieve size (mm)</th><th>Percentage passing (%)</th></tr><tr><td>0.063</td><td>100</td></tr><tr><td>0.075</td><td>12</td></tr><tr><td>0.15</td><td>14</td></tr><tr><td>0.3</td><td>18</td></tr><tr><td>0.425</td><td>21</td></tr><tr><td>0.6</td><td>23</td></tr><tr><td>1.18</td><td>27</td></tr><tr><td>2</td><td>32</td></tr><tr><td>3.35</td><td>40</td></tr><tr><td>5</td><td>48</td></tr><tr><td>6.3</td><td>52</td></tr><tr><td>10</td><td>59</td></tr><tr><td>14</td><td>64</td></tr><tr><td>20</td><td>71</td></tr><tr><td>28</td><td>76</td></tr><tr><td>37.5</td><td>84</td></tr><tr><td>50</td><td>93</td></tr><tr><td>63</td><td>100</td></tr></table></div>				Sieve size (mm)	Percentage passing (%)	0.063	100	0.075	12	0.15	14	0.3	18	0.425	21	0.6	23	1.18	27	2	32	3.35	40	5	48	6.3	52	10	59	14	64	20	71	28	76	37.5	84	50	93	63	100
Sieve size (mm)	Percentage passing (%)																																											
0.063	100																																											
0.075	12																																											
0.15	14																																											
0.3	18																																											
0.425	21																																											
0.6	23																																											
1.18	27																																											
2	32																																											
3.35	40																																											
5	48																																											
6.3	52																																											
10	59																																											
14	64																																											
20	71																																											
28	76																																											
37.5	84																																											
50	93																																											
63	100																																											
5	48																																											
3.35	40																																											
2	32																																											
1.18	27																																											
0.6	23																																											
0.425	21																																											
0.3	18																																											
0.15	14																																											
0.063	12																																											
		SAND																																										
		SILT/CLAY																																										

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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 2300	Report No. R119067
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T5 TP1	
50	100		Sample No. AA140087	Lab. Sample No. A21/0546
37.5	93	GRAVEL	Sample Type: B	
28	78		Depth (m) 0.50	Customer: Energia / MWP
20	70		Date Received 18/01/2021	Date Testing started 29/01/2021
14	63		Description: Brown clayey/silty, very sandy, GRAVEL	
10	55		Remarks	
6.3	47		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	44			
3.35	35			
2	28			
1.18	24			
0.6	19			
0.425	17			
0.3	15			
0.15	11			
0.063	8			
		SAND		
		SILT/CLAY		

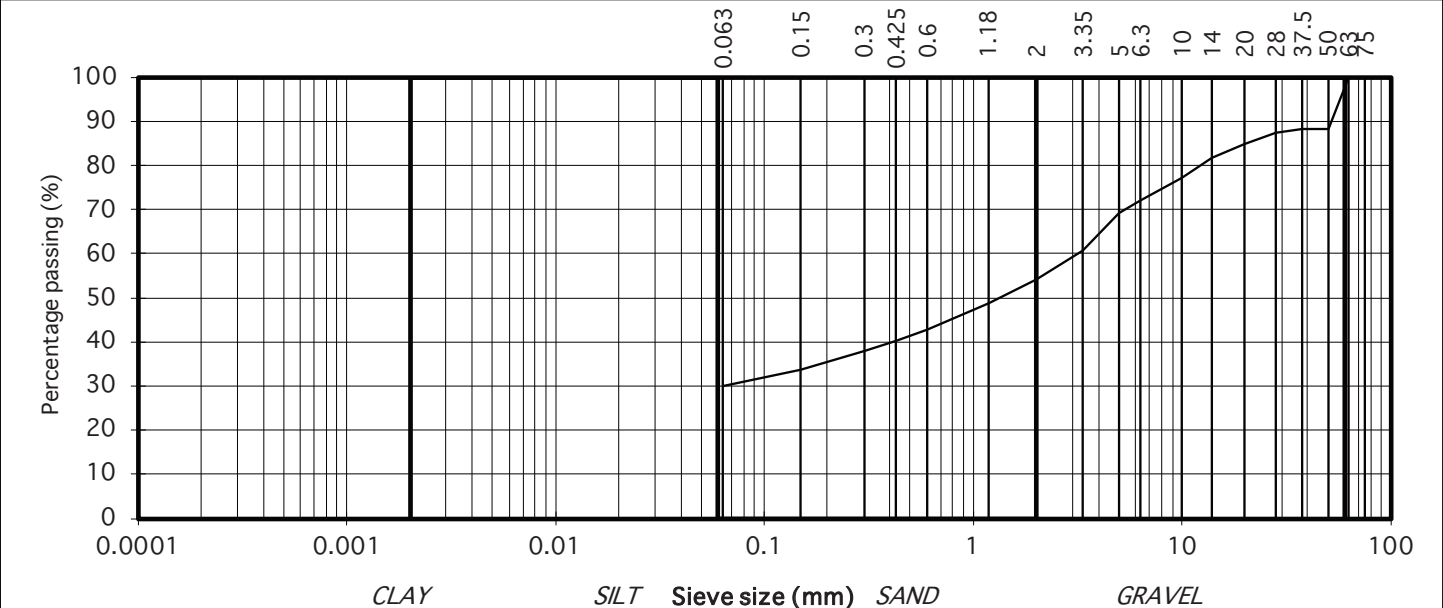
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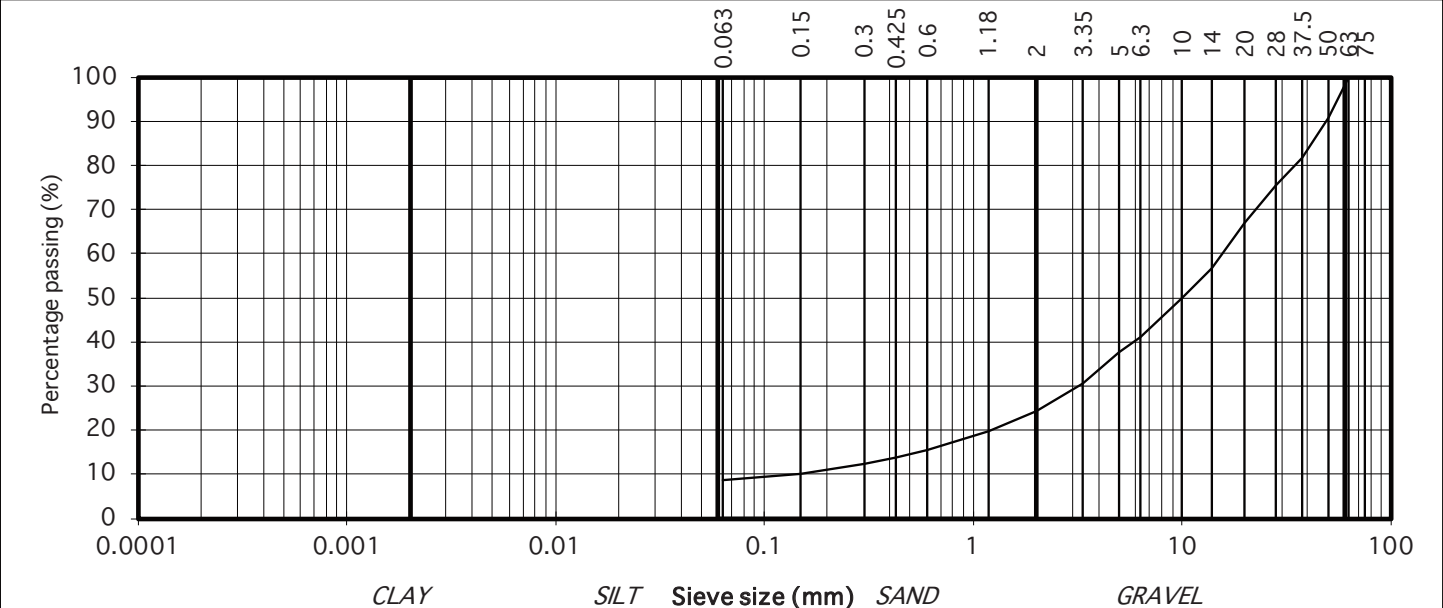
TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	2300	Report No.	R118584
			Contract Name:	7 Hills Windfarm		
			BH/TP :	T6 TP01		
			Sample No.	AA145087	Lab. Sample No.	A21/0548
			Sample Type:	B		
			Depth (m)	0.50	Customer:	Energia / MWP
			Date Received	18/01/2021	Date Testing started	29/01/2021
			Description:	Brown slightly sandy, gravelly, SILT/CLAY		
			Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received. Sample size did not meet the requirements of BS1377		
75	100	COBBLES				
63	100					
50	88					
37.5	88					
28	88					
20	85					
14	82					
10	77					
6.3	72					
5	69					
3.35	61	GRAVEL				
2	54					
1.18	49					
0.6	43					
0.425	40					
0.3	38					
0.15	34					
0.063	30					
		SAND				
		SILT/CLAY				

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	23000	Report No.	R118585	
75	100	COBBLES	Contract Name:	7 Hills Windfarm			
63	100		BH/TP :	T6 TP02			
50	91		Sample No.	AA145088	Lab. Sample No.	A21/0550	
37.5	82	GRAVEL	Sample Type:	B			
28	76		Depth (m)	1.50	Customer:	Energia / MWP	
20	67		Date Received	18/01/2021	Date Testing started	28/01/2021	
14	57		Description:	Brown clayey/silty, sandy, GRAVEL			
10	50		Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.			
6.3	41						
5	38						
3.35	30						
2	24						
1.18	20						
0.6	15	SAND					
0.425	14						
0.3	12						
0.15	10	SILT/CLAY					
0.063	9						

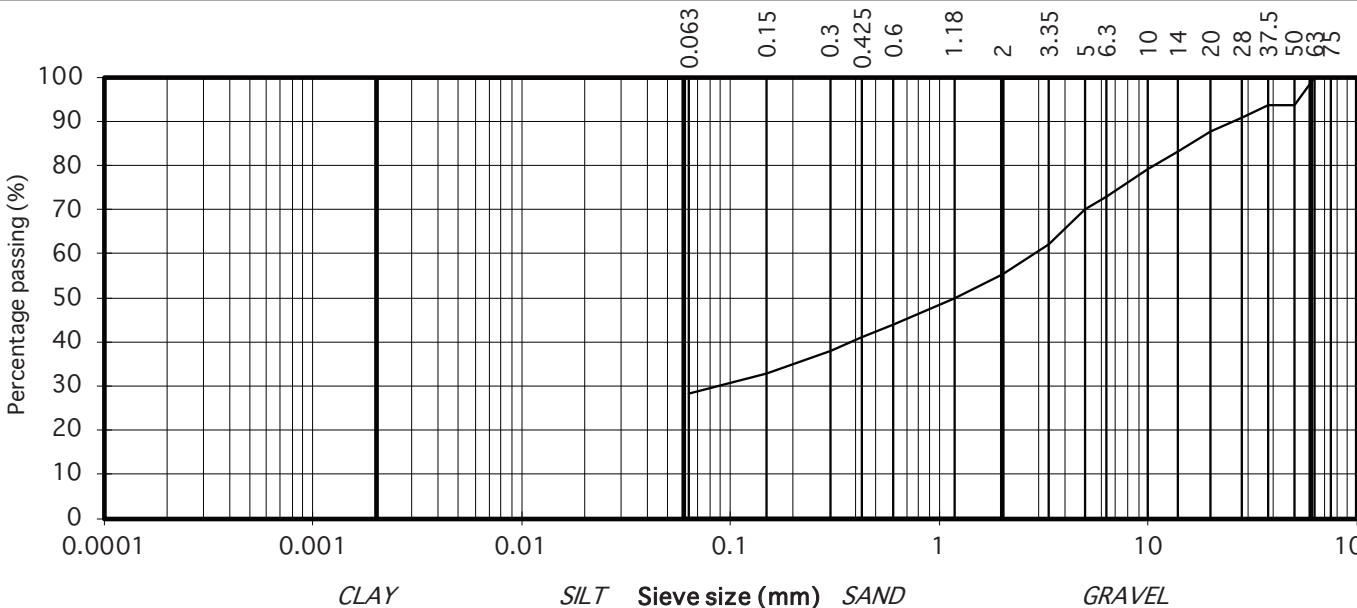
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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	23000	Report No.	R118586				
			Contract Name:	7 Hills Windfarm						
			BH/TP :	T7 TP1						
			Sample No.	AA145080	Lab. Sample No.	A21/0552				
			Sample Type:	B						
			Depth (m)	0.50	Customer:	Energia / MWP				
			Date Received	18/01/2021	Date Testing started	28/01/2021				
			Description:	Brown slightly sandy, gravelly, SILT/CLAY						
			Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.						
75	100	COBBLES								
63	100									
50	94									
37.5	94									
28	91						GRAVEL			
20	88									
14	83									
10	79									
6.3	73									
5	70									
3.35	62									
2	55									
1.18	50									
0.6	44	SAND								
0.425	41									
0.3	38									
0.15	33									
0.063	29									
		SILT/CLAY								

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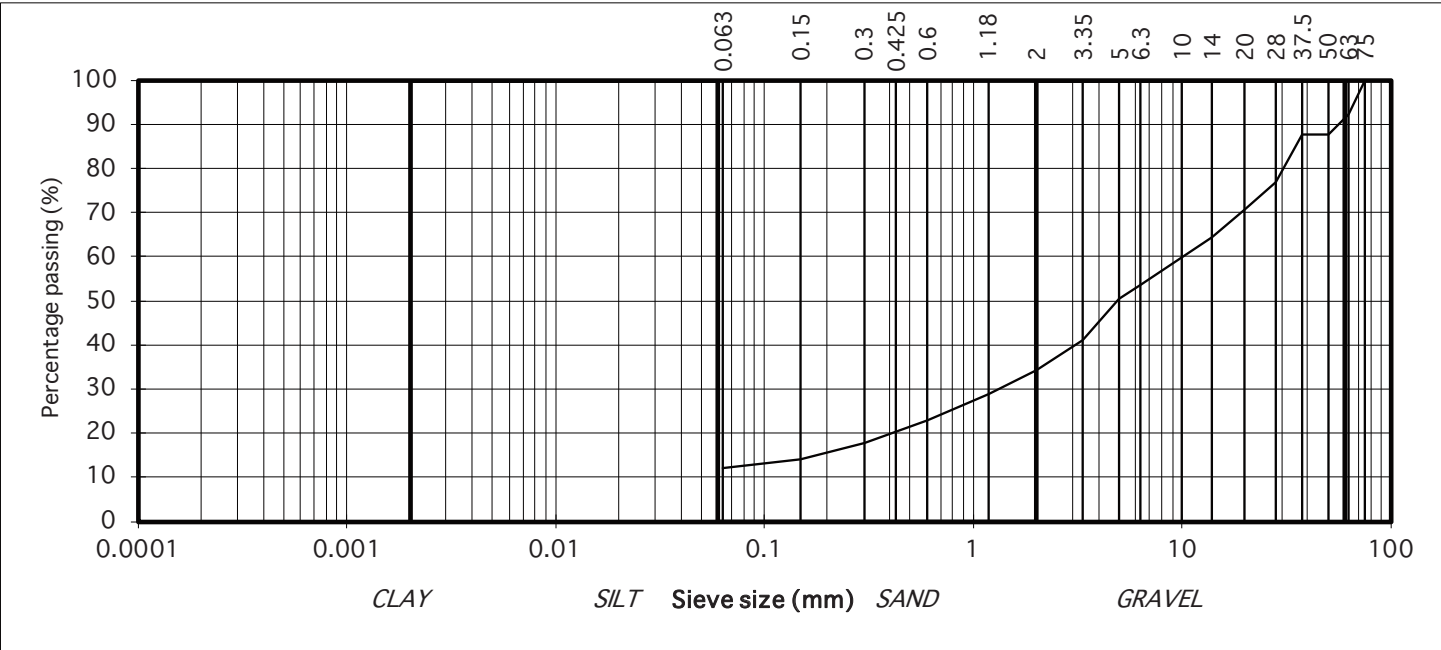
TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R118587
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	92		BH/TP : T7 TP2	
50	88		Sample No. AA140081	Lab. Sample No. A21/0553
37.5	88	GRAVEL	Sample Type: B	
28	77		Depth (m) 0.80	Customer: Energia / MWP
20	71		Date Received 18/01/2021	Date Testing started 28/01/2021
14	64		Description: Brown clayey/silty, very sandy, GRAVEL with some cobbles	
10	60			
6.3	53			
5	50			
3.35	41			
2	34	SAND		
1.18	29			
0.6	23			
0.425	20			
0.3	18	SILT/CLAY		
0.15	14			
0.063	12			

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.



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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	2300	Report No.	R119068				
			Contract Name:	7 Hills Windfarm						
			BH/TP :	T8 TP1						
			Sample No.	AA144656	Lab. Sample No.	A21/0554				
			Sample Type:	B						
			Depth (m)	0.50	Customer:	Energia / MWP				
			Date Received	18/01/2021	Date Testing started	29/01/2021				
			Description:	Brown clayey/silty, sandy, GRAVEL with many cobbles						
			Remarks	<div><div>Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.</div><div>Sample size did not meet the requirements of BS1377</div></div>						
75	80	COBBLES	<div></div>							
63	80									
50	80									
37.5	68									
28	54									
20	46									
14	41									
10	37									
6.3	33									
5	31									
3.35	28	GRAVEL								
2	25									
1.18	23									
0.6	21									
0.425	20									
0.3	19	SAND								
0.15	16									
0.063	12									
		SILT/CLAY								

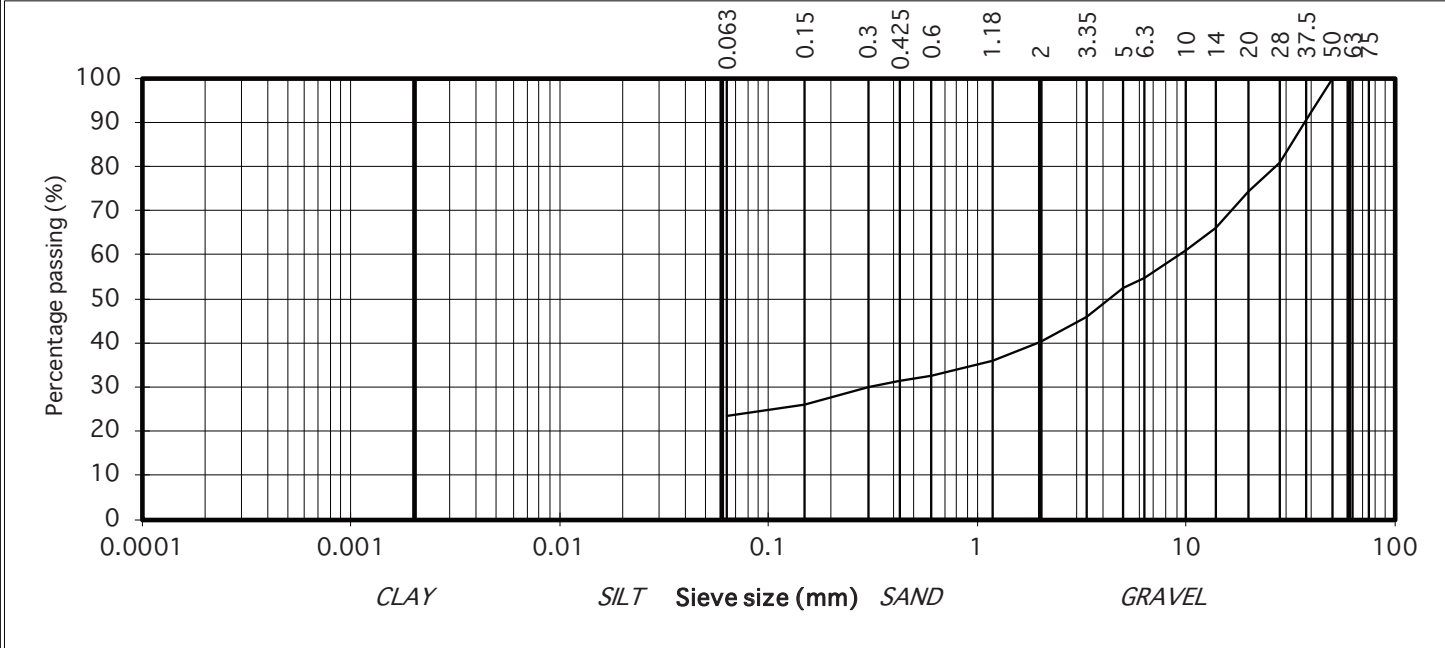
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 2300	Report No. R119069
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T8 TP2	
50	100		Sample No. AA149656	Lab. Sample No. A21/0555
37.5	91	GRAVEL	Sample Type: B	
28	81		Depth (m) 0.50	Customer: Energia / MWP
20	74		Date Received 18/01/2021	Date Testing started 29/01/2021
14	66		Description: Brown slightly sandy, gravelly, SILT/CLAY	
10	61		Remarks	
6.3	55		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	52			
3.35	46			
2	40	SAND		
1.18	36			
0.6	32			
0.425	31			
0.3	30	SILT/CLAY		
0.15	26			
0.063	24			

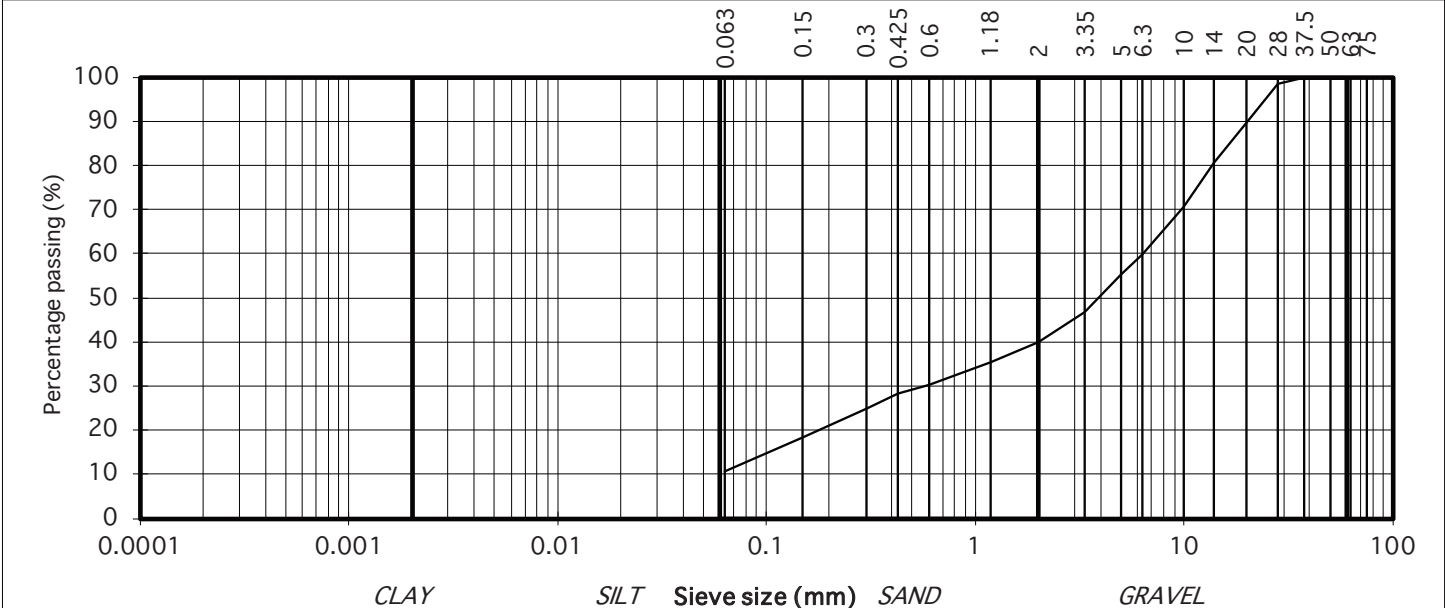


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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	2300	Report No.	R119070
75	100	COBBLES	Contract Name:	7 Hills Windfarm		
63	100		BH/TP :	T10 TP1		
50	100		Sample No.	AA144653	Lab. Sample No.	A21/0556
37.5	100	GRAVEL	Sample Type:	B		
28	99		Depth (m)	0.50	Customer:	Energia / MWP
20	90		Date Received	18/01/2021	Date Testing started	29/01/2021
14	81		Description:	Brown clayey/silty, very sandy, GRAVEL		
10	71		Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.		
6.3	60					
5	55					
3.35	47					
2	40					
1.18	35					
0.6	30					
0.425	28					
0.3	25					
0.15	18					
0.063	11					

