

Planning Ref.: 08.PA0044

Grousemount Wind Farm County Kerry

Additional Information

March 2016

Part 3 of 3

ESB International, Stephen Court, 18/21 St Stephen's Green, Dublin 2, Ireland.
Phone +353 (0)1 703 8000
www.esbi.ie

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Grousemount Wind Farm –Additional Information

Planning Ref.: 08.PA0044 Grousemount Wind Farm, County Kerry Additional Information

Part 3 of 3

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INTERNATIONAL

PEAT STABILITY RISK ASSESSMENT Appendices B & D

Grousemount Wind Farm

W78035-F105-018-R-0001 August 2015

ESB Wind Development Ltd.

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APPENDIX B

Barnastooka Wind Farm Site Investigation Report

IGSL Ltd

Barnastooka Wind Farm Site Investigation

Geotechnical Site Investigation Report (Factual) for Proposed Windfarm Development in Barnastooka, Co. Kerry

Project No. 18312

July 2015



M7 Business Park Naas Co. Kildare Ireland

T: +353 (45) 846176 E: info@igsl.ie W: www.igsl.ie

Distribution	Copies	Rev.	Date of Issue	Prepared By:	Approved By:
ESB International	Draft – by email (PDF)	А	15-07- 2015	Ciaran Killaly Chartered Geotechnical Engineer BE CEng MIEI	John Lawler BSc MSc P.Geo. EurGeol FGS

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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 (**Barnastooka Wind Farm**) have been carried out by IGSL 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 5930:1999 +A2:2010 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 14688-1:2002 Geotechnical Investigation and Testing Identification and Classification of Soil, Part 1: Identification and Description
- EN ISO 14688-2:2004 Geotechnical Investigation and Testing Identification and Classification of Soil, Part 2: Classification Principles
- EN ISO 14689-1:2004 Geotechnical Investigation and Testing Identification & Classification of Rock, Part 1: Identification & Description

Reporting

This report has been prepared for ESB International and the information should not be used without prior written permission of either party. IGSL Ltd accepts no responsibility or liability for this document being used other than for the purposes for which it was intended. 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.

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 variations 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.

Rotary Drilling Procedures

Rotary drilling methods are used to recover very heavily over-consolidated glacial till and bedrock samples in line with Section 3.5 of IS EN 1997-2:2007 and IS EN ISO 22475-1. Open hole drilling methods (odex or symmetrix) are utilized to advance the drillholes through granular dominant superficial deposits, with coring in hard ('cemented') fine grained or cohesive glacial deposits and bedrock. In this particular project, the key objective of the rotary coring operations was to advance and sample the high strength glacial till and underlying granite bedrock.

In-Situ Testing

Standard penetration tests are conducted by IGSL 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) 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).

Groundwater

The depth of entry of any influx of groundwater is recorded during the course of boring or drilling 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.

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.

Where appropriate Class 1 thin wall undisturbed tube samples (UT100) are 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.

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

Table A	– Details	of Sample	Ouality	Requirem	ents
Labiell	Details	or Sumple	Zuuniy	requirem	

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.

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 hittils 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 company policy to discard soil samples one month after submission of our final report.

1. INTRODUCTION

At the instruction of ESB International, IGSL has undertaken a programme of geotechnical site investigation works for a proposed Wind Farm Development 4.5km east of the village of Kilgarvan, in southeast Kerry. It is understood that the scheme will involve the construction of fourteen turbines and associated infrastructure. The proposed development is to be located in the townland of Barnastooka, Co. Kerry and occupies a site envelope of approximately 3.5km x 2.0km.



Figure 1 – Site Location Plan

The investigations comprised rotary coreholes, trial pitting and a geophysical survey. The investigations were executed in accordance with BS 5930, Code of Practice for Site Investigations (1999+A2:2010) and EN 1997-2 Eurocode 7 Part 2 Ground Investigation & Testing. Geotechnical laboratory testing was carried out on a range of bulk disturbed samples and rotary core samples as agreed with ESBI. Testing has been performed in accordance with BS 1377, 1990 & IRSM Rock Characterization Testing and Monitoring, respectively. This included particle size distributions, moisture contents, Atterberg Limits, pH and sulphate analysis. Point load strength index (PLSI) and unconfined compressive (UCS) tests were performed on the rock cores. To assess the re-use potential of the rock on the site, a suite of performance tests comprising Ten per cent fines, Slake durability and Magnesium Sulphate Soundness testing was undertaken on the rock also. The 'as-built' co-ordinates and ground levels are shown on the exploratory hole logs with a full list of the coordinates provided in Appendix 6. Exploratory hole drawings are to be included in future versions of this report.

This report presents the factual geotechnical data acquired from the 2015 investigation.

2. CONTRACT OUTLINE & OBJECTIVES

The contract was carried out in one phase and comprised rotary core drillholes and machine excavated trial pits.

The primary objectives of the works were as follows:

- Determine the composition, consistency and strength / stiffness of the superficial soils
- Establish the rockhead elevation, weathering profile, discontinuity characteristics and strength of the bedrock
- Recover samples for geotechnical laboratory testing in accordance with the requirements of the Employer's Representative

This factual report presents all fieldwork records and the results of laboratory testing.

Banastooka T36 T37 T36 T36 T37 T36 T37 T36 T37 T37 T30 T31 T32 T31 T32 T31 T31 T31 T31 T31 T31 <thT31</th> T32 <thT31</th> <thT31

Figure 2 – Turbine Locations (Adapted from Google Earth 2014)

3.3 Trial Pitting

The trial pits were undertaken using a 13 tonne tracked hydraulic excavator. The pits were logged and sampled by an IGSL geotechnical engineer. Representative disturbed bulk samples were taken as the pits were excavated, these were placed in heavy-duty polyethylene bags and tubs and returned to the site laboratory for examination and laboratory testing.

The trial pits were backfilled with the as-dug arisings and reinstated to the satisfaction of the Employer's Representative. The trial pit logs are presented in Appendix 2 and include engineering descriptions of the soils encountered, samples recovered, groundwater strikes and stability of the pit sidewalls.

3.4 Geophysical Surveying

APEX Geoservices carried out the geophysical survey at the site. The key aim of the survey was to map rockhead and to identify any anomalous ground conditions. A combination of techniques was utilised. It included 2D Electrical Resistivity Tomography [ERT], Seismic Refraction Profiling and Multichannel Analysis of Surface Waves [MASW]. The findings of the geophysical survey are incorporated in Appendix 3.

3.5 Surveying of Exploratory Locations

Following completion of the exploratory boreholes and trial pits, surveying was carried out using Realtime Kinetic GPS techniques. Co-ordinates (x, y) were measured to national grid and ground level (z) established relative to OD Malin Head. The co-ordinates and ground levels are shown on the exploratory hole logs. The 'as-constructed' locations are listed in Appendix 6. The exploratory hole plan is to be included in future versions of this report.

4. LABORATORY ANALYSIS

Laboratory analysis was performed on a selection of soil and core samples to validate consistency and establish strength and chemical characteristics. The laboratory test results are presented in Appendices 4 (soil) and 5 (rock).

The geotechnical testing was carried out in accordance with BS1377; British Standard Methods of Test for Soils for Civil Engineering Purposes; British Standards Institute:1990 and ISRM unless otherwise stated. The following suites of tests were undertaken for this project:

Moisture Content

The moisture contents of representative disturbed samples (sealed bags, tubs) were carried out in accordance with BS1377 Part 2:1990.

Atterberg Limits

The liquid limits were determined using the cone method as described in BS 1377 Pt.2:1990. In the majority of cases, the specimens for liquid and plastic limit determination were obtained at their natural state by removal of particles greater than 425 μ m. This is the definitive method, as stated in BS1377: Part 2: 1990, Clause 4. Where this was considered impractical, specimens were air-dried and sieved, as recommended in BS 1377.

While BS 1377 suggests that the results should include the percentage of material passing the 425 micron sieve, this information can be misleading in the case of coarse soils such as the glacial till encountered on this site. In the laboratory the percentage can only be related to the sample presented for testing while the actual soil stratum may contain coarse gravel and cobbles which would not necessarily be contained in the sample. Inclusion of coarse soil in a small sample would also distort the proportions.

Particle Size Distributions

Particle size distribution tests were carried out to BS1377: Part 2: 1990, method 9.2 (Wet sieving). Hydrometer tests to BS1377: Part 2: 1990, Method 9.5 were conducted on some samples to establish the percentage of silt and clay present.

To obtain particle size distributions, wet sieving methods were used, as specified. Large cobble and boulder size material was excluded from all tests while, in some instances the maximum particle size was further limited to take into account the mass of the sample. BS 1377 suggests that, for specimens with less than 10% retained on the 20mm sieve a sample mass of 2.5 kg should be used. This compares with a sample mass of 17 kg for specimens with less than 10% retained on the 37.5mm sieve. This is of particular importance for borehole samples in coarse soils.

Sulphate, pH & Chloride

Determination of pH values, sulphate content and Chloride content of soil were conducted by a nominated accredited environmental laboratory (Jones Environmental Laboratory) and results are presented in Appendix 4.

Aggregate Testing on Rock Core Samples

Materials testing was carried out on samples of rock core in order to assess the reusability potential of excavated bedrock. Tests performed included:

- Ten per cent fines (TPF) in accordance with BS812: Part 111:1990
- Slake Durability in accordance with ISRM Part 2 (1981)

The TPF tests were carried out on rock core samples which were broken down into pieces of between 10 and 14 mm diameter. The tests were then performed in order to provide a relative measure of the resistance of the resulting aggregate to crushing under a gradually applied compressive load.

Unconfined Compressive Strength (UCS) on Rock Core Samples

Unconfined compression tests were performed on intact lengths of rock, in accordance with ASTM standards. The specimens are prepared as right circular cylinders with a length to diameter ratio of 2.0 to 2.5 and the ends are saw cut and ground to eliminate irregularities. The load is applied through a hydraulic ram and the compressive strength is defined as the maximum load recorded immediately at the point of crushing (load at failure) divided by the cross-sectional area.

UCS tests were conducted in the IGSL materials laboratory.

Point Load Strength Index

The Point Load Index Test provides an assessment of strength cores or lump samples and unlike the Uniaxial Compression test (UCS) does not require careful preparation of intact lengths of core. The test specimen is compressed between two cones loaded from a hydraulic hand pump. The core fails due to the tensile forces over the diametral area between the points. The strength at failure is expressed as the point load index Is.

For purposes of comparison, the Is values are corrected to give the equivalent strength for a 50 mm diameter specimen. Recommended correction factors vary between 18 and 24 to estimate the Is_{50} value.

References

- 1. BS 5930 (1999) Code of Practice for Site Investigation, British Standards Institution (BSI).
- 2. BS 1377 (1990) Methods of Testing of Soils for Civil Engineering Purposes, BSI.
- **3.** Brown E.T., (1984) Rock Characterization Testing and Monitoring, ISRM Suggested Methods.
- **4.** Site Investigation Practice: Assessing BS 5930 (1986), Geological Society Special Publication, No. 2.

Appendix 1

Rotary Core Drillhole Records & Photographs



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		/																
cc	NTR/	ACT	B	arna	stooka Wi	indfarm							DRI	LHOLE ET	E NO	RC2 Shee	27A et 1 of 1	1
CC GF	ORE	dina Id Le	TES	(mO	507,614 572,000 D)	4.00 E 0.92 N 344.85			RIG TYPE			Casagrar Air/Mist	ide DAT	e drill E logg	_ED SED	15/0 18/0	6/2015 6/2015	5
CL EN	IENT GINE	ER	E	SBi SBi					INCLINATI	ON (deg) METER (m	m)	-90 88	DRI LOG	LLED B	Y Y	IG D.	SL O'Shea	а
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m)	ture cing 0g m) 0 500	Non-intact Zone	Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0	2.00	10	0	0	_				CORING: CORING: GRAVEL.	Poor recove	ery returns o ery, returns o	layey	1.00	343.85		N = 14 (1, 3, 3, 3, 4, 4)		
- 3	2.90	33 100	11 53	0					Medium st purple, fine	trong to stro	enish	2.75	342.10		(3, 5, 5, 6, 5, 5)			
- - - - - 4	4.10	100	51	0					Discontinu rough, pla moderately stained to	ities are me nar and uno y open, loca	to de							
-	4.85	100	96	19	F		<u> </u>		sub-vertica	al.	ennig. Dipo		la locally					
5	5.15	100	27 81	0														
- 6	5.85	100	98	81		5	20											
- - 7	6.85 7.30	100	33	0		4												
- 8	8.30	100	100	94		6	50								8.30	336.55		
/15 6 6									End	ot Borehole								
	MAR	KS								10/04-1-	Casin	Cocle-1	Dier	T:/	WA	TER ST	RIKE	DETAILS
8312.GPJ IGSL.GDT	le cas	sed C).00-8	.30m	1.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	lo wate	s r strike	recorded
	2741									Data	Hole	Casing	Depth t	0 000	GRO		VAIE	DETAILS
	Date		Tip De	epth	RZ Top	RZ Base	!	Ту	De	Date	Depth	Depth	Water			5		
							1			1		1	1					



REPORT NUMBER

со	NTR/	ACT	B	arnas	stooka W	indfarm							DRI	LLHOLE	NO	RC	27B					
со	-ORD	DINA [.]	TES		507,59 572,00	5.97 E 6.96 N			RIG TYPE			Casadrand	DA1	ET EDRILL	.ED	Shee 18/0	et 1 of 6/2015	1				
			E	(mOl SBi SBi	D)	346.3	2			ON (deg)		Air/Mist -90	DRI	LLED B	Y	IG	iSL	·				
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lo (m	cture cing og m)	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)				
0	1.70	24	0	0					CORING: CORING: sandy GR/	Poor recove Poor recove AVEL.	layey	0.20	346.12		N = 37 (5, 7, 9, 8, 9, 11)							
2	2.90	100	30	0				0	Medium st purple bec SANDSTC Fresh to sl	344.32												
3	3.70	100	79	0					Discontinuities are medium to closely spaced, smooth to rough, planar and locally stepped. Apertures are tight to moderately open, locally clay-smeared ,slightly iron-oxide stained, local quartz-veining. Dips are sub-horizontal and locally sub-vertical.													
4	4.50	100	83	33	F				stained, local quartz-veining. Dips are sub-horizontal and locally sub-vertical.													
5	5.50	100	65	32																		
6	6.15	100	97	54																		
7		100	98	68			720															
-9	7.65							The second se														
RE Hol	MAR e cas	KS sed 0	.00-7	.65m			·	·		Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	WA Co	TER ST	TRIKE	DETAILS				
															N	lo wate	r strike	recorded				
INC	TA11									Data	Hole	Casing	Depth	0 000	GR		VATE	COETAILS				
	Date		Tip De	epth	RZ Top	RZ Bas	e	Тур	be		Depth_	Depth	Water									



REPORT NUMBER

		/																			
СС	DNTR	ACT	В	arna	stooka Wi	indfarm							DR SH	ILLHO EET	LE NO	RC: Shee	28A et 1 of	1			
GF)-ORI	dina Id Le	TES EVEL	(mO	507,363 571,710 D)	3.96 E 0.00 N 340.73						Casagrar	nde DA	TE DRI	ILLED GGED	06/0 06/0	5/2015 5/2015	5			
CL EN	IENT GINE	ER	E	SBi SBi	,				INCLINATI	ON (deg) METER (m	m)	-90 88	DR LO	GGED	BY BY	IG D.	SL O'She	a			
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	ture cing bg m) ⁰ 500	Non-intact Zone	Legend			Descriptio	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)			
- 0									CORING:	Poor recove	ery returns of		0.35	340.38							
	2 00	40	0	0					CORING: GRAVEL.	Poor recove				N = 50/15 mm (10, 50)							
2	2.40	50	0	0											N = 45 (7, 9, 9, 11, 13, 12)						
Ē	2.90	100	0	0										007 70		13, 12)					
- 3	3 40	100	80	80					Medium st	trong to stro	ng, medium	ark	3.00	337.73		N = 46/225 mm (3, 4, 4, 7, 14)					
- 4	4.20	100	96	53	F				Discontinu rough, pla	ities are me				21)							
5	5.60	100	94	55	Ļ				Discontinuities are medium to closely spaced, smooth to rough, planar and undulating. Apertures are tight to moderately open, locally clay-smeared,slightly iron-oxide stained. Dips are 30° and locally sub-vertical.												
- - - - - - - - - - - - - - - - - - -	7.10	100	97	61	ľ		Kinal														
	8.30	100	83	51			<u> </u>		End o	of Borehole	at 8.30 m				8.30	332.43					
9																					
	MAR	KS		20		I				Water	Casing	Sealed	Rico	Tir	WA'	TER S	RIKE	DETAILS			
HO	le cas	sea (J.UU-8	.30m	1.					Strike	Depth	<u>At</u>	To	(m	in) Co	mment lo wate	r strike	recorded			
	.									Deta	Hole	Casino	Denth	to	GR		VATER	R DETAILS			
	Date		Tip D	epth	RZ Top	RZ Base	!	Тур	De	Date .	Depth	Depth	Wate		omments	5					
2											1										



REPORT NUMBER

1	_	7																	
COI	NTR/	АСТ	B	arna	stooka Wi	indfarm							DF SF	RILLH HEET	IOLE I	NO	RC2 Shee	28B et 1 of	1
CO- GR(ORE	DINA [.]	TES	(mO	507,363 571,733 D)	3.97 E 3.00 N 345.12	2		RIG TYPE			Casagrai Air/Mist	nde DA	ATE D	ORILLE	D D	07/0 07/0	5/2015 5/2015	
CLII ENG	ent Sinei	ER	E:	SBi SBi					INCLINATI	ON (deg) METER (m	m)	-90 88	DF	RILLE	D BY		IG D.	iSL O'Shei	а
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	ture cing og m) 0 500	Non-intact Zone	Legend			Descripti	on				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0		55	0	0					CORING: Returns of CORING: GRAVEL.	Poor recover stiff, brown Poor recover	ery returns c n sandy sligh ery, returns o	f PEAT. Itly gravell of purple a	y CLAY/S and green	SILT claye	әу	0.50 0.80	344.62 344.32		N = 22 (3, 3, 4, 5, 7, 6)
2	2.00	54	15	0	-											<u>3.10</u>	342.02		N = 22 (2, 3, 5, 4, 6, 7) N = 49/75 mm
4	4.30	100	58	13	F				Medium st fine-graine SILTSTON Discontinu rough, plan moderately	rong to stro d SANDST NE. Fresh to ities are me nar and uno	ong, medium ONE with in o slightly wea edium to clos dulating. Ape ally clay-sme	to thinly b terbedded athered. sely space ertures are ared sligh	edded, p I subordir ed, smoot tight to	urple hate h to xide	,				(6, 8, 22, 27)
5	5.55	100	67	34	Ŀ				stained. D	ips are 45°.		aroa, origi		, iiiii					
6	7.00	100	100	77	Ē														
8	8 50	100	100	89												8 50	336 62		
9					-		<u> </u>		End	of Borehole	at 8.50 m								
		KS red 0	00-2	50~	י 			1	1	Water	Casing	Sealed	Rise	-	Time	WA	TER ST	RIKE	DETAILS
	- 08	ieu U	.00-0							Strike	Depth	At	To	(<u>(min)</u>	Co N	mment o wate	s r strike	recorded
																GRO	DUNDV	VATE	R DETAILS
NS	TALI	ATI	ON D	ETA	ILS					Date	Hole Depth	Casing Depth	Depti Wat	n to er	Comr	ments	3		
1	Date		Tip De	epth	RZ Top	RZ Base	;	Ту	De										
						1					1								



REPORT NUMBER

ONTR	АСТ	B	arnas	stooka Windfarm							DRILI SHEE	_HOLE	NO	RC2 Shee	29A et 1 of	1
:O-ORI	DINA ID LE	tes Vel	(m0[507,005.94 E 571,776.98 N D 351.50	0		RIG TYPE			Casagrano	de DATE	DRILL LOGG	ED ED	01/08 01/08	5/2015 5/2015	; ;
	ER	E	SBi SBi				INCLINATIO	ON (deg) METER (m	m)	-90 88	DRILI LOGO	LED BY	/ /	IG A.	SL Chrys	t
Downhole Depth (m) Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 ²⁵⁰ 500	Non-intact Zone	Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
2.00	15	0	0				CORING: I CORING: I angular GF	Poor recove Poor recove RAVEL and	ery returns o ery, returns o cobbles	f PEAT. of purple sli	ghtly clayey	/	0.25	351.25		N = 22 (4, 4, 5, 4, 6 7)
2 3.00	20	0	0				CORING: I	Poor recove	ery, returns o	of purple cla	ayey GRAV	EL.				N = 31 (2, 5, 7, 8, 7 9) N = 34
<u>3.80</u>	38	0	0				CORING: I	Returns of I	brown sandy	/ gravelly C	LAY.		3.80	347.70		(4, 7, 7, 8, 1 9) N = 39 (3, 6, 8, 10 11, 10)
5.00	100	23	0				CORING: I SANDSTO	Returns of NE/SILTS	purple weath	nered	rolo fina cr		4.50 5.00	347.00 346.50		
5.80	100	100	100				SANDSTO slightly wea	NE with int athered.	erbedded pu	urple SILTS	TONE. Fre	sh to				
6 6.70	100	96	58				rough, plar moderately	har and und open, loca	dulating. Ape	ared. Dips	ight to are sub-ver	tical.				
7.10	100	100 96	100 70													
8 8.45																
9	100	100	30				End c	of Borehole	at 9.70 m				9.70	341.80		
REMAR Iole cas	sed 0	.00-9	.70m					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)		TER ST	RIKE s	DETAILS
															Suike	
	1							Data	Hole	Casing	Depth to	Cor	GRU			DETAILS
Date	.LA11	Tip De	epth	RZ Top RZ Base	e	Тур	De	Dale	Depth	Depth	Water			3		



REPORT NUMBER

CONTR	RACI	<u> </u> Е	Barna	stooka Wi	indfarm							DR	LLHOLE	E NO	RC	29B	
O-OR	RDIN/	TES		507,005 571,799	5.97 E 9.03 N						Casacran	DA	EET FE DRILL	.ED	Shee 05/0	et 1 of 5/2015	1
	ND L T	EVEL	(m0	D)	354.41						Air/Mist	DA.		SED	05/0	5/2015	
	EER	E	SBi					CORE DIA	METER (mi	m)	-90 88	LO	GGED B	Y	A.	Chrys	t
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac Lc (mi	ture cing bg m) 0 500	Non-intact Zone	Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
)					K			CORING:	Poor recove	ery returns c	f PEAT.			0.40	354.01		
3.70	0	0	0					CORING: angular Gf	Poor recove	ery, returns (of purple s	lightly clay	/ey	3.70	350.71		N = 7 (1, 1, 1, 2, 2, 2) $N = 8$ (2, 2, 2, 1, 2, 3) (2, 3, 3, 4, 3, 3) (2, 3, 3, 4, 3, 3)
Ļ	100	0 100	43	E_			· · · · · · · · · · · · · · · · · · ·	Medium st fine-graine SILTSTON	rong, mediu d SANDST NE. Fresh to	IM to thinly I ONE with in Slightly wea	bedded, gr terbedded athered.	eenish, greenish					
4.88 5.50	5	82	60	F		(A		Discontinu rough, plai moderately and locally	ities are me nar and und y open, loca y vertical.	edium to clos lulating. Ape Ily clay-sme	sely spaced ertures are ared. Dips	d, smooth tight to are sub-v	to rertical				
6.20	100	93	0	E	-												
7.30	82	59	16	E													
	100	42	0	-										0.50	045.04		
)					E			End o	of Borehole	at 8.50 m				8.50	545.91		
REMA	RKS									2				WA	TER ST	RIKE	DETAILS
lole ca	ased	8-00.0	3.50m	1.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co N	mment o wate	s r strike	recorded
	11 ^7								Date	Hole	Casing	Depth	to Cor	GRO		VATE	RDETAILS
Dat	e	Tip D	epth	RZ Top	RZ Base		Ту	De		Depth	Depth	Wate	r 001		·		