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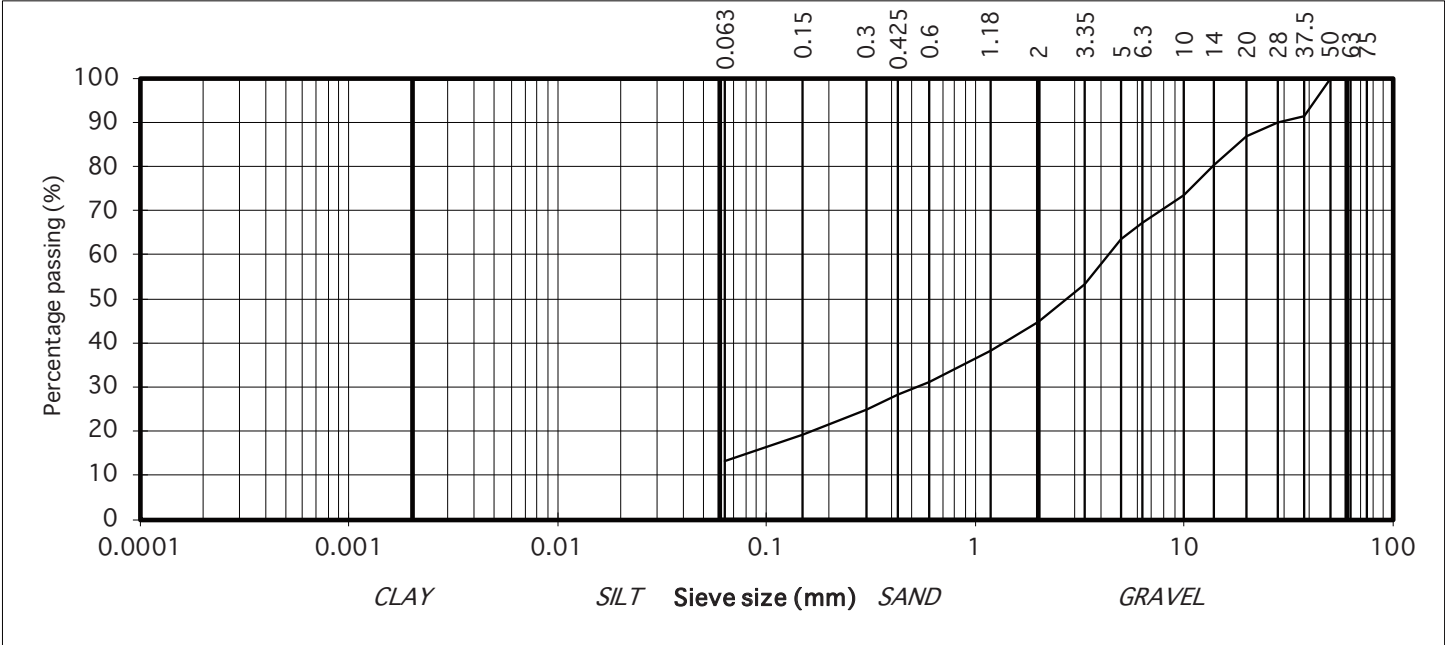
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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R118588
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T10 TP1	
50	100		Sample No. AA144654	Lab. Sample No. A21/0557
37.5	92	GRAVEL	Sample Type: B	
28	90		Depth (m) 2.50	Customer: Energia / MWP
20	87		Date Received 18/01/2021	Date Testing started 29/01/2021
14	80		Description: Grey/brown clayey/silty, very sandy, GRAVEL	
10	74		Remarks	
6.3	67		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	64			
3.35	53	SAND		
2	45			
1.18	38			
0.6	31			
0.425	28	SILT/CLAY		
0.3	25			
0.15	19			
0.063	13			



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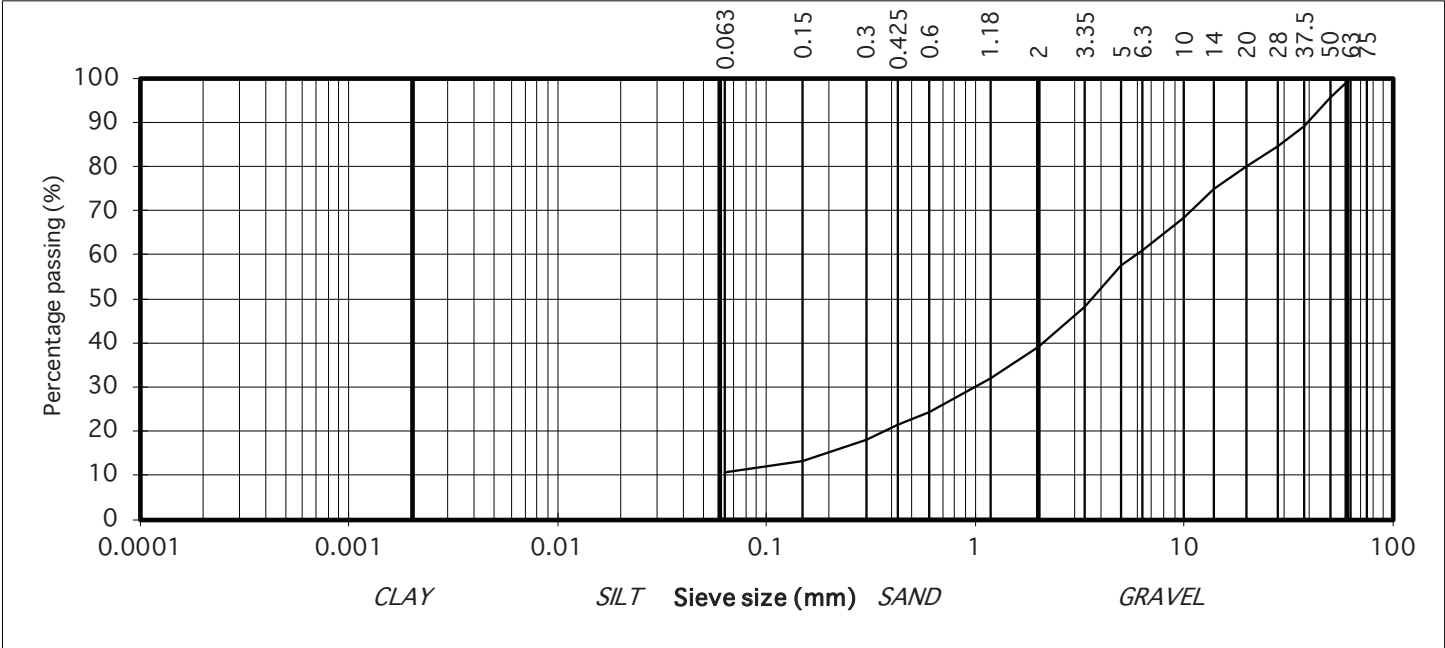
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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



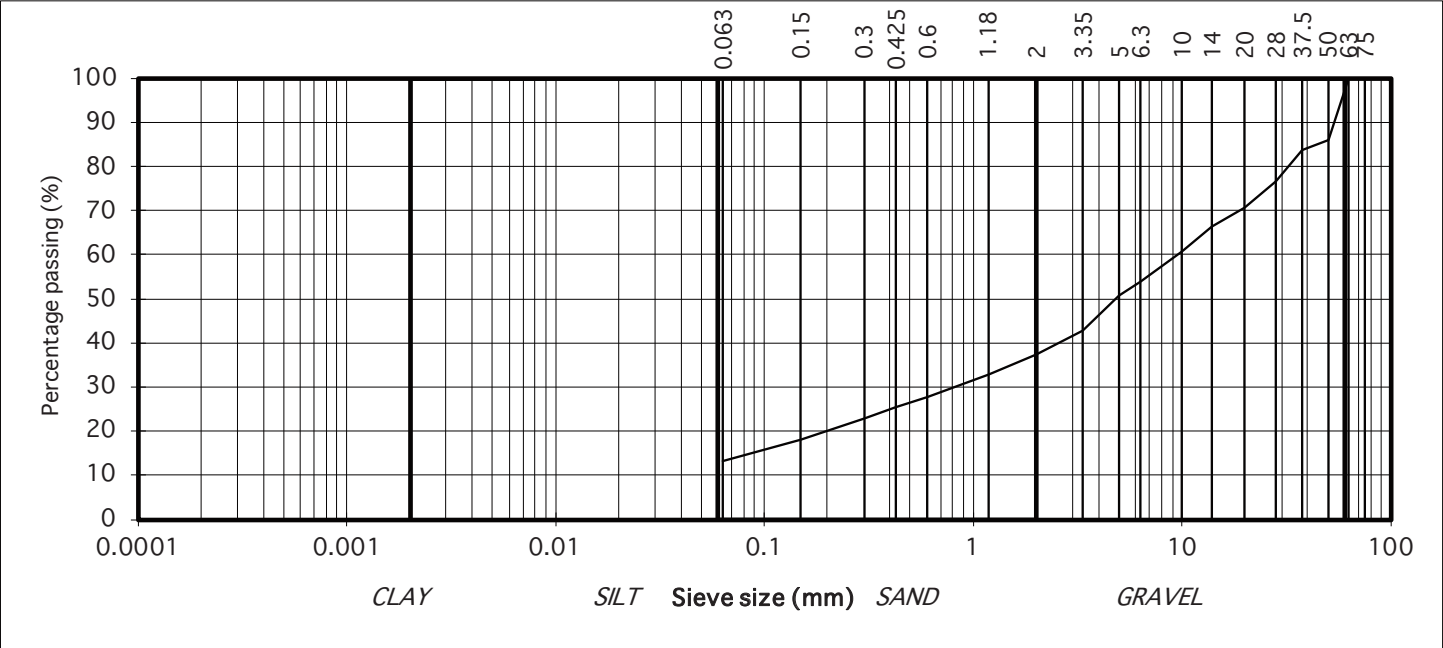
particle size	% passing		Contract No. 2300	Report No. R119072
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T10 TP2	
50	96		Sample No. AA144655	Lab. Sample No. A21/0558
37.5	89	GRAVEL	Sample Type: B	
28	85		Depth (m) 1.50	Customer: Energia / MWP
20	80		Date Received 18/01/2021	Date Testing started 29/01/2021
14	75		Description: Brown clayey/silty, very sandy, GRAVEL	
10	68		Remarks	
6.3	61		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	58			
3.35	48			
2	39	SAND		
1.18	32			
0.6	24			
0.425	21			
0.3	18	SILT/CLAY		
0.15	13			
0.063	11			



TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 2300	Report No. R119071
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T11 TP01	
50	86		Sample No. AA170966	Lab. Sample No. A21/0559
37.5	84		Sample Type: B	
28	77		Depth (m) 0.50	Customer: Energia / MWP
20	71	GRAVEL	Date Received 18/01/2021	Date Testing started 01/02/2021
14	66		Description: Brown clayey/silty, very sandy, GRAVEL	
10	61			
6.3	54			
5	51			
3.35	43	SAND	Remarks	
2	37			
1.18	33			
0.6	28			
0.425	26			
0.3	23	SILT/CLAY		
0.15	18			
0.063	13			

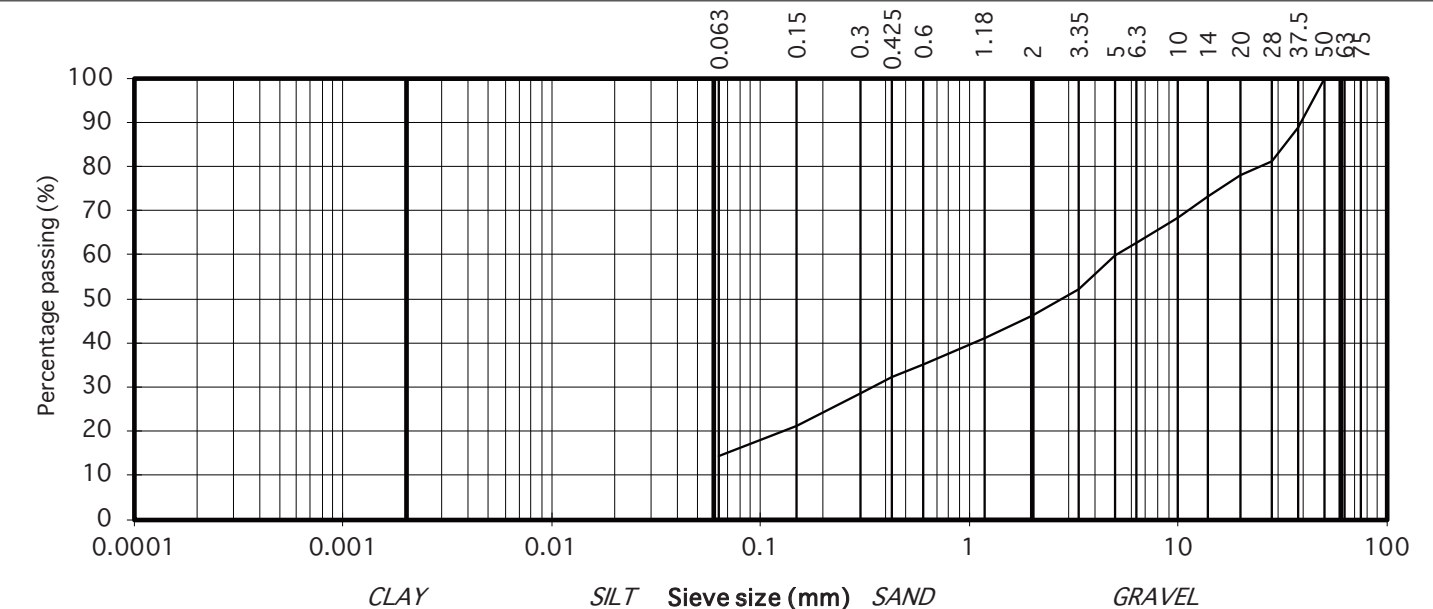


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TEST REPORT
Determination of Particle Size Distribution
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 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	2300	Report No.	R119073
75	100	COBBLES	Contract Name:	7 Hills Windfarm		
63	100		BH/TP :	T12 TP1		
50	100		Sample No.	AA140099	Lab. Sample No.	A21/0560
37.5	89	GRAVEL	Sample Type:	B		
28	81		Depth (m)	1.50	Customer:	Energia / MWP
20	78		Date Received	18/01/2021	Date Testing started	01/02/2021
14	73		Description:	Brown clayey/silty, very sandy, GRAVEL		
10	68		Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received. Sample size did not meet the requirements of BS1377		
6.3	63					
5	60					
3.35	52					
2	46					
1.18	41					
0.6	35					
0.425	32					
0.3	29	SAND				
0.15	21					
0.063	15					
		SILT/CLAY				

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TEST REPORT
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 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R118589
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T12 TP2	
50	96		Sample No. AA145097	Lab. Sample No. A21/0561
37.5	86	GRAVEL	Sample Type: B	
28	81		Depth (m) 0.50	Customer: Energia / MWP
20	75		Date Received 18/01/2021	Date Testing started 29/01/2021
14	71		Description: Brown clayey/silty, very sandy, GRAVEL	
10	64		Remarks	
6.3	56		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	53			
3.35	42			
2	33			
1.18	26			
0.6	18			
0.425	15			
0.3	11			
0.15	8			
0.063	7			
		SAND		
		SILT/CLAY		

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 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 2300	Report No. R119074
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T12 TP2	
50	93		Sample No. AA140098	Lab. Sample No. A21/0562
37.5	81	GRAVEL	Sample Type: B	
28	80		Depth (m) 2.00	Customer: Energia / MWP
20	74		Date Received 18/01/2021	Date Testing started 29/01/2021
14	67		Description: Brown clayey/silty, very sandy, GRAVEL	
10	62		Remarks	
6.3	56		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	53			
3.35	46			
2	40			
1.18	36			
0.6	32			
0.425	30			
0.3	28			
0.15	24			
0.063	20			
		SAND		
		SILT/CLAY		

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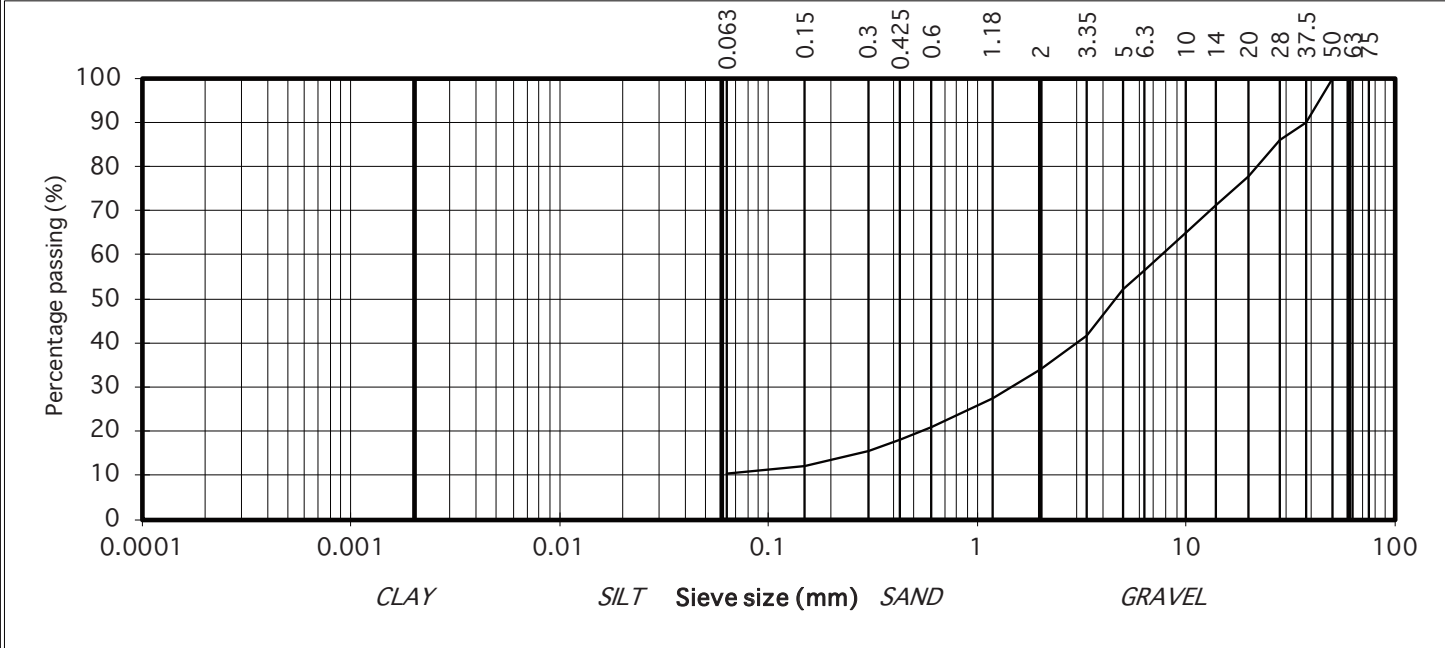
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Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 2300	Report No. R119075
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T13 TP01	
50	100		Sample No. AA140100	Lab. Sample No. A21/0565
37.5	90	GRAVEL	Sample Type: B	
28	86		Depth (m) 1.50	Customer: Energia / MWP
20	78		Date Received 18/01/2021	Date Testing started 29/01/2021
14	71		Description: Brown clayey/silty, very sandy, GRAVEL	
10	65		Remarks	
6.3	57		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	52			
3.35	42			
2	34	SAND		
1.18	27			
0.6	21			
0.425	18			
0.3	15	SILT/CLAY		
0.15	12			
0.063	10			



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)

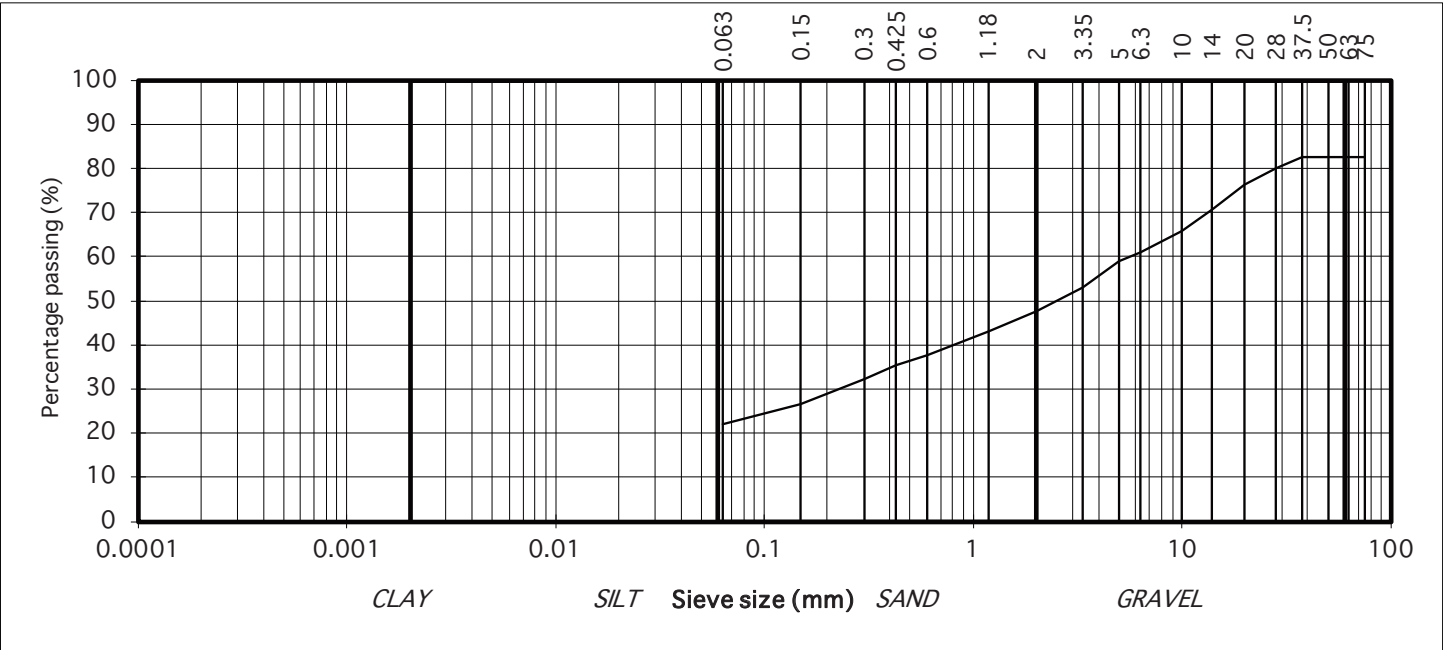


particle size	% passing		Contract No. 23000	Report No. R118590
75	83	COBBLES	Contract Name: 7 Hills Windfarm	
63	83		BH/TP : T13 TP2	
50	83		Sample No. AA144651	Lab. Sample No. A21/0563
37.5	83	GRAVEL	Sample Type: B	
28	80		Depth (m) 1.50	Customer: Energia / MWP
20	76		Date Received 18/01/2021	Date Testing started 28/01/2021
14	71		Description: Brown slightly sandy, gravelly, SILT/CLAY with some cobbles	
10	66			
6.3	61			
5	59			
3.35	53	SAND		
2	48			
1.18	43			
0.6	38			
0.425	35	SILT/CLAY		
0.3	32			
0.15	27			
0.063	22			

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.