REPORT NUMBER

		B	arna	stooka Wi	indfarm							DRIL SHEE	lhole Et	NO	RC: Shee	30A et 1 of :	2
GROUN		VEL	(mO	506,693 571,596 D)	5.90 E 6.99 N 346.76	;		RIG TYPE FLUSH			Casagran Air/Mist	de DATE	E DRILL	ED ED	20/0 21/0	4/2015 4/2015	5
CLIENT	ER	E	SBi SBi	1	1			INCLINATION CORE DIA	ON (deg) METER (m	m)	-90 88	DRIL LOG	LED BY GED BY	((IG D.	SL O'She	a
Downhole Depth (m) Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (mi	ture cing bg m) 500	Non-intact Zone	Legend			Descript	tion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0							<u>\\</u> 1, \\.	CORING:	Poor recov	ery returns o	of PEAT.						
1 2.00	30	0	0														N = 4 (1, 1, 1, 1, 1, 1)
3 3.50	13	0	0					CORING: GRAVEL.	Poor recov	ery, returns	of purple ar	nd green cla	ayey	2.40	344.36		N = 5 (1, 1, 1, 2, 7 1)
4 4.30	25	0	0	-				Returns of	stiff, browr	sandy sligi	htly gravelly	CLAY/SIL	T	4.30	342.46		N = 30 (4, 7, 7, 6, 7) 10) N = 40 (4, 5, 7, 11) N = 10 N =
5	27	0	0					Medium st	rong to stro	na medium	n to thinly be	edded purr	ble	5.40	341.36		N = 50/75
6 6.90	100	99	45	F				fine-graine SILTSTON Discontinu rough, plan moderately stained, loo	d SANDST IE. Fresh to har and uno y open, loca cally quartz	ONE with ir o slightly we duating to clo dulating. Ap- ally clay-sme -veined (1-5	athered. sely spaced ertures are eared, strong 50mm). Dips	l, smooth to gly iron-oxio s are 40° a	bio, bio de nd				mm (7, 8, 32, 1
7 8 8.40	100	85	25	Į				locally sub	-vertical.								
9 9.30	100	91	61			('n x /											
REMAR	KS				i	350								WA	TER S	 	DETAILS
Hole cas	sed 0	.00-1	0.65	m.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	mment lo wate	ts er strike	recorded
											Costar	Death		GRO	OUND	VATE	R DETAILS
NSTAL Date		ON D Tip De	ETA	IILS RZ Top	RZ Base	:	Тур	De	Date	Depth	Depth	Water	Con	nments	5		



REPORT NUMBER

		2																
C	ONTR	ACT	B	arna	stooka Wi	indfarm							DRIL	LHOLE	NO	RC: Shee	30A et 2 of 2	2
C(GI	D-ORI	DINA	tes Evel	<u>(m</u> O	506,699 571,596 D)	5.96 E 6.99 N <u>34</u> 6.76	6		RIG TYPE			Casagrar Air/Mist	ide DATI	E DRILL	ED	20/0 21/0	4/2015 4/2015	5 5
CI EN	IENT	ER	E:	SBi SBi					INCLINATI	ON (deg) METER (mr	n)	-90 88	DRIL LOG	LED B GED B	Y Y	IG D.	SL O'She	a
Downhole Denth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	ture cing 0g m) 500	Non-intact Zone	Legend			Descripti	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
									End o	of Borehole	at 10.65 m				10.65	336.11		
	MAR ble cas	sed 0	0.00-1	0.65	m.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co N	TER ST mment	TRIKE ts r strike	DETAILS
18312										l						ייםואו ור		
MI 10	STAI			ETA	ILS					Date	Hole	Casing	Depth to	D Con	nment			V DE LAILO
	Date		Tip De	epth	RZ Top	RZ Base	9	Ту	pe		Depth	Depth	vvater					
<u>0</u>																		



REPORT NUMBER

		/																
со	NTR	АСТ	В	arna	stooka Wi	ndfarm							DRIL	.LHOLE ET	NO	RC: Shee	30B et 1 of	2
CO GR		DINA [.] ID LE	TES	(mO	506,685 571,615 D)	5.99 E 5.03 N 348.70)					Casagran	de DATI	e drill E logg	ED ED	21/0 22/0	4/2015 4/2015	5
CL EN	IENT GINE	ER	E	SBi SBi					INCLINATION CORE DIA	ON (deg) METER (m	m)	-90 88	DRIL LOG	LED B	Y Y	IG D.	SL .O'She	а
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac Lc (mi	ture cing bg m) 	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0								<u> </u>	CORING:	Poor recove	ery returns o	of PEAT.			0.65	249.05		
- 1		25	0	0					CORING: GRAVEL.	Poor recove	ery, returns (of purple ar	nd green cl	ayey	0.05	546.05	1	N = 12 (1, 2, 3, 2, 3, 4)
2	3.00	35	0	0														N = 9 (8, 2, 2, 1, 3, 3) N = 17
4	4.00	60	0	0	-											(2, 2, 4, 4, 4, 5) N = 33 (4, 5, 6, 7, 9,		
5		16	0	0					No recove	ry, observe	d by driller a	s returns of	gravel		5.40	343.30		11) N = 28
6	5.90				-			000000000000000000000000000000000000000			5							(4, 6, 6, 8, 5, 9)
- 7	7.30	100	04	62				00	Medium st fine-graine SILTSTON	rong to stro d SANDST NE. Fresh to	ng, medium ONE with in slightly we	to thinly be iterbedded athered.	edded, purj subordinat	ole, e	7.30	341.40		
- 8	8.80		34	02			<u> </u>	399999999	Discontinu rough, plan moderately stained, lo locally sub	ities are me nar and und y open, loca cally quartz -vertical.	edium to clos dulating. Ape ally clay-sme -veined (1-5	sely spaced ertures are eared, stron 50mm). Dips	l, smooth t tight to gly iron-oxi s are 40° a	o de nd				
		100	89	72			(a)											
RE	MAR	ĸs							·						WA		TRIKE	DETAILS
Hol	le cas	sed 0	.00-1	2.901	m.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co N	lo wate	ts er strike	
INC	T	I A TI								Data	Hole	Casing	Depth to		GR		VAIE	VETAILS
	Date		Tip D	epth	RZ Top	RZ Base	9	Тур	De		Depth	Depth	Water			3		
!																		



REPORT NUMBER

ОМТ	RACI	В	Barna	stooka W	indfarm							DRII SHE	_LHOL ET	E NO	RC: Shee	30B et 2 of	2
D-OI	RDIN/	ATES	(mO	506,68 571,61 D)	5.99 E 5.03 N 348.70)		RIG TYPE FLUSH			Casagrar Air/Mist	nde DAT	e dril E logo	LED GED	21/0 22/0	4/2015 4/2015	5
LIEN NGIN	T IEER	E	SBi SBi					INCLINATIO	ON (deg) METER (m	m)	-90 88	DRII LOG	LED E	BY BY	IG D.	SL .O'She	а
Core Run Denth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	eture cing og m) 	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0 10. 1 11. 2	30 100 80) 98	57			(in) /		Medium st fine-graine SILTSTON Discontinu rough, plar moderately stained, lo locally sub	rong to stro d SANDST IE. Fresh to ities are me har and und y open, loca cally quartz -vertical. (co	ng, medium ONE with in o slightly we edium to cloo dulating. Ape slly clay-sme -veined (1-5 ontinued)	to thinly b terbedded athered. sely space ertures are eared, stror 60mm). Dip	edded, pur subordinat d, smooth t tight to ngly iron-ox s are 40° a	ple, e to ide and				
<u>12.</u> 3	100 90	0 100	56	F				End c	of Borehole	at 12.90 m				12.90	335.80		
5																	
6 7																	
8 9																	
EMA	RKS										0			WAT	FER ST	 	DETAILS
ole c	ased	0.00-1	2.90	m.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min	e) Co N	mment o wate	ts er strike	recorded
														GRO	יטאטכ		
STA			DETA	AILS					Date	Hole	Casing	Depth to	0 Co	mments	3		
Da	te	Tip D	epth	RZ Top	RZ Base	9	Ту	00		Depth	Deptn	vvaler					
									1		1	1					



REPORT NUMBER

cc	ONTR/	АСТ	B	arna	stooka Wi	indfarm							DRIL	LHOLE	NO	RC	31A	
СС)-ORI	DINA	TES		506,387	7.05 E							SHE	ET		Shee	et 1 of 2	2
GF	ROUN	ID LE	EVEL	(mO	571,276 D)	6.96 N 343.8	7		RIG TYPE			Casagran Air/Mist		LOGG	ED ED	13/0	4/2015 4/2015	
CL EN	IENT GINE	ER	E	SBi SBi	_				INCLINATI	ON (deg) METER (m	m)	-90 88	DRIL LOG	LED BY GED BY	(IG D.	SL O'Shea	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac Lc (mi	ture cing og m) 	Non-intact Zone	Legend			Descrip	tion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0								<u>\\</u> <u>\</u> \\\	CORING:	Poor recov	ery returns	of PEAT.						
- 1	1.55	39	0	0	_				CORING:	Returns of	boulder	of numbers	ightly clave	M	1.00 1.55	342.87 342.32		N = 18 (1, 2, 3, 4, 5, 6)
2		23	0	0					angular G	RAVEL and	l cobbles			у				N = 40 (6, 6, 9, 11, 12, 8)
- 3	<u>3.30</u> 4.20	100	6	0	-				Medium st fine-graine SILTSTON Discontinu	rong to stro d SANDST NE. Fresh to ities are mo	ong, mediun ONE with ir o slightly we	n to thinly be nterbedded eathered. osely spaced	edded, purp subordinati	ble, e	3.30	340.57		N = 50/0 mm (25, 5, 50)
- 5	5 70	100	55	24					rough, plai moderately stained, lo locally sub	nar and un y open, loca cally quartz -vertical.	dulating. Ap ally clay-smo -veined (1-2	ertures are eared, stron 25mm). Dip	tight to gly iron-oxi s are 30° a	de nd				
6	6.80	100	55	20														
- 7 - 7 	7.60	100	64	15														
- 8	9.10	100	91	45			X = 1 /											
GL///		100	70	32						1								
<u>2</u> RE Ho	le cas	sed ().00-1	2.00	m.					Water	Casing	Sealed	Rise	Time	Co	mment	I RIKE	DETAILS
12.6PJ 16SL(JUIKE	Берш	<u></u>	10		N	lo wate	r strike	recorded
	2741	1								Data	Hole	Casing	Depth to		GR		VATEF	RDETAILS
	Date		Tip D	epth	RZ Top	RZ Base	e	Тур	De		Depth	Depth	Water		ments	>		
20																		



REPORT NUMBER

/		2																
со	NTR	АСТ	В	arna	stooka W	indfarm								LHOLE ET	E NO	RC: Shee	31A et 2 of 2	2
CO GR		DINA D LE	TES EVEL	<u>(m</u> O	506,38 571,27 D)	7.05 E 6.96 N <u>343.8</u>	7		RIG TYPE			Casagrar Air/Mist	nde DATE	E DRILL	.ED GED	10/0 13/0	4/2015 4/2015	j j
CL EN	IENT GINE	ER	E	SBi SBi					INCLINATI	ON (deg) METER (mi	m)	-90 88	DRIL	LED B GED B	Y Y	IG D.	SL O'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lo (m	ture cing og m)	Non-intact Zone	Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10 11 12 12 13 13 13 14 15 16 17 17	10.40 <u>11.90</u>	100	89	77			700.0000		Medium st fine-graine SILTSTON Discontinu rough, pla moderately stained, lo locally sub End o	rong to stro d SANDST VE. Fresh to ities are me nar and und y open, loca cally quartz -vertical. (or of Borehole	ng, medium ONE with in o slightly weat dium to clos lulating. Ape lly clay-sme -veined (1-2 ontinued) at 11.90 m	to thinly b terbedded athered. sely space ared, stror 5mm). Dip	edded, purp subordinate d, smooth to ight to ngly iron-oxi is are 30° a	ole, e o de nd	11.90	331.97		
19 RE Hol	MAR e cas	KS sed 0).00-1	2.00	m.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	WA1 Co	r ER S T mment o wate	r RIKE ts	DETAILS
											11.1	0	_		GRO	DUND	NATE	R DETAILS
INS	TAL	LATI		DETA	AILS					Date	Hole Depth	Casing	Depth to Water	Cor	nments	6		
	Date		Tip D	epth	RZ Top	RZ Base	9	Тур	De		Doput							
					1						1	1	1					



REPORT NUMBER

CO	NTR	ACT	B	arna	stooka Wi	indfarm							SH	EET	= NO	Shee	31B et 1 of	1
GR		DINA	TES EVEL	(mO	506,380 571,276 D)	0.93 E 6.96 N 345.89	9		RIG TYPE FLUSH			Casagrar Air/Mist	nde DA	TE DRILI	LED GED	14/0 14/0	4/2015 4/2015	5
	ent Ginei	ER	E	SBi SBi	1				INCLINATI	ON (deg) METER (mi	n)	-90 88	DR LO	ILLED B GGED B	Y Y	IG D.	iSL O'Shea	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac Lc (mi	ture cing bg m) 500	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								<u> \// \</u> // \//	CORING:	Poor recove	ery returns o	of PEAT.			0.50	345.39		
1	2.00	30	0	0					CORING:	Poor recove	ery, returns (of purple c	layey GR	AVEL.				N = 27 (7, 8, 7, 6, 8, 6)
3	3.30	38	0	0	-							4- 41-2-1-1			3.30	342.59		N = 33 (7, 9, 7, 7, 8, 11)
4	4.10	100	89	16					Discontinu rough, plai	ities are me nar and unc	ong, medium ONE with in slightly wea dium to clos lulating. Ape	terbedded athered. sely space ertures are	d, smooth	ate to				
5	5.60	100	88	0					moderately stained, at sub-vertica	y open, loca bundant qua al.	Illy clay-sme artz-veining.	ared, sligh Dips are 3	itly iron-o 30° and lo	ide cally				
7	7.10	100	81	28														
8	8.60	100	91	37			//								8.60	337.29		
9									End o	of Borehole	at 8.60 m							
RE	MAR	KS						•		\\/otor	Casina	Socied	Picc	Time	WA	TER ST	TRIKE	DETAILS
Hole	e cas	sed ().00-8	.60m	1.					Strike	Depth	At	To	(min)) Co	mment lo wate	r strike	recorded
											Hole	Casino	Denth	to a	GR	OUND	VATER	R DETAILS
	Date		Tip D	epth	RZ Top	RZ Base	; ;	Тур	De	Date	Depth	Depth	Wate	er Cor	nment	5		



REPORT NUMBER

00	NTR		. 	arna	stooka Wi	ndfarm							DR	LLHOLI		RC	32A	
00			TES		505 908	8 15 E							SH	EET	-	Shee	et 1 of	1
GR		DLE	EVEL	(mO	571,182 D)	2.87 N 365.53	3		RIG TYPE FLUSH			Casagran Air/Mist	ide DA	TE DRILI	LED GED	26/0 30/0	6/2015 6/2015	5
CLI EN	ent Gine	ER	E	SBi SBi	1				INCLINATI	ON (deg) METER (m	m)	-90 88	DR LO	ILLED B GGED B	Y Y	IG D.	SL O'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac Lc (mi	ture cing bg m) 500	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
1	2.40	25	0	0					CORING: CORING: sandy GR/	Poor recove Poor recove AVEL.	ery returns c	of PEAT.	nd green	clayey	0.20	365.33		N = 31 (4, 6, 6, 7, 8, 10) N = 31 (5, 4, 7, 8, 7,
3	3.30	67	0	0	_										2 50	262.02		N - 50/75
- - - - 4	4.30	100	75	13	Ē	-			Medium st fine-graine subordinat	rong to stro d SILTSTO e SANDST	ng, medium NE/MUDST ONE. Fresh	to thinly b ONE with to slightly	edded, pu interbedd weathere	rple, ed d.	3.50	002.00		mm (9, 11, 36, 14)
5	5.80	100	87	57			<u> </u>		rough, plai moderately stained, lo sub-vertica	nar and loca y open, loca cal quartz-v al.	ally stepped. Illy clay-sme eining. Dips	Apertures ared, sligh are 45° ar	tly iron-ox d locally	ide				
- - - - - - - - - - - - - - - - - - -	7.30	100	97	32	Ę													
8	8.40	100	85	16		-	<u> </u>		End	of Porcholo	at 8 40 m				8.40	357.13		
9											at 0.40 III							
RE	MAR	KS		I	I			I	l						WA	TER S	FRIKE	DETAILS
Hol	e cas	sed ().00-8	8.40m	1.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Cc	mment lo wate	ts r strike	recorded
	T • • •) - - -						Dete	Hole	Casing	Denth	to	GR		NATER	R DETAILS
	Date		Tip D	epth	RZ Top	RZ Base)	Тур	De	Date	Depth	Depth	Wate	ř Coi	nment	5		


REPORT NUMBER

СО	NTR	ACT	B	arna	stooka Wi	indfarm							DRIL	LHOLE	NO	RC	32B	
со	-ORE	DINA	TES		505,902 571,208	2.04 E 8.01 N			RIG TYPE			Casadran	DAT	ET E DRILL	ED	Shee 30/0	et 1 of 2 6/2015	2
GR		ID LE	EVEL	(m0 SBi	D)	369.34	ŀ		FLUSH	ON (dea)		Air/Mist			ED V	01/0 IG	//2015)
EN	GINE	ER	E	SBi	1				CORE DIA	METER (m	m)	88	LOG	GED B	Y	D.	O'Shea	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	ture cing bg m) 500	Non-intact Zone	Legend			Descript	tion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0									CORING:	Poor recov	ery returns o	of PEAT.			0.40	368.94		
- - - - - - - - - - - - - - - - - - -	2.40	25	0	0					CORING: sandy GR/	Poor recov AVEL.	ery, returns	of purple ar	nd green cl	ayey				N = 25 (3, 5, 6, 7, 7, 5) N = 31 (4, 5, 7, 8, 7, 9)
- - - - - - - - - - - - - - - - - - -	4.80	13	0	0														N = 29 (3, 7, 7, 6, 7, 9) N = 27 (7, 7, 5, 7, 8, 7)
6	7.65	21	7	0			<i>x</i>		Medium st	rong to stro	ng, medium	n to thinly be	edded, purj	ple,	7.20	362.14		N = 39 (6, 7, 11, 9, 10, 9)
- 8	8.70	100	92	0	E	-			Discontinu rough, plar moderately stained, loo sub-vertica	ities are me nar and loca y open, loca cal quartz-v al.	ONE. Fresh edium to clo ally stepped illy clay-sme eining. Dips	sely spaced Apertures eared ,slight are 70° an	l, smooth t are tight to ly iron-oxic d locally	o b de				
	9.85	100	57	19														
RE Ho	MAR le cas	KS sed 0	.00-1	2.10	m.					Water	Casing	Sealed	Rise	Time		mment	I RIKE	DETAILS
										STIKE	Depth	AL	10	<u>(min)</u>	N	lo wate	r strike	recorded
											Hole	Casing	Dopth t	2	GR	OUNDV	VATEF	R DETAILS
	Date		ON D	epth	I LS RZ Top	RZ Base	•	Тур	De	Date	Depth	Depth	Water	Con	nment	5		
											1							



REPORT NUMBER

CONTRACT Barnatiooka Windfam PRILHOLE NO PC3283 SHEET COORDNATES 505,602.04 E 571,036.01 N FRC TYPE Casegnande AufMat DATE DRILLED 30082015 CROUND LEVEL (mOD) 368.34 FRC TYPE Casegnande AufMat DRILLOS BUE DRILLOS BUE DRILLOS BUE DOIDT2015 ENNINEER ESBI CORE DAMETER (mm) 88 DRILLOS BUE DRILLOS BUE </th <th></th> <th><u> </u></th> <th></th>		<u> </u>																	
CO-ORDINATES S0:002.04 E 571/2.08 I h GROUND LEVEL (mOD) TOP TOPELLED 571/2.08 I h CORE DIAMETER (mm) Costspandor 4.01/Met CORE DIAMETER (mm) Date Diameter 1.00000 Distribution (mm) Distribution <th< td=""><td>со</td><td>NTR</td><td>АСТ</td><td>В</td><td>arna</td><td>stooka W</td><td>indfarm</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>NO</td><td>RC: Shee</td><td>32B et 2 of 2</td><td>2</td></th<>	со	NTR	АСТ	В	arna	stooka W	indfarm									NO	RC: Shee	32B et 2 of 2	2
CLINATION (deg) -90 DRILLED BY DOCINATION (deg) -90 DRILLED BY DOCINATION MEMORIER ESR Status 0	CO GR	-ORI	dina Id Le	TES	(mO	505,90 571,20 D)	2.04 E 8.01 N 369.34	4		RIG TYPE			Casagran Air/Mist	de DATE	DRILL	ED ED	30/0 01/0	6/2015 7/2015	5
No. 000000000000000000000000000000000000	CL EN	IENT GINE	ER	E	SBi SBi					INCLINATI	ION (deg) METER (mi	m)	-90 88	DRIL	LED BN GED BN	r r	IG D.	SL O'She	а
100 86 18 Medium strong to strong, medium to Think'p bedded, purple, the grant SANDSTONE. If nehredded subcordinate SANDSTONE. Fresh to slightly weathered. Image: SandSTONE. Fresh to slightly weathered. 11 100 91 58 0 Image: SandSTONE. Tresh to slightly weathered. 12 12.10 0 15 0 Image: SandSTONE. Tresh to slightly weathered. 12 12.10 0 12.10367.24 Image: SandSTONE. Tresh to slightly weathered. 13 12 12.10 Image: SandSTONE. Tresh to slightly weathered. Image: SandSTONE. 14 14 14 14 12.10367.24 Image: SandSTONE. 14 14 16 16 12.10367.24 Image: SandSTONE. 15 16 16 16 12.10367.24 Image: SandSTONE. 14 16 16 16 16 16 16 16 17 18 18 16 12.10367.24 Image: SandSTONE. 16 18 18 16 16 16 16 16 17 19 19 16 16 16 17	Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	eture cing og m)	Non-intact Zone	Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
1 1	10	11.00	100	88	18	Ľ		<u> </u>		Medium si fine-graine subordina	trong to stro ed SILTSTO te SANDST	ng, medium NE/MUDST ONE. Fresh	to thinly be ONE with i to slightly	edded, purp interbedded weathered.	le,				
12 Image: Second S	- 11	12.10	91	58	0	6				rough, pla moderatel stained, lo sub-vertica	nar and loca y open, loca ocal quartz-v al. <i>(continue</i>	ally stepped. Illy clay-sme eining. Dips ed)	Apertures ared ,slight are 70° ar	are tight to tly iron-oxide id locally	9	12 10	357 24		
REMARKS WATER STRIKE DETA Hole cased 0.00-12.10m. Water Strike Casing Depth Sealed At Rise To Time (min) Comments Image: No water strike record No water strike record No water strike record No water strike record Image: No water strike record Date Hole Depth Casing Depth Depth to Water Comments Image: No water strike record Date Hole Depth Casing Depth Depth to Water Comments	13																		
INSTALLATION DETAILS Date Hole Depth Casing Depth to Depth Comments Date Tip Depth RZ Top RZ Base Type Image: Casing Depth Depth Water Comments	Hol	e cas	rs sed ().00-1	2.10	m.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co N	mment	r strike	recorded
Date Tip Depth RZ Top RZ Base Type	INC	.									Dete	Hole	Casing	Depth to	0	GRO		VATEF	R DETAILS
		Date		Tip D	epth	RZ Top	RZ Base	9	Ту	pe		Depth	Depth	Water					