Sample size did not meet the requirements of BS1377



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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)

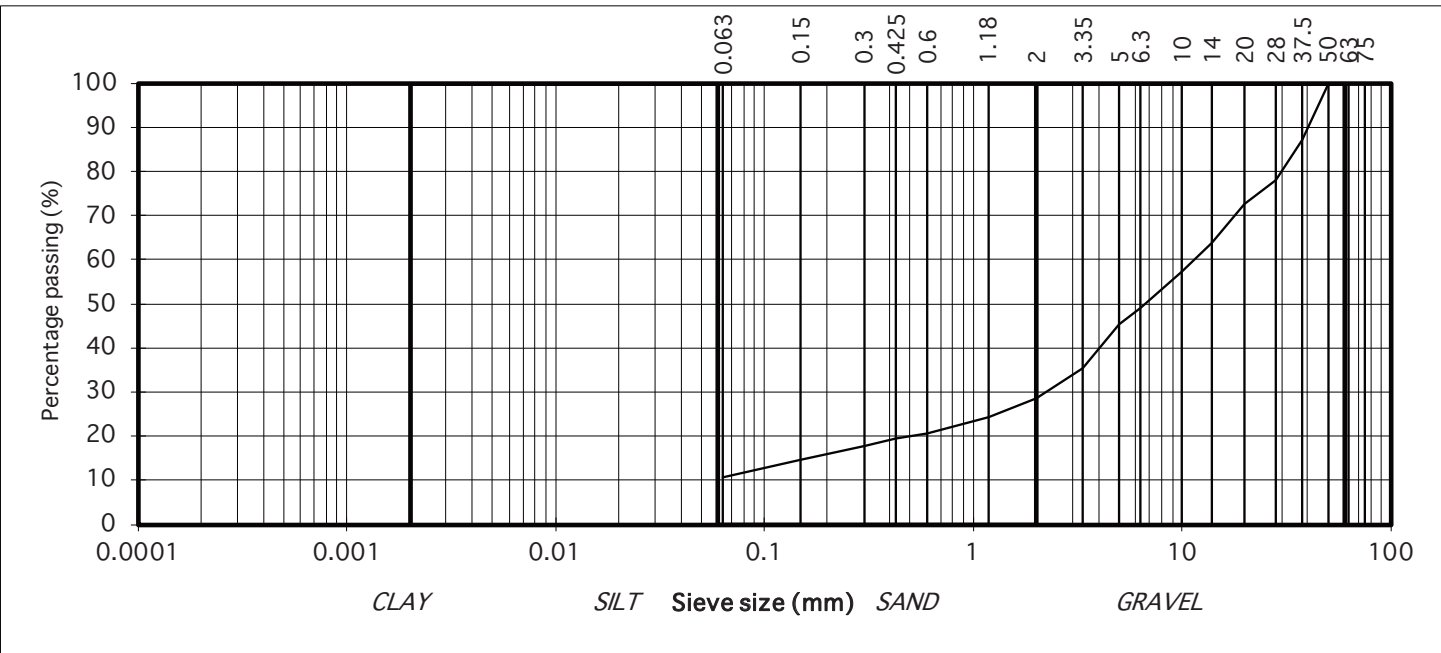


particle size	% passing		Contract No. 23000	Report No. R118591
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T14 TP2	
50	100		Sample No. AA140096	Lab. Sample No. A21/0567
37.5	87	GRAVEL	Sample Type: B	
28	78		Depth (m) 1.50	Customer: Energia / MWP
20	73		Date Received 18/01/2021	Date Testing started 29/01/2021
14	64		Description: Brown clayey/silty, sandy, GRAVEL with occasional cobbles	
10	57			
6.3	49			
5	45			
3.35	35			
2	29	SAND		
1.18	24			
0.6	21			
0.425	19			
0.3	18	SILT/CLAY		
0.15	15			
0.063	11			

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.

Sample size did not meet the requirements of BS1377



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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)

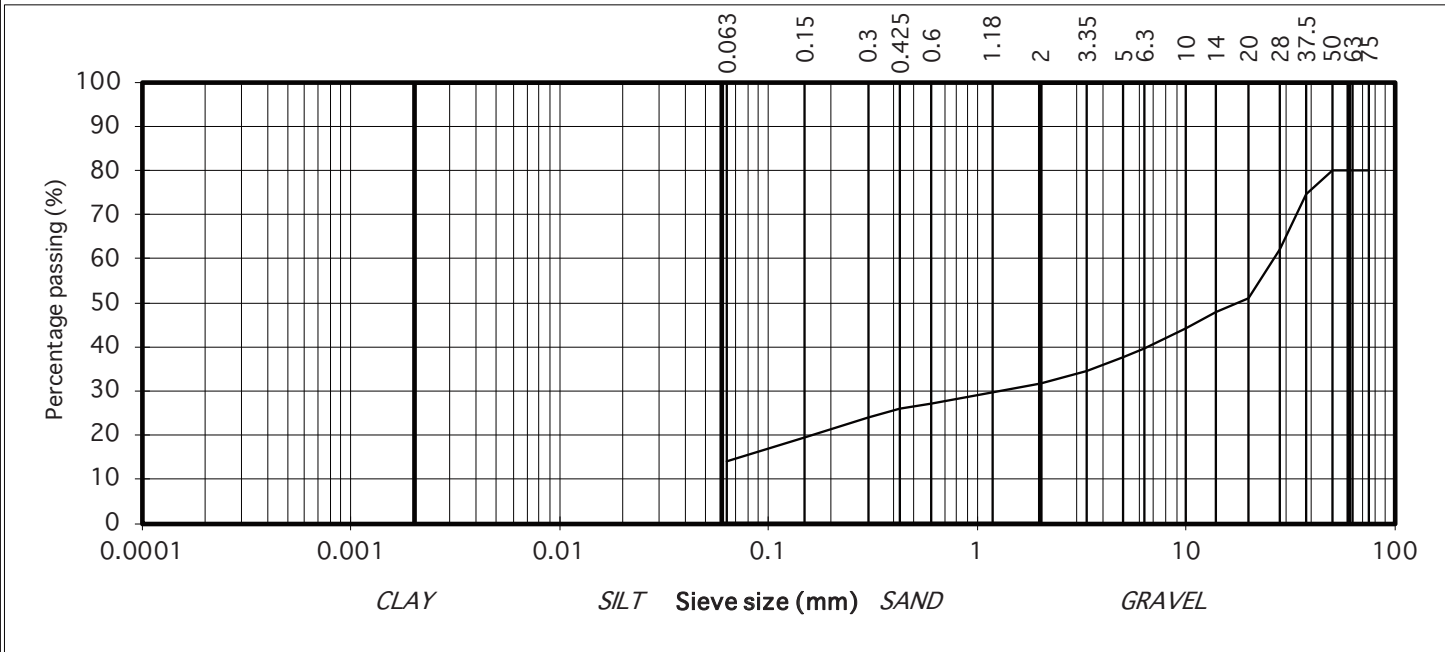


particle size	% passing		Contract No. 23000	Report No. R119076
75	80	COBBLES	Contract Name: 7 Hills Windfarm	
63	80		BH/TP : T14 TP1	
50	80		Sample No. AA140097	Lab. Sample No. A21/0566
37.5	75	GRAVEL	Sample Type: B	
28	62		Depth (m) 1.50	Customer: Energia / MWP
20	51		Date Received 18/01/2021	Date Testing started 29/01/2021
14	48		Description: Brown clayey/silty, sandy, GRAVEL with some cobbles	
10	44			
6.3	40			
5	38			
3.35	35			
2	32	SAND		
1.18	30			
0.6	27			
0.425	26			
0.3	24	SILT/CLAY		
0.15	19			
0.063	14			

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.

Sample size did not meet the requirements of BS1377



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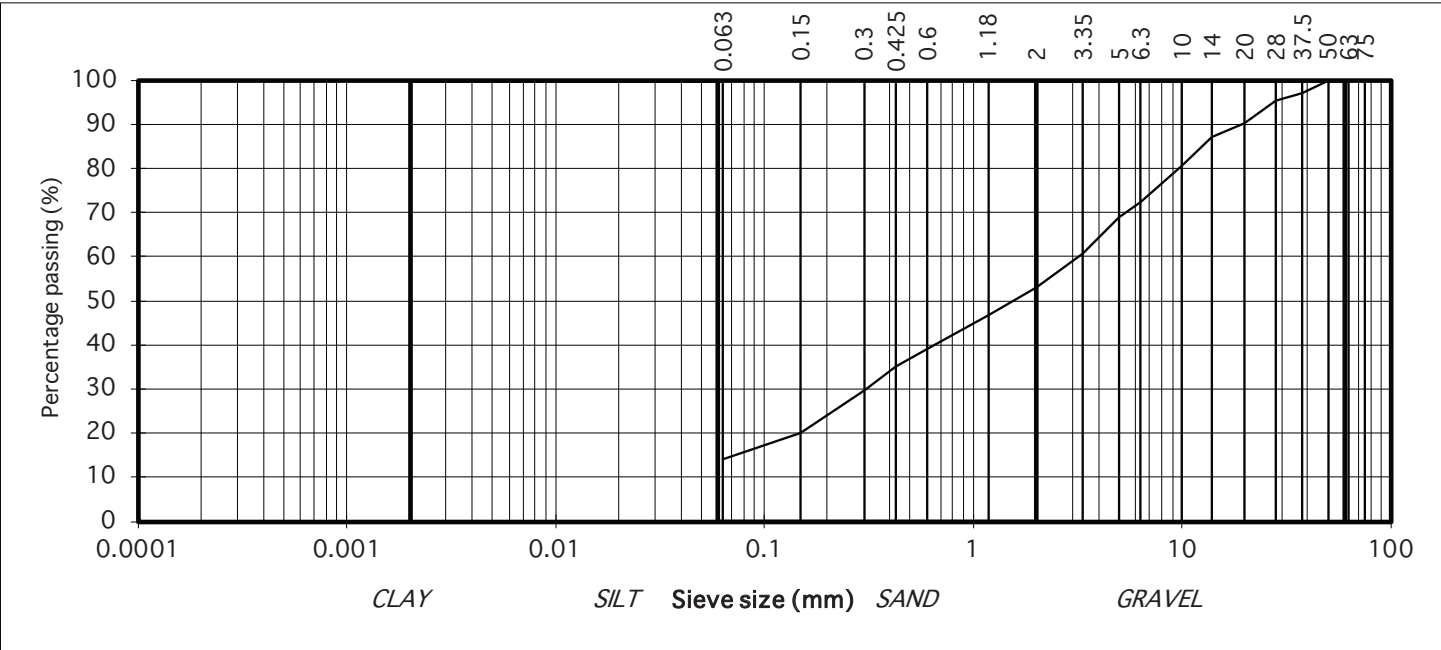
TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R118592
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T15 TP2	
50	100		Sample No. AA145093	Lab. Sample No. A21/0568
37.5	97	GRAVEL	Sample Type: B	
28	96		Depth (m) 1.50	Customer: Energia / MWP
20	90		Date Received 18/01/2021	Date Testing started 29/01/2021
14	87		Description: Brown clayey/silty, very sandy, GRAVEL with occasional cobbles	
10	81			
6.3	72			
5	69			
3.35	61			
2	53	SAND		
1.18	47			
0.6	39			
0.425	35			
0.3	30	SILT/CLAY		
0.15	20			
0.063	14			

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.



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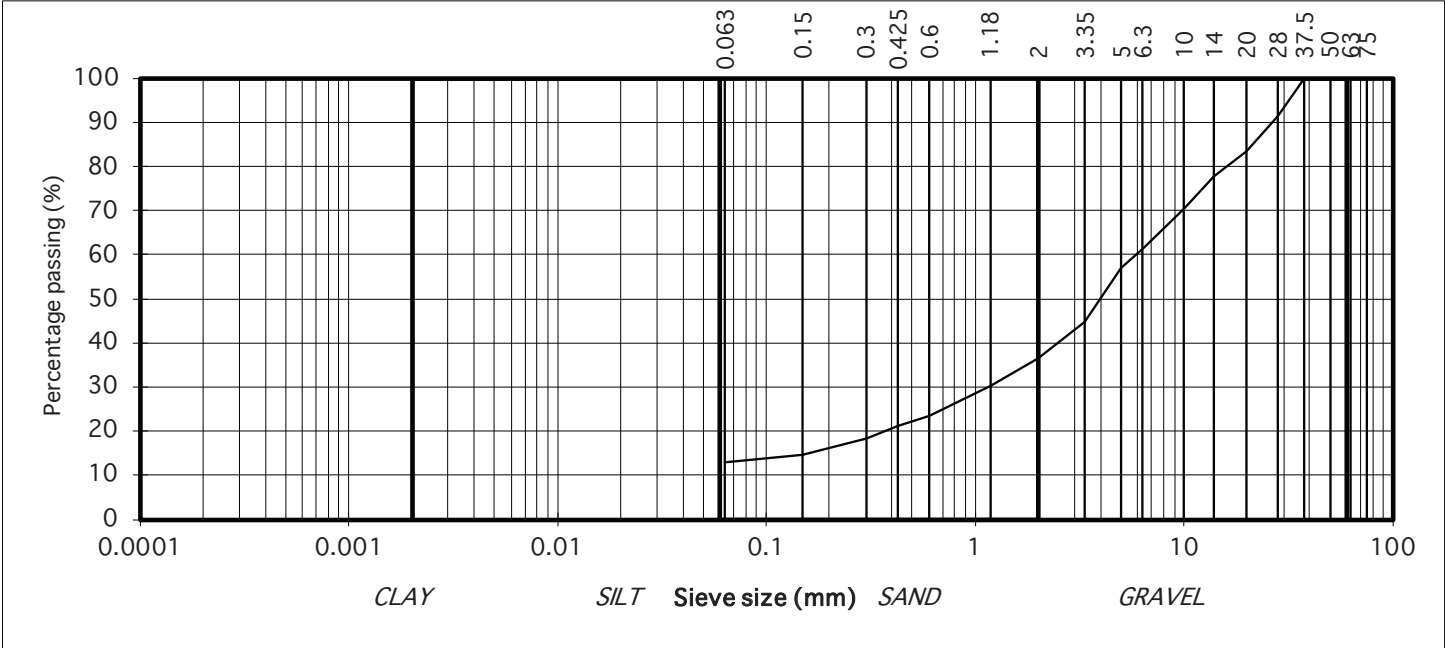
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R118593
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T15 TP1	
50	100		Sample No. AA145094	Lab. Sample No. A21/0569
37.5	100	GRAVEL	Sample Type: B	
28	92		Depth (m) 0.50	Customer: Energia / MWP
20	84		Date Received 18/01/2021	Date Testing started 27/01/2021
14	78		Description: Brown clayey/silty, very sandy, GRAVEL with occasional cobbles	
10	70		Remarks	
6.3	61		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	57			
3.35	45	SAND		
2	37			
1.18	30			
0.6	23			
0.425	21			
0.3	18	SILT/CLAY		
0.15	15			
0.063	13			



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)

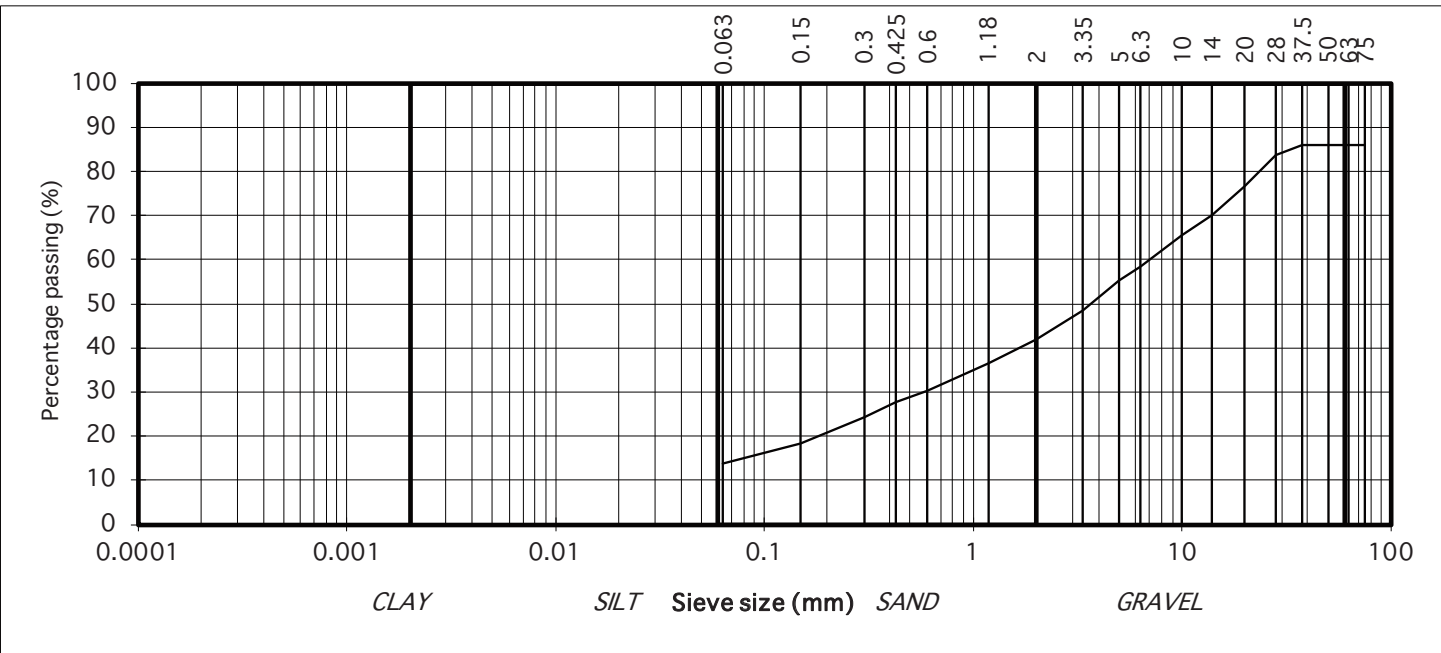


particle size	% passing		Contract No. 23000	Report No. R118594
75	86	COBBLES	Contract Name: 7 Hills Windfarm	
63	86		BH/TP : T15 TP1	
50	86		Sample No. AA140095	Lab. Sample No. A21/0570
37.5	86	GRAVEL	Sample Type: B	
28	84		Depth (m) 2.00	Customer: Energia / MWP
20	77		Date Received 18/01/2021	Date Testing started 29/01/2021
14	70		Description: Brown clayey/silty, very sandy, GRAVEL with some cobbles	
10	65			
6.3	59			
5	55			
3.35	48			
2	42	SAND		
1.18	37			
0.6	30			
0.425	28			
0.3	24	SILT/CLAY		
0.15	18			
0.063	14			

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.

Sample size did not meet the requirements of BS1377



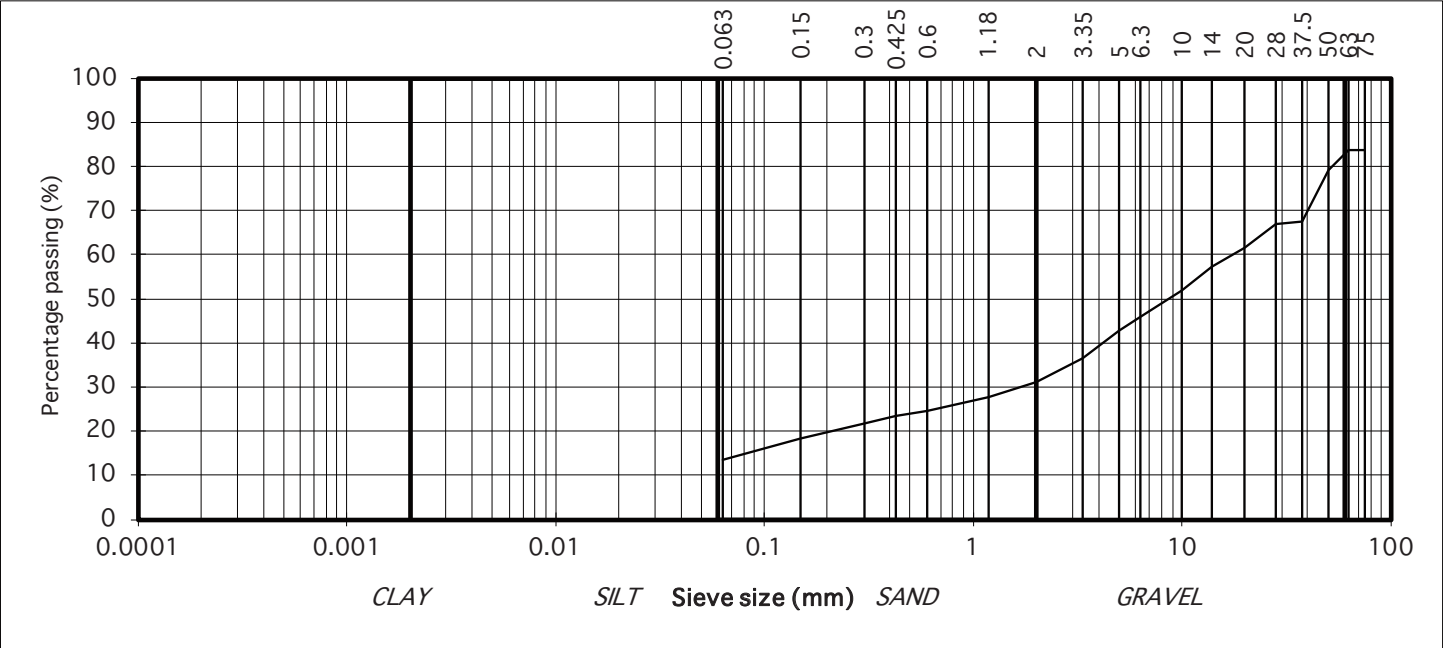
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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R119077
75	84	COBBLES	Contract Name: 7 Hills Windfarm	
63	84		BH/TP : T16 TP1	
50	79		Sample No. AA145090	Lab. Sample No. A21/0571
37.5	68		Sample Type: B	
28	67		Depth (m) 0.50	Customer: Energia / MWP
20	62	GRAVEL	Date Received 18/01/2021	Date Testing started 29/01/2021
14	57		Description: Brown clayey/silty, sandy, GRAVEL with some cobbles	
10	52			
6.3	46			
5	43			
3.35	37	SAND	Remarks	
2	31			
1.18	28			
0.6	25			
0.425	23			
0.3	22	SILT/CLAY		
0.15	18			
0.063	14			



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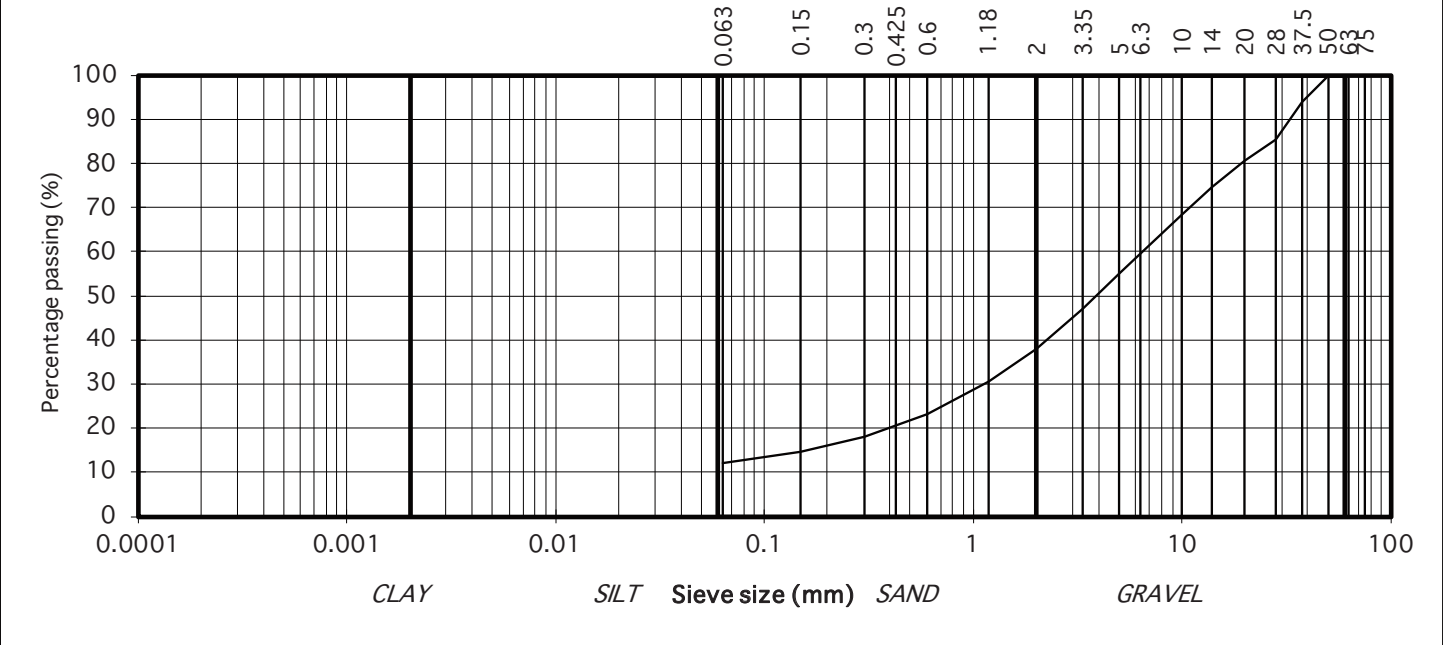
TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R118595
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T16 TP2	
50	100		Sample No. AA140093	Lab. Sample No. A21/0572
37.5	94	GRAVEL	Sample Type: B	
28	86		Depth (m) 1.40	Customer: Energia / MWP
20	81		Date Received 18/01/2021	Date Testing started 29/01/2021
14	75		Description: Brown clayey/silty, very sandy, GRAVEL with occasional cobbles	
10	68			
6.3	60			
5	55			
3.35	47			
2	38	SAND		
1.18	31			
0.6	23			
0.425	20			
0.3	18	SILT/CLAY		
0.15	15			
0.063	12			

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.



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TEST REPORT
Determination of Particle Size Distribution
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 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	23000	Report No.	R119079
			Contract Name:	7 Hills Windfarm		
			BH/TP :	T17 TP1		
			Sample No.	AA149658	Lab. Sample No.	A21/0574
			Sample Type:	B		
			Depth (m)	1.50	Customer:	Energia / MWP
			Date Received	18/01/2021	Date Testing started	29/01/2021
			Description:	Brown clayey/silty, very sandy, GRAVEL		
			Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.		
75	100	COBBLES	<div><div><div>Percentage passing (%)</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></di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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R119078
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T17 TP2	
50	93		Sample No. AA144657	Lab. Sample No. A21/0573
37.5	83	GRAVEL	Sample Type: B	
28	70		Depth (m) 1.50	Customer: Energia / MWP
20	63		Date Received 18/01/2021	Date Testing started 29/01/2021
14	56		Description: Brown clayey/silty, sandy, GRAVEL	
10	49		Remarks	
6.3	42		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	39			
3.35	34			
2	29			
1.18	25			
0.6	21			
0.425	20			
0.3	18			
0.15	14			
0.063	9			
		SAND		
		SILT/CLAY		

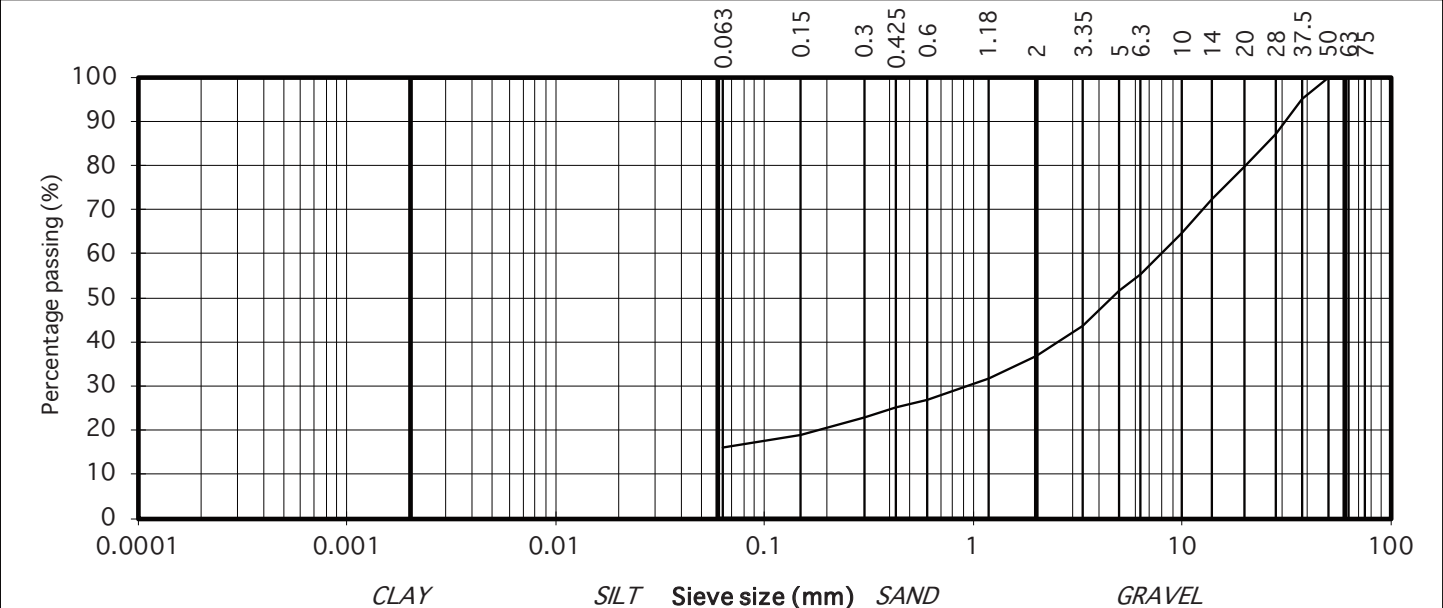
IGSL Ltd Materials Laboratory

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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	23000	Report No.	R118596	
75	100	COBBLES	Contract Name:	7 Hills Windfarm			
63	100		BH/TP :	T18 TP1			
50	100		Sample No.	AA144600	Lab. Sample No.	A21/0575	
37.5	95	GRAVEL	Sample Type:	B			
28	87		Depth (m)	0.50	Customer:	Energia / MWP	
20	80		Date Received	18/01/2021	Date Testing started	29/01/2021	
14	72		Description:	Brown clayey/silty, very sandy, GRAVEL with occasional cobbles			
10	65		Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.			
6.3	55						
5	52						
3.35	44						
2	37						
1.18	32						
0.6	27	SAND					
0.425	25						
0.3	23						
0.15	19	SILT/CLAY					
0.063	16						

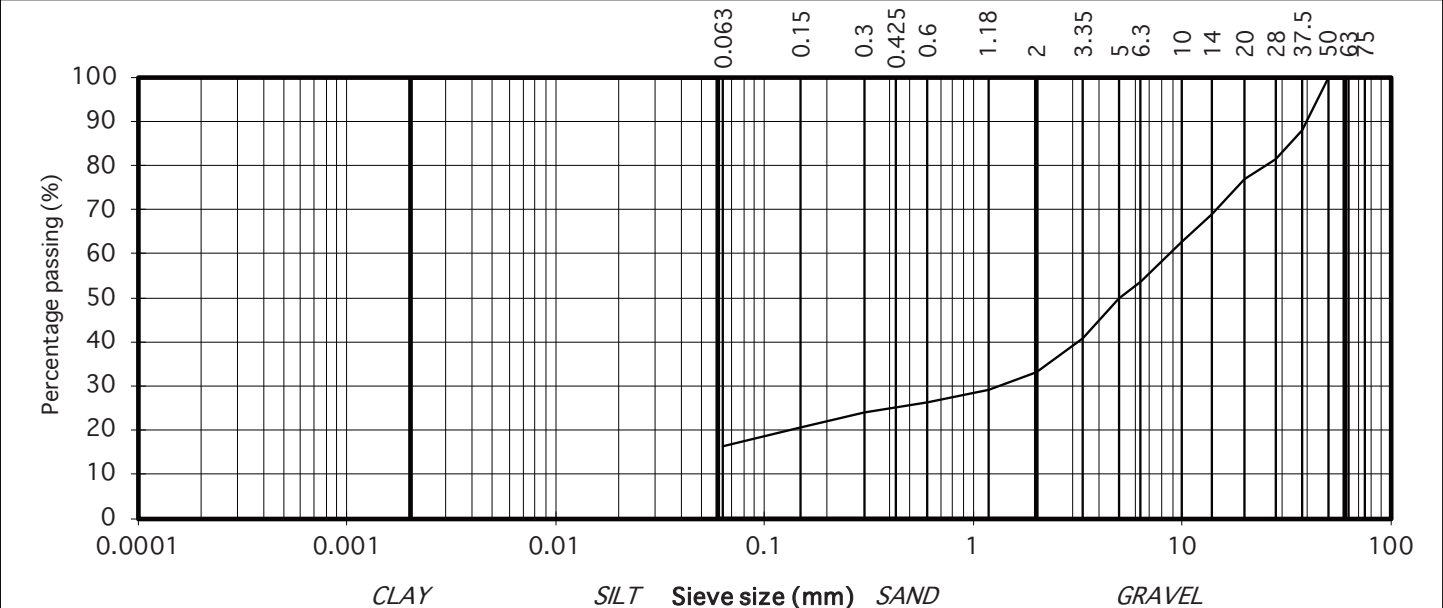
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	23000	Report No.	R119081	
75	100	COBBLES	Contract Name:	7 Hills Windfarm			
63	100		BH/TP :	T18 TP1			
50	100		Sample No.	AA144661	Lab. Sample No.	A21/0577	
37.5	88	GRAVEL	Sample Type:	B			
28	81		Depth (m)	2.50	Customer:	Energia / MWP	
20	77		Date Received	18/01/2021	Date Testing started	29/01/2021	
14	69		Description:	Brown clayey/silty, sandy, GRAVEL			
10	63		Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received. Sample size did not meet the requirements of BS1377			
6.3	54						
5	50						
3.35	41						
2	33						
1.18	29						
0.6	26						
0.425	25						
0.3	24	SAND					
0.15	21						
0.063	16						
		SILT/CLAY					

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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	23000	Report No.	R119080																																				
			Contract Name:	7 Hills Windfarm																																						
			BH/TP :	T18 TP2																																						
			Sample No.	AA149659	Lab. Sample No.	A21/0576																																				
			Sample Type:	B																																						
			Depth (m)	1.50	Customer:	Energia / MWP																																				
			Date Received	18/01/2021	Date Testing started	01/02/2021																																				
			Description:	Brown slightly sandy, gravelly, SILT/CLAY																																						
			Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.																																						
75	100	COBBLES	<table><tr><th>Sieve size (mm)</th><th>Percentage passing (%)</th></tr><tr><td>0.063</td><td>24</td></tr><tr><td>0.15</td><td>31</td></tr><tr><td>0.3</td><td>36</td></tr><tr><td>0.425</td><td>38</td></tr><tr><td>0.6</td><td>40</td></tr><tr><td>1.18</td><td>45</td></tr><tr><td>2</td><td>49</td></tr><tr><td>3.35</td><td>54</td></tr><tr><td>5</td><td>60</td></tr><tr><td>6.3</td><td>64</td></tr><tr><td>10</td><td>71</td></tr><tr><td>14</td><td>77</td></tr><tr><td>20</td><td>82</td></tr><tr><td>28</td><td>89</td></tr><tr><td>37.5</td><td>91</td></tr><tr><td>50</td><td>100</td></tr><tr><td>63</td><td>100</td></tr></table>				Sieve size (mm)	Percentage passing (%)	0.063	24	0.15	31	0.3	36	0.425	38	0.6	40	1.18	45	2	49	3.35	54	5	60	6.3	64	10	71	14	77	20	82	28	89	37.5	91	50	100	63	100
Sieve size (mm)	Percentage passing (%)																																									
0.063	24																																									
0.15	31																																									
0.3	36																																									
0.425	38																																									
0.6	40																																									
1.18	45																																									
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3.35	54																																									
5	60																																									
6.3	64																																									
10	71																																									
14	77																																									
20	82																																									
28	89																																									
37.5	91																																									
50	100																																									
63	100																																									
63	100																																									
50	100																																									
37.5	91																																									
28	89																																									
20	82																																									
14	77																																									
10	71																																									
6.3	64																																									
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0.15	31																																									
0.063	24																																									
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IGSL Ltd Materials Laboratory				Approved by:	Date:	Page no:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)

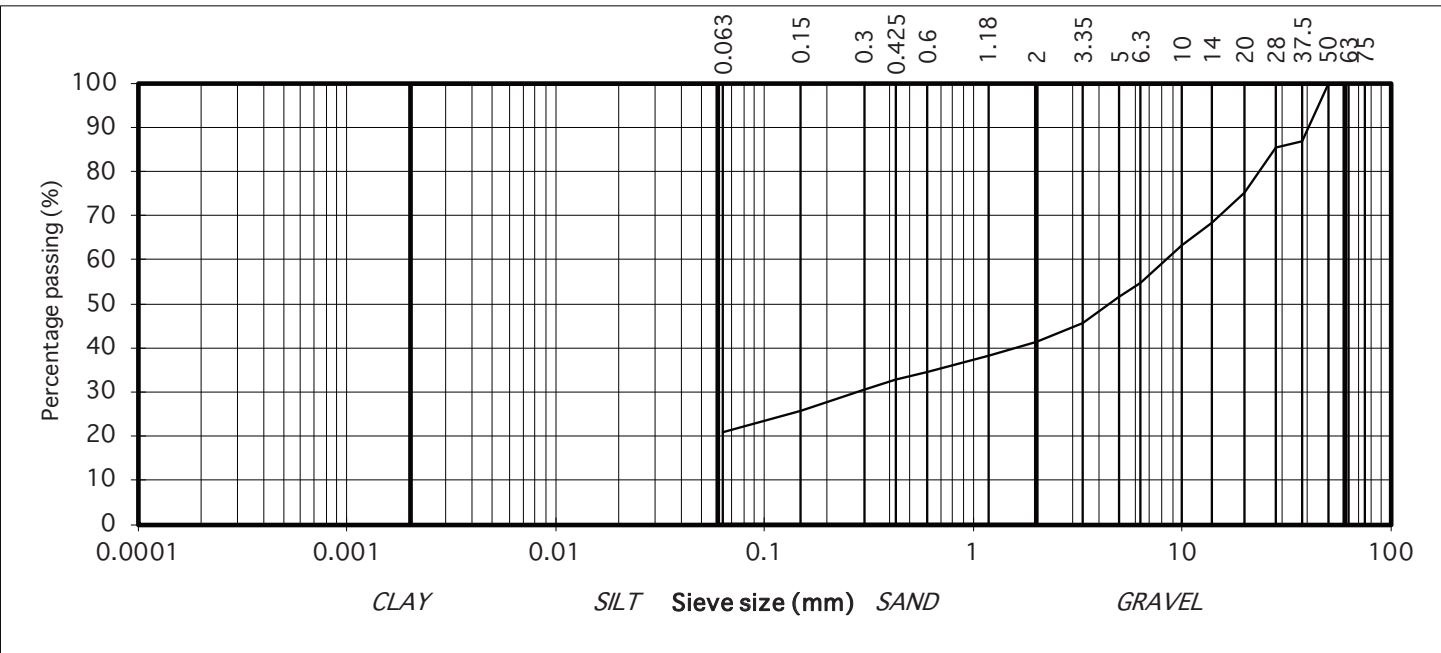


particle size	% passing		Contract No. 23000	Report No. R118597
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T19 TP2	
50	100		Sample No. AA144663	Lab. Sample No. A21/0579
37.5	87	GRAVEL	Sample Type: B	
28	86		Depth (m) 0.50	Customer: Energia / MWP
20	75		Date Received 18/01/2021	Date Testing started 29/01/2021
14	68		Description: Brown slightly sandy, gravelly, SILT/CLAY with occasional cobbles	
10	63			
6.3	55			
5	52			
3.35	46			
2	41	SAND		
1.18	38			
0.6	35			
0.425	33			
0.3	31	SILT/CLAY		
0.15	26			
0.063	21			

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.

Sample size did not meet the requirements of BS1377



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Date:

15/02/21

Page no:

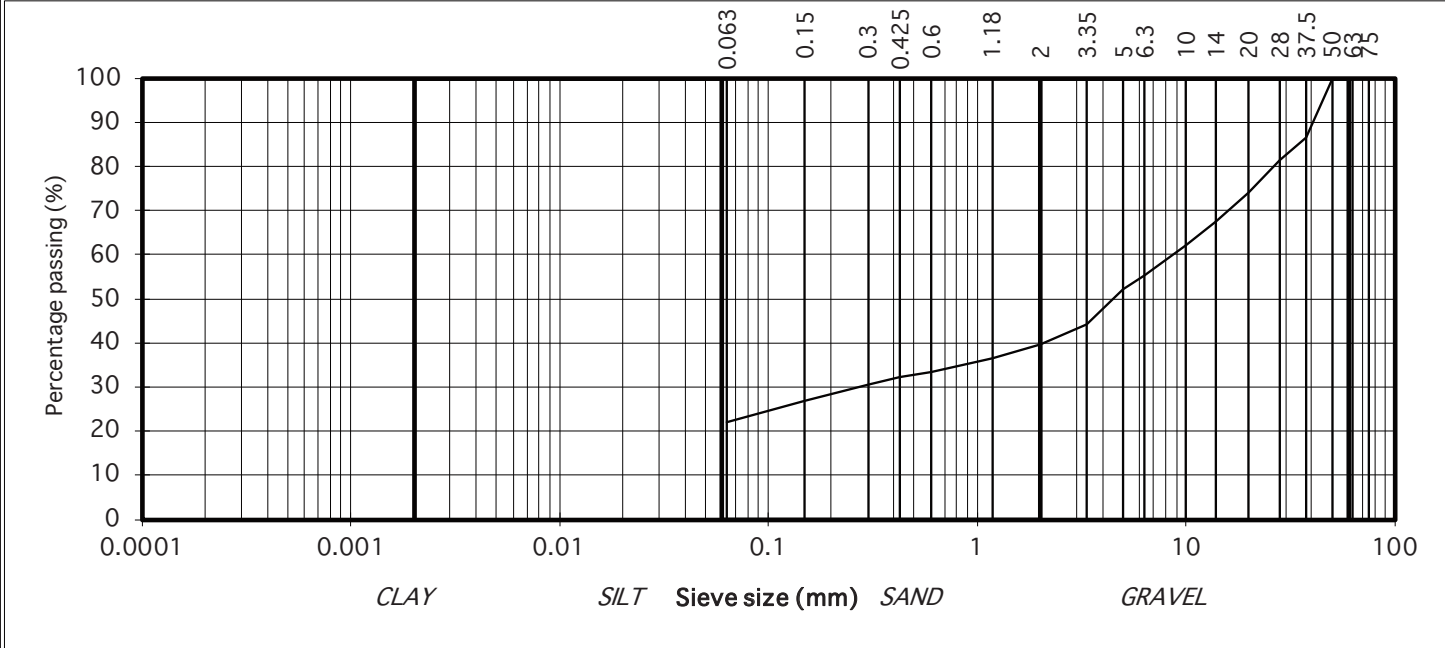
1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R119082
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T19 TP1	
50	100		Sample No. AA144662	Lab. Sample No. A21/0578
37.5	87	GRAVEL	Sample Type: B	
28	82		Depth (m) 1.50	Customer: Energia / MWP
20	74		Date Received 18/01/2021	Date Testing started 29/01/2021
14	68		Description: Brown slightly sandy, gravelly, SILT/CLAY	
10	62		Remarks	
6.3	55		<small>Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received. Sample size did not meet the requirements of BS1377</small>	
5	52			
3.35	44	SAND		
2	40			
1.18	36			
0.6	33			
0.425	32	SILT/CLAY		
0.3	31			
0.15	27			
0.063	22			

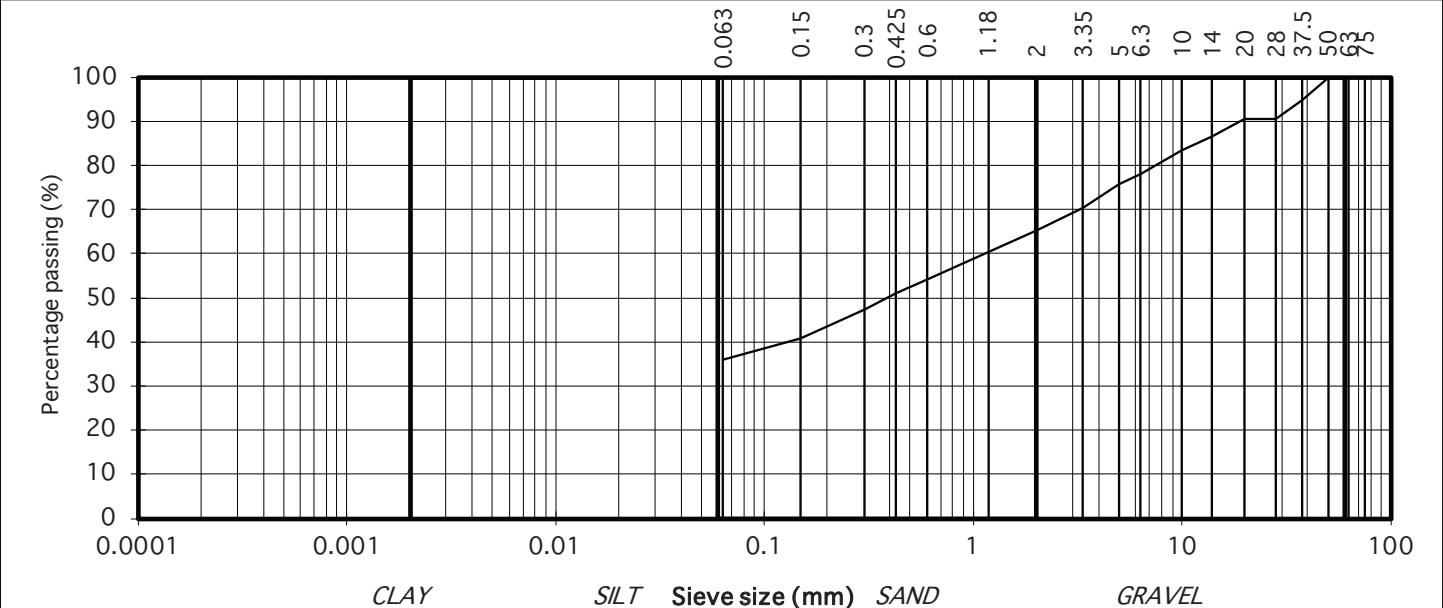


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			<i>H Byrne</i>	15/02/21	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	23000	Report No.	R119084	
75	100	COBBLES	Contract Name:	7 Hills Windfarm			
63	100		BH/TP :	T20 TP2			
50	100		Sample No.	AA144673	Lab. Sample No.	A21/0581	
37.5	95		Sample Type:	B			
28	91		Depth (m)	1.50	Customer:	Energia / MWP	
20	91	GRAVEL	Date Received	18/01/2021	Date Testing started	01/02/2021	
14	87		Description:	Brown slightly sandy, slightly gravelly, SILT/CLAY			
10	83		Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.			
6.3	78						
5	76						
3.35	70						
2	65						
1.18	60						
0.6	54						
0.425	51						
0.3	47						
0.15	41						
0.063	36						
		SILT/CLAY					