REPORT NUMBER

со	ONTR/	ACT	B	arnas	stooka Win	dfarm							DRIL	LHOLE	NO	RC	33A	
со	-ORD		TES		506,100.	.01 E							SHE	ET		Shee	et 1 of 1	1
GR		D LE	VEL	(mOl	571,507. D)	.05 N 388.88	5					Casagrano		E LOGG	ED ED	08/04 08/04	4/2015 4/2015	
CL EN	IENT GINE	ER	E	SBi SBi					INCLINATIO	ON (deg) METER (m	m)	-90 88	DRIL LOG	LED BY GED BY	((IG D.	SL O'Shea	à
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fractu Spaci Log (mm	ure ing)) 	Non-intact Zone	Legend			Descripti	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0									CORING:	Poor recov Poor recov	ery returns c erv. returns (of PEAT. of purple an	d areen cl	avev	0.20	388.68		
- 1	1.25	40	0	0					GRAVEL.				a g. con c.					
	2.10	29	0	0														
	2.80	43	0	0														
- 3	3.30	100	0	0														
4	4 20	78	17	0		-									4.10	384.78		
	5 20	100	70	36		-	<u> </u>		Medium st fine-graine SILTSTON Discontinu	rong to stro d SANDST IE. Fresh to ities are mo	ong, medium ONE with in o slightly weated	to thinly be terbedded s athered. sely spaced	dded, purp subordinati	ole, e o				
6	6.70	100	89	31	F		4		rough, plar moderately stained, loo sub-vertica	har and und / open, loca cal quartz-\ al.	dulating. Ape ally clay-sme reining. Dips	ertures are f ared ,slight are 30° an	ight to ly iron-oxid d locally	e				
- 7 - 7 - 8	8.20	100	89	43	L													
9	9.70	100	91	14	F										9.70	379.18		
RF	MAR	KS							End c	of Borehole	at 9.70 m				WA-	TER ST	RIKF	DETAILS
Ho	le cas	sed 0	.00-9	.70m	l.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	mment o wate	s r strike	recorded
																	VA	DETA
	STAL	LATI)ETA	ILS					Date	Hole	Casing	Depth to Water	Com	ments	SUNDV	VATER	DETAILS
	Date		Tip D	epth	RZ Top F	RZ Base	2	Тур	De			Deptn	vvalel					



REPORT NUMBER

CONTR	RACT	B	arnas	stooka Wir	ndfarm									NO	RC	33B	2
CO-OR	DINA	TES		506,094 571,528	.01 E .03 N			RIG TYPE			Casagrano		DRILLI	ED FD	08/0	4/2015	<u>~</u> ; ;
GROUI CLIENT ENGINE	nd Li T Eer	EVEL E	(mO SBi SBi	D)	390.84			FLUSH INCLINATION CORE DIA	ON (deg) METER (m	m)	Air/Mist -90 88	DRILL	LED BY	((IG A.	SL Chrys	t
Downhole Depth (m) Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fract Spac Lo, (mr	ure sing g n)	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0	40	0	0				<u>\\</u> <u>\\</u> <u>\\</u> \\\ \\\	CORING:	Poor recov	ery returns o	of PEAT.			1.00	000.04		
1	75	0	0	-		0 0 0 0 0		CORING: many cobb	returns of f bles.	ine to coarse	e angular G	RAVEL with	h	1.00	389.84		N = 7 (1, 1, 2, 2, 1, 2)
2	45	0	0	-													N = 35 (4, 4, 6, 7, 13, 9)
3 3.10 3.55	5 100	0	0	_			600										N = 46 (6, 9, 11, 11, 10, 14)
3.90	86	0	0	-			0	ł									
4 5 5.40	20	0	0											5.40	385.44		N = 50/95 mm (6, 7, 10, 40)
6 6.90	100	100	27	Ē				Medium st SANDSTC slightly we Discontinu rough, plan moderately	rong, medi DNE with in athered. ities are me har and und y open, loca	um to thinly terbedded p edium to clos dulating. Ape ally clay-sme	bedded, pu urple SILTS sely spaced ertures are t eared. Dips	rple, fine-gr TONE. Fre I, smooth to ight to are sub-ver	ained sh to tical.				
7 8 8.40	100	73	12	F													
9	100	93	29														
	RKS		EEm		E				Water	Casing	Sealed	Rise	Time	WA [.]	TER S	FRIKE	DETAILS
TOIE Ca	ised (1.00-3	.55M	Ι.					Strike	Depth	At	To	(min)	Co N	mment lo wate	ts er strike	recorded
														GR) JUND	NATE	R DETAILS
NSTAI	LLAT		DETA				+		Date	Hole Depth	Casing Depth	Depth to Water	Com	ment	S		
Date	e	Tip D	epth	RZ Top	R∠ Base		Гy	pe									



REPORT NUMBER

		/																
со	NTR	АСТ	Ba	arna	stooka Wi	ndfarm							DRIL	LHOLE ET	NO	RC: Shee	33B et 2 of 2	2
CO GR		DINA [.]	TES	(mO	506,094 571,528 D)	4.01 E 3.03 N 390.84	Ļ		RIG TYPE			Casagran Air/Mist	de DATE	E DRILL E LOGG	ED ED	08/0 08/0	4/2015 3/2015	;
CL EN	IENT GINE	ER	ES	SBi SBi					INCLINATI	ON (deg) METER (mr	n)	-90 88	DRIL LOG	LED B' GED B'	Y Y	IG A.	SL Chrys	t
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (mi	ture cing bg m) 500	Non-intact Zone	Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10 11 12 13 14 15 16 17 18 19 19 19 19 19 19 19 19 19 19	<u>10.45</u>	100 KS sed 0	.00-3	82 .55m					End	of Borehole	at 10.45 m	Sealed	Rise	Time	10.45	380.39		DETAILS
	le cas	sed 0	.00-3.	.55m	1.					Strike	Depth	At	To	(min)	Co	mment	S	
312.GPJ IG															N	o wate	r strike	recorded
18.															GRO		VATE	R DETAILS
	TAL	LATI	ON D	ETA	ILS					Date	Hole Depth	Casing	Depth to Water	Con	nments	6		
	Date	-	Tip De	epth	RZ Top	RZ Base	•	Ту	00									



REPORT NUMBER

C	ONTR	ACT	. B	arna	stooka Wi	indfarm							DRIL	LHOLE	NO	RC:	34A	1
Co	D-ORI	DINA ID LE	TES	(mO	506,375 571,763 D)	5.94 E 3.06 N 389.08	3					Casagran	de DATE	DRILL	ED ED	15/0 16/0	4/2015 4/2015	;
CI EN		ER	E	SBi SBi					INCLINATI	ON (deg) METER (m	m)	-90 88	DRIL	LED BY GED BY	((IG D.	SL O'She	a
Downhole Denth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (mi	ture cing og m) 500	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0									CORING:	Poor recov	ery returns o	of PEAT.			0.40	388.68		
1	2.30	22	0	0					GRAVEL.	Poor recov	ery, returns (or purple ar	na green cla	ayey				N = 21 (4, 5, 4, 6, 6, 5)
	2 90	83	0	0														N = 50/150 mm (7, 12, 28, 17,
- 3	3.30	50	0	0	-													3)
	3.80	60	0	0		-			NA odiu uno od			te think to		wiele	3.80	385.28		
- 4	5.40	100	88	38	Ē		760		Discontinu rough, pla stained. Discontinu	rong to stro e-grained S te SILTSTC ities are me nar and uno y open, loca ips are 30°	ANDSTONE ANDSTONE NE. Fresh t edium to clos dulating. Ape ally clay-sme and locally s	i to thinly be E with interts o slightly w sely spaced ertures are eared,slightl sub-vertical	edded, gree bedded eathered. d, smooth to tight to y iron-oxide	inisn D				
6	6.90	100	91	41			<<											
- 7	8.40	100	100	81			560											
9	9.90	100	100	60			(:= x /								9.90	379.18		
	EMAR	KS sed 0	0.00-9	.90m	1.	1			End	f Borehole Water	at 9.90 m Casing	Sealed	Rise	Time	WA	TER ST		DETAILS
312.GPJ IGSL.GC										Strike	Depth	At	To	(min)	N	omment lo wate	r strike	recorded
0M 18.	STVI	ידא ו								Data	Hole	Casing	Depth to	Corr	GRO		VATER	R DETAILS
	Date	. _ ~11	Tip D	epth	RZ Top	RZ Base	;	Тур	De		Depth	Depth	Water			<u>,</u>		



REPORT NUMBER

ONTRAC	<u>.</u> г в	Barna	stooka Wi	ndfarm							DRIL		NO	RC	34B	2
O-ORDIN	ATES .evel	(mO	506,358 571,779 D)	3.91 E 9.03 N 392.33	3		RIG TYPE			Casagran	de DATE	E DRILL LOGG	ED ED	5nee 16/04 20/04	4/2015 4/2015	<
LIENT	E	SBi SBi	_/		-		INCLINATIO	ON (deg) METER (m	m)	-90 88	DRIL LOG	LED BY GED BY	((IG D.	SL O'She	a
Core Run Depth (m) T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac Lc (mi	ture cing og m)	Non-intact Zone	Legend			Descripti	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
26	6 0	0					CORING: Returns of	Poor recover	ery returns c	of PEAT.	CLAY/SIL	T	0.45	391.88		N = 26 (4, 4, 6, 7, (7)
2.30	0 0	9	-				CORING:	Poor recove	ery, returns o	of purple cla	ayey GRA\	ÆL.	2.30	390.03		N = 30 (3, 6, 6, 8, 9 7)
4.30 4.80	0 68	40					Medium st fine-graine SILTSTON Discontinu	rong to stro d SANDST NE. Fresh to ities are me	ong, medium ONE with in o slightly weatedium to clos	to thinly be terbedded s athered.	edded, purp subordinate I, smooth to	ple, e	4.00	388.33		
5.80	0 51	13	Ē		/ i x/		rougn, plar moderately stained. Di	nar and und y open, loca ps are 70°	ally clay-sme ally clay-sme and locally s	ared, slight sub-vertical.	ignt to ly iron-oxid	e				
7.30	0 99	9	È													
8.80	0 66	35														
EMARKS		1	<u> </u>			::::							WA [.]	LER S1	RIKE	DETAILS
lole cased	0.00-1	0.10	m.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	omment lo wate	r strike	recorded
								Data	Hole	Casing	Depth to	Com	GR		VATER	RDETAILS
Date	Tip D	epth	RZ Top	RZ Base	>	Тур	De	Date	Depth	Depth	Water	Con	iment	5		



REPORT NUMBER

	/																
CONTRA	АСТ	Bai	rnas	stooka Wi	indfarm							DRIL	LHOLE	E NO	RC She	34B	2
CO-ORD	d Le	TES EVEL (r	mOl	506,358 571,779 D)	8.91 E 9.03 N 392.33	3					Casagran	de DAT	e drill E logo	.ED	16/0 20/0	4/2015 4/2015	5
CLIENT ENGINEI	ER	ES ES	Bi Bi				1	INCLINATI	ON (deg) METER (mr	n)	-90 88	DRIL LOG	LED B	Y Y	IG D	SL .O'She	a
Downhole Depth (m) Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (mi	ture cing og m)	Non-intact Zone	Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- ¹⁰ 10.10				-	<u></u>	<u> </u>		End o	of Borehole	at 10.10 m				10.10	382.23	6	
11 12 13 14 15 16 17 18 REMAR Hole cas	KS sed (0.00-10	.10	n.					Water	Casing	Sealed	Rise	Time	WA	TER S	TRIKE	DETAILS
Hole cas	ed (0.00-10	.10r	m.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	mmen	ts	
312.6PJ 1681														N	lo wate	er strike	recorded
22										Holo	Caeine	Donth 4		GR	OUND	NATER	R DETAILS
	LAT	ION DE	ETA	ILS					Date	Depth	Depth	Water	Cor	nments	S		
Date		I IP Dep	pth	KZ Top	RZ Base	<u>}</u>	Гу	pe									



REPORT NUMBER

	~																
ONTRA	АСТ	B	arna	stooka Wi	indfarm							DRIL	LHOLE ET	NO	RC3 Shee	35A et 1 of	1
0-ORD ROUNI	DINA D LE	TES EVEL	<u>(m</u> O	506,668 571,980 D)	8.91 E 0.08 N <u>389.1</u> 8			RIG TYPE			Casagrar Air/Mist	nde DATE		ED ED	27/04 27/04	4/2015 4/2015	; ;
	ER	E	SBi SBi						ON (deg) METER (mi	m)	-90 88	DRIL LOG	LED B' GED B'	((IG D.	SL O'She	a
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (mi	ture cing bg m) 500	Non-intact Zone	Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
2.00	40	16	6		=			CORING: Returns of CORING: Medium st	Poor recover stiff, brown Poor recover trong to stro	ery returns o a sandy sligh ery, returns c ong (becomir	f PEAT. tly gravelly of purple c	y CLAY/SIL layey GRA\ r 4.00-5.30	T /EL n),	1.00 1.50 1.65	388.18 387.68 387.53		N = 6 (2, 2, 1, 1, 2, 2)
2.80	100	56	0		K			thickly to the medium-gr intrebedde weathered	hinly beddeo rained, SAN ed with Ryho	d, grey/greer IDSTONE (n olitic Volcanio	n/brown, fi netamorph cs), fresh	ne to nosed, poss to slightly	ibly				
4.00	100	54	13					rough, plar clay-smea quartz-veir	nar. Apertur red, strong ning. Dips a	res are tight to close penetrating i re 30° and lo	o modera ron-oxide ocally sub-	tely open, lo staining, loc vertical.	o cally al				
4.70	100	89	64			(i) /											
5.30	100	100	100	-	6	30	· · · · · ·	End o	of Borehole	at 5.30 m				5.30	383.88		
EMARI ole cas	KS sed 0	0.00-5	.30m	۱.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	FER ST mment	I <mark>RIKE</mark> IS	DETAILS
														N	o wate	r strike	recorded
										Llolo	Casina	Dorth 1		GRO	DUNDV	VATE	RDETAILS
Date		ON D Tip De	DETA	NILS RZ Top	RZ Base	!	Тур	De	Date	Depth	Depth	Water	Con	nments	6		



REPORT NUMBER

		/																
co	ONTR	АСТ	В	arna	stooka Wi	indfarm							DRI	LLHOLE ET	NO	RC: Shee	35B et 1 of	1
CC GF)-ORI	dina Id Le	TES EVEL	(mO	506,658 571,997 D)	8.07 E 7.30 N 392.00)		RIG TYPE			Casagrano Air/Mist	de DAT	e drill E logg	.ED iED			
CL EN	IENT	ER	E	SBi SBi					INCLINATI	ON (deg) METER (m	m)	-90 88	DRI LOG	LLED B GED B	Y Y	IG D.	SL O'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac Lc (mi	ture cing 0g m) 500	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0									CORING:	Poor recove	ery returns c	of PEAT.			0.50	301 50		
1	2.00	50	0	0					Returns of	f stiff, brown	ı sandy sligh	ntly gravelly	CLAY/SII	LT	0.50	-91.50		
- 2	3.00	100	0	0	-													
	4.00	50	0	0					Medium st	rong to stro	ng thickly t	a thinly bed	ded		4.00	388.00		
	5.50	100	61	14					(metamore (metamore Volcanics) Discontinu rough, plan	h/brown, fine bhosed, pos fresh to sli ities are me nar. Apertur	e to medium sibly intrebe ightly weath edium to close res are tight	-grained, S edded with F ered. sely spaced to moderate	ANDSTO Ryholitic , smooth	NE to locally				
- 6	6.40	100	93	26			<u> </u>		quartz-veir	ning. Dips a	re 30° and l	ocally sub-v	rertical.	lcai				
- - - 7 - -	7.40	100	94	40	È	-	1											
- 8	8.45	100	99	68					End	of Borehole	at 8.45 m				8.45	383.55		
	MAR	ĸs	1												WA		RIKE	DETAILS
8312.GPJ IGSL.GD1										Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co N	lo wate	r strike	recorded
	STAI)ETA	ILS					Date	Hole	Casing	Depth t	0 Con	nment		VAIE	T DE LAILS
	Date		Tip D	epth	RZ Top	RZ Base	9	Ту	00		Depth	Depth	vvater					



REPORT NUMBER

со	NTR/	ACT	B	arna	stooka Wi	indfarm							DRIL	LHOLE	NO	RC	36A	4
CO			TES	(mO	507,573 572,44	3.96 E 1.01 N 364 69			RIG TYPE			Casagran	de DATI	E I E DRILL E LOGG	ED ED	05/0 08/0	6/2015 6/2015	1 ; ;
CL		ER	E	SBi SBi	0)	304.03			FLUSH INCLINATI CORE DIA	ON (deg) METER (mi	m)	Air/Mist -90 88	DRIL LOG	LED B' GED B'	r r	IG D.	SL O'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	ture cing pg m) 0 500	Non-intact Zone	Legend			Descripti	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
1	2 10	67	29	0	E				CORING: CORING: sandy GR/ Medium st fine-graine SILTSTON	Poor recove Poor recove AVEL. rong to stro d SANDST IE. Fresh to	ng, medium ONE with in oslightly wea	of PEAT. of purple ar to thinly be terbedded athered.	nd green cl edded, purj subordinat	ayey ble, e	0.20	364.49 363.49		N = 50/0 mm (9, 15, 50)
2	2.90	100	84	19			(<u></u>) (<u></u>)		Discontinu rough, plar moderately stained, loo sub-vertica	ities are me nar and loca y open, loca cal quartz-v al.	edium to clos ally stepped. Illy clay-sme eining. Dips	sely spaced Apertures ared ,slight are 70° an	d, smooth t are tight to d iocally	o le				
J	3.50	100	93	25				· · · · · · · · · · · · · · · · · · ·										
4	4.30	100	100	80	_			· · · · · · · · · · · · · · · · · · ·										
5	5.45	100	93	27			(<u>.</u>											
6		100	100	94		71	10								0.70			
- 7	5.70								End o	of Borehole	at 6.70 m				0.70	901.99		
RE Hol	MAR e cas	KS Sed C).00-6	.70m	ו ז.	I				Water	Casing	Sealed	Rise	Time	WA	TER SI		DETAILS
										Strike	Depth	At	То	(min)	N	lo wate	r strike	recorded
											Holo	Caeing	Donth to		GR	OUNDV	VATE	R DETAILS
INS	Date		Tip D	epth	NILS RZ Top	RZ Base		Тур	De	Date	Depth	Depth	Water	Con	nment	3		



REPORT NUMBER

со	NTR/	ACT	B	arna	stooka Wi	indfarm							DRI	LLHOLE	NO	RC	36B	
со	-ORE	DINA	TES		507,563	3.94 E							SHE	ET		Shee	et 1 of	1
GR	OUN	D LE	VEL	(mO	572,420 D)	0.97 N 368.47	,		RIG TYPE			Casagran		E LOGG	ED	09/0 09/0	6/2015 6/2015))
CL EN	ENT GINE	ER	E	SBi SBi					INCLINATI	ON (deg) METER (mi	m)	-90 88	DRI LOC	LLED B' GED B	r r	IG D.	SL O'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	ture cing 0g m) 	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
1	1.60	94	65	51	Ē	=			CORING: CORING: sandy GR, Medium st purple, fine subordinat	Poor recove Poor recove AVEL. rong to stro e-grained S, ie SILTSTO	ery returns o ery, returns o ng, medium ANDSTONE NE. Fresh to edium to clos	of PEAT. of purple a to thinly b with interf o slightly w selv space	nd green o edded, gre bedded eathered.	layey eenish	0.30	368.17 367.92		N = 50/0 mm (25, 50)
2	2.70	100	94	78	ļ				rough, plai moderately stained, lo sub-vertica	nar and loca y open, loca cal quartz-v al.	ally stepped. Illy clay-sme eining. Dips	Apertures ared ,sligh are 30° ar	are tight to tly iron-oxi nd locally	de				
3	4.20	100	100	31														
5	5.30	100	97	82														
- 6	5.90	100	100	18	Ŀ			· · · · · · · · · · · · · · · · · · ·	End	of Borehole	at 5.90 m				5.90	362.57		
- 7	MAR	K.S.													WA		TDIKE	
RE Hol	MAR e cas	KS sed (0.00-5	.90n	۱.					Water	Casing	Sealed	Rise	Time		TER S	RIKE	DETAILS
										Strike	Depth	At	To	(min)		lo wate	r strike	recorded
INS	TAL	LATI		DETA	ALS					Date	Hole	Casing	Depth 1	o Con	ment	S	VAIE	DETAILS
	Date		Tip D	epth	RZ Top	RZ Base	•	Ту	De		Depth	Depth	vvater					



REPORT NUMBER

co	ONTR	АСТ	B	arna	stooka Wi	indfarm							DRIL	LHOLE	NO	RC	37A	
СС)-ORI	DINA	TES		507,21 572,34	1.00 E 8.97 N						Capacita		et E Drill	ED	Shee 28/0	et 1 of 5/2015	1
GF	ROUN	ID LE	VEL	(mO	D)	393.00	0		FLUSH			Air/Mist	DAT	E LOGG	ED	02/0	6/2015	;
CL EN	IENT	ER	E	SBi SBi					INCLINATI	ON (deg) METER (m	m)	-90 88	DRII LOG	LED B	Y Y	IG D.	SL O'Shea	а
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	ture cing bg m) 0 500	Non-intact Zone	Legend			Descripti	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0									CORING:	Poor recove	ery returns c	of PEAT.			0.40	392.60		
	1.80	56	0	0	_				Returns of CORING: sandy GR/	Poor recove	ery, returns o	of purple ar	r CLAY/SIL	-T layey	1.50	391.50		N = 29 (4, 5, 6, 7, 7, 9)
2	2.40	50	17	0			k	¢ 	NA - diama - 4			4 - 4 - 1 - 1 - 1 - 1		- 1 - 1-	2.30	390.70		N = 50/90 mm
	2.80	75	28	0					grey, fine-	rong to stro grained SAI e SII TSTO	ng, meaium NDSTONE v NF Fresh ti	vith interbe	edded, blu dded eathered	eisn				(7, 9, 20, 30)
- 3	3.25	100	91	22					Discontinu	ities are me	edium to clos	sely spaced	l, smooth f	O				
	4.00	100	77	41					rough, plar moderately stained, lo sub-vertica	nar and loca y open, loca cal quartz-v al.	ally stepped. Illy clay-sme eining. Dips	de						
- 4	4 70	100	96	64														
- 5	5.10	100	70	28			<u> </u>											
	5.90	100	95	30	Į.													
6	0.00	100	93	70	Ŀ													
- 7	7.20 7.45	100	100	100			700	· · · · · · · · · · · · · · · · · · ·	End	of Borehole	at 7.45 m				7.45	385.55		
9																		
RE	MAR	KS		' 15~				-		Water	Casing	Sealed	Rise	Time	WA [·]	TER ST	RIKE	DETAILS
	iie Gas	5CU U	r.UU-7	.4011						Strike	Depth	At	To	(min)	N	omment	s r strike	recorded
			<u></u>							Det	Hole	Casino	Depth t	0	GR	OUNDV	VATEF	R DETAILS
	INSTALLATION DETAILS Date Tip Depth RZ Top RZ Base 1								De	Date	Depth	Depth	Water	- Con	nment	5		



REPORT NUMBER

со	NTR	ACT	B	arna	stooka Wi	indfarm							DRI	LLHOLE	E NO	RC	87B	
со	-ORI	DINA	TES		507,22 ⁻ 572,320	1.01 E 6.00 N						Casagrar	DA1	ET E DRILL	ED	Shee 03/0	et 1 of 6/2015	1
GR	OUN	D LE	EVEL	(mO	D)	396.64			FLUSH			Air/Mist	DA1	ELOGO	ED	05/0	6/2015	5
CL EN	ENT GINE	ER	E	SBi SBi					INCLINATI	ON (deg) METER (m	m)	-90 88	DRI LOC	LLED B GED B	Y Y	IG D.	SL O'Shea	а
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (mi	ture cing bg m) 500	Non-intact Zone	Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0 E									CORING:	Poor recove	ery returns o	f PEAT.			0 45	396 19		
- 1	2 40	42	0	0					Returns of CLAY/SIL	⁻ stiff, purple T	eish grey sar	ndy slightly	/ gravelly		2 40	394 24		N = 24 (3, 4, 4, 7, 6, 7) N = 30 (2, 6, 6, 8, 7,
	2.10				1			0-0-0 0-0	CORING: sandy GR/	Poor recove AVEL.	ery, returns o	of purple a	nd green o	layey				9)
3	3.30		0	0		_									3.45	393.19		N = 15/0 mm
	4.00	100	79	41	È.				Medium st grey, fine-(rong to stro grained SAI	ng, medium NDSTONE.	to thinly b Fresh to s	edded, blu lightly wea	eish thered.				(10, 15)
- 4	4.90	100	100	100	_	6	60		Discontinu rough, plai moderately stained, lo	ities are me nar and loca y open, loca cal quartz-v	edium to clos ally stepped. ally clay-sme reining. Dips	sely space Apertures ared ,sligh are 30° a	d, smooth are tight t atly iron-oxi nd locally	to o de				
5	5.35	100	100	84		5	50		Sub-vertica	ai.								
	5.90	100	100	58		-												
- 7	7.40	100	100	100		1	260											
8	8.50	100	92	74											8.50	388.14		
9									End o	of Borehole	at 8.50 m							
RE	MAR	KS								\A/otor	Casing	Coolod	Diag	Time	WA	TER ST	RIKE	DETAILS
Hol	e cas	sed C	0.00-8	.50m	1.					Strike	Depth	At	To	(min)	Cc N	omment lo wate	s r strike	recorded
<u> </u>												Cocine	Denth		GR	OUNDV	VATEF	R DETAILS
INS	INSTALLATION DETAILS Date Tip Depth RZ Top RZ Base Typ								De	Date	Depth	Depth	Wate	Cor	nment	5		