IGSL Ltd Materials Laboratory

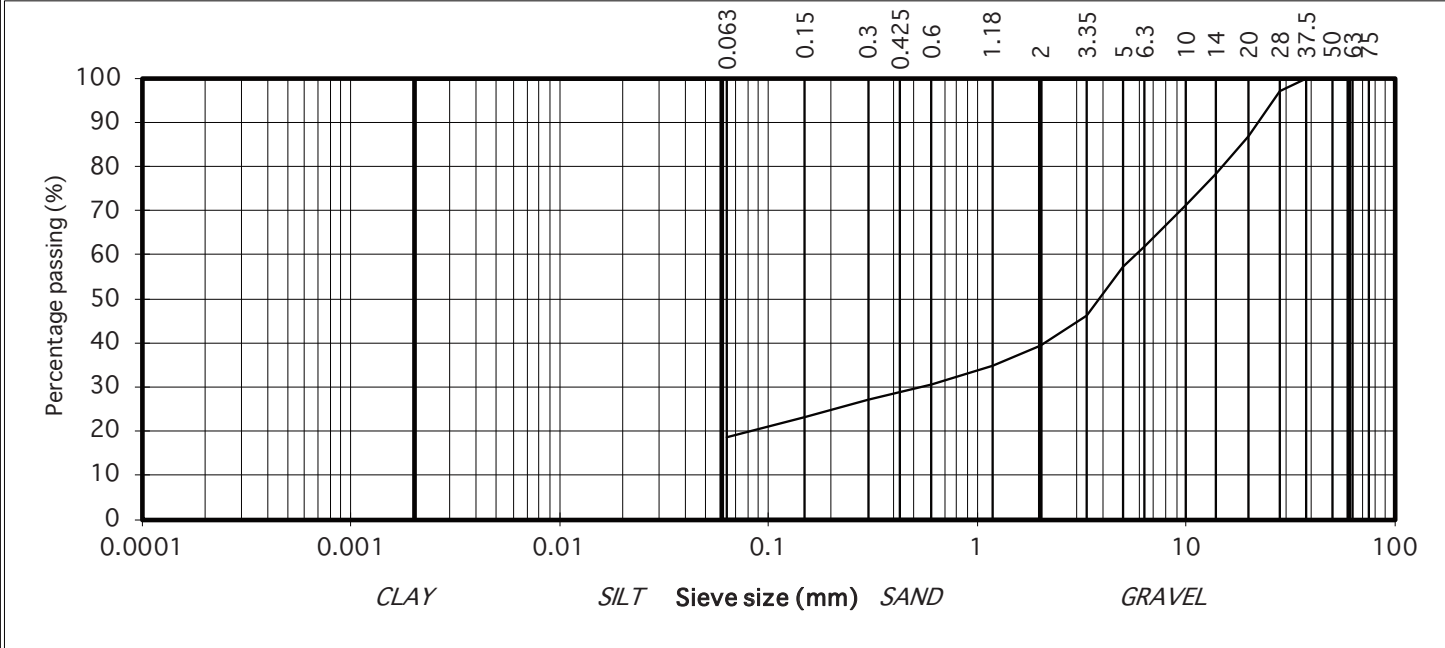
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R119083
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T19 TP2	
50	100		Sample No. AA149663	Lab. Sample No. A21/0580
37.5	100	GRAVEL	Sample Type: B	
28	97		Depth (m) 2.20	Customer: Energia / MWP
20	87		Date Received 18/01/2021	Date Testing started 29/01/2021
14	78		Description: Brown clayey/silty, very sandy, GRAVEL	
10	71		Remarks	
6.3	62		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	57			
3.35	46	SAND		
2	39			
1.18	35			
0.6	31			
0.425	29	SILT/CLAY		
0.3	27			
0.15	23			
0.063	19			



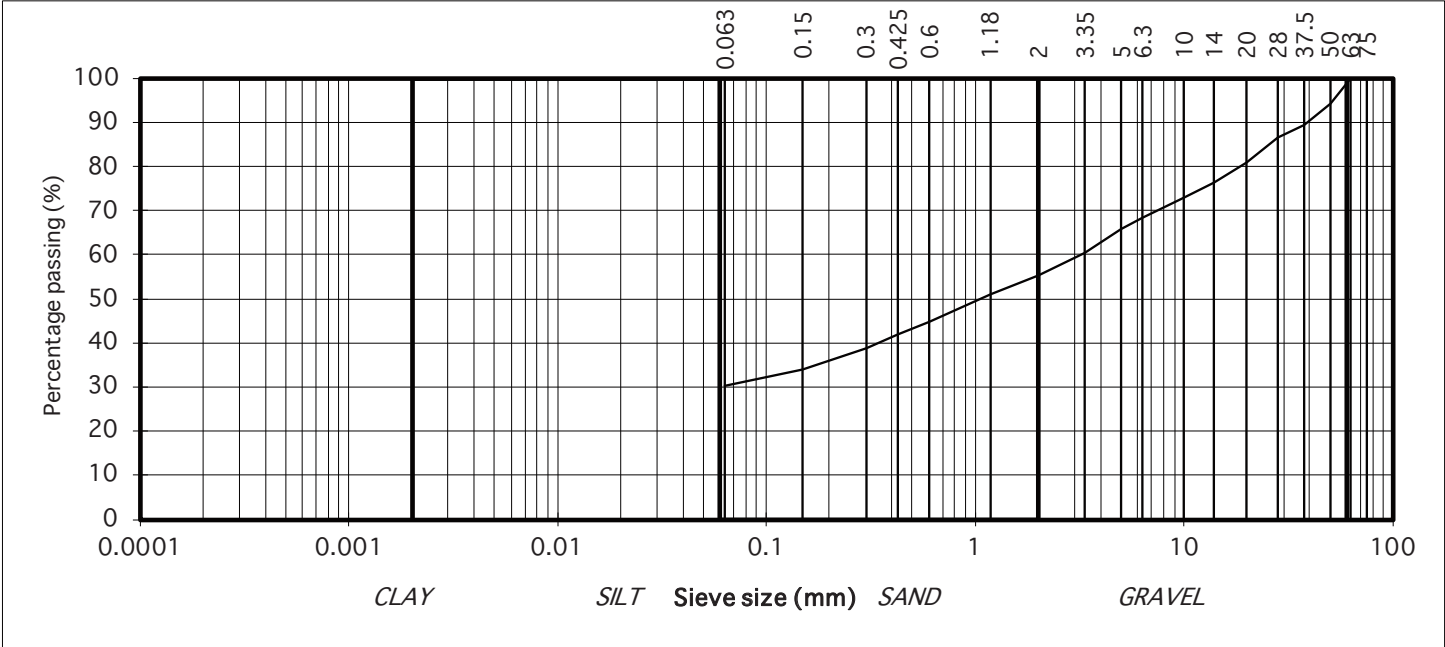
IGSL Ltd Materials Laboratory		Approved by:	Date:	Page no:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R118598
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T20 TP1	
50	94		Sample No. AA149674	Lab. Sample No. A21/0582
37.5	90	GRAVEL	Sample Type: B	
28	87		Depth (m) 0.50	Customer: Energia / MWP
20	81		Date Received 18/01/2021	Date Testing started 29/01/2021
14	76		Description: Brown slightly sandy, gravelly, SILT/CLAY with occasional cobbles	
10	73			
6.3	68			
5	66			
3.35	60	SAND	Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.
2	55			
1.18	51			
0.6	45			
0.425	42	SILT/CLAY		
0.3	39			
0.15	34			
0.063	30			

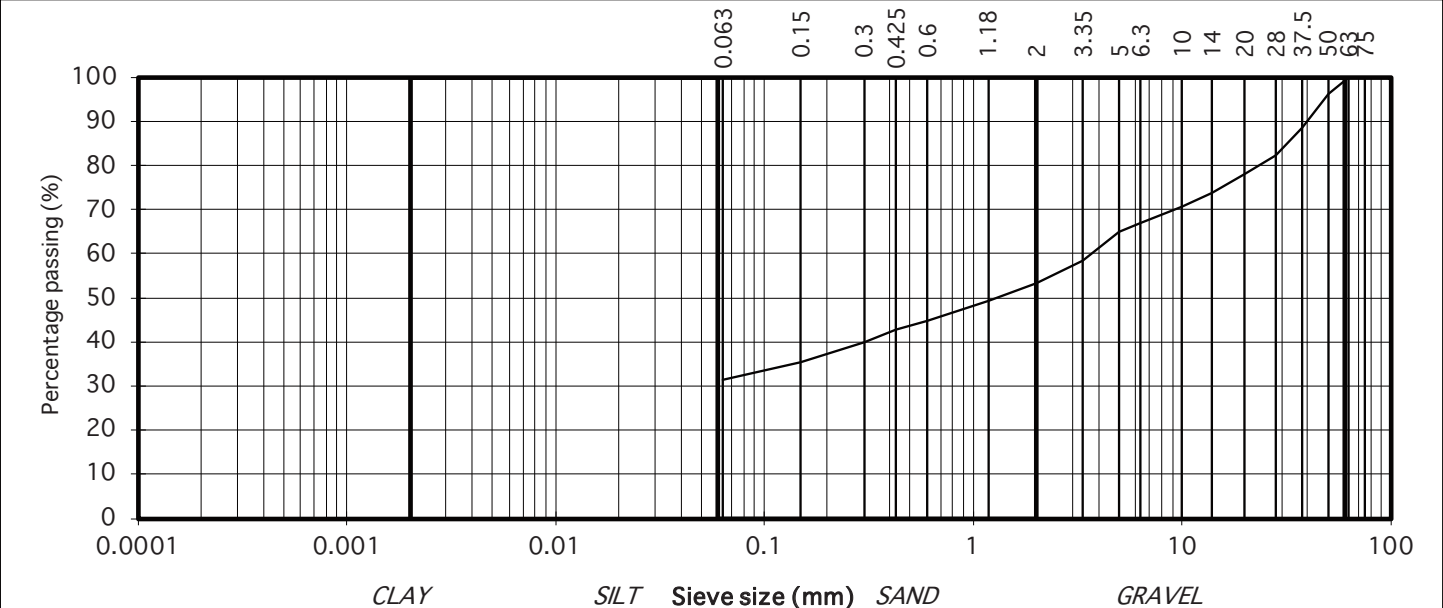


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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	23000	Report No.	R119085	
			Contract Name:	7 Hills Windfarm			
			BH/TP :	T20 TP1			
			Sample No.	A149675	Lab. Sample No.	A21/0583	
			Sample Type:	B			
			Depth (m)	2.80	Customer:	Energia / MWP	
			Date Received	18/01/2021	Date Testing started	01/02/2021	
			Description:	Brown slightly sandy, gravelly, SILT/CLAY			
			Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.			
75	100	COBBLES					
63	100						
50	96						
37.5	89						GRAVEL
28	82						
20	78						
14	74						
10	71						
6.3	67						
5	65						
3.35	58						
2	53						
1.18	49	SAND					
0.6	45						
0.425	43						
0.3	40						
0.15	35						
0.063	32						
							SILT/CLAY

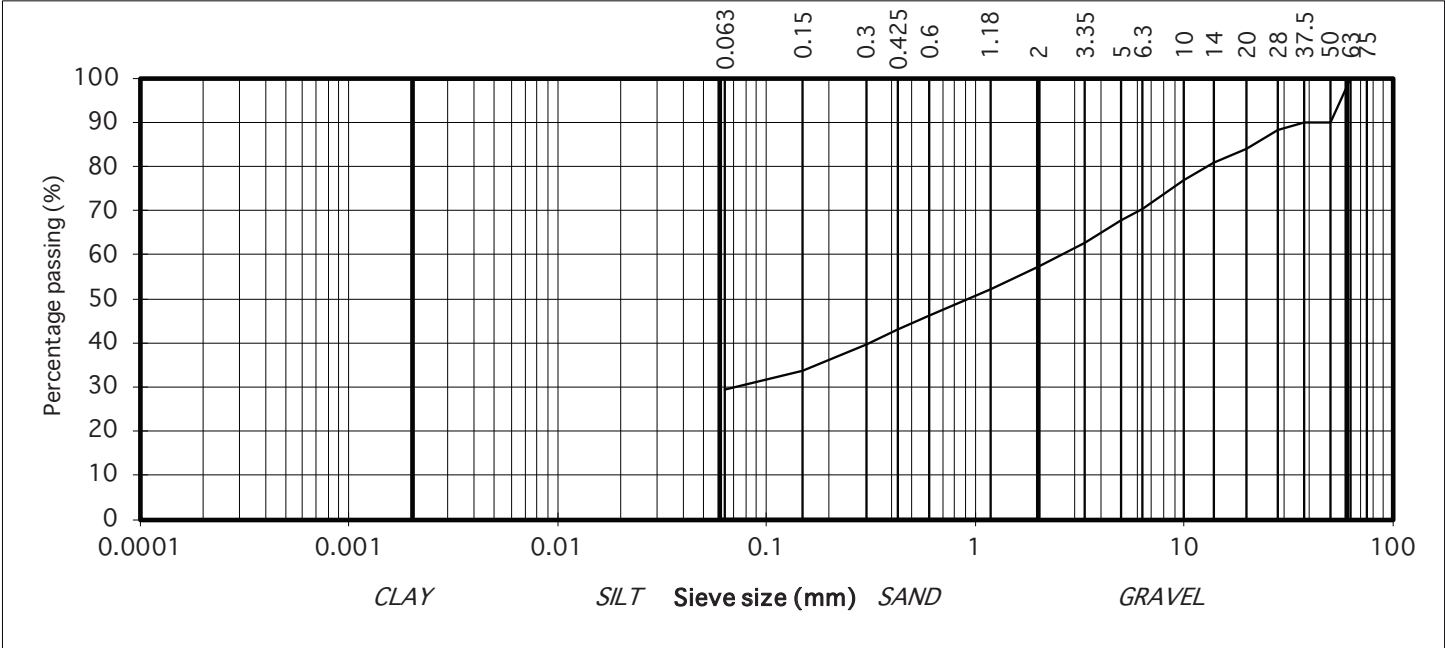
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R118599
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : T21 TP1	
50	90		Sample No. AA144672	Lab. Sample No. A21/0584
37.5	90		Sample Type: B	
28	88		Depth (m) 1.50	Customer: Energia / MWP
20	84	GRAVEL	Date Received 18/01/2021	Date Testing started 29/01/2021
14	81		Description: Brown slightly sandy, gravelly, SILT/CLAY with occasional cobbles	
10	77			
6.3	70			
5	68			
3.35	63	SAND	Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.
2	57			
1.18	52			
0.6	46			
0.425	43			
0.3	40	SILT/CLAY		
0.15	34			
0.063	29			

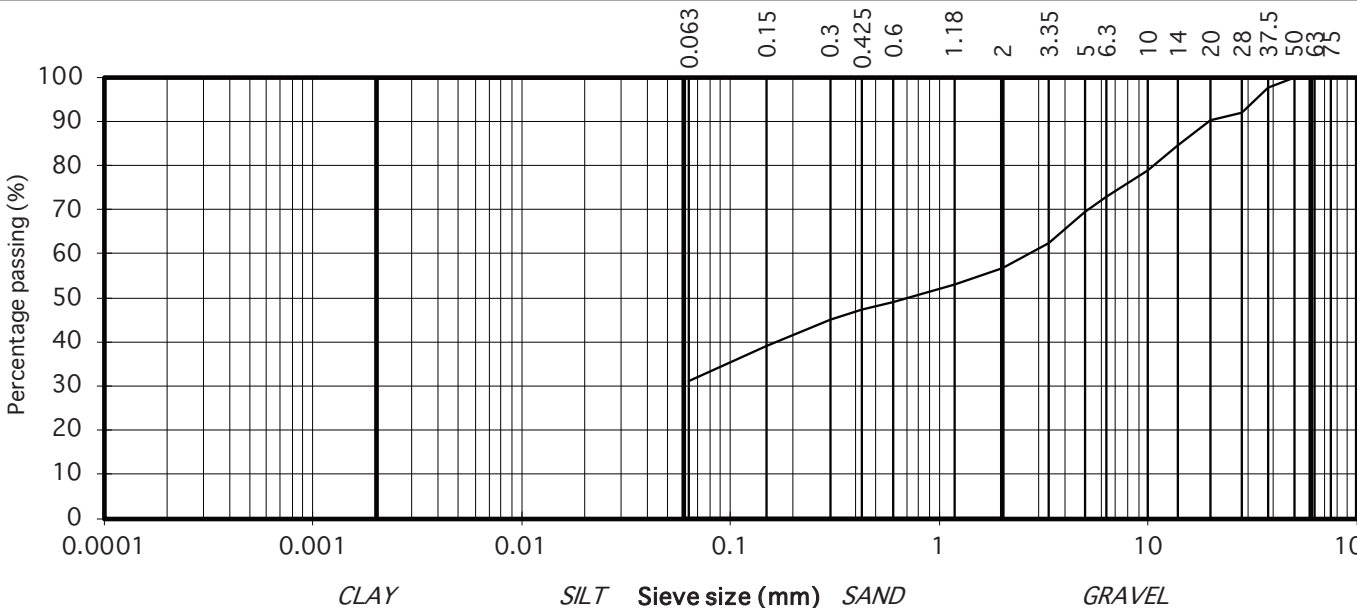


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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

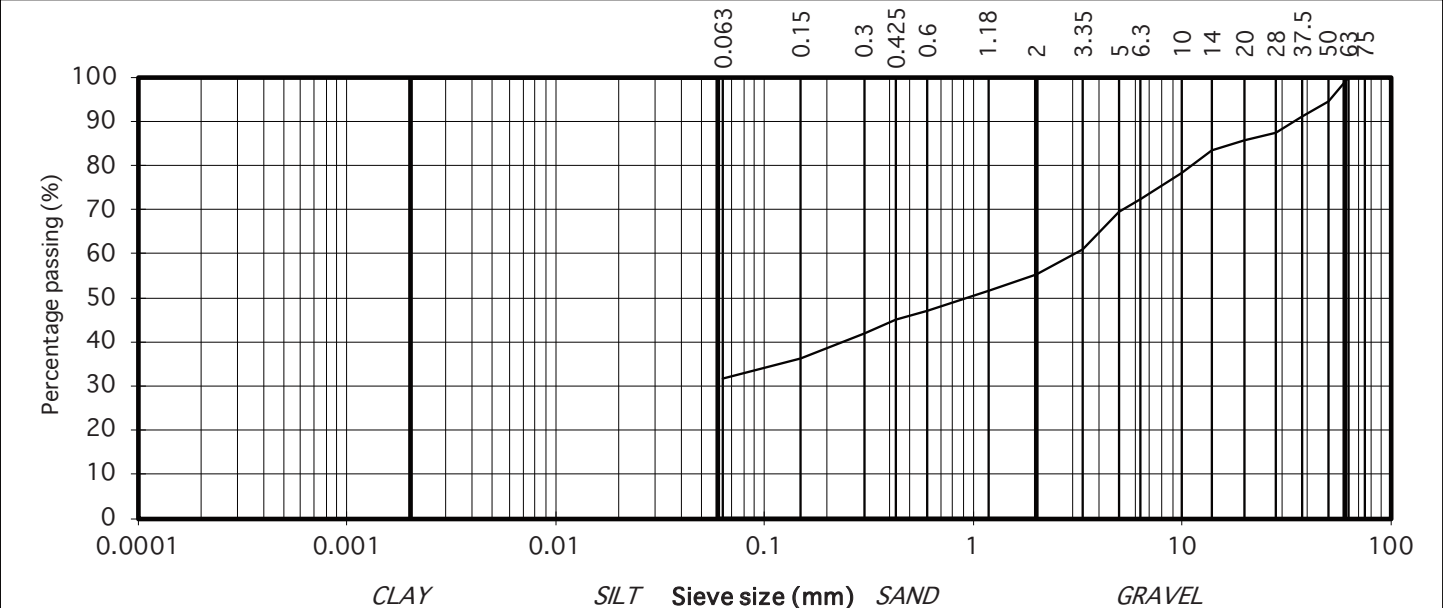
TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	23000	Report No.	R119086	
			Contract Name:	7 Hills Windfarm			
			BH/TP :	T21 TP2			
			Sample No.	AA149670	Lab. Sample No.	A21/0585	
			Sample Type:	B			
			Depth (m)	0.50	Customer:	Energia / MWP	
			Date Received	18/01/2021	Date Testing started	29/01/2021	
			Description:	Brown slightly sandy, gravelly, SILT/CLAY			
			Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.			
75	100	COBBLES					
63	100						
50	100						
37.5	98						GRAVEL
28	92						
20	90						
14	85						
10	79						
6.3	73						
5	70						
3.35	62						
2	57						
1.18	53	SAND					
0.6	49						
0.425	47						
0.3	45						
0.15	39						
0.063	31						
							SILT/CLAY

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	23000	Report No.	R119087	
75	100	COBBLES	Contract Name:	7 Hills Windfarm			
63	100		BH/TP :	T21 TP2			
50	95		Sample No.	AA144671	Lab. Sample No.	A21/0586	
37.5	91		Sample Type:	B			
28	87		Depth (m)	2.50	Customer:	Energia / MWP	
20	86	GRAVEL	Date Received	18/01/2021	Date Testing started	29/01/2021	
14	83		Description:	Brown slightly sandy, gravelly, SILT/CLAY			
10	78		Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.			
6.3	72						
5	69						
3.35	61						
2	55						
1.18	52						
0.6	47						
0.425	45						
0.3	42						
0.15	36						
0.063	32						
		SILT/CLAY					