REPORT NUMBER

со	NTR	ACT	B	arna	stooka Wi	indfarm							DRI	LHOLE	E NO	RC	38A	
co	ORD	DINA	TES		506,95 572,370	7.99 E 6.95 N						Casagran	DAT	ET E DRILL	ED	27/0	et 1 of 5/2015	1
GR		D LE	EVEL	(mO	D)	392.55			FLUSH			Air/Mist	DAT		ED	28/0	5/2015	
ENC	GINE	ER	E	SBI SBI	1				CORE DIA	ON (deg) METER (m	m)	-90 88	LOC	GED B	Y	D.	o'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	ture cing bg m) 500 500	Non-intact Zone	Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0		60	0	0					CORING:	Poor recove	ery returns o	f PEAT.			0.55	392.00		
- 1	1.00				-				CORING: sandy GR/	Poor recove AVEL.	ery, returns o	of purple a	nd green o	layey				N = 27
	1.50	40	0	0		F		- 0- 	Medium st	rong to stro	ng, medium	to thinly b	edded, pur	ple,	1.50	391.05		(4, 6, 7, 6, 7, 7)
2	2.60	91	88	56			()		fine-graine SILTSTON Discontinu	d SANDST IE. Fresh to ities are me	ONE with in slightly weated	erbedded ithered. ely space	subordina d, smooth	to ocally				
- 3		100	62	18			(· · · A		clay-smeal Dips are si	red ,slightly ub-horizont	iron-oxide s al and locally	tained, loc sub-vertion	al quartz-v cal.	eining.				
- 4	3.85	100	71	0	F													
	4.30	100	91	75														
- 5	5.25	100	100	100					Finder	(Davahala	-+ 5 05				5.25	387.30		
REI Hol	MAR e cas	KS sed 0	0.00-5	.25m).					Water	Casing	Sealed	Rise	Time	WA	TER ST	RIKE	DETAILS
	0 000	.54 0		011						Strike	Depth	At	To	(min)	N	lo wate	r strike	recorded
INS				ETA						Date	Hole	Casing	Depth t	0 Cor	GR(DUNDV	VATER	RDETAILS
	Date Tip Depth RZ Top RZ Base							Тур	De		Depth	Depth	vvater			-		



REPORT NUMBER

СС	ONTR	ACT	B	arna	stooka Wi	indfarm							DR		OLE NO))	RC:	38B	1
CC GF			TES	(mO	506,952 572,353 D)	2.90 E 3.99 N 396.45			RIG TYPE			Casagra	nde DA	TE DF	RILLED		26/0	5/2015 5/2015	
CL EN	IENT GINE	ER	E	SBi SBi					INCLINATIO	ON (deg) METER (m	m)	-90 88	DR LO	GGE	D BY D BY		IG D.	SL O'Shea	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	ture cing bg m) 500	Non-intact Zone	Legend			Descripti	on			(m) 44mm (Ueptn (m)	Elevation	Standpipe Details	SPT (N Value)
- 0									Returns of CLAY/SIL	stiff, purple	eish grey sar	ndy slightly	y gravelly		0.	50	395.95		
- 1	2.00	45	0	0					Returns of	stiff, brown	ı sandy sligh	itly gravell	y CLAY/S	ILT	2	00	204 45		N = 17 (1, 2, 2, 3, 5, 7)
2	2.00	88	88	58					Medium st purple, fine subordinat	ng, medium ANDSTONE NE. Fresh to	h	00	594.45						
- 3	4.30	100	96	61	F				Discontinu rough, plar moderately stained, loo locally sub	ities are me har and loca y open, loca cal quartz-v -vertical.	edium to clos ally stepped. Illy clay-sme eining. Dips	n to to kide and							
- 5	5.65	100	99	67															
- 6	7.10	100	86	75		56	59.9999 	999999999							7.	10	389.35		
7/15 6 8 8 7									End of Borehole at 7.10 m										
	MAR le cas	KS sed (0.00-7	.10m	1.					Water	Casing	Sealed	Rise	Ti	ime		rer ST mment	RIKE	DETAILS
3312.GPJ 1GSL.C										ЗШКЕ	υεριη	AL	10	(n	111(1)	N	o wate	r strike	recorded
20 M		I A T								Dato	Hole	Casing	Depth	to	Comme	BRC		VATEF	RDETAILS
	Date		Tip D	epth	RZ Top	RZ Base		Тур	De		Depth	Depth	Wate	er '		- 113	,		



REPORT NUMBER

		7																
со	NTR	АСТ	В	arna	stooka Wi	indfarm							DRI SHE	LLHOL ET	E NO	RC Shee	R1 et 1 of	2
CO GR		DINA D LE	TES EVEL	(mO	507,10 [.] 572,120 D)	1.03 E 0.98 N 392.4	.1		RIG TYPE			Casagrar Air/Mist	nde DAT	e dril E log	LED GED	12/0 13/0	5/2015 5/2015	5
CL EN	IENT GINE	ER	E	SBi SBi	1		1		INCLINATI	ON (deg) METER (m	m)	-90 88	DRI LOC	LLED E GGED E	BY BY	IG D.	SL .O'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac Lo (mi	ture cing bg m) 500 500	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0									CORING:	Poor recove	ery returns o	of PEAT.			0.35	392.06	6	
		50	0	0				- <u>-</u>	Returns of	f stiff, brown	n sandy sligł	ntly gravelly	y CLAY/SI	LT				
2	3.90	31	0	0						Poor recove	ery, returns	of purple a	nd green c	dayey	1.00	391.41		N = 32 (5, 6, 7, 7, 8, 10) N = 32 (5, 4, 7, 8, 8, 9) N = 41 (4, 6, 9, 11, 12, 9)
- 4	5.00	71	0	0					4 4 4 4									N = 39 (3, 5, 9, 9, 9, 11, 10)
	5.30	40	0	0	-			00										N = 27 (4, 5, 5, 7, 7,
6	5.80	100	90	40				<u>2</u>	Medium st fine-graine SILTSTON	trong to stro ed SANDST NE. Fresh to	ng, medium ONE with ir slightly we	to thinly b terbedded athered.	edded, pui subordina	rple, te	5.80	386.61		8)
- - - 7	6.60 7.30	100	87	64		I			Discontinu rough, plai moderately stained. Di	iities are me nar and und y open, loca ips are 60°	edium to clo dulating. Apo ally clay-smo and locally s	sely space ertures are eared,slight sub-vertica	d, smooth tight to ly iron-oxic l.	to le				
	8.60	100	98	55		l												
	9.75	100	99	99														
	MAR	KS		4.00				7	Į	W(ator	Cooing	Socied	Piece	Tim	WA	TER S	TRIKE	DETAILS
OH IGSL.GD1	le cas	sed ().00-1	1.00	m.					Strike	Depth	At	To	(min	N	omment lo wate	ts er strike	recorded
1831.															GR		NATE	R DETAILS
	STAL	LAT		DETA	AILS					Date	Hole Depth	Casing Depth	Depth t Water	Co	omments	S		
IGSL RC I	Date		Tip D	epth	RZ Top	RZ Bas	ie	Ty	pe									

/	A														RE	PORT	NUME	BER
	5) GS				(GEOT	ECł	INIC	CAL COP	re log	RECO	RD				1	831	2
со	NTR	ACT	B	arnas	tooka Wi	ndfarm							DRILL	HOLE N	10	RCF	R1)
CO			TES	(mO[507,10 [.] 572,120	1.03 E 0.98 N	1		RIG TYPE			Casagran	de DATE	DRILLEI LOGGEI	D	12/0	5/2015 5/2015	-
			E:	<u>(mol</u> SBi SBi	<u>, (</u>	392.4	1			ON (deg) METER (mr	n)	Air/Mist -90 88		ED BY		IG	SL O'Shea	
Ê	<u> </u>											00					0 Once	4
Downhole Depth (r	Core Run Depth (n	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	ture cing 9g m) 500	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 10	10.45	100	100	90														
-		100	100	73											1.00			
- 11	11.00								End c	of Borehole	at 11.00 m			1	1.00	381.41		
12 13 13 14 15 16 17 18																		
		Ke													10/07	ED 07	סוער	
Hol	e cas	sed 0	.00-1	1.00n	n.					Water	Casing	Sealed	Rise	Time	Cor	mment	S	DETAILS
											Deptit		10	_((1))	N	o water	r strike	recorded
INS	TAL	LATI		ETA	LS					Date	Hole	Casing	Depth to	Comm	GRC	JUNDV	VATER	DETAILS
	Date		Fip De	p Depth RZ Top RZ Base Type							Depth	Depth	vvater					

IGSL RC FI 10M 18312.GPJ IGSL.GDT 13/7/15



REPORT NUMBER

ONTRA	СТ	Ba	irnas	tooka Wi	ndfarm							DRI		E NO	RC	R2	2
CO-ORDI		'ES VEL (I	mOE	506,827 571,633)	7.00 E 3.97 N 341.78	3		RIG TYPE			Casagran	de DAT	e drill E logg	.ED iED	22/0 24/0	4/2015 4/2015	5
LIENT	R	ES ES	Bi Bi					INCLINATI	ON (deg) METER (m	m)	-90 88	DRI LOG	LLED B GED B	Y Y	IG D	SL .O'She	a
Downhole Depth (m) Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac Lo (mr	ture cing yg m)	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
1	25	0	0					CORING:	Poor recove	ery returns c	of PEAT.			1.40	340.38		N = 5 (1, 1, 1, 1, 1 2)
2 2.80	20	0	0					Returns of	stiff, browr	n sandy sligh	ntly gravelly	CLAY/SII	LT	2.80	338.98		N = 22 (2, 2, 4, 6, 5 7)
3 4 4.30	20	0	0					Coring: Gravel.	Poor recove	ery, returns	of purple ar	nd green c	layey			0 0 0 0 0 0 0 0 0 0	N = 20 (4, 5, 4, 5, 6 5)
5.50	33	0	0													0 0 0 0 0 0	N = 26 (3, 5, 7, 8, 6 5)
6.70	33	0	0													0 0 0 0 0 0	N = 35 (3, 7, 7, 8, 9 11)
7.30	100 38	0	0														N = 33 (4, 7, 8, 7, 9 9)
8.10 8.80 9.10	100	89	80 80	Ē				Medium st fine-graine SILTSTON	rong to stro d SANDST IE. Fresh to	ong, medium ONE with in o slightly we	to thinly be iterbedded athered.	edded, pur subordina	rple, te	8.15	333.63	0 0 0 0 0 0	N = 50/0 mr (25, 50)
	100	92	37					rough, plar moderately stained. Di	nar and und open, loca ps are 60°	dulating. Ape ally clay-sme and locally s	ertures are ared,slightl sub-vertical	tight to y iron-oxid	le			0 0 0 0	
KEMARK Hole case	5 ed 0.1	00-12	2.90n	n.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)		i ER S	ts er strike	recorded
														GR) DUND	NATE	R DETAILS
INSTALLATION DETAILS Date Tip Depth RZ Top RZ Base Type 24-04-15 12.90 0.50 12.90 50mm								n SP	Date	Hole Depth	Depth	Depth t Water	Con	nments	6		



REPORT NUMBER

CONTRACT	Barna	istooka Windfar	m						DRILL SHEET		NO	RC Shee	R2 et 2 of 2	2
CO-ORDINA	TES	506,827.00 E 571,633.97 N	Ē					0	DATE	DRILLEI	D	22/0	4/2015	;
GROUND L	EVEL (mC)D) 34	1.78		FLUSH			Casagrand Air/Mist	DATE	LOGGEI	D	24/0	4/2015	;
CLIENT	ESBi ESBi					ON (deg) METER (mr	n)	-90 88	DRILL	ED BY		IG D	iSL O'Shei	a
ÊÊ							.,	00	12000					
 Downhole Depth (r Core Run Depth (n T.C.R.% 	S.C.R.% R.Q.D.%	Fracture Spacing Log (mm)	1000 Non-intact Zone	Legend			Descriptio	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
	92 64				Medium st fine-graine SILTSTON	rong to stroi d SANDST NE. Fresh to	ng, medium ONE with int slightly wea	to thinly be erbedded s thered.	dded, purple subordinate	9,				
- 11 11.15	92 04		<. · · · ·		Discontinu	ities are me	dium to clos	ely spaced	, smooth to				o 🔤 o	
- 100	97 64				stained. D	y open, loca ips are 60° a	lly clay-smeand locally s	ared,slightly ub-vertical.	(<i>iron-oxide</i> (<i>continued</i>)				0 0 0 0	
- 12 12.20		E											•	
100	87 66												•	
12.90		-	A. in	<u>~~</u> ::::	End	of Borehole	at 12.90 m			1	2.90	328.88	o ⊟ o	
14														
- 15														
- 16														
- 17														
18														
- 19														
						1								
REMARKS Hole cased	0.00-12.90	lm.				Water	Casing	Sealed	Rise	Time		TER S		DETAILS
						Strike	Depth	At	То	<u>(min)</u>	N	o wate	r strike	recorded
												<u></u>		
						Date	Hole	Casing	Depth to	Comn	GRC nents		VATE	K DETAILS
Date	Tip Depth	RZ Top RZ E	Base	Ту	pe		Depth	Depth	vvater			-		
24-04-15	12.90	0.50 12.	90	50mn	n SP									



REPORT NUMBER

1	_	∕_																
CON	ITR/	АСТ	B	arnas	stooka Wi	indfarm							DRI She	LLHOLE ET	NO	RC Shee	R3 et 1 of 1	1
CO-(DINA ⁻	res Vel	(<u>m</u> O	506,624 571,415 D)	4.99 E 5.02 N 339.12	<u> </u>		RIG TYPE			Casagran Air/Mist	ide DAT	e drill E logg	.ED ED	22/0 24/0	6/2015 6/2015	
CLIE ENG	INE	ER	E	SBi SBi					INCLINATIO	ON (deg) METER (m	m)	-90 88		LLED B' GED B	Y Y	IG D	SL .O'Shea	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (mi	ture cing bg m) 	Non-intact Zone	Legend			Descriptio	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0		00		0				<u> </u>	CORING:	Poor recove	ery returns of	PEAT.	nd areen a	avev	0.35	338.77		
1	1.00	40	0	0	-				sandy GR/	AVEL.	ery, returns t	i puipie a	nu green u	аусу	2.00	337.12		N = 43 (5, 7, 9, 9, 11, 14)
2	2.80	50	0	0				000 000 000	CORING: GRAVEL.	Poor recove	ery, returns c	f purple a	nd green				0 0 0 0	N = 70/75 mm (11, 14, 20, 50)
-3 -4	4.30	100	77	41		6	30		Medium st fine-graine SILTSTON Discontinu rough, plar	rong to stro d SANDST NE. Fresh to ities are me har and loca	ong, medium ONE with int o slightly wea edium to clos ally stepped.	to thinly b erbedded thered. ely space Apertures	edded, pur subordina d, smooth are tight to	rple, te to	3.10	336.02	0 0 0 0 0 0 0 0	
5	5.60	100	98	91		-			stained, loo locally sub	v open, ioca cal quartz-v -vertical.	eining. Dips	ared ,slign are sub-h	orizontal a	nd			0 0 0 0 0 0	
6	6.45	100	100	100	-	7	90											
_	7.00	100	100	100		5	50											
8 8	3.20	83	81	53		5	20		End	of Porcholo	at 8 20 m				8.20	330.92	0 0 0 0 0 0	
9									LIU		at 0.20 m							
REN Hole	IARI e cas	KS ied 0	.00-8	.20m	 I.			•		Water	Casing	Sealed	Rise	Time	WA	TER S		DETAILS
										Strike	Depth	At	То	<u>(min)</u>	N	lo wate	r strike	recorded
											Holo	Casing	Donth	0	GRO	OUND	NATER	RDETAILS
INSTALLATION DETAILS Date Tip Depth RZ Top RZ Base T								T	20	Date	Depth	Depth	Water	Con	nments	5		
24-(06-1	5	8.00))	1.00	8.20		50mm	n SP									



REPORT NUMBER

											D 07		
CONTRACT	Barna	stooka Windfarm								U	KCI Shee	≺4 et 1 of 1	1
CO-ORDINA	TES EVEL (mO	D)		RIG TYPE FLUSH			Casagrand Air/Mist	DATE DATE L	DRILLEI LOGGEI	D D	02/0 02/0	7/2015	
CLIENT ENGINEER	ESBi ESBi			INCLINATIO	ON (deg) METER (mi	n)	-90 88	DRILLE	ED BY ED BY		IG D.	SL O'Shea	a
Downhole Depth (m) Core Run Depth (m) T.C.R.%	S.C.R.% R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0				CORING: F	Poor recove	ery returns o ery, returns o	f PEAT.	d areen clav	(0.40			
2 2 40	0 0			Sandy GRA Medium str fine-grained	Tong to stro	ng, medium NE/MUDST	to thinly be ONE with ir	dded, purple	- , -,	1.80			N = 50/5 mm (18, 7, 50)
3 3.20	45 0			Discontinui rough, plan moderately	ties are me har and loca open, loca	dium to clos ally stepped. Ily clay-smea	ely spaced, Apertures a ared ,slightly	, smooth to are tight to y iron-oxide					
4.00	70 59			stained, ioc sub-vertica	ai quartz-v I.	eining. Dips	are 70 and	liocally					
4.60	30 0	-											
5 5.40 6 100	35 0 84 18												
6.85		┦		End o	f Borehole	at 6.85 m			6	6.85			
9													
REMARKS						,	<u> </u>	<u> </u>		WAT	ER ST	RIKE	DETAILS
Hole cased 0).00-6.85m	1.		-	Water Strike	Casing Depth	Sealed At	Rise To	fime (min)	Cor	mment	s r strike	recorded
						Hole	Casing	Depth to	1_	GRC	DUNDV	VATEF	RDETAILS
Date T	ON DETA	ILS RZ Top RZ Base	Тур	De	Date	Depth	Depth	Water	Comn	nents			



REPORT NUMBER

		/																
со	NTR	АСТ	Ba	arna	stooka Wi	indfarm							DRILL SHEE	.HOLE T	NO	RC: Shee	SUB1 et 1 of 1	1
CO		DINA [.]		(mO	וח				RIG TYPE			Casagrand	DATE	DRILL LOGG	ED ED	06/0 07/0	5/2015 5/2015	;
CL		ER	ES	SBi SBi	-,				FLUSH INCLINATI CORE DIA	ON (deg) METER (m	m)	Air/Mist -90 88	DRILL	ED BY	(IG D.	SL O'Shea	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lc (m	ture cing og m) 500	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0									OPEN HO returns of OPEN HO returns of cobbles OPEN HO	DLE DRILLIN peat DLE DRILLIN green/blue	NG: No reco NG: No reco sandy grave	very, observ very, observ illy clay with very, observ	ved by drille ved by drille occasional ved by drille	er as	0.30			
2	2.00	100	88	26			<u> </u>		Medium st fine-graine subordinat Discontinu rough, plai moderately stained, Di	weathered trong to stro ed SILTSTC te SANDST littles are me nar and uno y open, loca jos are 45°	rock ng, thickly to NE/MUDST ONE. Fresh edium to clo- dulating. Ape ally clay-sme and locally s	o thinly bedo ONE with ir to slightly v sely spaced ertures are t ared, slightl sub-vertical.	ded, purple, nterbedded veathered. , smooth to ight to y iron-oxide	2	2.00			
4	5.00	100	84	38			× :											
6	6.50	100	78	34			530											
- - -	7.00	100	100	62						(5	. =				7.00			
8									End o	or Borehole	at 7.00 m							
	MAR	KS													WAT	ER SI	RIKE	DETAILS
Ho	le cas	sed 0	.00-2.	.00m	1.					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	mment	s	
0012.0L0 100L													-		N	o wate	r strike	recorded
	TA 1	I A TI			11 8					Data	Hole	Casing	Depth to	Corr	GRC		VAIE	DETAILS
	INSTALLATION DETAILS Date Tip Depth RZ Top RZ Base 1								De	Dale	Depth	Depth	Water					
										I								



REPORT NUMBER

CONTRACT Barnastooka Windfarm					DRILL	HOLE I T	NO	RCS Shee	SUB2	1
CO-ORDINATES			(Casagrand	DATE	DRILLE	D	07/0	5/2015	
GROUND LEVEL (mOD)	FLUSH			Air/Mist	DATE		D	08/0	5/2015	•
CLIENT ESBI ENGINEER ESBI	CORE DIA	ION (deg) METER (mn	- n) 8	-90 38	LOGG	ED BY		IG D.	SL O'Shea	а
Core Run Depth (m) Core Run Depth (m) T.C.R.% R.Q.D.% R.Q.D.% R.Q.D.% R.Q.D.%	Legend		Descriptio	n			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
	$\frac{\sqrt{1/2}}{1/2}$ OPEN HC $\frac{1}{1/2}$ $\frac{\sqrt{1/2}}{1/2}$ returns of	DLE DRILLIN peat	G: No recove	ery, observ	ed by drille	r as	0.00			
	OPEN HC returns of cobbles	DLE DRILLIN green/blue s	IG: No recove andy gravelly	ery, observ y clay with	ed by drille occasional	ras	0.60			
	OPEN HC		G: No recove	ery, observ	ed by drille	r as	3.00			
- 3.80		DLE DRILLIN	G: No recove	ery, observ	ed by driller	r as	3.50 3.80			
4 100 100 100 300.0 5 100 95 57	returns of Medium s fine-grain subordina	weathered n strong to stror ed SILTSTOP the SANDSTO uities are mer anar and und ly open, local Dips are 45° a	ock ng, medium to NE/MUDSTC DNE. Fresh to dium to close ulating. Aper lly clay-smea and locally su	o thinly be DNE with ir o slightly w ely spaced, tures are ti red, slightly b-vertical.	dded, purple iterbedded eathered. smooth to ght to y iron-oxide	e,				
	End	of Borehole a	at 5.00 m				6.00			
							WAT	TER ST	RIKE	DETAILS
Hole cased 0.00-3.80m.		Water Strike	Casing S Depth	Sealed At	Rise To	Time (min)	Со	mment	S	
							GRO	o wate	r strike VATEF	recorded
INSTALLATION DETAILS		Date	Hole Depth	Casing Depth	Depth to Water	Comr	ments	3		
Date Tip Depth RZ Top RZ Base	Туре	_								