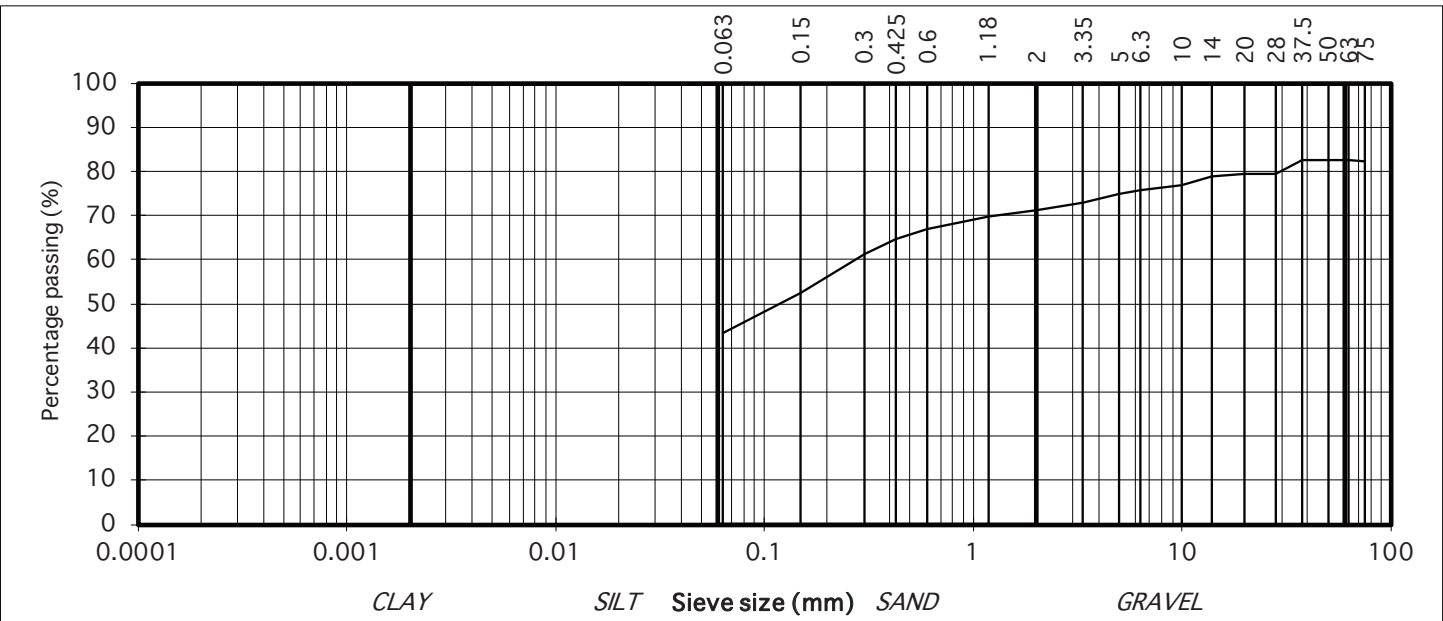
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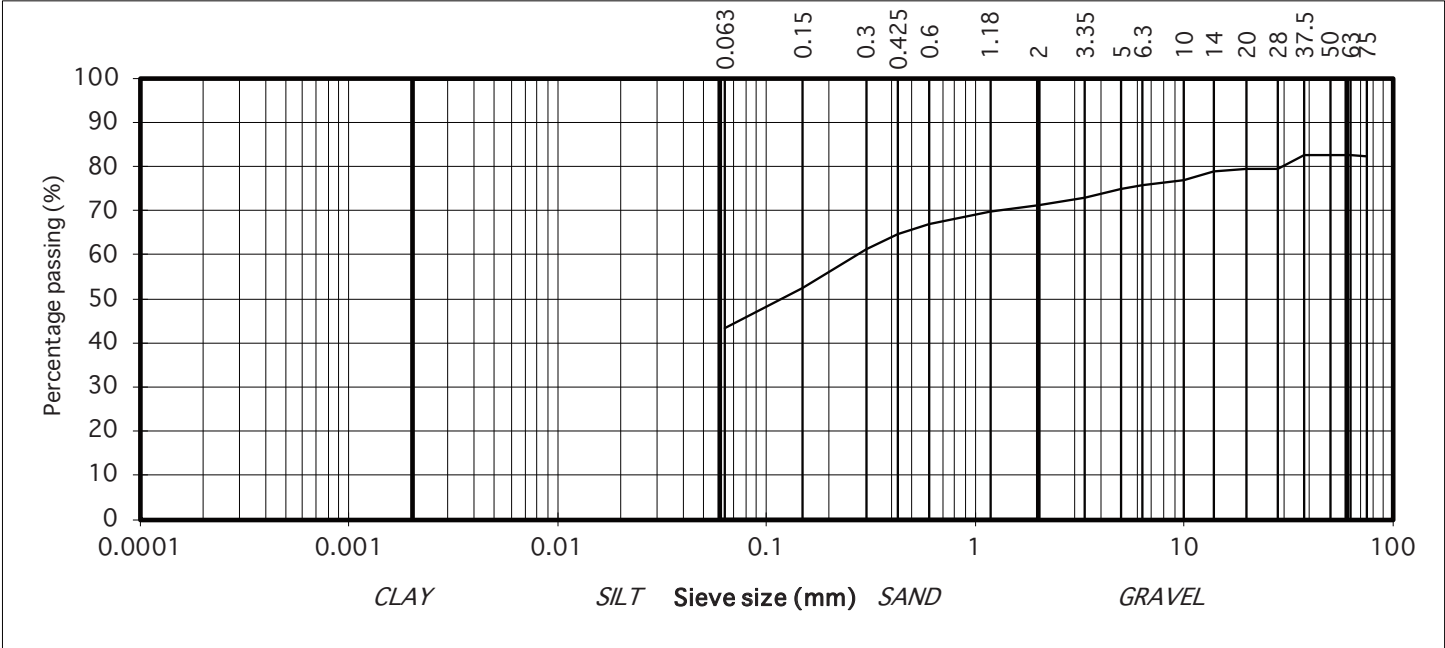
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	23000	Report No.	R119088
			Contract Name:	7 Hills Windfarm		
			BH/TP :	Mast TP1		
			Sample No.	AA140089	Lab. Sample No.	A21/0587
			Sample Type:	B		
			Depth (m)	0.40	Customer:	Energia / MWP
			Date Received	18/01/2021	Date Testing started	29/01/2021
			Description:	Brown slightly sandy, slightly gravelly, SILT/CLAY with some cobbles		
			Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received. Sample size did not meet the requirements of BS1377		
75	83	COBBLES				
63	83					
50	83					
37.5	83					
28	80					
20	80					
14	79					
10	77					
6.3	76					
5	75					
3.35	73	GRAVEL				
2	71					
1.18	70					
0.6	67					
0.425	65					
0.3	61					
0.15	53					
0.063	43					
		SAND				
		SILT/CLAY				

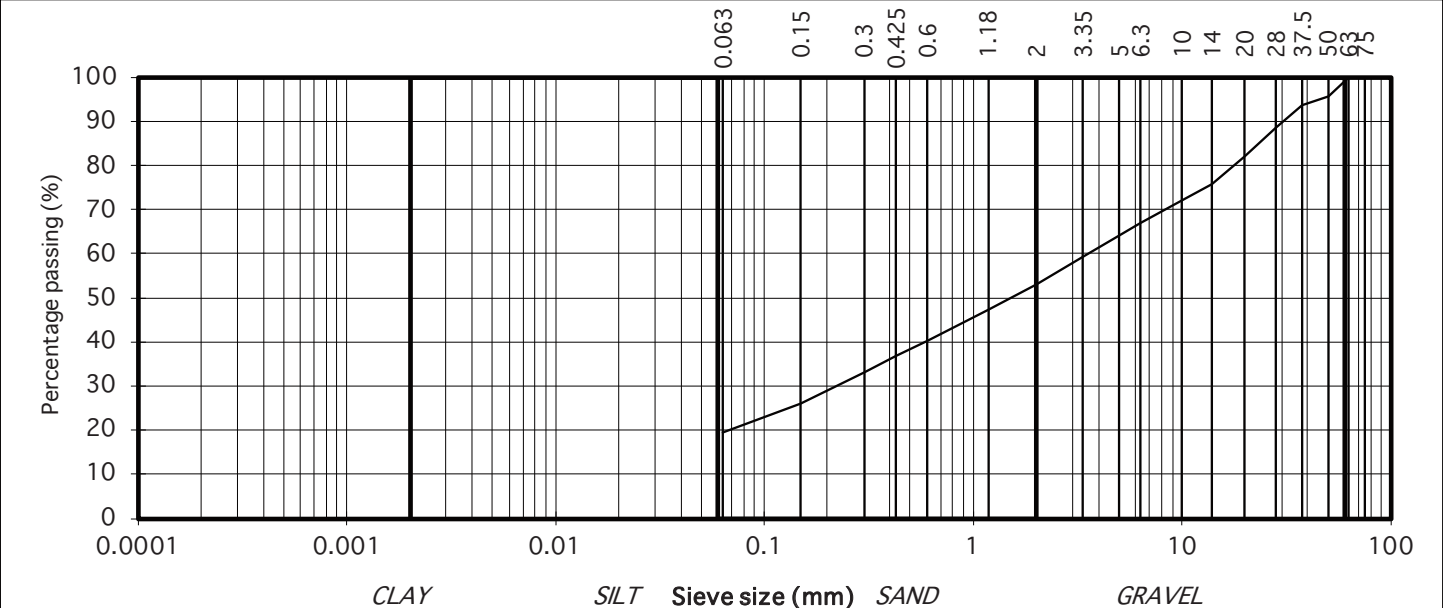


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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No.	23000	Report No.	R118600	
			Contract Name:	7 Hills Windfarm			
			BH/TP :	Mast TP1			
			Sample No.	AA145089	Lab. Sample No.	A21/0588	
			Sample Type:	B			
			Depth (m)	1.70	Customer:	Energia / MWP	
			Date Received	18/01/2021	Date Testing started	28/01/2021	
			Description:	Brown clayey/silty, very sandy, GRAVEL with occasional cobbles			
			Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.			
75	100	COBBLES					
63	100						
50	96						
37.5	94						
28	89						GRAVEL
20	82						
14	76						
10	72						
6.3	67						
5	64						
3.35	59						
2	53						
1.18	47						
0.6	40	SAND					
0.425	37						
0.3	33						
0.15	26						
0.063	19						
		SILT/CLAY					

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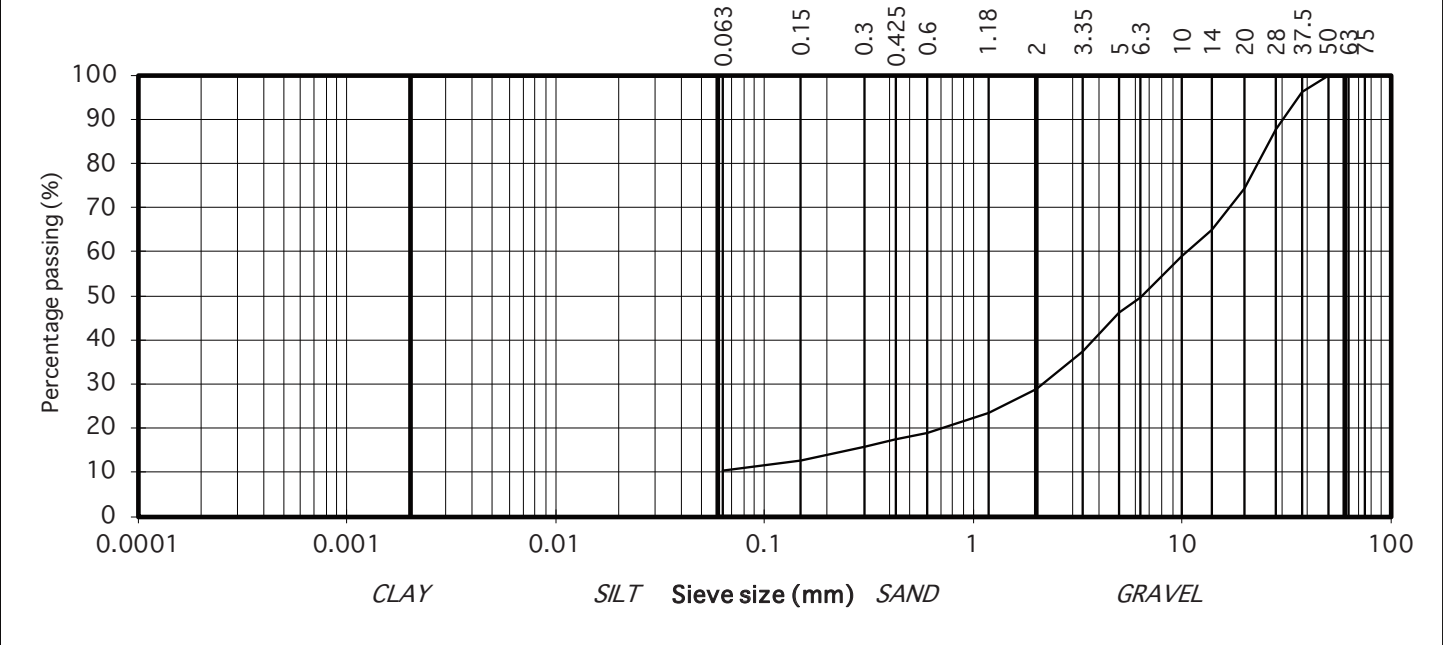
TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R118601
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : Mast TP2	
50	100		Sample No. AA140090	Lab. Sample No. A21/0589
37.5	96	GRAVEL	Sample Type: B	
28	88		Depth (m) 0.50	Customer: Energia / MWP
20	74		Date Received 18/01/2021	Date Testing started 29/01/2021
14	65		Description: Brown clayey/silty, sandy, GRAVEL with occasional cobbles	
10	59			
6.3	50			
5	46			
3.35	37			
2	29	SAND		
1.18	23			
0.6	19			
0.425	17			
0.3	16	SILT/CLAY		
0.15	13			
0.063	10			

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.



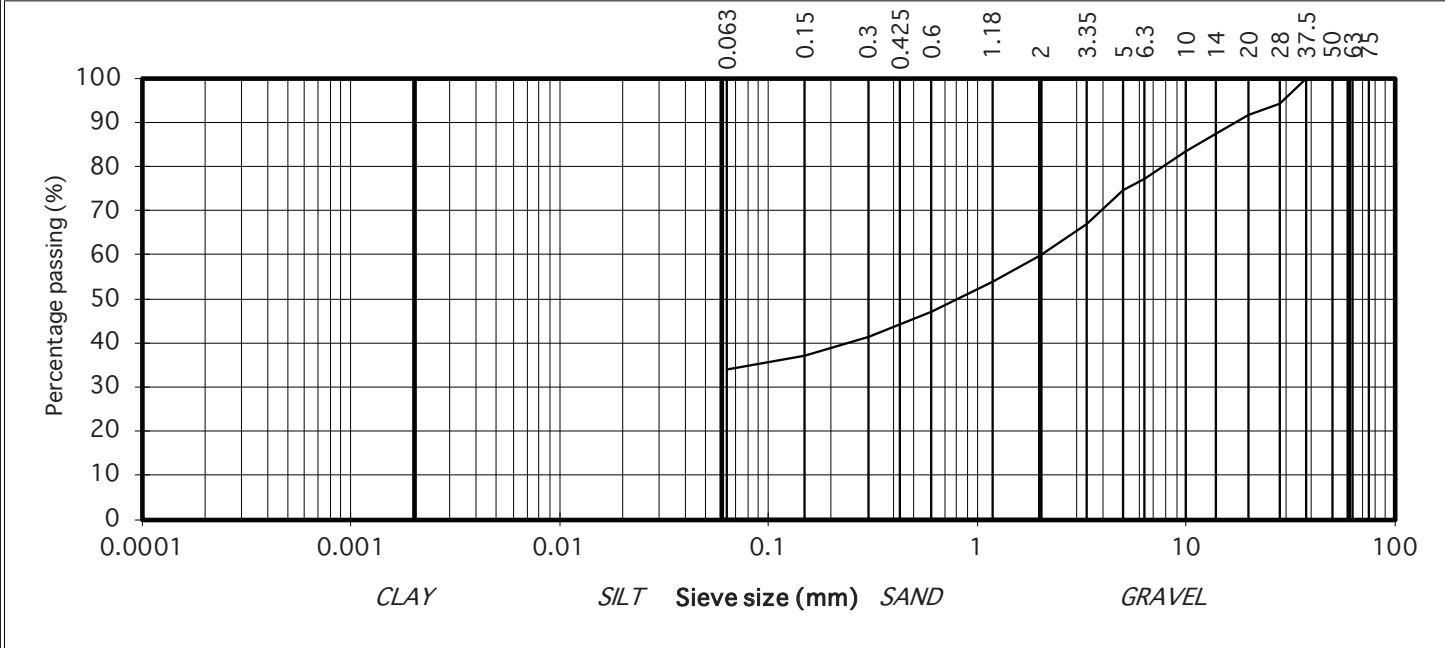
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R119089
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	100		BH/TP : Sub Station TP1	
50	100		Sample No. AA144667	Lab. Sample No. A21/0590
37.5	100	GRAVEL	Sample Type: B	
28	94		Depth (m) 0.50	Customer: Energia / MWP
20	92		Date Received 18/01/2021	Date Testing started 29/01/2021
14	87		Description: Brown slightly sandy, gravelly, SILT/CLAY	
10	83		Remarks	
6.3	77		Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.	
5	75			
3.35	67	SAND		
2	60			
1.18	54			
0.6	47			
0.425	44			
0.3	41	SILT/CLAY		
0.15	37			
0.063	34			



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)

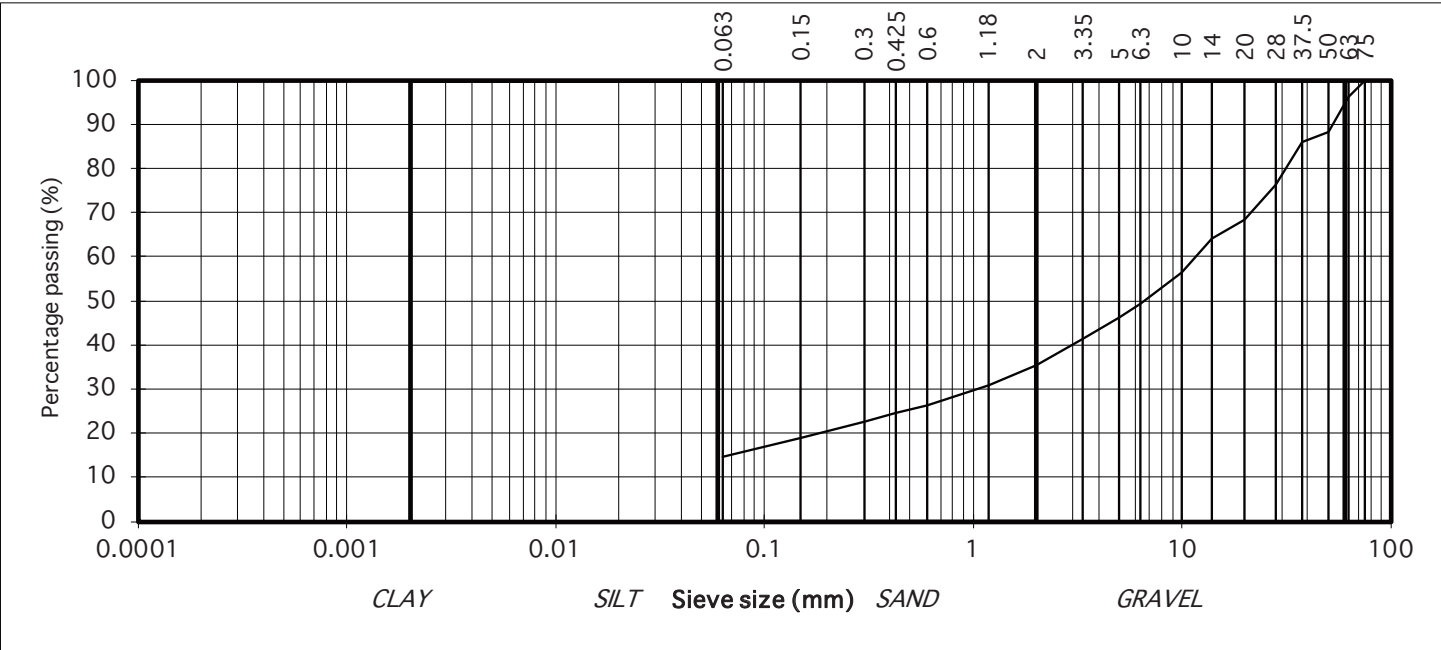


particle size	% passing		Contract No. 23000	Report No. R119267
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	96		BH/TP : Sub Station TP01	
50	88		Sample No. AA144668	Lab. Sample No. A21/0592
37.5	86	GRAVEL	Sample Type: B	
28	76		Depth (m) 2.20	Customer: Energia / MWP
20	68		Date Received 18/01/2021	Date Testing started 29/01/2021
14	64		Description: Brown clayey/silty, very sandy, GRAVEL with occasional cobbles	
10	56			
6.3	49			
5	46			
3.35	41			
2	35	SAND		
1.18	31			
0.6	26			
0.425	25			
0.3	23	SILT/CLAY		
0.15	19			
0.063	15			

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.

Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory

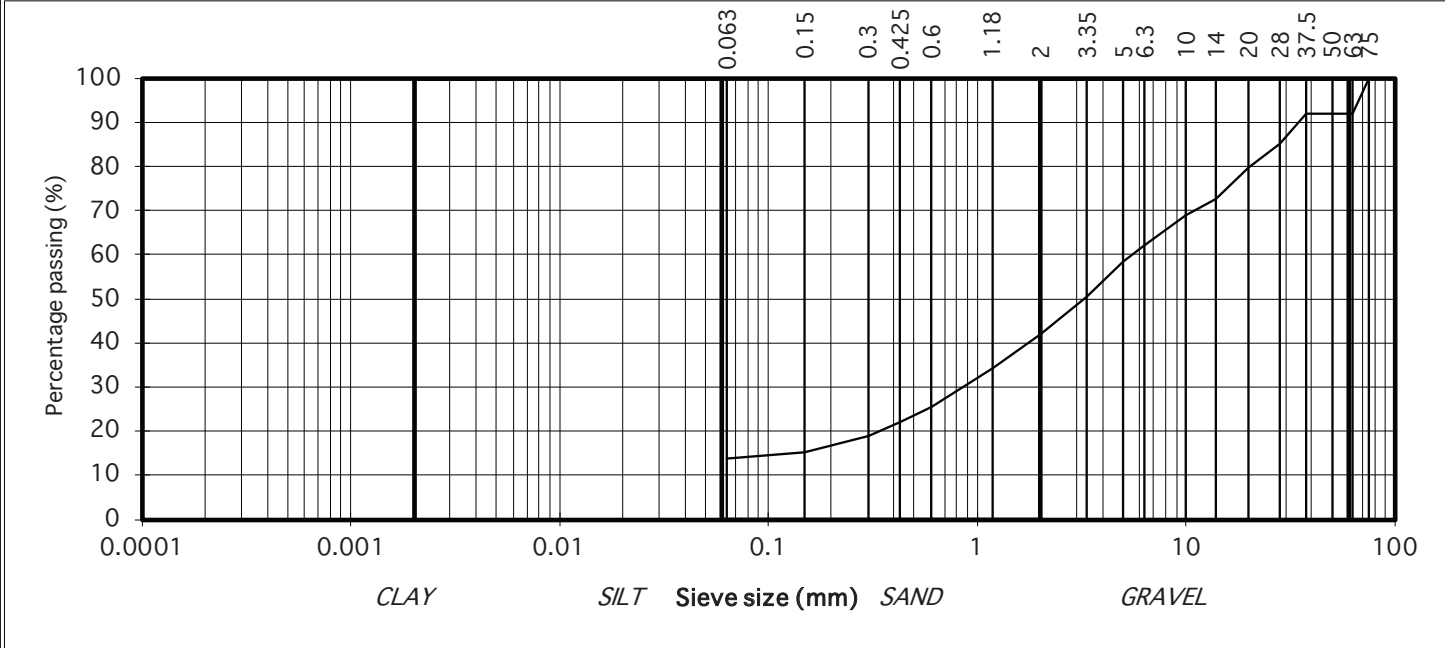
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TEST REPORT
Determination of Particle Size Distribution
 Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
 (note: Sedimentation stage not accredited)



particle size	% passing		Contract No. 23000	Report No. R119043
75	100	COBBLES	Contract Name: 7 Hills Windfarm	
63	92		BH/TP : Sub Station TP02	
50	92		Sample No. AA144669	Lab. Sample No. A21/0593
37.5	92		Sample Type: B	
28	85		Depth (m) 1.50	Customer: Energia / MWP
20	80	GRAVEL	Date Received 18/01/2021	Date Testing started 29/01/2021
14	73		Description: Brown clayey/silty, very sandy, GRAVEL with some cobbles	
10	69			
6.3	62			
5	58			
3.35	50	SAND	Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.
2	42			
1.18	34			
0.6	25			
0.425	22			
0.3	19	SILT/CLAY		
0.15	15			
0.063	14			



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Appendix 7

Chemical Testing – Soil

Chemtest Report

Standard Report_21-02643-20210203 072257
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Final Report

Report No.: 21-02643-1

Initial Date of Issue: 03-Feb-2021

Client IGSL

Client Address: M7 Business Park
Naas
County Kildare
Ireland

Contact(s): Darren Keogh

Project 23000 7 Hills Windfarm Energia (MWP)

Quotation No.: Q20-21693 **Date Received:** 29-Jan-2021

Order No.: **Date Instructed:** 29-Jan-2021

No. of Samples: 24

Turnaround (Wkdays): 7 **Results Due:** 08-Feb-2021

Date Approved: 03-Feb-2021

Approved By:

Details: Glynn Harvey, Technical Manager

Results - Soil

Project: 23000 7 Hills Windfarm Energia (MWP)

Client: IGSL	Chemtest Job No.:													
Quotation No.: Q20-21693	Chemtest Sample ID.:													
	Client Sample ID.:													
	Sample Location:													
	Sample Type:													
	Top Depth (m):													
	Bottom Depth (m):													
Determinand	Accred.	SOP	Units	LOD										
Moisture	N	2030	%	0.020	10	12	13	9.3	18	8.3	9.1	10	6.2	8.2
pH	U	2010		4.0	[A] 8.8		[A] 8.6		[A] 8.4		[A] 8.7	[A] 8.9	[A] 9.0	[A] 9.1
pH (2.5:1)	N	2010		4.0	[A] 8.8		[A] 8.6		[A] 8.5		[A] 8.8	[A] 9.1	[A] 9.0	[A] 9.3
Magnesium (Water Soluble)	N	2120	g/l	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Sulphate (2:1 Water Soluble) as SO ₄	U	2120	g/l	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Total Sulphur	U	2175	%	0.010	[A] 0.032		[A] 0.036		[A] 0.041		[A] 0.025	[A] 0.028	[A] 0.019	[A] 0.016
Chloride (Water Soluble)	U	2220	g/l	0.010	[A] 0.011		[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010		< 0.010		0.013		0.011	< 0.010	< 0.010	< 0.010
Ammonium (Water Soluble)	U	2120	g/l	0.01	< 0.01		< 0.01		< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.018		[A] 0.046		[A] 0.057		[A] 0.016	[A] 0.010	[A] < 0.010	[A] < 0.010
Organic Matter	U	2625	%	0.40		[A] 0.66		[A] < 0.40		[A] < 0.40				

Results - Soil

Project: 23000 7 Hills Windfarm Energia (MWP)

Client: IGSL	Chemtest Job No.:													
Quotation No.: Q20-21693	Chemtest Sample ID.:													
	Client Sample ID.:													
	Sample Location:													
	Sample Type:													
	Top Depth (m):													
	Bottom Depth (m):													
Determinand	Accred.	SOP	Units	LOD										
Moisture	N	2030	%	0.020	17	7.9	18	8.4	6.4	5.3	7.6	6.3	12	7.6
pH	U	2010		4.0	[A] 8.5	[A] 8.8	[A] 8.5	[A] 8.9	[A] 9.0	[A] 9.1	[A] 8.9	[A] 9.0	[A] 8.7	[A] 9.0
pH (2.5:1)	N	2010		4.0	[A] 8.5	[A] 9.0	[A] 8.6	[A] 9.0	[A] 9.1	[A] 9.1	[A] 9.0	[A] 9.1	[A] 8.9	[A] 9.1
Magnesium (Water Soluble)	N	2120	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Sulphate (2:1 Water Soluble) as SO ₄	U	2120	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Total Sulphur	U	2175	%	0.010	[A] 0.034	[A] 0.028	[A] 0.028	[A] 0.018	[A] 0.021	[A] 0.016	[A] 0.017	[A] 0.018	[A] 0.018	[A] 0.016
Chloride (Water Soluble)	U	2220	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010	0.012	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Ammonium (Water Soluble)	U	2120	g/l	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.052	[A] 0.015	[A] 0.027	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] 0.013	[A] < 0.010	[A] 0.015	[A] < 0.010
Organic Matter	U	2625	%	0.40										

Results - Soil

Project: 23000 7 Hills Windfarm Energia (MWP)

Client: IGSL	Chemtest Job No.:				21-02643	21-02643	21-02643	21-02643
Quotation No.: Q20-21693	Chemtest Sample ID.:				1132847	1132848	1132849	1132850
	Client Sample ID.:				149670	140089	144667	144669
	Sample Location:				T21 TP02	Mast TP01	Substation TP01	Substation TP02
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.40	0.50	1.50
	Bottom Depth (m):				0.80	0.60	1.00	1.80
Determinand	Accred.	SOP	Units	LOD				
Moisture	N	2030	%	0.020	8.2	17	8.1	8.9
pH	U	2010		4.0	[A] 8.8	[A] 8.5	[A] 8.9	[A] 9.1
pH (2.5:1)	N	2010		4.0	[A] 8.9	[A] 8.6	[A] 8.9	
Magnesium (Water Soluble)	N	2120	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	
Sulphate (2:1 Water Soluble) as SO ₄	U	2120	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	
Total Sulphur	U	2175	%	0.010	[A] 0.019	[A] 0.031	[A] 0.015	
Chloride (Water Soluble)	U	2220	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010	< 0.010	
Ammonium (Water Soluble)	U	2120	g/l	0.01	< 0.01	< 0.01	< 0.01	
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.015	[A] 0.030	[A] 0.011	
Organic Matter	U	2625	%	0.40				

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1132825		145084	T1 TP01		A	Amber Glass 250ml
1132825		145084	T1 TP01		A	Plastic Tub 500g
1132827		145073	T3 TP01		A	Amber Glass 250ml
1132827		145073	T3 TP01		A	Plastic Tub 500g
1132828		145075	T3 TP02		A	Amber Glass 250ml
1132828		145075	T3 TP02		A	Plastic Tub 500g
1132829		145076	T3 TP02		A	Amber Glass 250ml
1132829		145076	T3 TP02		A	Plastic Tub 500g
1132830		140077	T4 TP02		A	Amber Glass 250ml
1132830		140077	T4 TP02		A	Plastic Tub 500g
1132831		140078	T4 TP02		A	Amber Glass 250ml
1132831		140078	T4 TP02		A	Plastic Tub 500g
1132832		140087	T5 TP01		A	Amber Glass 250ml
1132832		140087	T5 TP01		A	Plastic Tub 500g
1132833		145087	T6 TP01		A	Amber Glass 250ml
1132833		145087	T6 TP01		A	Plastic Tub 500g
1132834		140080	T7 TP01		A	Amber Glass 250ml
1132834		140080	T7 TP01		A	Plastic Tub 500g
1132836		144653	T10 TP01		A	Amber Glass 250ml
1132836		144653	T10 TP01		A	Plastic Tub 500g
1132837		170966	T11 TP01		A	Amber Glass 250ml
1132837		170966	T11 TP01		A	Plastic Tub 500g

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1132838		140098	T12 TP02		A	Amber Glass 250ml
1132838		140098	T12 TP02		A	Plastic Tub 500g
1132839		145099	T13 TP01		A	Amber Glass 250ml
1132839		145099	T13 TP01		A	Plastic Tub 500g
1132840		140097	T14 TP02		A	Amber Glass 250ml
1132840		140097	T14 TP02		A	Plastic Tub 500g
1132841		145094	T15 TP01		A	Amber Glass 250ml
1132841		145094	T15 TP01		A	Plastic Tub 500g
1132842		145090	T16 TP01		A	Amber Glass 250ml
1132842		145090	T16 TP01		A	Plastic Tub 500g
1132843		144657	T17 TP02		A	Amber Glass 250ml
1132843		144657	T17 TP02		A	Plastic Tub 500g
1132844		144660	T18 TP01		A	Amber Glass 250ml
1132844		144660	T18 TP01		A	Plastic Tub 500g
1132845		144662	T19 TP01		A	Amber Glass 250ml
1132845		144662	T19 TP01		A	Plastic Tub 500g
1132846		144673	T20 TP02		A	Amber Glass 250ml
1132846		144673	T20 TP02		A	Plastic Tub 500g
1132847		149670	T21 TP02		A	Amber Glass 250ml
1132847		149670	T21 TP02		A	Plastic Tub 500g
1132848		140089	Mast TP01		A	Amber Glass 250ml
1132848		140089	Mast TP01		A	Plastic Tub 500g

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1132849		144667	Substation TP01		A	Amber Glass 250ml
1132849		144667	Substation TP01		A	Plastic Tub 500g
1132850		144669	Substation TP02		A	Amber Glass 250ml
1132850		144669	Substation TP02		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurement by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operation procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix 8

Soil Redox Potential

Nicholls Colton Report

L21-0576-IGS-001

IGSL
Unit F
M7 Business Park
Naas

Analytical Test Report: L21/0576/IGS/001

Your Project Reference:	7 Hills Windfarm Energia	Samples Received on:	22/02/2021
Your Order Number:	18877	Testing Instruction Received:	22/02/2021
Report Issue Number:	1	Sample Tested:	22/02 to 02/03/2021
Samples Analysed:	9 soil samples	Report issued:	02/03/2021

Signed



Peter Swanston
Environmental Laboratories Manager
Nicholls Colton Group

Notes:

General

Please refer to Methodologies tab for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Samples were supplied by customer, results apply to the samples as received.

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Accreditation Key

UKAS = UKAS Accreditation, u = Unaccredited

Date of issue 10/12/2020

Owned by Emily Blissett - Customer Services Supervisor

Authorised by James Gane - Commercial Manager

J:\Public\Projects\2021\L21 - IGS - IGS\L21-0576-IGS\L21-0576-IGS-001.XLSX\EN 1744 Combined

L21/0576/IGS/001

Project Reference - 7 Hills Windfarm Energia

Analytical Test Results - Aggregate Testing

NC Reference	143518	143519	143520	143521
Client Sample Reference	A21/0709	A21/0711	A21/0714	A21/0720
Material	Soil	Soil	Soil	Soil
Source/Client Ref	TP02	TP01	TP02	TP02
	T1	T3	T6	T13
Sample Description	Greyish brown clayey sandy crushed rock	Brown slightly silty very gravelly sandy clay	Greyish brown clayey sandy crushed rock	Orangish brown slightly sandy very gravelly silty clay

	Units	Accreditation				
In House Determinations						
Redox (pE)	(mV)	u	160	181	190	198

L21/0576/IGS/001

Project Reference - 7 Hills Windfarm Energia

Analytical Test Results - Aggregate Testing

NC Reference			143522	143523	143524	143525
Client Sample Reference			A21/0722	A21/0723	A21/0726	A21/0727
Material			Soil	Soil	Soil	Soil
Source/Client Ref			TP02	TP02	TP02	TP01
			T15	T16	T19	T20
Sample Description			Brownish grey slightly clayey very gravelly silty sand	Brownish grey slightly clayey very gravelly silty sand	Light brown very gravelly sandy clay	Greyish brown slightly silty very gravelly sandy clay

Analytical Test Results - Aggregate Testing

NC Reference			143526	143569	143570	143571
Client Sample Reference			A21/0728	A21/0710	A21/0712	A21/0713
Material			Soil	Soil	Soil	Soil
Source/Client Ref			TP01	TP02	TP02	TP02
			T21	T2	T4	T5
Sample Description			Light brown slightly silty very gravelly sandy clay	Brown slightly silty very gravelly sandy clay	Brown slightly silty very gravelly sandy clay	Dark greyish brown slightly clayey sandy crushed rock with rare rootlets
In House Determinations	Units	Accreditation				
Redox (pE)	(mV)	u	184	196	195	209

L21/0576/IGS/001

Project Reference - 7 Hills Windfarm Energia

Analytical Test Results - Aggregate Testing

NC Reference			143572	143573	143574	143575
Client Sample Reference			A21/0715	A21/0717	A21/0718	A21/0719
Material			Soil	Soil	Soil	Soil
Source/Client Ref			TP02	TP02	TP01	TP01
			T7	T10	T11	T12
Sample Description			Dark brown slightly silty very gravelly sandy clay	Brownish grey clayey slightly sandy gravel	Dark greyish brown slightly clayey sandy crushed rock	Brownish grey slightly clayey sandy crushed rock
			Units	Accreditation		
In House Determinations						
Redox (pE)	(mV)	u	214	203	203	199

Analytical Test Results - Aggregate Testing

NC Reference			143576	143577	143578	143579
Client Sample Reference			A21/0721	A21/0724	A21/0725	A21/0729
Material			Soil	Soil	Soil	Soil
Source/Client Ref			TP01	TP01	TP02	TP02
			T14	T17	T18	Mast
Sample Description			Dark orangish brown slightly silty very gravelly sandy clay	Dark brownish grey slightly clayey very gravelly silty sand	Dark brown slightly silty very gravelly sandy clay with rare rootlets	Orangish brown slightly sandy slightly gravelly silty clay with rare rootlets
	Units	Accreditation				
In House Determinations						
Redox (pE)	(mV)	u	203	206	207	222

L21/0576/IGS/001

Project Reference - 7 Hills Windfarm Energia

Analytical Test Results - Aggregate Testing

NC Reference	143580	143582
Client Sample Reference	A21/0730	A21/0716
Material	Soil	Soil
Source/Client Ref	TP02	TP01
	Substation	T8
Sample Description	Dark brownish grey slightly clayey sandy crushed rock	Dark brown slightly silty very gravelly sandy clay
	Units	Accreditation
In House Determinations		
Redox (pE)	(mV)	u
	209	217

L21/0576/IGS/001

Project Reference - 7 Hills Windfarm Energia

Analysis Methodologies and Notes

Determinant	Test method and notes
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Redox	Testing was in accordance with In-house method statement - MS - CL - Redox Reading measured with Silver/Silver Chloride Reference Probe with no correction applied
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Appendix 9

Chemical Testing – Water

Chemtest Report

Standard Report_21-05411-20210223 160908
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Final Report

Report No.: 21-05411-1
Initial Date of Issue: 23-Feb-2021
Client IGSL
Client Address: M7 Business Park
Naas
County Kildare
Ireland
Contact(s): Darren Keogh
Project 23000 7 Hills Wind Farm (MWP)
Quotation No.: **Date Received:** 22-Feb-2021
Order No.: **Date Instructed:** 22-Feb-2021
No. of Samples: 3
Turnaround (Wkdays): 7 **Results Due:** 02-Mar-2021
Date Approved: 23-Feb-2021

Approved By:

Details: Glynn Harvey, Technical Manager

Results - Water

Project: 23000 7 Hills Wind Farm (MWP)

Client: IGSL	Chemtest Job No.:				21-05411	21-05411	21-05411
Quotation No.:	Chemtest Sample ID.:				1146278	1146279	1146280
Order No.:	Client Sample Ref.:				AA144627	AA144629	AA144631
	Sample Location:				Tower 18	Tower 19	Tower 4
	Sample Type:				WATER	WATER	WATER
	Top Depth (m):				5.70	9.75	7.20
Determinand	Accred.	SOP	Units	LOD			
pH	U	1010		N/A	[A] 7.4	[A] 7.4	[A] 7.4
Alkalinity (Carbonate)	U	1220	mg CaCO ₃ /l	10	[A] < 10	[A] < 10	[A] < 10
Chloride	U	1220	mg/l	1.0	[A] 46	[A] 50	[A] 78
Sulphate	U	1220	mg/l	1.0	[A] 110	[A] 440	[A] 300

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1146278	AA144627		Tower 18		A	Coloured Winchester 1000ml
1146279	AA144629		Tower 19		A	Plastic Bottle 1000ml
1146280	AA144631		Tower 4		A	Coloured Winchester 1000ml

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt


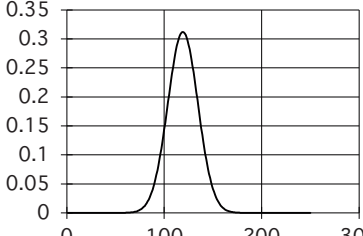
All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix 10

Geotechnical Laboratory Test Records – Rock

(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA										
Contract: Seven Hills Windfarm Contract no. 23000 Date of test: 22/3/21			Sample Type: Core							
RC No.	Depth m	D (Diameter) mm	P (failure load) kN	F	Is (index strength) Mpa	Is(50) (index strength) Mpa	*UCS MPa	Type		
T04 - RC01	9.7	78	28.0	1.222	4.60	5.62	112	d	//	
	12.2	78	31.0	1.222	5.10	6.22	124	d	//	
T05 - RC01	1.9	78	22.0	1.222	3.62	4.42	88	d	//	
	4.9	78	30.0	1.222	4.93	6.02	120	d	//	
T11 - RC03	9.3	78	34.0	1.222	5.59	6.83	137	d	//	
	15.4	78	28.0	1.222	4.60	5.62	112	d	//	
T11 - RC04	3.3	78	32.0	1.222	5.26	6.42	128	d	//	
	5.3	78	34.0	1.222	5.59	6.83	137	d	//	
T15 - RC02	3.8	78	29.0	1.222	4.77	5.82	116	d	//	
	8.8	78	24.0	1.222	3.94	4.82	96	d	//	
T18 - RC02	7.5	78	30.0	1.222	4.93	6.02	120	d	//	
	9.5	78	34.0	1.222	5.59	6.83	137	d	//	
Statistical Summary Data			Is(50)	UCS*	*UCS Normal Distribution Curve			Abbreviations		
Number of Samples Tested			12	12		i		irregular		
Minimum			4.42	88		a		axial		
Average			5.96	119		b		block		
Maximum			6.83	137		d		diametral		
Standard Dev.			0.77	15		approx. orientation to planes of weakness/bedding				
Upper 95% Confidence Limit			7.46	149.21						
Lower 95% Confidence Limit			4.45	89.05						
Comments:			*UCS taken as k x Point Load Is(50):		k=	20	U	unknown		
							//	perpendicular		
								parallel		

Uniaxial Compression Test Report Sheet

I.G.S.L.

Sample Identification

Contract Name: Seven Hills Windfarm
 Job Number: 23000
 Hole No: T04 - RC01
 Depth (m): 9.80m

Sample Description

Colour: Light blueish grey
 Grain size: Fine-grained
 Weathering Grade: Fresh
 Rock Type: LIMESTONE

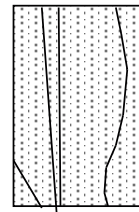
Weathering Grade Criteria

I. Fresh: Unchanged from original state
 II. Slightly weathered: Slight discolouration, slight weakening
 III. Moderately weathered: Considerable weakening, penetrative discolouration
 IV. Highly weathered: Considerable weakening, penetrative discolouration, breaks in hand

Sample Measurements

Length: 202 mm
 Diameter (Ø): 78.1 mm

Sketch of Failure Surfaces



Testing

Load Rate: 4.3 kN/min
 Load at Failure (P): 498 kN

Strength Calculations

Uniaxial Compressive Strength = $\frac{498000}{4788.19385}$
 = $\frac{1000 \times P}{\pi \times (\phi/2)^2}$
 = 103.95 (Mpa)
 Bulk Density = 2.68 (Mg/m³)

Notes:

Uniaxial Compression Test Report Sheet

I.G.S.L.

Sample Identification

Contract Name: Seven Hills Windfarm
 Job Number: 23000
 Hole No: T05 - RC01
 Depth (m): 3.90m

Sample Description

Colour: Light blueish grey
 Grain size: Fine-grained
 Weathering Grade: Fresh
 Rock Type: LIMESTONE

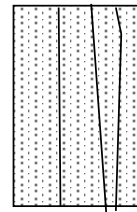
Weathering Grade Criteria

I. Fresh: Unchanged from original state
 II. Slightly weathered: Slight discolouration, slight weakening
 III. Moderately weathered: Considerable weakening, penetrative discolouration
 IV. Highly weathered: Considerable weakening, penetrative discolouration, breaks in hand

Sample Measurements

Length: 204 mm
 Diameter (Ø): 78 mm

Sketch of Failure Surfaces



Testing

Load Rate: 4.3 kN/min
 Load at Failure (P): 465 kN

Strength Calculations

Uniaxial Compressive Strength = $\frac{465000}{4775.94}$
 = $\frac{1000 \times P}{\pi \times (\phi/2)^2}$
 = 97.31 (Mpa)
 Bulk Density = 2.68 (Mg/m³)

Notes:

Uniaxial Compression Test Report Sheet

I.G.S.L.

Sample Identification

Contract Name: Seven Hills Windfarm
 Job Number: 23000
 Hole No: T11 - RC03
 Depth (m): 16.70m

Sample Description

Colour: Light blueish grey
 Grain size: Fine-grained
 Weathering Grade: Fresh
 Rock Type: LIMESTONE

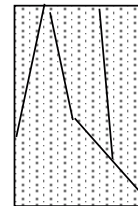
Weathering Grade Criteria

I. Fresh: Unchanged from original state
 II. Slightly weathered: Slight discolouration, slight weakening
 III. Moderately weathered: Considerable weakening, penetrative discolouration
 IV. Highly weathered: Considerable weakening, penetrative discolouration, breaks in hand

Sample Measurements

Length: 211 mm
 Diameter (Ø): 78.1 mm

Sketch of Failure Surfaces



Testing

Load Rate: 4.3 kN/min
 Load at Failure (P): 532 kN

Strength Calculations

Uniaxial Compressive Strength = $\frac{532000}{4788.19385}$
 = $\frac{1000 \times P}{\pi \times (\phi/2)^2}$
 = 111.05 (Mpa)
 Bulk Density = 2.69 (Mg/m³)

Notes:

Uniaxial Compression Test Report Sheet

I.G.S.L.

Sample Identification

Contract Name: Seven Hills Windfarm
 Job Number: 23000
 Hole No: T11 - RC04
 Depth (m): 2.30m

Sample Description

Colour: Light blueish grey
 Grain size: Fine-grained
 Weathering Grade: Fresh
 Rock Type: LIMESTONE

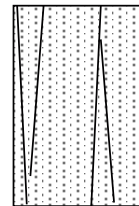
Weathering Grade Criteria

I. Fresh: Unchanged from original state
 II. Slightly weathered: Slight discolouration, slight weakening
 III. Moderately weathered: Considerable weakening, penetrative discolouration
 IV. Highly weathered: Considerable weakening, penetrative discolouration, breaks in hand

Sample Measurements

Length: 199 mm
 Diameter (Ø): 78 mm

Sketch of Failure Surfaces



Testing

Load Rate: 4.3 kN/min
 Load at Failure (P): 446 kN

Strength Calculations

Uniaxial Compressive Strength = $\frac{446000}{4775.94}$
 = $\frac{1000 \times P}{\pi \times (\phi/2)^2}$
 = 93.34 (Mpa)
 Bulk Density = 2.67 (Mg/m³)

Notes:

Uniaxial Compression Test Report Sheet

I.G.S.L.