RC25A Box 1 of 3



RC25A Box 2 of 3



RC25A Box 3 of 3



RC25B Box 1 of 2



RC25B Box 2 of 2



RC26A Box 1 of 3



RC26A Box 2 of 3



RC26A Box 3 of 3



RC26B Box 1 of 3



RC26B Box 2 of 3



RC26B Box 3 of 3



RC27A Box 1 of 3



RC27A Box 2 of 3



RC27A Box 3 of 3



RC27B Box 1 of 3



RC27B Box 2 of 3



RC27B Box 3 of 3



RC27B Box 1 of 3



RC27B Box 2 of 3



RC27B Box 3 of 3



RC28A Box 1 of 3



RC28A Box 2 of 3



RC28A Box 3 of 3



RC28B Box 1 of 3




RC28B Box 2 of 3

RC28B Box 3 of 3



RC29A Box 1 of 3



RC29A Box 2 of 3



RC29A Box 3 of 3



RC29B Box 1 of 3



RC29B Box 2 of 3



RC29B Box 3 of 3



RC30A Box 1 of 3



RC30A Box 2 of 3



RC30A Box 3 of 3



RC30B Box 1 of 3



RC30B Box 2 of 3



RC30B Box 3 of 3



RC31A Box 1 of 4



RC31A Box 2 of 4



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RC31A Box 4 of 4



RC31B Box 1 of 3



RC31B Box 2 of 3



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RC32A Box 1 of 3



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RC32B Box 1 of 3



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RC33A Box 2 of 3



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RC33B Box 1 of 3



RC33B Box 2 of 3



RC33B Box 3 of 3



RC34A Box 1 of 3



RC34A Box 2 of 3



RC34A Box 3 of 3



RC34B Box 1 of 3



RC34B Box 2 of 3



RC34B Box 3 of 3



RC35A Box 1 of 2



RC35A Box 2 of 2



RC35B Box 1 of 3



RC35B Box 2 of 3



RC35B Box 3 of 3



RC36A Box 1 of 3



RC36A Box 2 of 3



RC36A Box 3 of 3



RC36B Box 1 of 3



RC36B Box 2 of 3



RC36B Box 3 of 3



RC37A Box 1 of 3



RC37A Box 2 of 3



RC37A Box 3 of 3



RC37B Box 1 of 3



123455789

RC37B Box 2 of 3

RC37B Box 3 of 3



RC38A Box 1 of 2



RC38A Box 2 of 2



RC38B Box 1 of 3



RC38B Box 2 of 3



RC38B Box 3 of 3



RCR1 Box 1 of 3



RCR1 Box 2 of 3



RCR1 Box 3 of 3



RCR2 Box 1 of 3



RCR2 Box 2 of 3



RCR2 Box 3 of 3



RCR3 Box 1 of 3



RCR3 Box 2 of 3



RCR3 Box 3 of 3



RCR4 Box 1 of 3


18312 - Barnastooka Windfarm - Rock Core Photographs

RCR4 Box 2 of 3



RCR4 Box 3 of 3



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18312 - Barnastooka Windfarm - Rock Core Photographs



RCSUB1 Box 1 of 2

RCSUB1 Box 2 of 2



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18312 – Barnastooka Windfarm – Rock Core Photographs

RCSUB2 Box 1 of 1



Appendix 2

Trial Pit Records

ાલલા	a	TRIAL PIT	RECO	RD					18	312	
CONTRAC	CT Barnastooka Windfarm						TRIAL P	IT NO.	TP0	01	
OGGED	BY F.C	CO-ORDINAT	ËS	508,62 572,48	24.65 E 38.18 N		DATE S	TARTED	21/05 21/05	5/2015 5/2015	
CLIENT ENGINEER	ESBI R ESBI	GROUND LE	VEL (m)	193.29	9		EXCAVA METHO	ATION D	13 To	onne Exc	cavato
								Samples	3	a)	meter
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro
0.0 Pea Sof Sou 1.0 Sof 2.0 Obs 3.0 3.0	ty TOPSOIL t to firm grey very gravelly sandy SILT wit Iders. Cobbles and boulders are subangu rounded. struction - Possible rock I of Trial Pit at 1.70m	th cobbles and ular to		0.20	193.09	L. (Slow)	AA34558	В	0.80-0.80	10 -[R]	
4.0											
≩roundw a Vater ingr Stability No instabil	ater Conditions ess at 0.20m ity Observed										

										REPORT NU	JMBER	
	3SL	т	RIAL PIT I	RECO	RD					183	312	
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	02	
LOG	GED BY	F.C	CO-ORDINAT	ES	508,57 572,42	79.60 E 27.77 N		DATE S	TARTED	Shee 21/05 TED 21/05	1 of 1 /2015 /2015	
CLIE	NT	ESBI	GROUND LEV	/EL (m)	187.5	5		EXCAVA		13 To	nne Exc	avator
ENG	NEER	ESBI							Samples	S	(eter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa	Hand Penetrom (KPa)
0.0	Peaty TO	DPSOIL		$\frac{\underline{\lambda}^{\underline{\lambda}} \cdot I_{\underline{\lambda}}}{I_{\underline{\lambda}}} \cdot \underline{\lambda}^{\underline{\lambda}} \cdot I_{\underline{\lambda}}}$	0 30	187 25						
-	Soft dar	k brown fibrous PEAT (H4-H7)			0.00	107.20			-		8	
-							1	AA34556	В	0.60-0.60	-[R]	
1.0	Soft to fil boulders subround	m grey very gravelly sandy SILT with . Cobbles and boulders are subangula ded.	cobbles and ar to	* · · · · · · · · · · · · · · · · · · ·	1.00	186.55	(Slow)				12 -[R]	
-									-			
-				××				AA34557	В	1.60-1.60		
2.0	Obstruct End of T	ion - Possible rock rial Pit at 2.00m			2.00	185.55						
-												
-												
3.0												
-												
-												
4.0												
-												
-												
Grou Wate	indwater (er ingress a	Conditions at 1.00m		1	<u> </u>	<u> </u>		<u> </u>				
Stab No in	ility Istability Ol	oserved										
Gene	eral Rema	rks										

	F									REPORT NU	JMBER	
	SSL	Т				183	312					
CON	TRACT	Barnastooka Windfarm						TRIAL PI	T NO.	TP0	03	
LOG	GED BY	F.C	CO-ORDINATE	ES	508,52 572,34	24.00 E 14.02 N		DATE ST		C 20/05 TED 20/05	1 of 1 /2015 /2015	
CLIE	NT	ESBI	GROUND LEV	′EL (m)	189.10)		EXCAVA		13 To	nne Exc	avator
ENG	NEER	ESBI							Sample	s	(1	leter
		Geotechnical Description		pue	th	ation	er Strike	ple	0	÷	e Test (KPa	d Penetrom a)
				Lege	Dep (m)	Elev	Wat	Sam Ref	Type	Dep	Van	Han (KP
0.0 	Soft blac	:k/brown fibrous PEAT (H4-H7)									20 8[R]	
- 1.0 	Soft to fi Sand is Cobbles	m blue/grey very sandy gravelly SILT fine to coarse. Gravel is angular to sul are subangular.	with cobbles. bangular.		1.20	187.90		AA19324	В	1.00-1.00	12 2[R]	
2.0 	Obstruct	ion - Possible rock		x . Q Q X .	2.40	186.70		AA19325	В	2.00-2.00		
- - -	End of T	rial Pit at 2.40m										
_ 3.0 - - - - -												
4.0 												
Grou No G	indwater Groundwate	Conditions er Observed		ıl		<u> </u>						
Stab No in	ility istability O	bserved										
Gene	eral Rema	rks										

6	And									REPORT N	JMBER	
	35L	Т	RIAL PIT	RECO	RD					18	312	
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	04	
LOG	GED BY	F.C	CO-ORDINAT	ES	508,48 572,28	30.02 E 56.08 N		DATE S	TARTEI	Shee 20/05 TED 20/05	t 1 of 1 5/2015 5/2015	
CLIE	NT	ESBI	GROUND LE	VEL (m)	195.3	6		EXCAVA		13 To	onne Exc	cavator
ENG	NEER	ESBI										
									Sample	s	Pa)	ometer
		Geotechnical Description				<u>د</u>	itrike				est (K	enetro
				Legend	Depth (m)	Elevatio	Water S	Sample Ref	Type	Depth	Vane Te	Hand Pe (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)										
	Soft brov	vn sandv gravellv SILT with rootlets. S	Sand is coarse.	×o, × ;	0.30	195.06					30	
	Gravel is	subangular.		× <u></u> , ×							12[R]	
				* × · · · × · · · · · · · · · · · · · ·								
-10				$\times \cdot \times$ $\times \circ \times \cdot \times$	e:							
1.0	Soft blue	e/grey sandy gravelly SILT with cobble	es. Sand is fine	1. <u>1</u> X	1.10	194.26		AA19326	В	1.00-1.00		
	to coarse	e. Gravel and cobbles are subangular.		× · × · ×	e.							
				× ô;								
2.0				× . %	¢			AA19327	в	2 00-2 00		
				Q.X.Q.X.				, u (1002)	Ľ	2.00 2.00		
				10.×	2 50	102.86	1					
	Soft silty	fine SAND with pockets of coarse sa	nd throughout	× . 	2.50	192.00	(Slow)					
				× 	:							
3.0	End of T	rial Pit at 3.00m		×	3.00	192.36						
4.0												
0		0									L	
Wate	er ingress a	at 2.50m										
Stab	ility											
Pit si	des unstat	ble due to water ingress										
Gene	eral Rema	rks										

(st A	The second									REPORT NU	JMBER	
138	3L		I RIAL PIT	RECO	RD					183	312	
CONTR	RACT	Barnastooka Windfarm							IT NO.	TP0	05	
LOGGI	ED BY	F.C	CO-ORDINAT	ËS	508,4 572,1	19.99 E 72.98 N		DATE ST	TARTEI	D 20/05 TED 20/05	/2015 /2015	
CLIEN	T	ESBI	GROUND LE	VEL (m)	196.4	1		EXCAVA		13 To	nne Exc	cavato
ENGINI	EER	ESBI							Sample	S		eter
		Geotechnical Description		pu	٩	ation	er Strike	ble		ء	e Test (KPa)	Penetrom
				Lege	Dept (m)	Eleva	Wate	Sam Ref	Type	Dept	Vane	Hand
0.0	Soft blac Soft brow Gravel is Soft to fir with root subround	k fibrous PEAT (H4-H7) vn sandy gravelly SILT with rootlets subangular to subrounded. m blue/grey slightly sandy slightly s lets to 1.00m. Sand is fine to coarsided.	a. Sand is coarse. gravelly SILT e. Gravel is	× · · · · · · · · · · · · · · · · · · ·	0.10	196.31 196.01	(Rapid)	AA19328	В	1.00-1.00		
2.0	End of T	rial Pit at 3 00m		x x x x x x x x x x x x x x x x x x x	3.00	193.41		AA19329	В	2.50-2.50		
4.0												
Ground No Gro Stabili No inst	dwater (bundwate ty ability Ot	Conditions Pr Observed										
Genera	al Rema	rks										



TRIAL PIT RECORD

CONT	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	06	
LOGO	GED BY	F.C	CO-ORDINAT	ES	508,36 572,09	64.51 E 94.92 N		DATE S		20/05	t 1 of 1 5/2015 5/2015	
		ESBI	GROUND LEV	/EL (m)	200.5	1		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
ENGI	NEER	ESBI							Samples		Pa)	meter
		Geotechnical Descriptio	n	Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetro (KPa)
0.0 	Soft blac large tim	k fibrous PEAT with pockets of g iber logs at 1.50m	ravelly silt and		2.20	198.31		AA19330 AA19331	В	1.50-1.50	26 8[R] 14 2[R] 10 0[R]	
Grou No Gi	ndwater roundwate	Conditions er Observed bserved										
Gene	ral Rema	ırks										



TP LOG 18312 FINAL TP LOC.GPJ IGSL

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GDT 15/7/15

stra									REPORT NU	JMBER	
igsl	ī	FRIAL PIT F	RECO	RD					183	312	
ONTRACT	Barnastooka Windfarm							IT NO.	TP0	08	
OGGED BY	F.C	CO-ORDINATI	ES	508,19 571,98	98.86 E 84.68 N		DATE S		D 20/05	5/2015	
IENT	ESBI	GROUND LEV	/EL (m)	209.2	6		EXCAVA		13 Tc	onne Exc	cavat
NGINEER	ESBI										J.
						0		Sample	is	KPa)	romete
	Geotechnical Description		Legend	Depth (m)	Elevation	₩ater Strike	Sample Ref	Type	Depth	Vane Test (Hand Penet
⁰ Soft bro 0.40m.	own very sandy very gravelly SILT with Sand is coarse. Gravel and cobbles a	rootlets to re subrounded.	×o. · × · × · × · × · × ·			(Seepage)					
			* · · · · · · · · · · · · · · · · · · ·	8							
			× × × × × × × × × × × × × × × × × × ×	e: e:							
0			ו ו ו ×	e: e:			AA19334	В	1.00-1.00		
			× · × · × · × · × · × · × · × · × · × ·								
Loose	very gravelly SAND with cobbles. Sand Gravel is rounded to subrounded. Col	d is fine to bbles are	··· · · · · · · · · · · · · · · · · ·	1.50	207.76						
subrou	nded.										
0			0.0. .0.								
			· · · · · · · · · · · · · · · · · · ·				AA19335	В	2.50-2.50		
			0.0								
0 End of	Trial Pit at 3 10m			3.10	206.16						
.0											
roundwater apid water ir	r Conditions ngress from G.L		1	I	1		1]		I
t ability t sides unsta	able due to water ingress										
eneral Rem	arks										





REPORT NUMBER



TRIAL PIT RECORD

18312

CON	TRACT Barna	stooka Windfarm						TRIAL P	IT NO.	TP0	11	
LOG	GED BY F.C		CO-ORDINAT	ËS	508,09 571,72	95.39 E 25.36 N		DATE S	TARTED	Shee 20/05	t 1 of 1 5/2015	
CLIE	NT ESBI		GROUND LEV	VEL (m)	232.18	8		EXCAVA		ED 20/08	onne Exc	avator
ENG	NEER ESBI											<u> </u>
									Samples		(Pa)	omete
		Geotechnical Description		g	_	tion	· Strike	٥			Test (ŀ	Penetr
				Leger	Depth (m)	Eleva	Watei	Samp Ref	Type	Depth	Vane	Hand (KPa)
0.0	TOPSOIL: Soft I Sand is coarse.	orown sandy gravelly CLAY v Gravel is subrounded.	vith rootlets.	$\frac{\underline{x}^{\underline{\lambda}} \cdot \underline{h}_{\underline{\lambda}}}{\underline{y}_{\underline{\lambda}} \cdot \underline{x}^{\underline{\lambda}} \cdot \underline{h}_{\underline{\lambda}}} \cdot \underline{x}^{\underline{\lambda}} \cdot \underline{h}_{\underline{\lambda}}}$								
-				<u>. 16</u> . <u>16</u> 1 <u>7</u> . <u>17</u> . <u>1</u>								
-	Soft brown sand	y gravelly CLAY with cobbles	. Sand is		0.70	231.48						
- - 1.0	coarse. Gravel is subrounded.	s subrounded to rounded. Co	bbles are					AA19339	В	1.00-1.00		
-												
-												
-	(Medium dense	to dense) Clayey sandy GRA	VEL with		1.80	230.38						
2.0	cobbles. Sand is	coarse. Gravel is subrounde	d to rounded.					AA19340	В	2.00-2.00		
-				0000								
-												
-		10.00			3.00	229.18						
	End of Trial Pit a	at 3.00m										
-												
-												
4.0												
-												
-												
-												
Grou No G	Indwater Condition Broundwater Observ	ons rved										
Stab No in	ility Istability Observed	l										
Gene	eral Remarks											



GDT 15/7/15 18312 FINAL TP LOC.GPJ IGSL TP LOG

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- St	And	-								REPORT NU	JMBER	
	BSL	I	RIAL PIT I	RECO	RD					183	312	
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	13	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,90 571,5	65.68 E 55.72 N		DATE S	TARTE	21/05 TED 21/05	2015 2015	
	NT	ESBI	GROUND LEV	/EL (m)	245.6	9		EXCAVA METHO		13 To	nne Exc	avator
ENG		ESBI							Sample	s		ter
		Out the ind December					e				(KPa)	etrome
		Geolecrinical Description		Legend	Depth (m)	Elevation	Water Stril	Sample Ref	Type	Depth	Vane Test	Hand Pene (KPa)
0.0	TOPSO	L with roots		<u>x 1/2 x 1/2</u> 1/2 x 1/2 x 1/2	0.25	245.44						
	Soft to fi and bou	rm grey/brown slightly gravelly CLAY ders. Cobbles and boulders are subar	with cobbles ngular to		0.25	245.44		AA34552	В	0.40-0.40	9	
	Soft to fi boulders	rm grey very gravelly sandy SILT with . Cobbles and boulders are subangula	cobbles and ar to		0.00	210.10					-[R]	
- 1.0	subroun	ded.		× × ×				AA34553	в	1.00-1.00		
				×···· ×··· ×··· ×···	4 40	044.00					10 -[R]	
	Obstruct End of T	ion - Possible large boulders rial Pit at 1.40m			1.40	244.29	()					
2.0												
3.0												
-												
4.0												
Grou	Indwater	Conditions										
Wate	er ingress a	at 1.30m										
Stab	ility											
INO IN	istability O	bservea										
Gene	eral Rema	rks										

	т		REPORT N								
	BSL		_						18	312	
CON	TRACT Barnastooka Windfarm						TRIAL P	PIT NO.	TP0 Shee	9 14 et 1 of 1	
LOG	GED BY F.C	CO-ORDINAT	ËS	507,90 571,49	07.92 E 90.05 N		DATE S DATE C	TARTEI OMPLE	21/0 TED 21/0	5/2015 5/2015	
	INT ESBI	GROUND LEV	VEL (m)	265.2	5		EXCAV/ METHO	ATION D	13 Te	onne Exc	cavator
								Sample	s		eter
	Geotechnical Description					ike				t (KPa)	letrome
			Legend	Depth (m)	Elevation	Water Str	Sample Ref	Type	Depth	Vane Tes	Hand Per (KPa)
0.0	TOPSOIL		<u>xh 1, </u>								
-	Soft to firm brown/grey slightly gravelly CLAY and boulders	with cobbles		0.30	264.95	1				9 -[R]	
-				0.80	264.45	(Slow)	AA34651	В	0.60-0.60	10 -[R]	
	Obstruction - Possible large boulders End of Trial Pit at 0.80m			0.00	204.45					7	
F										-[R]	
-											
-											
2.0											
-											
-											
3.0											
-											
-											
-											
4.0											
-											
Grou	undwater Conditions										
VVate	er Ingress at U.oum										
Stab No ir	ility Istability Observed										
Gen	eral Remarks										
2											
2											



18312 FINAL TP LOC.GPJ TP LOG

IGSL

15/7/15 GDT

IGSL

	And									REPORT NU	JMBER	
	3SL	Т	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Barnastooka Windfarm						TRIAL PI	T NO.	TP0	16	
LOG	GED BY	C.Killaly	CO-ORDINATE	ES	507,70 571,44	03.97 E 42.93 N		DATE ST	ARTED	0 01/04 TED 01/04	/2015 /2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	'EL (m)	284.58	8		EXCAVA METHOD	TION	13 To	nne Exc	avator
									Sample	s	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
0.0 	Soft blac Soft grey content.	k brown fibrous PEAT (H4-H7) / blue sandy very gravelly SILT with m Gravel is subangular to angular	edium cobble	2、20×20×20×20×20×20×20×20×20×20×20×20×20×2	1.30	283.28	(Moderate)	AA21679 AA21679T AA21680 AA21680T	B D D	0.60-0.60 0.60-0.60 1.60-1.60 1.60-1.60	14 4[R] 16 2[R]	
2.0 	End of T	rial Pit at 3.10m		b b cor	3.10	281.48		AA21681 AA21681T	B D	2.70-2.70 2.70-2.70		
- - - - - - - - - - - - - - - - - - -	Indwater	Conditions										
Grou	ndwater ol	oserved at 1.3mbgl										
Trial	Pit unstab	e from 1.3mbgl										
Gene	eral Rema	rks										



TRIAL PIT RECORD

CON	TRACT	Barnastooka Windfarm							IT NO.	TP0	17	
LOG	GED BY	C.Killaly	CO-ORDINAT	ES	507,59 571,43	93.96 E 33.03 N		DATE S		01/04	1/2015	
CLIE	NT	ESBI	GROUND LE	VEL (m)	292.2	7		DATE C		ED 01/04	nne Exc	avator
ENG	INEER	ESBI)			
									Samples		Pa)	meter
		Geotechnical Descr	iption	Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetro (KPa)
0.0	Soft blac	k fibrous PEAT with rootlets	(H4-H7)		0.20	292.07					_	
-	Soft brov	vn sandy gravelly CLAY with	rootlets/organics					AA21676 AA21676T	B D	0.20-0.20 0.20-0.20	8 2[R]	
- - - - 1.0	Firm grey	y blue sandy very gravelly SIL	T with cobbles and		0.90	291.37		AA21677 AA21677T	B D	0.60-0.60 0.60-0.60		
- - - - -	boulders	. Gravel is subrounded to suc	angular		1 70	290 57		AA21678	В	1.60-1.60		
- - 2.0	Obstructi End of T	ion -possible bedrock rial Pit at 1.70m			1.70	290.57		AA21678T	D	1.60-1.60		
-												
- - -												
- - - - 4.0												
- - -												
- - - -												
Groι No G	Indwater (Groundwate	Conditions er Observed										
Stab No ir	ility nstability Ot	oserved										
Gene	eral Rema	rks										

REPORT NUMBER TRIAL PIT RECORD 18312 1920 TRIAL PIT NO. **TP018** CONTRACT Barnastooka Windfarm SHEET Sheet 1 of 1 **CO-ORDINATES** 507,486.11 E DATE STARTED 01/04/2015 LOGGED BY C.Killaly 571,438.00 N DATE COMPLETED 01/04/2015 **GROUND LEVEL (m)** 297.09 EXCAVATION METHOD 13 Tonne Excavator CLIENT ESBI ENGINEER ESBI Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Legend Elevation Sample Ref Depth Depth (m) Type 0.0 Soft brown sandy gravelly CLAY with rootlets/organics ÷ġ. 3 AA21674 В 0.50-0.50 20 <u>. Ö</u>. AA21674 D 0.50-0.50 2[R] 0.80 296.29 Firm grey blue sandy very gravelly SILT with medium cobble and boulder content. Gravel is subrounded to subangular 1.0 $\mathcal{O}_{\mathcal{O}}^{\mathcal{O}}$ AA21675 1.50-1.50 В D 1.50-1.50 AA21675 2.00 295.09 Obstruction -possible bedrock End of Trial Pit at 2.00m 2.0 3.0 4.0 GDT 15/7/15 **Groundwater Conditions** 18312 FINAL TP LOC.GPJ IGSL. No Groundwater Observed Stability No instability Observed **General Remarks**

TP LOG

. Igsl

stra								F	REPORT NU	JMBER	
2 Igsl	Т	RIAL PIT I	RECO	RD					183	312	
ONTRACT Ba	arnastooka Windfarm						TRIAL P	T NO.	TP0	19	
DGGED BY C.	Killaly	CO-ORDINAT	ES	507,38 571,47	34.99 E 70.00 N		DATE SI	ARTED	01/04 ED 01/04	t 1 of 1 1/2015 1/2015	
LIENT ES	SBI	GROUND LEV	/EL (m)	303.90	6		EXCAVA		13 To	nne Exc	avato
NGINEER ES	SBI										L .
								Samples	·	Pa)	mete
	Geotechnical Description		egend)epth m)	levation	Vater Strike	ample čef	ype	lepth	'ane Test (K	land Penetro
.0 Soft black fit	prous PEAT with rootlets (H4-H7)				ш	>	01	H		>	
Soft/firm gre cobble and b	y blue sandy very gravelly SILT w poulder content	ith medium		0.20	303.76		AA21672	В	0.50-0.50	24 6[R]	
Rootlets/Org	ganics present from GL to 0.7mbg	Ι		8			AA21672T	D	0.50-0.50		
Becoming si	ilty GRAVEL from 1.3mbgl		X X X X X X X X X X X X X X X X X X X				AA21673 AA21673T	B D	1.50-1.50 1.50-1.50		
Obstruction End of Trial	-possible bedrock Pit at 1.80m										
0											
0											
o Groundwater Con	iditions bserved				· /		·		<u> </u>		
ability	nved										
eneral Remarks											

Arra								REPORT N	JMBER	
IGSL	TRIAL PIT	RECO	RD					18	312	
CONTRACT Barnastooka Windfarm						TRIAL P	IT NO.	TP0	20	
OGGED BY C.Killaly	CO-ORDINA	TES	507,2 571,4	79.84 E 85.04 N		DATE S	TARTEI	Shee 0 01/04 TED 01/04	t 1 of 1 1/2015 1/2015	
LIENT ESBI	GROUND LE	EVEL (m)	309.2	1		EXCAVA		13 Tc	onne Exc	cavate
NGINEER ESBI							.			
							Sample	s	a)	neter
Geotechnical Descr	iption	jend	pth	vation	tter Strike	mple f	ЭС	pth	ne Test (KF	nd Penetro
0		L L L L L L L L L L L L L L L L L L L	D De	Ele	Ma	Sa Re	Ту	De	Va	На
.0 Soft black brown fibrous PEAT (H4-H	7)	<u>1, 1, 1</u>							I	
Soft arey brown sandy gravelly CLAY	with rootlets/organics	<u>\\/</u> \//	0.40	308.81		AA21670	в	0 40-0 40	30	
Set g. c, storm oundy gratery OLAT					1	AA21670T	D	0.40-0.40	2[R]	
Firm grey blue sandy gravelly SILT wi	th cobbles and	×02	0.80	308.41	(Moderate)			1	
boulders. Gravel is subrounded to sub	bangular.	× (.)× ; × (×)							1	
Recoming stiff from 1.3 mbal		××××××	*						1	
becoming sum norm r.smbgr		$ \begin{array}{c} \widehat{} \\ \times \\ \cdot \\ \cdot \\ \cdot \\ \end{array} \begin{array}{c} \widehat{} \\ \cdot \\ \cdot \\ \cdot \\ \end{array} \begin{array}{c} \widehat{} \\ \cdot \\ \cdot \\ \cdot \\ \end{array} \begin{array}{c} \widehat{} \\ \cdot \\ \cdot \\ \cdot \\ \end{array} \begin{array}{c} \widehat{} \\ \cdot \\ \cdot \\ \cdot \\ \end{array} \begin{array}{c} \widehat{} \\ \cdot \\ \cdot \\ \cdot \\ \end{array} \begin{array}{c} \widehat{} \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \end{array} \begin{array}{c} \widehat{} \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \end{array} \begin{array}{c} \widehat{} \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \end{array} \begin{array}{c} \widehat{} \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \end{array} \begin{array}{c} \widehat{} \\ \cdot \\$				AA21671 AA21671T	B D	1.40-1.40	1	
		×U ×1 . ×.~ × • • ×.	1.80	307 41					1	
End of Trial Pit at 1.80m			1.00	007.41					1	
0									1	
									1	
									1	
									I	
0									1	
									1	
									1	
									1	
0									1	
									1	
									1	
									I	
									1	
roundwater Conditions			1							1
iounuwalei observeu al olohibyi										
a hilitha										
rial Pit unstable from 0.8mbgl										
eneral Remarks										



18312 FINAL TP LOC.GPJ IGSL. . Igsl

TP LOG

GDT 15/7/15

-Az											
IGSL		I KIAL PIT RE	ECO	κIJ					18	312	
CONTRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	22 et 1 of 1	
LOGGED BY	C.Killaly	CO-ORDINATES	6	507,08 571,49	31.96 E 96.00 N		DATE S		01/04	4/2015 4/2015	
	ESBI	GROUND LEVE	L (m)	313.54	1		EXCAVA	ATION	13 To	onne Exc	cavator
								Samples	6		eter
	Geotechnical Description				-	rike				st (KPa	netrom
			egend	epth n)	levation	Vater St	ample tef	ype	lepth	ane Te	land Pe <pa)< td=""></pa)<>
0.0 Soft bla	ck fibrous PEAT with rootlets (H4-H7	r) <u></u>		05	ш	>	о ш	H		>	τe
Stiff gre	y blue sandy very gravelly SILT with	occasional		0.40	313.14		AA21666	В	0.40-0.40	22 8[R]	
cobbles subrour	and boulders. Gravel, cobble and bo ded to subangular	ulders are	∩Q: >×° ×	0.70	312.84		AA21666T AA21667 AA21667T	D B D	0.40-0.40 0.60-0.60 0.60-0.60		
End of T	Trial Pit at 0.70m										
2.0											
3.0											
4.0											
Groundwater	Conditions er Observed										
Stability No instability C	Dbserved										
General Rema	arks										

5	And								F	REPORT NU	JMBER	
	SSL	т	RIAL PIT I	RECO	RD					183	312	
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	23 t 1 of 1	
LOG	GED BY	C.Killaly	CO-ORDINAT	ES	506,97 571,48	79.00 E 34.00 N		DATE ST	TARTED OMPLET	01/04 ED 01/04	/2015 /2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LE	/EL (m)	314.32	2		EXCAVA METHO	TION D	13 Tc	onne Exc	avator
									Samples		a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)
0.0	Soft blac	k fibrous PEAT with rootlets (H4-H7)			0.20	314.12					16	
- - - -							1	AA21664 AA21664T	B D	0.50-0.50 0.50-0.50	4[R]	
- - - -	Soft grey cobble a are suba	v blue very sandy very gravelly SILT w nd boulder content. Gravel, cobbles ar ngular to subrounded	ith medium nd boulders	* 0x x *	1.00	313.32	(Moderate)					
-	Becomir	ig firm/stiff from 1.5mbgl		× · × ×				AA21665 AA21665T	B D	1.50-1.50 1.50-1.50		
2.0	Obstruct End of T	ion -possible bedrock rial Pit at 1.90m		×L/ × 1	1.90	312.42						
-												
-												
- - - 3.0												
-												
-												
- - - 4.0												
-												
-												
-												
Grou Grou	Indwater (ndwater ol	Conditions oserved at 1.0m										
Stab Unsta	ility able from 7	I.0mbgl										
Gene	eral Rema	rks										

										REPORT N	UMBER		
	J BSL	Т											
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	24		
LOG	GED BY	C.Killaly	CO-ORDINAT	ES	506,88 571,4	83.06 E 57.99 N		DATE S	TARTED	Shee 31/03 TED 31/03	et 1 of 1 3/2015 3/2015		
CLIE	NT	ESBI	GROUND LEV	/EL (m)	319.0	9		EXCAVA		13 To	onne Exc	cavator	
ENG		ESBI							Sample	5	(8	leter	
		Geotechnical Description		-egend	Depth (m)	Elevation	Nater Strike	Sample Ref	Lype	Jepth	/ane Test (KPa	Hand Penetrom KPa)	
0.0	Soft blac	k fibrous PEAT with rootlets (H4-H7)			0 10	318 99		0, 12					
- - - - - - - - - - - - -	Soft grey boulders Becomin Obstruct End of T	v blue sandy gravelly SILT with cobble . Gravel is subangular to angular g silty GRAVEL from 0.9mbgl ion -possible bedrock rial Pit at 1.20m	es and		1.20	317.89		AA21663 AA21663T	B D	0.60-0.60 0.60-0.60			
- 3.0 - - - - -													
- - - - - -													
- - -													
Grou No G Stab	ווויע illity היוויע חו	Conditions er Observed		<u> </u>	<u> </u>							<u> </u>	
Gene	eral Rema	rks											

	A									REPORT N	UMBER	
	J.J. BSL	Т	RIAL PIT	RECO	RD					18	312	
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	25	
LOG	GED BY	C.Killaly	CO-ORDINAT	ËS	506,78 571,44	32.02 E 41.97 N		DATE S	TARTE	Shee D 31/03	et 1 of 1 3/2015 3/2015	
CLIE	NT	ESBI	GROUND LEV	VEL (m)	322.3	2		EXCAV	ATION	13 To	onne Exc	cavator
ENG	INEER	ESBI		1				METHO	D			
									Sample	es	(Pa)	ometer
		Geotechnical Description		-egend	Depth (m)	Elevation	₩ater Strike	Sample Ref	Type	Jepth	∕ane Test (ŀ	Hand Peneti (KPa)
0.0	Soft blac	k fibrous PEAT with rootlets (H4-H7)		<u> </u>			(Slow)					
-												
								AA21661 AA21661T	B D	0.50-0.50 0.50-0.50	12 0[R]	
- 1.0 	Soft/firm	grey blue sandy gravelly SILT with ro	otlets/organics	× · · · · · · · · · · · · · · · · · · ·	1.10	321.22		AA21662 AA21662T	B D	1.00-1.00 1.00-1.00	22 2[R]	
	Dense/ve	ery dense grey sandy angular GRAVE	L and	ו׷×	1.50	320.82						
Ē	Obstruct	ion -possible bedrock			1.80	320.52						
- - - - - - - - - - - - - - - - - - -												
Grou	undwater of	conditions oserved at Ground Level										
Stab No ir	ility nstability Ol	oserved										
Gene	eral Rema	rks										



GDT 15/7/15 18312 FINAL TP LOC.GPJ IGSL

TP LOG

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	An								REPORT N	UMBER	
		RIAL PIT F	RECO	RD					18	312	
CON	ITRACT Barnastooka Windfarm						TRIAL P	IT NO.	TP0	27	
LOG	GED BY C.Killaly	CO-ORDINATE	ES	506,59 571,30	91.00 E 51.00 N		DATE S	TARTEI	D 31/03 TED 31/03	3/2015 3/2015	
CLIE	ENT ESBI	GROUND LEV	'EL (m)	337.30	D		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
ENG	INEER ESBI										J.
								Sample	is	(Pa)	omete
	Geotechnical Description		Я		ю	Strike	a			⁻ est (Þ	Penetr
			Legen	Depth (m)	Elevati	Water	Sample Ref	Type	Depth	Vane 1	Hand F (KPa)
0.0	Soft black fibrous PEAT with rootlets (H4-H7)										
-	Firm grey blue sandy very gravelly SILT with m	edium cobble	*	0.30	337.00		AA21654 AA21654T	B	0.20-0.20	20 4[R]	
	angular		*				AA32059	B	0.60-0.60		
-			×	8							
1.0											
-	Obstruction possible bodrock		×00 × ×	1.40	335.90		AA21655 AA21655T	B D	1.20-1.20 1.20-1.20		
	End of Trial Pit at 1.40m						AA32061	В	1.60-1.60		
-											
2.0											
-											
-											
-											
3.0											
-											
4.0 -											
-											
2 -											
Bi Grou	undwater Conditions Broundwater Observed										
5											
Stab No ir	ility Istability Observed										
Gen	eral Remarks										
50											



TRIAL PIT RECORD

CON	TRACT Barnastooka Windfarm						TRIAL P SHEET	IT NO.	TP0 Shee	28 t 1 of 1	
LOG	GED BY C.Killaly	CO-ORDINAT	ES	506,50 571,3	06.99 E 18.97 N		DATE S	TARTED OMPLET	30/03 ED 30/03	3/2015 3/2015	
CLIE ENGI	NT ESBI NEER ESBI	GROUND LE	/EL (m)	339.6)		EXCAVA METHO	ATION D	13 To	onne Exc	avator
								Samples		a)	neter
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetror (KPa)
0.0	Soft black fibrous PEAT with rootlets (H4-H7)		<u>, ,, ,,</u>								
-	Soft brown sandy gravelly CLAY with rootlets			0.30	339.30						
- - - 1.0	soft grey blue sandy gravelly SILT with mediur boulder content. Gravel, cobble and boulder ar to angular	n cobble and re subangular	*@ × , , , , , , , , , , , , , , , , , ,	0.60	339.00		AA21652 AA21652T	B D	0.60-0.60 0.60-0.60		
- - - - - 2.0	Becoming silty GRAVEL from 1.7mbgl						AA21653 AA21653T	B D	1.80-1.80 1.80-1.80		
-	Obstruction -possible bedrock End of Trial Pit at 2.20m			2.20	337.40						
3.0											
- - - 4.0 - -											
Grou No G	ndwater Conditions roundwater Observed										
Stab No in	ility stability Observed		_	_		_	_			_	_
Gene	eral Remarks										

											JMBER	
	jsl	Т	RIAL PIT I	RECO	RD					18	312	
CONT	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	29	
					500.00			SHEET		Shee	t 1 of 1	
LOGO	GED BY	C.Killaly	CO-ORDINAT	ES	506,32 571,24	26.09 E 40.22 N		DATE S	TARTED OMPLE	30/03 TED 30/03	3/2015 3/2015	
CLIEN	NT	ESBI	GROUND LEV	VEL (III)	541.4	J		EXCAVA METHO	ATION D	13 To	onne Exc	avator
ENGI	NEER	ESBI							Samples	6	(F	leter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetron (KPa)
0.0	Soft blac	k fibrous PEAT with rootlets (H4-H7)					(Slow)					
-	Soft brow	wn sandy gravelly CLAY with rootlets			0.45	341.01		AA16698 AA16698T	B D	0.40-0.40 0.40-0.40	16 4[R]	
1.0	Soft/firm	grey blue sandy gravelly SILT. Grave	l is subangular		0.90	340.56						
· · · · · · · · · · · · · · · · · · ·	Becomir Obstruct End of T	ig firm to stiff from 1.8mbgl ion -possible bedrock irial Pit at 2.50m		x x x x x x x x x x x x x x x x x x x	2.50	338.96		AA16699 AA16699T	B D	1.80-1.80 1.80-1.80		
3.0												
4.0												
Grou Grour	ndwater of	Conditions bserved between GL and 0.9mbgl		1	<u>.</u>		L					<u> </u>
Stabi No ins	lity stability O	bserved										
Gene	ral Rema	rks										

										REPORT NU	JMBER	
	GSL	т	RIAL PIT	RECO	RD					18	312	
CON	ITRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	30	
LOG	GED BY	C.Killaly	CO-ORDINAT	ES	506,23 571,19	34.02 E 90.96 N		DATE S	TARTEI OMPLE	Shee 30/03 TFD 30/03	t 1 of 1 /2015 /2015	
CLIE	ENT	ESBI	GROUND LE	VEL (m)	341.3	2		EXCAVA		13 To	nne Exc	cavator
ENG	INEER	ESBI			1			METHO	D			
							_		Sample	s	(Pa)	rometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (ŀ	Hand Penet (KPa)
0.0	Soft blac	k fibrous PEAT with rootlets (H4-H7)										
-	Soft brov	wn sandy gravelly CLAY. Gravel is sul	bangular		0.50	340.82		AA16696 AA16696T	B D	0.50-0.50 0.50-0.50	22 6[R]	
- - - -	Soft/firm content.	grey blue sandy gravelly SILT with m Gravel is subangular	edium cobble	×0× ×	1.00	340.32						
-												
				× · · · · · · · · · · · · · · · · · · ·								
- 2.0					2.40	338.92		AA16697 AA16697T	B D	2.00-2.00 2.00-2.00		
- - -	End of T	ion -possible bedrock irial Pit at 2.40m										
- - - -												
-												
4.0												
1 15///15												
סקרים Broi No C	undwater Groundwate	Conditions or Observed]		_ 1]		
Stat	bility Instability O	bserved										
	oral Pomo	rke										
gen Clarker	erai kema	1172										
IGSL												

										REPORT NU	JMBER			
	プー 3L	I		183	312									
CONTR	ACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	31			
				:c	506.11	39 04 E		SHEET		Shee	t 1 of 1			
LOGGE	D BY	C.Killaly			571,1	52.83 N		DATE S	OMPLE	FED 30/03	3/2015 3/2015			
CLIENT	-	ESBI	GROUND LEV	EL (m)	342.7	1		EXCAVA		13 Tc	onne Exc	cavator		
ENGINE	ER	ESBI												
									Samples	6	(e	leter		
		Controbution Description					ke				(KP	etron		
		Geolechnical Description		pu	c	ition	r Stri	e			Test	Pen		
				-egei	Depth (m)	Eleva	₩ate	Samp Ref	Гуре	Depth	/ane	Hand KPa		
^{0.0} S	Soft blac	k fibrous PEAT with rootlets (H4-H7)		<u> </u>			(Slow)				-			
			-											
				<u>ر بر برما</u> بر <u>م</u> بر برما	0.50	342.21			_		30			
S	Soft brov	vn sandy gravelly CLAY. Gravel is su	bangular	-°	0.70	342.01		AA16694 AA16694T	В D	0.50-0.50 0.50-0.50	6[R]			
F S	Firm grey Subangu	y blue sandy very gravelly SILT. Gra∖ lar	elis	^^,× ^, × _,× ;										
1.0			:	* · · · · · · · · · · · · · · · · · · ·										
			:	× · · × , · × · ~ ,										
				. ×. × ×°. ×				AA16695	В	1.60-1.60				
			:	×				AA166951	D	1.60-1.60				
2.0				× ·× · · · · · · · · · · · · · · · · ·										
C	Obstructi	ion -possible bedrock		<u> </u>	2.20	340.51								
		nai Pit at 2.20m												
3.0														
4.0														
Ground Ground	dwater (water ob	Conditions oserved between GL and 0.5mbgl												
Stahilit	v													
No insta	ability Ob	oserved												
Genera	l Rema	rks												

	An									REPORT N	UMBER	
	35L	Т	RIAL PIT I	RECO	RD					18	312	
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	32	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,03 571,14	35.96 E 19.96 N		DATE S	TARTEI	Shee D 15/05 TED 15/05	t 1 of 1 5/2015 5/2015	
CLIE	NT	ESBI		/EL (m)	352.2	1		EXCAVA		13 To	onne Exc	avator
ENG	INEER	ESBI		1				METHO	כ			1
									Sample	s	(Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (k	Hand Penetr (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u><u> </u></u>							-	
	Soft to fil coarse. (rm brown sandy gravelly SILT with roo Gravel is angular to subangular.	otlets. Sand is	× · · · × · · × ·	0.30	351.91		AA20479	В	0.30-0.30	22 10[R]	
- - - - - - - -	Soft to fir is fine to Cobbles	rm blue/grey sandy gravelly SILT with coarse. Gravel is subangular to subro are subangular.	cobbles. Sand bunded.	× × × × × × × × × × × × × × × × × × ×	0.90	351.31		AA20480	В	0.90-0.90		
2.0				ૢૺૢૢૢૢૢૢૢૢૢૢૢઌૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢ	3.00	340.21		AA20481	В	2.50-2.50		
3.0 	End of T	rial Pit at 3.00m			0.00	010.21						
Grou	Indwater (Groundwate	Conditions er Observed										
OC: CEL												
Stab	ility istability Ol	bserved										
Ger IP LOG 18312	eral Rema	rks										


GDT 15/7/15 18312 FINAL TP LOC.GPJ IGSL TP LOG . Igsl

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	J.J. SSL	Т	RIAL PIT F	RECO	RD					18	312	
CON	ITRACT	Barnastooka Windfarm							PIT NO.	TP0	34	
LOG	GED BY	F.C	CO-ORDINAT	ES	505,90 571,33	67.04 E 35.01 N		DATE S		D 15/08	5/2015 5/2015	
CLIE	NT	ESBI	GROUND LEV	/EL (m)	377.5	1		EXCAV		13 To	onne Exc	cavator
ENG	INEER	ESBI										
									Sample	s	a)	meter
		Geotechnical Description				_	trike				st (KF	enetro
				gend	pth	vatio	tter St	mple	e	pth	ne Te	nd Pe Pa)
0.0				Ľ	Ð E	Ш	Ma	Sai	T	De	Va	Н К Г К
-	Soft blac	ck fibrous PEAT (H4-H7)		<u></u>	-							
Ē				$\frac{\langle 1_{j} \rangle \langle 1_{j} \rangle}{\langle 1_{j} \rangle \langle 1_{j} \rangle}$								
	Soft to fi	rm blue/grey sandy gravelly SILT with	cobbles. Sand	*0. · × ;	0.60	376.91		AA20486	В	0.50-0.50	24 10[R]	
-	is fine to Cobbles	coarse. Gravel is subangular to subro are subangular.	ounded.	× × ×	*							
1.0				× × · ×	Ì							
				ו••••••••••••••••••••••••••••••••••••	*							
-				× · · ×	*							
-					1 *							
2.0				× × • × • ×	*							
-				× × ×	*							
-					*				_			
-				$(\mathcal{X}, \mathcal{X}, \mathcal{Y})$	*			AA20487	В	2.50-2.50		
-				QX. %	3.00	374 51						
- 3.0	End of T	rial Pit at 3.00m			5.00	574.51						
-												
-												
4.0												
-												
-												
5/7/15												
GDT	un altare 4	Conditions										
୍ରା Grou ଆଧାର ଅନ୍ତ	Groundwater	er Observed										
0C.GP												
Idd Stab	oility nstability O	bserved										
18312 Gen	eral Rema	ırks										
, LOG												
IGSL TI												

	A									REPORT N	JMBER	
	35L	Т	RIAL PIT	RECO	RD					18	312	
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	35	
LOG	GED BY	F.C.	CO-ORDINAT	ËS	506,0 ⁻ 571,42	10.74 E 21.09 N		DATE S	TARTE	Shee 0 15/05 TED 15/05	t 1 of 1 5/2015 5/2015	
		ESBI	GROUND LEV	VEL (m)	375.70)		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
ENG		ESDI							Sample	s	(E	neter
		Geotechnical Description		egend	lepth n)	levation	Vater Strike	ample tef	ype	lepth	ane Test (KP	land Penetron ≮Pa)
0.0	Soft blac	k fibrous PEAT (H4-H7)			05	ш	5	S R	F		>	τ÷
-	Soft/firm fine to co	blue/grey sandy gravelly SILT with co parse. Gravel is subangular to subrou	obbles. Sand is nded. Cobbles	x x x x x x x x	0.70	375.00		AA21582	В	0.50-0.50	22 8[R]	
- 1.0 		пушаг.		ઌૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢ	2.00	372 70		AA21583	В	2.60-2.60		
_ 3.0 	End of T	rial Pit at 3.00m			3.00	572.70						
Grou	Inductor	Conditions										
No G	roundwate	er Observed										
Stab No in	ility Istability Ol	oserved										
Gene	aral Rema	rks										
Gene		ing										

REPORT NUMBER TRIAL PIT RECORD 18312 1920 Barnastooka Windfarm TRIAL PIT NO. **TP036** CONTRACT SHEET Sheet 1 of 1 **CO-ORDINATES** 506,121.17 E DATE STARTED 27/03/2015 LOGGED BY F.C 571,570.42 N DATE COMPLETED 27/03/2015 **GROUND LEVEL (m)** 399.93 EXCAVATION 13 Tonne Excavator CLIENT ESBI METHOD ENGINEER ESBI Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation Sample Ref Legend Depth Depth (m) Type 0.0 Soft dark brown fibrous PEAT (H4-H7) <u>// \// \/</u> <u>\/</u> \// <u>1, \1, \</u> AA19308 В 0.50-0.50 3 0.60 399.33 Loose brown peaty silty GRAVEL with cobbles and boulders. -[R] Cobbles and boulders are subangular to subrounded. 1.0 11 -[R] AA19309 В 1.20-1.20 1.40 398.53 Loose grey silty sandy GRAVEL with cobbles and boulders. Cobbles and boulders are subangular to subrounded. 2.0 AA19310 2.20-2.20 B D: O×0 0.00 3.00 396.93 3.0 End of Trial Pit at 3.00m 4.0 Groundwater Conditions No Groundwater Observed Stability No instability Observed **General Remarks** *Pit moved 30m to avoid ancient stone circle

GDT 15/7/15

18312 FINAL TP LOC.GPJ IGSL

TP LOG

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18312 FINAL TP LOC.GPJ IGSL

.GDT 15/7/15

TP LOG IGSL

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	JSL JSL	Т	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Barnastooka Windfarm						TRIAL PI	T NO.	TP0	38	
		FC	CO-ORDINATI	ES	506,26	62.00 E		DATE ST	ARTE	Sheet 27/03	: 1 of 1 /2015	
LUG	GED B1	r.u	GROUND LEV	/EL (m)	398.54	96.04 N 1		DATE CO		TED 27/03	/2015	a votor
CLIE ENGI	NT NEER	ESBI ESBI		. ,				METHOD)	13 10		avaloi
								:	Sample	5	(Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (k	Hand Penetr (KPa)
0.0	Soft dark	s brown PEAT (H4-H7)			0 20	398 34						
-	Soft to fil are suba	m grey sandy gravelly SILT with cobb ngular to subrounded.	les. Cobbles	* 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,				AA19313	В	0.50-0.50	6 -[R]	
1.0					: : :			AA19314	В	1.50-1.50	14 -[R]	
2.0	(Loose to cobbles to to subroo	o medium dense) Brown sandy GRAV and boulders. Cobbles and boulders a unded.	EL with re subangular	× × • • • • • • • • • • • • • • • • • •	2.00	396.54		AA19315	В	2.50-2.50		
3.0	End of T	rial Pit at 2.50m		8	3.00	395.54						
4.0												
Grou No G	ndwater (roundwate	Conditions Pr Observed										
Stab No in	ility stability Ol	oserved										
Gene	eral Rema	rks										