Sample Identification

Contract Name: Seven Hills Windfarm
 Job Number: 23000
 Hole No: T15 - RC02
 Depth (m): 6.10m

Sample Description

Colour: Light blueish grey
 Grain size: Fine-grained
 Weathering Grade: Fresh
 Rock Type: LIMESTONE

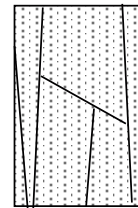
Weathering Grade Criteria

I. Fresh: Unchanged from original state
 II. Slightly weathered: Slight discolouration, slight weakening
 III. Moderately weathered: Considerable weakening, penetrative discolouration
 IV. Highly weathered: Considerable weakening, penetrative discolouration, breaks in hand

Sample Measurements

Length: 206 mm
 Diameter (Ø): 78.1 mm

Sketch of Failure Surfaces



Testing

Load Rate: 4.3 kN/min
 Load at Failure (P): 588 kN

Strength Calculations

Uniaxial Compressive Strength = $\frac{588000}{4788.19385}$
 = $\frac{1000 \times P}{\pi \times (\phi/2)^2}$
 = 122.74 (Mpa)
 Bulk Density = 2.68 (Mg/m³)

Notes:

Uniaxial Compression Test Report Sheet

I.G.S.L.

Sample Identification

Contract Name: Seven Hills Windfarm
 Job Number: 23000
 Hole No: T18 - RC02
 Depth (m): 4.70m

Sample Description

Colour: Light blueish grey
 Grain size: Fine-grained
 Weathering Grade: Fresh
 Rock Type: LIMESTONE

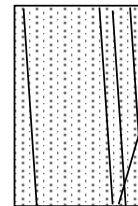
Weathering Grade Criteria

I. Fresh: Unchanged from original state
 II. Slightly weathered: Slight discolouration, slight weakening
 III. Moderately weathered: Considerable weakening, penetrative discolouration
 IV. Highly weathered: Considerable weakening, penetrative discolouration, breaks in hand

Sample Measurements

Length: 211 mm
 Diameter (Ø): 78.1 mm

Sketch of Failure Surfaces



Testing

Load Rate: 4.3 kN/min
 Load at Failure (P): 396 kN

Strength Calculations

Uniaxial Compressive Strength = $\frac{396000}{4788.19385}$
 = $\frac{1000 \times P}{\pi \times (\phi/2)^2}$
 = 82.66 (Mpa)
 Bulk Density = 2.67 (Mg/m³)

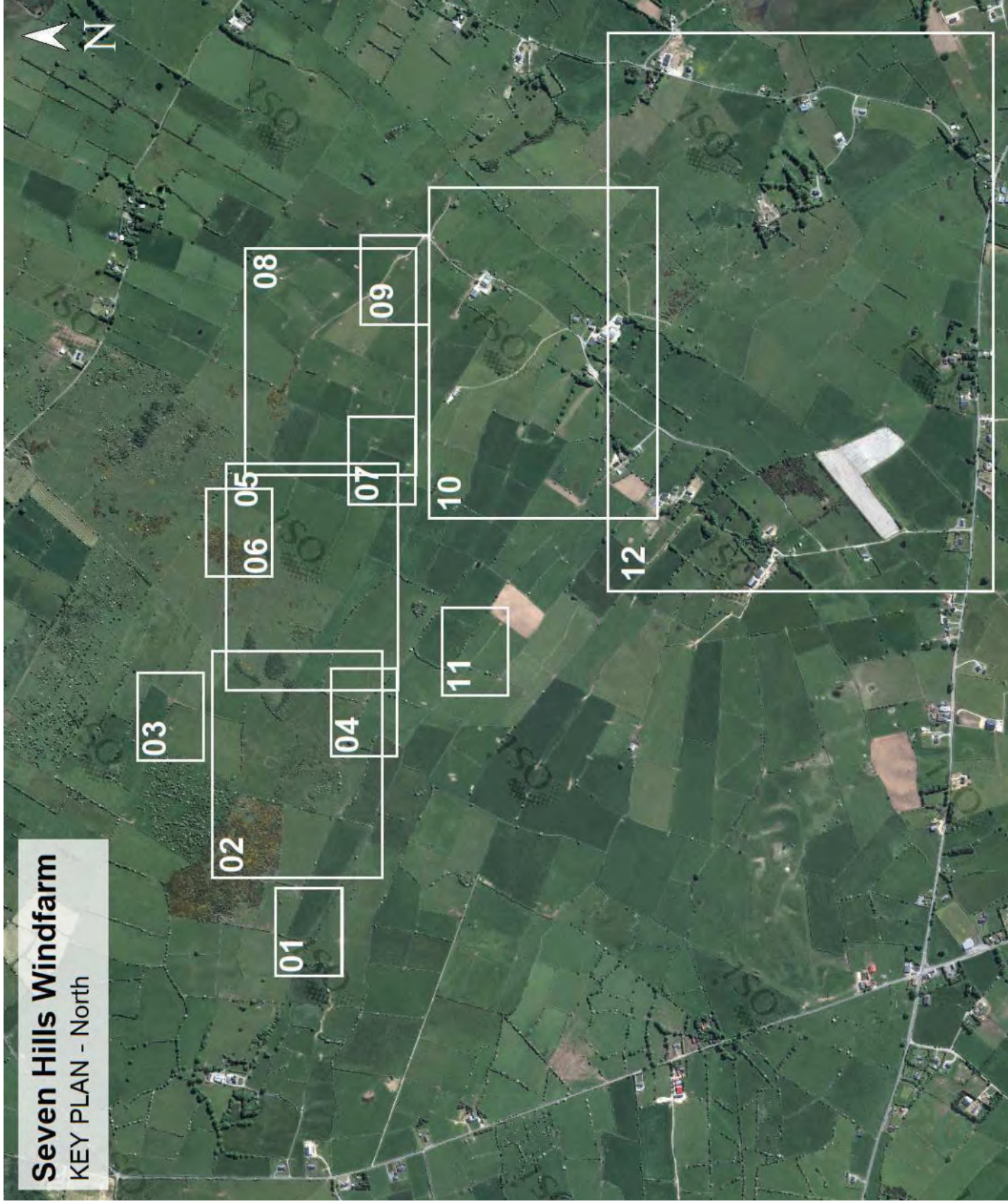
Notes:

Appendix 11

Exploratory Hole Location Plan

Seven Hills Windfarm




KEY PLAN - North



Seven Hills Windfarm

Exploratory Hole Location Plan - 01

Legend

-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit

Mast - RC01

MAST TP01

DP01

MAST TP02

DP02

T05 TP01

T05 - RC01

T05 TP02




T05 - RC02



Seven Hills Windfarm

Exploratory Hole Location Plan - 02

Legend




-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit



Seven Hills Windfarm

Exploratory Hole Location Plan - 03

Legend

-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit

T01 TP03

T01 TP04

T01 - RC02

T01 TP02

T01 - RC01

DP07




T01 TP01



Seven Hills Windfarm

Exploratory Hole Location Plan - 04

Legend

-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit

T06 TP02

T06 - RC01

T06 - RC02

DP08


T06 TP01





Seven Hills Windfarm

Exploratory Hole Location Plan - 05

Legend

 Dynamic Probehole

 Rotary Drillhole




 Trial Pit



Seven Hills Windfarm

Exploratory Hole Location Plan - 06

Legend

-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit

T02 - RC02

T02 TP01

T02 - RC01

DP13


T02 TP02





Seven Hills Windfarm

Exploratory Hole Location Plan - 07

Legend

 Dynamic Probehole

 Rotary Drillhole


 Trial Pit





Seven Hills Windfarm

Exploratory Hole Location Plan - 08

Legend

 Dynamic Probehole

 Rotary Drillhole




 Trial Pit



Seven Hills Windfarm

Exploratory Hole Location Plan - 09

Legend


-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit





Seven Hills Windfarm

Exploratory Hole Location Plan - 10

Legend

 Dynamic Probehole

 Rotary Drillhole




 Trial Pit



Seven Hills Windfarm

Exploratory Hole Location Plan - 11

Legend

-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit

T07 TP02

T07 TP01


T07 - RC02





Seven Hills Windfarm

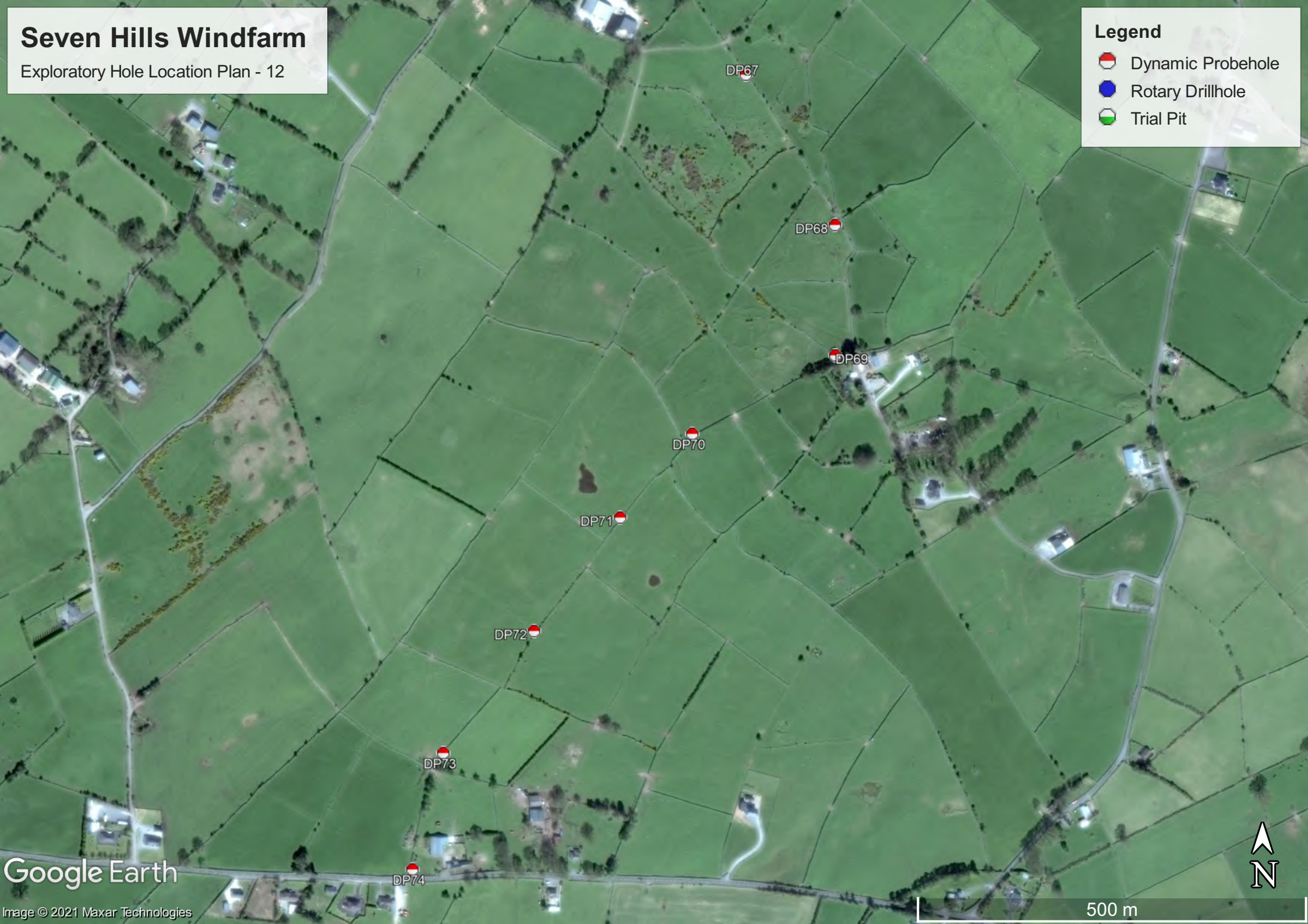
Exploratory Hole Location Plan - 12

Legend

 Dynamic Probehole

 Rotary Drillhole

 Trial Pit



Seven Hills Windfarm

KEY PLAN - Southwest

19

18

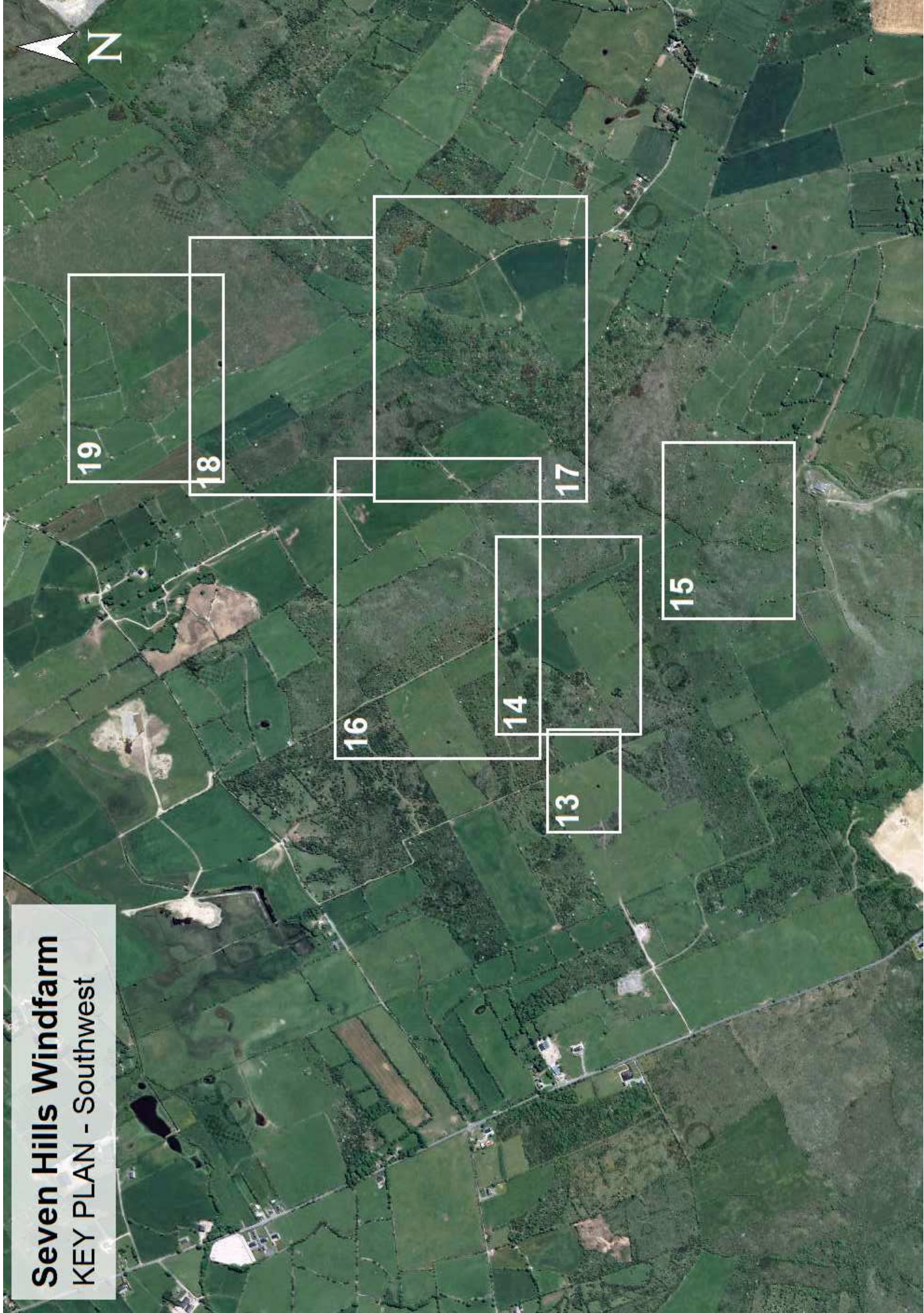
16

14

13

17




15



Seven Hills Windfarm

Exploratory Hole Location Plan - 13

Legend

-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit

T08 -RC01

T08 TP01

T08 -RC02

DP23


T08 TP02





Seven Hills Windfarm

Exploratory Hole Location Plan - 14

Legend

 Dynamic Probehole

 Rotary Drillhole




 Trial Pit



Seven Hills Windfarm

Exploratory Hole Location Plan - 15

Legend

-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit

DP26

T10 - RC02

T10 TP02

T10 - RC01


T10 TP01





Seven Hills Windfarm

Exploratory Hole Location Plan - 16

Legend

 Dynamic Probehole

 Rotary Drillhole


 Trial Pit





Seven Hills Windfarm

Exploratory Hole Location Plan - 17

Legend

 Dynamic Probehole

 Rotary Drillhole


 Trial Pit


The figure is an aerial photograph of a rural landscape, likely in Scotland, showing a mix of green agricultural fields and brownish-grey moorland. Four locations for Dynamic Probeholes are marked with red-and-white circular icons and labeled: DP33 is on the left side in a green field; DP34 is in the lower-middle section in a brownish area; DP35 is in the lower-right section in a brownish area; and DP36 is on the right side in a green field. The map includes a legend in the top right corner defining the symbols for Dynamic Probehole, Rotary Drillhole, and Trial Pit. A north arrow is located in the bottom right corner, and a scale bar indicating 200 meters is positioned at the very bottom right. The text 'Google Earth' and 'Image © 2021 Maxar Technologies' are visible in the bottom left corner.


Seven Hills Windfarm

Exploratory Hole Location Plan - 18

Legend

 Dynamic Probehole

 Rotary Drillhole

 Trial Pit



T14 TP02

DP38

T14 - RC02

T14 TP01




T14 - RC01



Seven Hills Windfarm

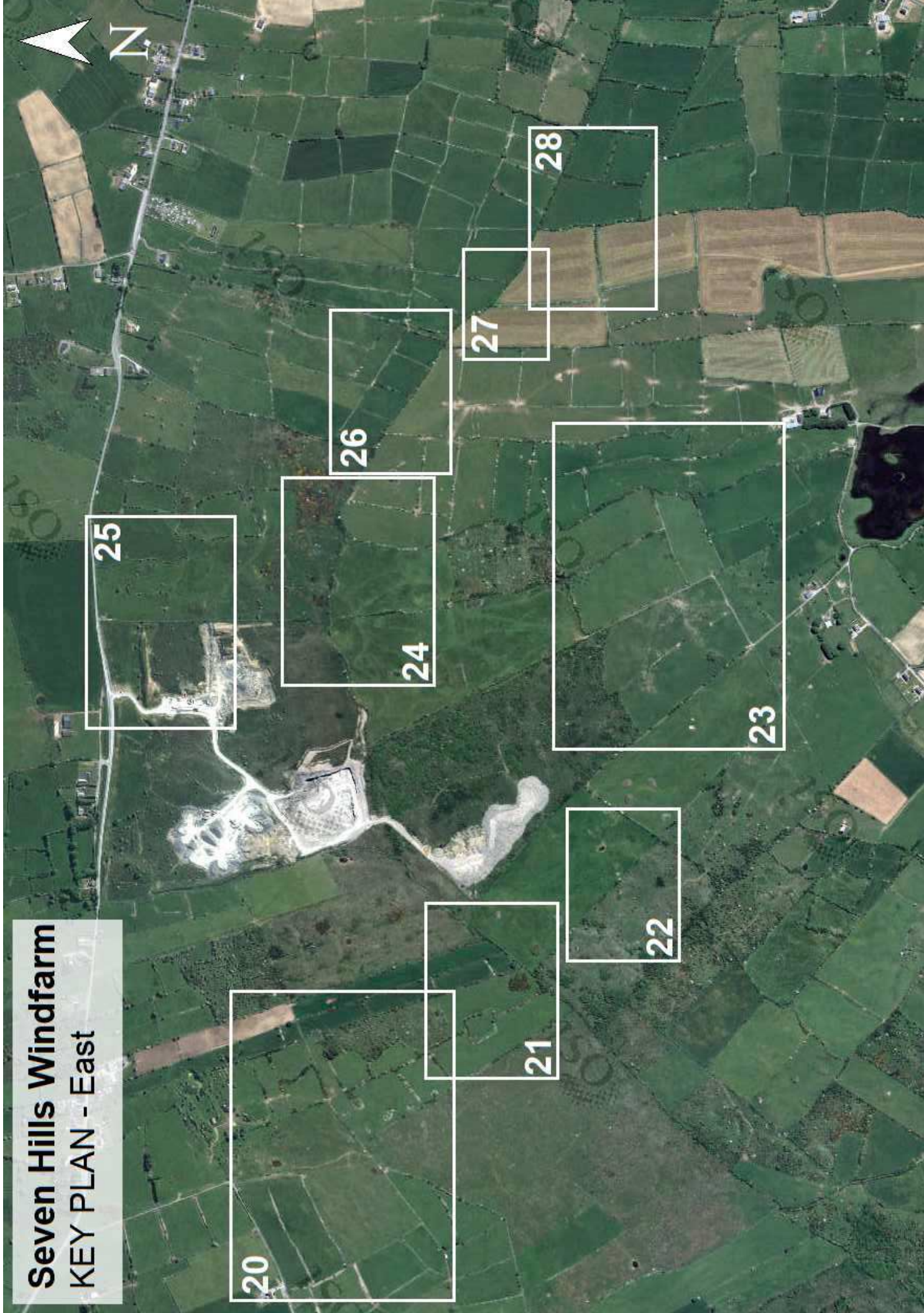
Exploratory Hole Location Plan - 19

Legend

-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit






Seven Hills Windfarm
KEY PLAN - East



Seven Hills Windfarm

Exploratory Hole Location Plan - 20

Legend


-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit





Seven Hills Windfarm

Exploratory Hole Location Plan - 21

Legend

 Dynamic Probehole

 Rotary Drillhole

 Trial Pit

Google Earth




Image © 2021 Maxar Technologies


100 m

Seven Hills Windfarm


Exploratory Hole Location Plan - 22

Legend


-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit

T17 TP01 

DP50 

T17 - RC01 

T17 TP02 

T17 - RC02 

DP51 





100 m


Seven Hills Windfarm

Exploratory Hole Location Plan - 23

Legend

 Dynamic Probehole

 Rotary Drillhole


 Trial Pit





Seven Hills Windfarm

Exploratory Hole Location Plan - 24

Legend

 Dynamic Probehole

 Rotary Drillhole




 Trial Pit



Seven Hills Windfarm

Exploratory Hole Location Plan - 25

Legend

-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit

DP58

DP57






100 m

Seven Hills Windfarm

Exploratory Hole Location Plan - 26

Legend

-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit

DP60

Substation TP01

Substation TP02




DP61



Seven Hills Windfarm

Exploratory Hole Location Plan - 27

Legend

-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit

T20 - RC01

T20 TP01

T20 - RC02

DP62




T20 TP02



Seven Hills Windfarm

Exploratory Hole Location Plan - 28

Legend

-  Dynamic Probehole
-  Rotary Drillhole
-  Trial Pit

DP63

T21 TP01

DP64

T21 - RC01

T21 TP02

T21 - RC02