IGSL TP LOG 18312 FINAL TP LOC.GPJ IGSL.GDT 15/7/15

	TRIAL PIT RECORD										312	
CON	ITRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	39	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,4 ⁷ 571,8 ⁷	12.96 E 16.90 N		DATE S		Shee D 27/03	t 1 of 1 3/2015	
CUE	NT	FSBI	GROUND LEV	/EL (m)	389.2	1		EXCAVA		13 To	nne Exc	cavator
ENG	INEER	ESBI		1				METHO	2	1		
									Sample	s	(Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (k	Hand Penetr (KPa)
0.0	Soft dark	k brown fibrous PEAT (H4-H7)										
-	Firm gre subangu	y sandy gravelly SILT with cobbles. Co lar to subrounded.	obbles are	× × × × × × × × × × × × × ×	0.60	388.61		AA19320	В	0.50-0.50	3 -[R]	
- - - - - -				<u>୦</u> . ୦. ୦. ୦. ୦. ୦. ୦. ୦. ୦. ୦. ୦. ୦. ୦. ୦. ୦. ୦. ୦. ୦. ୦.				AA19321	В	1.00-1.00	14 -[R]	
- - - - - - -	(Loose)	Brown silty GRAVEL with cobbles. Co	bbles are		2.60	386.61		AA19322	В	2.20-2.20		
-	subangu	lar to subrounded.		AXA A								
3.0 	End of T	rial Pit at 3.00m			3.00	386.21		AA19323	В	3.00-3.00		
- - - - - - - - - -												
GSC.GUI 15/11 GSC.GUI 15/11	undwater (Groundwate	Conditions er Observed										
LOC.GPJ												
	oility nstability Ol	oserved										
IGSL TP LOG 1831	eral Rema	rks										

REPORT NUMBER											
IGSL)					18	312				
CONTRAC	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	40	
LOGGED B	Y F.C	CO-ORDINA	TES	506,4 571,8	90.00 E 55.99 N		DATE S	TARTEI	Shee D 10/04 TED 10/04	et 1 of 1 4/2015 4/2015	
CLIENT	ESBI	GROUND LE	EVEL (m)	385.2	0		EXCAVA		13 To	onne Exc	cavator
ENGINEER	ESBI										
								Sample	s	(a)	metei
	Geotechnical Description				_	trike				st (KI	enetro
			gend	,)	evation	ater St	mple	be	pth	ne Te	nd Pe
0.0 0.4				De De	<u><u></u></u>	Ň	Sa Re	Ty	De	Va	ΗŽ
Soft	o firm blue/grev sandy gravelly SILT S	Sand is coarse	×0, ×	0.20	385.00					6	
Grav	el is subangular to subrounded.		× ·× ·× ·							0[R]	
			× × ×	*			AA25448	В	0.60-0.60		
			× · × ×				AA25448T	D	0.60-0.60		
1.0			× .	\$							
			× ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	*							
			ו × × × × ×								
			* · · · · · · · · · · · · · · · · · · ·	\$							
2.0			· × • ×	*			AA25449	В	1.90-1.90		
			× · × · × · × · ×·	ł				D	1.00-1.00		
			×°^`× ×	2 50	382 70						
Obst End	ruction - Possible boulders/bedrock of Trial Pit at 2.50m										
3.0											
4.0											
Groundwat No Groundwat	er Conditions vater Observed										
Stability	(Observed										
General Re	marks										

E	TRIAL PIT RECORD									REPORT N	UMBER 312	
CON.	TRACT	Barnastooka Windfarm						TRIAL PI	T NO.	TP0	41	
LOG	GED BY	F.C	CO-ORDINAT	TES	506,55 571,90	51.95 E 01.98 N		DATE ST		Shee 10/04 TED 10/04	et 1 of 1 4/2015 4/2015	
CLIEI ENGI	NT NEER	ESBI ESBI	GROUND LE	VEL (m)	385.99	9		EXCAVA METHOD	TION)	13 To	onne Exc	cavator
									Sample	S	Pa)	ometer
		Geotechnical Description		-egend	Depth (m)	Elevation	Water Strike	Sample Ref	Гуре	Depth	/ane Test (K	Hand Penetro (KPa)
0.0	Soft blac	sk fibrous PEAT (H4-H7)						0,11			20	
1.0	Soft blue and boul subround	e/grey sandy gravelly SILT with occa Iders. Sand is coarse. Gravel is suba ded. Cobbles and boulders are suba	sional cobbles angular to ingular.	³	0.70	385.29		AA25450 AA25450T	B D	0.60-0.60 0.60-0.60	2[R]	
2.0	Obstruct End of T	ion - Possible boulders/bedrock rial Pit at 2.20m			2.20	383.79		AA27904 AA27904T	B D	1.90-1.90 1.90-1.90		
3.0												
4.0												
Grou	ndwater	Conditions										
No G	roundwate	er Observed										
3tab i √o in:	ility stability Ol	bserved										
Gene	eral Rema	ırks										

	RE										JMBER		
	3SL	1	RIAL PIT	RECO	RD					18	312		
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	42		
LOG	GED BY	F.C	CO-ORDINAT	TES	506,82 571,53	28.02 E 33.99 N		DATE S	TARTED	09/04 09/04 TED 09/04	k/2015 k/2015		
CLIE		ESBI	GROUND LE	VEL (m)	333.6	D		EXCAVA METHO	ATION D	13 To	onne Exc	cavator	
ENG		ESDI							Sample	S	(7	leter	
		Geotechnical Description		gend	.pth)	evation	ater Strike	mple	e	pth	ne Test (KPa	ind Penetrom Pa)	
0.0	Soft blac	k fibrous PEAT (H4-H7)			۳ ۳	ш	Ň	Re Re	Ту	De	< S	Ξ <u>Ξ</u>	
- - - -	Soft blue	/grey sandy gravelly SILT with occas	ional cobbles.		0.50	333.10		AA25430	В	0.50-0.50	14		
- - - - - - -	Sand is Ccobble	coarse. Gravel is subangular to subro s are subrounded)	ounded.					AA25430T	D	0.50-0.50	6[R]		
								AA25431 AA25431T	B D	1.50-1.50 1.50-1.50			
- - - - 3.0	End of T	rial Pit at 3.10m			3.10	330.50		AA25432 AA25432T	B D	2.80-2.80 2.80-2.80			
- - - - - - - - - - - - - - - - - - -													
No G	andwater (Groundwate	Conditions Pr Observed											
Stab No ir	ility istability O	oserved											
Gen	eneral Remarks												

An								REPORT N	UMBER	
IGSL		TRIAL PIT RE	CORD					18	312	
CONTRACT	Barnastooka Windfarm					TRIAL P	IT NO.	TP0	43	
LOGGED BY	PF	CO-ORDINATES	506,8 571,6	91.99 E 00.00 N		DATE S	TARTED	09/04 09/04	4/2015 4/2015	
CLIENT	ESBI	GROUND LEVEL	(m) 335.8	2		EXCAVA		13 To	onne Exc	cavato
ENGINEER	ESBI									L
							Sample	s	Pa)	omete
	Geotechnical Description		end th	/ation	er Strike	Jple	Ð	th	le Test (K	Id Penetro
			Dep Dep	Elev	Wat	San Ref	Typ	Dep	Van	Han
^{0.0} Soft bla	ck fibrous PEAT (H4-H7)	<u> </u>								
			<u>· · · /</u> · · · · · · · · · · · · · · · · · · ·	335 32						
Soft bro rootlets.	wn gravelly CLAY with cobbles and Gravel and cobbles are angular.	abundant	0.00	000.02		AA26422	В	0.50-0.50	22 4[R]	
0 Obstruc	tion - Possible rock		1.10	334.72		AA26423	В	1.00-1.00		
End of	Trial Pit at 1.10m									
.0										
0										
.0										
.0										
roundwater	Conditions									
lo groundwate	er observed									
tability lo instability o	bserved				_		_		_	_
eneral Rem	arks									

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IGSL	т	RIAL PIT I	RECO	RD					18	312	
CONTRACT Barnast	ooka Windfarm						TRIAL P	IT NO.	TP0	44	
LOGGED BY F.C		CO-ORDINAT	ES	506,94 571,6	40.96 E 76.03 N		DATE S	TARTED	0 09/04	t 1 of 1 1/2015 1/2015	
CLIENT ESBI		GROUND LEV	/EL (m)	341.6	1		EXCAVA		13 To	onne Exc	cavator
ENGINEER ESBI								,		 	
								Sample	S	Pa)	omete
	Geotechnical Description				ц	Strike				est (K	enetro
			Legend	Depth (m)	Elevatio	Water S	Sample Ref	Type	Depth	Vane T	Hand P (KPa)
. ^{0.0} Soft black fibrous	PEAT with occasional cobbl	es. Cobbles	*0 × ¢								
			$\bigcirc \times \circ \cdot $ $\times \cdot \circ \cdot $ $\bigcirc \times \cdot \circ \cdot \circ \cdot $	*						20	
Firm to stiff blue/g	rey sandy very gravelly SILT	Г. Sand is	×°××	0.50	341.11		AA25434	В	0.50-0.50	4[R]	
			×°. × ×. × ;	0.90	340.71		AA25435	В	0.80-0.80		
^{1.0} Obstruction - poss End of Trial Pit at	ible boulders/bedrock 0.90m			0.00			AA25435T	D	0.80-0.80		
2.0											
-											
-											
3.0											
-											
-											
-											
- - 4.0											
-											
-											
-											
No Groundwater Observe	ed										
Stability No instability Observed											
General Remarks											

REPORT NUMBER												
	JJ JSL	Т	RIAL PIT F	RECO	RD					18	312	
CON	ITRACT	Barnastooka Windfarm							PIT NO.	TP0	45	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,99 571,73	96.00 E 30.08 N		DATE S		09/04 TED 09/04	t 1 of 1 1/2015 1/2015	
CLIE	INT	ESBI	GROUND LEV	/EL (m)	345.6	4		EXCAV	ATION	13 To	onne Exc	cavator
ENG	INEER	ESBI		1	1			WIETHO	D			
									Sample	s	(Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (M	Hand Penetr (KPa)
0.0	Soft blac	ck fibrous PEAT (H4-H7)		$\frac{1}{1} \frac{1}{1} \frac{1}{1}$	0.10	345.54					20	
	Soft blue angular	e/grey sandy gravelly SILT. Sand is co to subrounded.	arse. Gravel is	× · · · × · × · · × · ·	*			AA25436	В	0.50-0.50	8[R]	
-	Obstruc End of T	tion - Possible boulders/bedrock Frial Pit at 0.70m			0.70	344.94		AA204301		0.50-0.50		
-												
-												
2.0												
-												
3.0												
-												
- - 4.0												
DI 15/7/15												
	undwater Groundwate	Conditions er Observed		1	<u>.</u>	1	<u>.</u>	1	I	1		<u>.</u>
Stat	bility hstability O	bserved										
Gen	eral Rema	arks										
SL IP LOG												
ő												

TRIAL PIT RECORD 18312 IGSL TRIAL PIT NO. **TP046** CONTRACT Barnastooka Windfarm SHEET Sheet 1 of 1 **CO-ORDINATES** 507,134.76 E DATE STARTED 09/04/2015 LOGGED BY F.C 571,765.11 N DATE COMPLETED 09/04/2015 **GROUND LEVEL (m)** 347.01 EXCAVATION METHOD 13 Tonne Excavator CLIENT ESBI ENGINEER ESBI Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation Legend Sample Ref Depth Depth (m) Type 0.0 Soft black fibrous PEAT (H4-H7) <u>_____×</u> 0.20 346.81 //_____X *_____X *_____X *_____X *_____X *____X *____X *____X Soft blue/grey sandy gravelly SILT. Sand is fine to coarse. 38 10[R] Gravel is subangular to subrounded. 0.50-0.50 0.50-0.50 AA25440 В AA25440T D 1.0 × . × .× *°.× 1.60-1.60 1.60-1.60 AA25441 ×____.× B D AA25441T 1.80 345.21 Obstruction - Possible boulders/bedrock End of Trial Pit at 1.80m 2.0 3.0 4.0 **Groundwater Conditions** No Groundwater Observed Stability No instability Observed **General Remarks**

GDT 15/7/15

18312 FINAL TP LOC.GPJ IGSL

TP LOG

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and may a	REPORT NU	JMBER							
IGSL	183	312							
CONTRACT Barnastooka Windfarm					TRIAL P	IT NO.	TP0 Shee	47 t 1 of 1	
OGGED BY F.C	CO-ORDINATES	507,2 571,7	23.00 E 53.13 N		DATE ST	TARTE	09/04 TED 09/04	/2015 /2015	
LIENT ESBI	GROUND LEVEL (r	m) 349.2	9		EXCAVA METHO		13 Tc	nne Exc	cavato
						Sample	S		eter
Geotechnical Description				ke				t (KPa)	etrome
	eaend	Depth (m)	Elevation	Water Stri	Sample Ref	Type	Depth	Vane Tes	Hand Pen
^{.0} Soft black fibrous PEAT (H4-H7)				-		•		-	
		<u>\ //</u>							
Soft blue/grey sandy gravelly SILT with occasic and boulders. Sand is coarse. Gravel is subarg	onal cobbles	(x, y) = 0.50	348.79		AA25442 AA25442T	B D	0.50-0.50 0.50-0.50	20 2[R]	
subrounded. Cobbles and boulders are subang	jular.	×							
0	×	,× ,≉ ⊘							
		× 1 × 1			AA25443	в	1 50-1 50		
Obstruction - Possible boulders/bedrock	×.	[∞] d = 1.70	347.59		AA25443T	D	1.50-1.50		
.0									
.0									
.0									
roundwater Conditions									
o Groundwater Observed									
tability o instability Observed									
eneral Remarks									

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	J- ISL	Т	RIAL PIT R	ECO	RD					18	312	
CONT	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	48	
LOGO	GED BY	F.C	CO-ORDINATES	S	507,42 571,75	26.00 E 51.00 N		DATE S	TARTE	Shee D 09/04	t 1 of 1 1/2015 1/2015	
CLIEN	NT	ESBI	GROUND LEVE	EL (m)	345.82	2		EXCAVA		13 To	onne Exc	cavator
ENGI	NEER	ESBI										
							0		Sample	25	KPa)	trometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (Hand Penel (KPa)
0.0	Soft blac	ck fibrous PEAT (H4-H7)	2									
	Soft blue	e/grey sandy gravelly SILT	×		0.30	345.52		AA25446 AA25446T	B D	0.30-0.30 0.30-0.30	1 2[R]	
- 1.0 -	Obstruc End of T	tion rial Pit at 1.10m	×.		1.10	344.72		AA25447 AA25447T	B D	1.00-1.00 1.00-1.00		
-												
2.0												
- - - - - - - -												
- - - - - 4.0 - -												
Grou	ndwater	Conditions										
Stabi No ins	lity stability O	bserved										
Gene	ral Rema	arks										

REPORT NUMBER TRIAL PIT RECORD 18312 1920 TRIAL PIT NO. **TP049** CONTRACT Barnastooka Windfarm SHEET Sheet 1 of 1 **CO-ORDINATES** 507,520.00 E DATE STARTED 07/04/2015 C.Killaly LOGGED BY 571,799.01 N DATE COMPLETED 07/04/2015 **GROUND LEVEL (m)** 346.69 EXCAVATION 13 Tonne Excavator CLIENT ESBI METHOD ENGINEER ESBI Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation Sample Ref Legend Depth Depth (m) Type 0.0 Soft black brown fibrous PEAT (H4-H7) <u>// \// \/</u> <u>\\</u> \\/ ______X 0.50 346.19 ×0.×. × · · · Soft grey blue sandy gravelly SILT with medium cobble AA21686 В 0.50-0.50 40 content. Gravel and cobbles are subangular to subrounded. AA21686T D 0.50-0.50 10[R] × × × × × . 1.0 AA21687 1.50-1.50 В 1.50-1.50 AA21687T D 1.90 344.79 Loose grey sandy GRAVEL with cobbles. Gravel and 2.0 cobbles are angular (Moderate 2.20 344.49 Obstruction -possible bedrock 2.20-2.20 AA21688 В End of Trial Pit at 2.20m 2.20-2.20 AA21688T D 3.0 4.0 **Groundwater Conditions** Groundwater observed at 2.1mbgl Stability trial Pit slightly unstable at 1.5mbgl **General Remarks**

GDT 15/7/15

18312 FINAL TP LOC.GPJ IGSL

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TRIAL PIT RECORD

18312

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CON	ITRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0 Shee	51 t 1 of 1	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,5 571,9	85.01 E 59.99 N		DATE S DATE C	TARTED OMPLET	07/04 ED 07/04	4/2015 4/2015	
	INT	ESBI ESBI	GROUND LE	VEL (m)	348.2	3		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
									Samples		(E	leter
		Geotechnical Descripti	on	Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa	Hand Penetrom (KPa)
0.0	Soft blac	ck fibrous PEAT with rootlets (H4	1-H7)		0.20	348.03						
-	Soft brow Sand is o	wn sandy gravelly CLAY with roc coarse. Gravel is subrounded.	otlets throughout.		0.20	040.00					50 10[R]	
- - - - - - 1.0	Firm to s cobbles. Cobbles	tiff blue/grey sandy gravelly SIL Sand is fine. Gravel is subangul are subrounded.	T with occasional lar to subrounded.	× · · · · · · · · · · · · · · · · · · ·	0.50	347.73		AA21692	В	0.50-0.50		
-					2.00	246.02		AA21693	В	1.60-1.60		
_ 2.0 - - - - - - -	Obstruct End of T	ion -possible bedrock irial Pit at 2.00m			2.00	540.20						
- - - - - - -												
4.0												
Gro No (undwater (Groundwate	Conditions er Observed										<u> </u>
Stat No ii	bility hstability ob	oserved										
Gen	eral Rema	rks										



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TP LOG

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	3SL		ECO	RD					18	312	
CON	ITRACT Barnastooka Windfarm						TRIAL P	IT NO.	TP0 Shee	53 t 1 of 1	
LOG	GED BY F.C	CO-ORDINATE	S	507,72 572,17	29.99 E 75.00 N		DATE S	TARTED OMPLE	07/04 TED 07/04	4/2015 4/2015	
	ENT ESBI	GROUND LEVE	EL (m)	331.42	2		EXCAVA METHO		13 To	onne Exc	cavator
								Sample	s	(eter
	Geotechnical Description				_	rike				st (KPa	netrom
			egend)epth m)	levatior	Vater St	ample tef	ype)epth	'ane Te	land Pe KPa)
0.0	Soft black fibrous PEAT (H4-H7)	/			ш	>	O LE	-		>	10
-	Angular grey GRAVEL			0.30	331.12		AA21699 AA21699T	B D	0.30-0.30 0.30-0.30	30 10[R]	
	Obstruction -possible bedrock	c	000	0.70	330.72		AA21700 AA21700T	B D	0.60-0.60 0.60-0.60		
- 1.0	End of Trial Pit at 0.70m										
-											
-											
2.0											
-											
-											
- - - 2 0											
-											
-											
4.0											
-											
-											
-											
Gro No C	undwater Conditions Groundwater Observed										
Stak	nility										
No in	Instability Observed										
Gen	eral Remarks										

	SL		TRIAL PIT	RECO	RD					REPORT N	JMBER 312	
CONT	RACT	Barnastooka Windfarm							T NO.	TP0	54	
LOGG	GED BY	F.C ESBI	CO-ORDINAT	'ES VEL (m)	507,64 572,24 353.48	42.00 E 40.98 N 3		DATE SI DATE CO EXCAVA	ARTEI	D 07/04 TED 07/04 13 Tc	1 of 1 1/2015 1/2015 onne Exc	avator
ENGIN	IEER	ESBI							, 			- L
							e		Sample	s	(KPa)	etromet
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strik	Sample Ref	Type	Depth	Vane Test	Hand Pene (KPa)
1.0	Soft blue and boul subround	k fibrous PEAT (H4-H7) grey sandy gravelly SILT with occa ders. Sand is fine to coarse. Gravel ded. Cobbles and boulders are subro	sional cobbles is subangular to ounded.	1/2 1/2 1/2 1/2 1/2 1/2 1/2	0.70	352.78		AA25418 AA25418T	B D	0.70-0.70 0.70-0.70	20 8[R]	
2.0	Obstruct End of T	ion - possible boulders/bedrock rial Pit at 2.40m			2.40	351.08		AA25419 AA25419T	B D	2.00-2.00 2.00-2.00		
3.0												
4.0												
Groun No Gro	ndwater (oundwate	Conditions er Observed			1	<u>ı </u>		<u> </u>				
Stabil No ins	l ity stability Ol	bserved										
Gener	ral Rema	rks										

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	iSL		trial pit f	RECO	RD					183	312	
CONT	RACT	Barnastooka Windfarm							IT NO.	TP0	55	
LOGO	GED BY	F.C	CO-ORDINATI	ES	507,5 572,20	50.04 E 00.99 N		DATE ST	TARTEI	D 08/04 TED 08/04	/2015 /2015	
CLIEN	NT	ESBI	GROUND LEV	/EL (m)	363.1	0		EXCAVA METHO		13 Tc	nne Ex	cavator
ENGI	NEER	ESBI										5
									Sample	s	(Pa)	omete
		Geotechnical Description		egend	Depth m)	Elevation	Vater Strike	sample Ref	ype	Jepth	/ane Test (ŀ	Hand Peneti KPa)
0.0	Soft blac	ck/brown fibrous PEAT (H4-H7)					>	0.1	F		/	
				<u>1, 1, 1</u> <u>1, 1, 1</u>								
	Soft brow boulders subangu	wn/grey sandy gravelly CLAY with or s. Sand is fine. Gravel is subangular. llar.	ccasional Boulders are		0.50 0.70	362.60 362.40		AA25420 AA25420T	B D	0.50-0.50 0.50-0.50	12 2[R]	
1.0	cobbles subroun	and boulders. Sand is fine. Gravel is ded. Cobbles and boulders are subro	subangular to bunded.	× · × · × · × · × · × · × · × · × · × ·								
				$\begin{array}{c} \times \cdot & \times \\ \cdot & \times \\ \times & \cdot \\ \times & \times \\ \cdot & \times \\ \times \\$				AA25421 AA25421T	B D	1.60-1.60 1.60-1.60		
2.0				× · × · × ·	2.10	361.00						
	Obstruct End of T	ion - possible boulders/bedrock Trial Pit at 2.10m										
3.0												
4.0												
Groui	ndwater	Conditions er Observed			I	1						
Stabi	lity	here and										
No ins	stability O	bserved										
Gene	ral Rema	arks										



18312 FINAL TP LOC.GPJ IGSL.GDT 15/7/15

TP LOG

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										REPORT NU	JMBER	
	J) BSL	т	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Barnastooka Windfarm							T NO.	TP0	57	
LOG	GED BY	F.C	CO-ORDINATI	ES	507,35 572,12	59.99 E 25.03 N		DATE ST		C 30/04 TED 30/04	/2015 /2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	378.1′	1		EXCAVA		13 To	nne Exc	avator
									Sample	s	a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)
0.0 - - - - - - - - - - - - -	Soft blac Soft to fi boulders subround	the fibrous PEAT (H4-H7) rm grey very gravelly sandy SILT with Cobbles and boulders are subangula ded. ion - Possible rock 'rial Pit at 2.10m	cobbles and r to	- 1 とした、	0.90	377.21	(Moderate)	о <u>к</u> АА32154 АА32155	В	0.50-0.50	> 2 -[R] 11 -[R]	It
- - - - - - - - - - - -												
Grou Wate	indwater er ingress a	Conditions at 0.90m		<u> </u>		<u> </u>	<u> </u>					
Stab No in	ility stability O	bserved										
Gene	eral Rema	rks										

IGSL TP LOG 18312 FINAL TP LOC.GPJ IGSL.GDT 15/7/15

	BSL	т	RIAL PIT F	RECO	RD					REPORT N	з 312	
CON	TRACT	Barnastooka Windfarm						TRIAL PI	IT NO.	TP0 Shee	58 t 1 of 1	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,60 572,31	04.01 E 15.93 N		DATE ST DATE CO	TARTED OMPLE	D 06/05 TED 06/05	5/2015 5/2015	
CLIE ENGI	NT INEER	ESBI ESBI	GROUND LEV	/EL (m)	363.02	2		EXCAVA METHOD	TION)	13 To	onne Exc	avator
									Sample	s	(ac	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetrc (KPa)
0.0 - - - - -	Soft blac	ck fibrous PEAT (H4-H7)			0.80	362.22					22 10[R]	
- - - - - - - - - - - - - - - - - - -	Soft blue fine. Gra subangu	e/grey sandy gravelly SILT with cobble vel is subangular to subrounded. Cob lar.	s. Sand is bles are	ૻઌૼૢૢૢૢૡૢ૾ૢઌૼૢઌૢૻ૾ઌૢૻૢૢૢૡૢૢૢૢૢૢઌૢ ઌ૾ઌ૽ૺૢઌૺૡૢ૾ૢઌૢ૽ૻઌૢૼ૾ઌૢ૽ૼૡ૽૽ૢૢ૽ઌ૽ૺૢ૾ઌ	0.00	502.22		AA12652	В	0.80-0.80		
- - - - - 3.0	Obstruc End of T	ion rial Pit at 2.60m		(0×) *. ×.0 *. ×.	2.60	360.42		AA12653	В	2.40-2.40		
-												
- - - - -												
-												
No G	Groundwater Groundwate	er Observed										
Stab No in	ility istability O	bserved										
Gene	eral Rema	rks										

IGSL TP LOG 18312 FINAL TP LOC GPJ IGSL GDT 15/7/15



~ NULLBARD

	An								REPORT N	JMBER	
	T BSL	RIAL PIT I	RECO	RD					18	312	
CON	TRACT Barnastooka Windfarm						TRIAL P	IT NO.	TP0	59	
LOG	GED BY F.C	CO-ORDINAT	ËS	507,50 572,4	05.94 E 18.97 N		DATE S	TARTE	D 06/05	5/2015 5/2015	
CLIE	NT ESBI	GROUND LEV	VEL (m)	372.8	3		EXCAVA		13 To	onne Exc	cavator
ENG	INEER ESBI										L
								Sample	es	(ac	meter
	Geotechnical Description				<u>د</u>	trike				est (KI	enetro
			gend	bth	evatio	ater S	mple	be	pth	ne Te	nd P∈ ⊃a)
0.0			L L L	De	ш	Ň	Sa Re	Tyl	De	<a>	Н К Н
-	Soft black fibrous PEAT (H4-H7)				070 50						
	Soft brown sandy gravelly SILT with cobbles a Sand is coarse. Gravel is angular to subangula	nd rootlets. ar. Cobbles are	×9.×	0.30	372.53		AA34757	В	0.30-0.30	24 8[R]	
-	subangular.			* • *							
-				0.90	371.93		A A D 4750	P	0.00.0.00		
1.0	rock)	weathered	pd	1 00	074.00		AA34756	Б	0.90-0.90		
	Obstruction - Possible rock End of Trial Pit at 1.20m			1.20	571.05						
-											
-											
2.0											
-											
-											
-											
3.0											
-											
-											
4.0											
-											
-											
ן Grou <u>פ</u> No G	Indwater Conditions Groundwater Observed										
C. G.											
Stab	ility										
No ir	Istadility Ubserved										
Gen	eral Remarks										
L C C											
۲ Col											

2 \											
3L	т	RIAL PIT F	RECO	RD					18	312	
RACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	60 t 1 of 1	
ED BY	F.C	CO-ORDINATI	ES	507,4 572,38	19.97 E 88.96 N		DATE S	TARTED	06/05 ED 06/05	5/2015 5/2015	
r EER	ESBI ESBI	GROUND LEV	/EL (m)	386.10	0		EXCAVA METHO	ATION D	13 To	onne Exc	avator
								Samples		(eter
	Geotechnical Description		end	oth	/ation	ter Strike	nple	U	pth	ie Test (KPa	id Penetrom a)
			Leg	(m) Dep	Ш	Wa	Sar Ref	Тур	Dep	Var	Har (KP
Soft to fir ootlets. Subangul	m brown sandy gravelly SILT with col Sand is coarse. Gravel and cobbles a ar.	obles and re angular to	× × × ×	0.20	385.90					18 4[R]	
Angular (ock)	COBBLES and BOULDERS (Possible	weathered		0.80	385.30		AA34756	В	0.60-0.60		
Obstructi End of Ti	on - Possible rock rial Pit at 1.20m			1.20	384.90						
dwater (undwate	Conditions r Observed		<u> </u>		1		<u> </u>		<u> </u>		
t y ability Ot	oserved										
I Rema	rks										
	ACT ACT D BY ER Soft blac Soft to fir ootlets. S ubangular (oock) Dostructi End of Ti Soft V Ot I Remai	ACT Barnastooka Windfarm ACT Barnastooka Windfarm D BY F.C ESBI Geotechnical Description Geotechnical Description Goft black fibrous PEAT (H4-H7) Soft to firm brown sandy gravelly SILT with cot obtets. Sand is coarse. Gravel and cobbles at ubangular. Industrial COBBLES and BOULDERS (Possible ock) Destruction - Possible rock ind of Trial Pit at 1.20m Matter Conditions Indivater Observed Matter Conditions Indivater Observed	ACT Barnastooka Windfarm ACT Barnastooka Windfarm DBY F.C ESBI GROUND LEV Geotechnical Description Geotechnical Description Geotechnical Description Control black fibrous PEAT (H4-H7) off to fibr brown sandy gravelly SILT with cobbles and ooblets. Sand societs. Gravel and cobbles are angular to ubangular. Ingular COBBLES and BOULDERS (Possible weathered ock) Destruction - Possible rock ind of Trial Pit at 1.20m Mwater Conditions Indwater Observed I Remarks	ACT Barnastooka Windfarm ACT Barnastooka Windfarm D BY F.C ESBI Geotechnical Description Geotechnical Description Geotechnical Description Ingular COBBLES and BOULDERS (Possible weathered Dostruction - Possible rock and of Trial Pit at 1.20m Water Conditions undwater Observed I Remarks CO-ORDINATES GROUND LEVEL (m) CO-ORDINATES C	ACT Barnastooka Windfarm ACT Barnastooka Windfarm D BY F.C ESBI ER ESBI Ceotechnical Description Geotechnical Description Geotechnical Description Geotechnical Description Geotechnical could be and could be	ACT Bamastooka Windfam D BY F.C ESBI CO-ORDINATES 507,419,97 E 572,388,96 N GROUND LEVEL (m) 386,10 Ceotechnical Description Geotechnical Description Geotechnical Description Geotechnical Description Geotechnical Description Geotechnical Description Jost to firm brown sandy gravely SILT with cobbles and obbles are angular to obbles. Sand is coarse. Gravel and cobbles are angular to obbles. Sand is coarse. Gravel and cobbles are angular to obbles are angular to obbles. Sand is coarse. Gravel and cobbles are angular to obbles and order of the sand state o	ACT Bamastooka Windfam ACT Bamastooka Windfam DEV F.C. CO-ORDINATES 577,338.96 N SROUND LEVEL (m) 366.10 Image: Set in the set in th	ACT Banastooka Windfam D BY F.C. EBBI COORDINATES 507,419.97 E 572,388,98 N DATE C CROUND LEVEL (m) 36.10 ECCAVY ECCAVY ECCAVY CROUND LEVEL (m) 36.10 ECCAVY ECCA	ACT Bamastocka Windfam TRIAL PIT NO. D BY F.C. CO-ORDINATES 507,419.97 E DATE STARTED E ESBI GROUND LEVEL (m) 398.10 DATE STARTED Mathematical Description g	Act Banastooka Windlam TRAL PT No. TPO D BY F.0 CO-ORDINATES 507,418.97 E DOTE STARTED 0000 Certes Tarante Page FSBI Parts STARTED 0000 Cectechnical Description Trading Trading Trading Trading Cectechnical Description Trading Trading Trading Trading Trading Cectechnical Description Trading Trading Trading Trading Trading Trading Cectechnical Description Trading Trading	AGT Bernestocka Windfam D BY F.C. ER ESBI CO-ORDINATES S07.418 97 E D BY F.C. CO-ORDINATES S07.418 97 E CO-ORDINATES S07.

IGSL TP LOG 18312 FINAL TP LOC GPJ IGSL GDT 15/7/15

										REPORT N	UMBER	
IC	SL	Т	RIAL PIT I	RECO	RD					18	312	
CONT	RACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	61	
LOGG	ED BY	F.C	CO-ORDINAT	ES	507,33 572,30	31.11 E 58.93 N		DATE S	TARTE	D 06/05	5/2015 5/2015	
CLIEN	ΙТ	ESBI	GROUND LEV	/EL (m)	393.2	3		EXCAVA		13 To	onne Exc	cavator
ENGIN	IEER	ESBI										
									Sample	S	a)	meter
		Geotechnical Description					rike				st (KF	netro
				lend	oth	vatior	ter St	nple	ð	oth	le Te	nd Pe
				Leg	(m) Der	Ш	Wa	Sar Ref	Typ	Dep	Var	Наг (КР
0.0	Soft brow	vn/black fibrous PEAT (H4-H7)										
-				<u>\\</u> , <u>\\</u>								
-								AA34754	В	0.50-0.50	22	
-					0.80	392.43					8[R]	
-	Soft brow	vn sandy gravelly SILT with cobbles. Gravel is subangular to subrounded. (Sand is Cobbles are	× · · · · ·	*							
-	subangu	lar.		××××××	*							
-				× • • • • • • • • • • • • • • • • • • •	*							
-				×; ×; ×; ×; ×; ×; ×; ×; ×; ×; ×; ×; ×; ×	*							
-				×. *,	*							
2.0				× č,	Ì			AA34755	в	2.00-2.00		
-				× · · · · · · · · · · · · · · · · · · ·	2 30	300.03			2			
-	Obstruct End of T	ion - Possible rock rial Pit at 2.30m			2.50	390.93						
-												
-												
3.0												
-												
-												
-												
-												
4.0												
-												
-		0										
No Groun	oundwater	or Observed										
Stabil	ity											
No ins	tability Ol	oserved										
Gener	ral Rema	rks										

									I	REPORT N	JMBER	
	3SL	Т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	62	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,16 572,30	66.99 E 08.00 N		DATE S		06/05 06/05	t 1 of 1 5/2015 5/2015	
CLIE ENG	NT	ESBI ESBI	GROUND LEV	/EL (m)	394.70	0		EXCAVA METHO	ATION D	13 To	onne Exc	avator
									Samples	5	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> \1, \1,</u> 1, \1, \								
-	Soft to fir rootlets t subangu	m blue/grey slightly sandy gravelly Sl o 1.00m. Sand is fine. Gravel is angu lar.	LT with lar to	× · · · · · · · · · · · · · · · · · · ·	0.40	394.30		AA34750	В	0.40-0.40	16 4[R]	
1.0 												
2.0 	Stiff blue Gravel is	/grey slightly sandy gravelly SILT. Sa angular to subangular.	nd is fine.	0x xx xo xo xo xo	2.00	392.70		AA34751	В	1.90-1.90		
3.0	End of T	rial Pit at 3.00m		<u>×°. ×</u>	3.00	391.70						
- 4.0												
-												
-												
Grou No G	indwater (Groundwate	Conditions r Observed		1	L	<u>ı </u>		<u>ı </u>		<u> </u>		
Stab No ir	ility istability Ol	oserved										
Gene	eral Rema	rks										

IGSL TP LOG 18312 FINAL TP LOC.GPJ IGSL.GDT 15/7/15



	Am									REPORT N	JMBER	
	3SL	Т	RIAL PIT	RECO	RD					18	312	
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	79	
LOG	GED BY	C.Killaly	CO-ORDINAT	TES	509,73 570,7	38.01 E 67.05 N		DATE S	TARTE	D 27/03	t 1 of 1 3/2015 3/2015	
		ESBI	GROUND LE	VEL (m)	335.1	8		EXCAVA METHO	ATION D	13 Tc	onne Exc	cavator
									Sample	es	(F	leter
		Geotechnical Description		gend	.pth)	evation	ater Strike	mple	be	pth	ne Test (KPa	nd Penetron⊃a)
0.0	Soft blac	k brown fibrous DEAT (H4 H7)		Lee	D D	<u><u></u></u>	Ň	Re Re	Tyl	De	Va	E Ta
- - -	Solt blac			$\frac{1}{\sqrt{1}} \frac{\sqrt{1}}{\sqrt{1}} \frac{\sqrt{1}}{\sqrt{1}}$	0.50	004.00						
	Soft grey to subro	/ brown sandy gravelly CLAY. Gravel unded.	is subangular		0.50	334.68	Ŧ	AA16688 AA16688T	B D	0.50-0.50 0.50-0.50	16 0[R]	
1.0	Soft grey boulder	/ blue sandy gravelly SILT with mediu content. Gravel is subangular to angu	m cobble and lar	∑,,, *,,,,, .	0.90	334.28	(Seepage	AA16689 AA16689T	B D	0.90-0.90 0.90-0.90	18 0[R]	
2.0				x x x x x x x x x x x x x x x x x x x				AA16690 AA16690T	B	2.00-2.00 2.00-2.00		
3.0	Obstruct End of T	ion -possible bedrock rial Pit at 2.70m			2.70	332.48		AA16691 AA16691T	B D	2.70-2.70 2.70-2.70		
4.0												
Grou	Indwater	Conditions										
Occp	age at 0.0	in Sal										
Stab No in	ility Istability O	bserved										
Gene	eral Rema	rks										

5	An									REPORT NU	JMBER	
	BSL		TRIAL PIT	RECO	RD					183	312	
CON	TRACT	Barnastooka Windfarm						TRIAL PI	T NO.	TP0	80	
LOG	GED BY	C.Killaly	CO-ORDINAT	ËS	509,7 570,60	11.91 E 69.90 N		DATE ST	TARTED	Shee 27/03 TED 27/03	1 of 1 3/2015	
CLIE	NT E	ESBI	GROUND LE	VEL (m)	337.1	4		EXCAVA		13 To	nne Exc	cavator
ENG	INEER E	ESBI						METHOL)			
									Sample	s	Pa)	ometer
		Geotechnical Description		-egend	Depth (m)	Elevation	Nater Strike	Sample Ref	Lype	Jepth	/ane Test (K	Hand Penetro (KPa)
0.0	Soft black	brown fibrous PEAT (H4-H7)						<u>от</u>				
-							(Seepage)	AA16685 AA16685T	B D	0.50-0.50 0.50-0.50	22 8[R]	
1.0 	Soft grey b subrounde	rown SILT with abundant rootlets d to subangular	s. Gravel is	$ \begin{array}{c} \underbrace{(1)}_{\times} \underbrace{(1)}_{\times} \\ \times \\$	1.00	336.14					10 4[R]	
- - - 2.0	Blue grey S	SILT		× × × × × × × × × × × × × × × × × × ×	1.70	335.44		AA16686 AA16686T	B D	1.50-1.50 1.50-1.50		
					3.10	334.04		AA16687 AA16687T	B D	2.80-2.80 2.80-2.80		
	Trial Pit ter End of Tria	minated Il Pit at 3.10m										
4.0 												
Ē												
Grou Seep	age at 0.5ml	onditions ogl										
Stab No in	ility istability Obs	erved										
Gene	eral Remark	s										
		-										



REPORT NUMBER

18312 FINAL TP LOC.GPJ IGSL . Igsl

GDT 15/7/15

TP LOG



TRIAL PIT RECORD

18312

CON	ITRACT	Barnastooka Windfarm						TRIAL F	Pit no.	TP0 Shee	82 at 1 of 1		
LOGGED BY C.Killaly			CO-ORDINAT	CO-ORDINATES GROUND LEVEL (m)		509,634.10 E 570,489.93 N 336.35			DATE STARTED		26/03/2015		
CLIE	CLIENT ESBI ENGINEER ESBI								EXCAVATION METHOD			13 Tonne Excavator	
									Samples		a)	neter	
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetron (KPa)	
0.0	Soft blac	ck fibrous PEAT with rootlets (H4-H	7)	<u><u> </u></u>									
-	Soft red	dish brown slightly sandy gravelly C ded to subangular	LAY. Gravel is	· · · · ·	0.30	336.05							
-	Soft grey blue sandy gravelly SILT with medium cobble content. Gravel and cobbles are subrounded to subangular				0.60	335.75							
1.0 	Medium cobbles	dense grey GRAVEL and COBBLE are angular- Possible weathered ro	S. Gravel and ck		1.10	335.25							
- - - 2.0 -					240	333.05							
- - -	Obstruc End of 1	tion -possible bedrock ⁻rial Pit at 2.40m			2.40	333.95							
- 3.0 													
- 4.0 - - -													
Grou No C	undwater Groundwate	Conditions er Observed		<u> </u>		<u> </u>							
Stab No ir	oility nstability O	bserved											
Gen	eral Rema	arks											

								REPORT NUMBER					
TRIAL PIT RECORD									18312				
CON	ITRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	83		
									Shee	Sheet 1 of 1			
LOGGED BY C.Killaly		C.Killaly			509,639.71 E 570,389.09 N 337 95			DATE STARTED 26/03/2 DATE COMPLETED 26/03/2 DATE COMPLETED 26/03/2			3/2015 3/2015	2015 2015	
CLIE ENG	INEER	ESBI ESBI	GROUND LEVEL (III)		001.00			EXCAVATION 13 Tonne Ex METHOD			onne Exc	avator	
		i						Samples		'S	Pa)	ometer	
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)	
0.0	Soft blac	ck brown fibrous PEAT (H4-H7)		$\frac{\langle 1_{i} \rangle \langle 1_{j} \rangle}{ 1_{i} \rangle \langle 1_{j} \rangle}$									
- - -				$\frac{\sqrt{1}}{\sqrt{1}} \frac{\sqrt{1}}{\sqrt{1}}$				AA16676 AA16676T	B D	0.50-0.50 0.50-0.50	20 6[R]		
-	Soft grey brown sandy gravelly CLAY Gravel is subangular				0.90 337.05 (Moderate)			10					
_ 1.0 _	Soft grey blue sandy very gravelly SILT with medium cobble content. Gravel and cobbles are subangular to angular			× × ×	1.10	336.85	(0[R]		
-	Dense g horizons	rey sandy GRAVEL and COBBLES w - possible weathered bedrock	rith silt		1.50	336.45		AA16677 AA16677T	B D	1.50-1.50 1.50-1.50			
2.0	End of Trial Pit at 2.00m		×0(. ×	2.00	335.95								
- - -													
- 3.0													
- - -													
Grou	undwater of Indwater of	Conditions bserved at 0.9mbgl											
Stability No instability Observed													
Gen	eral Rema	rks											
2													
									REPORT N	UMBER			
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	TRIAL PIT RECORD										312		
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TP0	84		
LOG	GED BY	C.Killaly	CO-ORDINATI	ES	509,65 570,29	57.99 E 91.05 N		DATE S	TARTEI	D 26/03 TED 26/03	at 1 of 1 3/2015 3/2015		
CLIE		ESBI	GROUND LEV	/EL (m)	336.6	5		EXCAVA METHO	ATION D	13 To	onne Exc	cavator	
ENG	NEEK	ESDI							Sample	s		eter	
		Geotechnical Description		g		tion	- Strike	e			Test (KPa	Penetrom	
				Leger	Depth (m)	Eleva	Water	Samp Ref	Type	Depth	Vane	Hand (KPa)	
_ 0.0 _	Soft blac	k brown fibrous PEAT (H4-H7)		<u>, ,, , ,</u>									
	Soft grey	/ brown sandy gravelly CLAY. Gravel	is subangular	<u>\\/</u> , <u>\\/</u> <u>-0</u>	0.40 0.50	336.25 336.15		AA16674 AA16674T	B	0.40-0.40 0.40-0.40	28 10[R]		
	Obstruct End of T	ion -possible bedrock rial Pit at 0.70m		×ົ·×́	0.70	335.95		AA16675 AA16675T	B	0.70-0.70 0.70-0.70			
1.0 													
-													
-													
- 2.0													
-													
-													
3.0													
-													
-													
-													
- 4.0 - -													
-													
- - -													
Grou No G	indwater (iroundwate	Conditions er Observed		1	1	1	1	1			1	1	
Stab No in	ility Istability Ol	bserved											
Gene	eral Rema	irks											

and the second s									REPORT NU	JMBER	
IGSL	TRIAL PIT RECORD										
CONTRACT	Barnastooka Windfarm							IT NO.	TP0	85	
OGGED BY	C.Killaly	CO-ORDINAT	TES	509,72 570,22	29.96 E 21.99 N		DATE SI	TARTED	26/03	/2015 /2015	
	ESBI	GROUND LE	VEL (m)	339.1	8		EXCAVA		13 To	nne Exc	cavato
NGINEER	ESBI							Comula			er
						0		Samples	5	KPa)	romet
	Geotechnical Description		egend	Depth m)	Elevation	Vater Strike	Sample Ref	ype	Jepth	/ane Test (Hand Penet
.0 Soft black	brown fibrous PEAT (H4-H7)					>	0,12	F		/	
				0.40	338 78						
Soft grey content. C	brown sandy gravelly CLAY with me Gravel is subangular to angular	dium cobble		0.40	000.70		AA16671 AA16671T	B D	0.40-0.40	22 6[R]	
Soft grey	blue sandy very gravelly SILT. Grave	el is angular	ו•ו וו×	0.70	338.48		AA16672T	D	0.60-0.60		
0 Possible v	weather rock from 1.0mbgl		× × ×				AA16673	В	1.00-1.00		
Obstruction End of Tri	on -possible bedrock ial Pit at 1.20m			1.20	337.98		AA 100731	D	1.00-1.00		
0											
0											
.0											
roundwater C o Groundwater	onditions Observed										
tability											
o instability Ob	served										
eneral Remar	ks										

	T SSL				183	312					
CON	ITRACT Barnastooka Windfarm						TRIAL P	IT NO.	TP0	86	
							SHEET		Sheet	t 1 of 1	
LOG	GED BY C.Killaly	CO-ORDINAT	ES	509,74 570,12	13.05 E 23.96 N -		DATE ST DATE CO	TARTED	26/03 TED 26/03	/2015 /2015	
CLIE ENG	ENT ESBI INEER ESBI	GROUND LE	/EL (m)	333.2	7		EXCAVA METHO	ATION D	13 To	nne Exc	cavato
								Samples	6	a)	neter
	Geotechnical Description				_	trike				sst (KF	enetro
			Legend	Depth (m)	Elevatio	♦ ₩ater S	Sample Ref	Type	Depth	Vane Te	Hand Pe
0.0	Soft black brown fibrous PEAT (H4-H7)		<u> <u> </u></u>			(Slow)					
			<u> \\ /</u> \\ //								
							AA16669	В	0.50-0.50	10	
							AA 10009	U	0.50-0.50	ο[K]	
1.0	Soft grey brown sandy gravelly CLAY. Gravel i	s subangular	· <u>·</u> ·····	0.90	332.37						
	Soft grey blue sandy very gravelly SILT. Grave	l is angular	ו••ו• •ו•ו	1.10	332.17						
			×°. × × × ×								
			× × × ×				AA16670 AA16670	B D	1.50-1.50 1.50-1.50		
	Obstruction -possible bedrock		· ₀ x·	1.80	331.47						
2.0	End of Trial Pit at 2.00m		444	2.00	331.27						
3.0											
4 0											
Grou	undwater Conditions										
Grou	Indwater observed between GL and 1.1mbgl										
Stab No ir	bility Istability Observed										
Gen	eral Remarks										

	R										
	T BSL		18	312							
CON	TRACT Barnastooka Windfarm						TRIAL P	IT NO.	TP0	87	
LOG	GED BY C.Killaly	CO-ORDINAT	ËS	509,75 570,07	50.65 E 13.37 N		DATE S	TARTE	Shee 26/03 TED 26/03	t 1 of 1 3/2015 3/2015	
CLIE	INT ESBI	GROUND LEV	VEL (m)	340.0	1		EXCAVA		13 To	onne Exc	cavator
ENG	INEER ESBI)			
								Sample	s	(Pa)	ometer
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (k	Hand Penetr (KPa)
0.0	Soft black brown fibrous PEAT (H4-H7)		<u> <u> 1</u> <u>1</u></u>			-					
										10 0[R]	
- - 1.0 - - -	Soft grey brown sandy gravelly CLAY with med and boulder content	lium cobble		1.20 1.40	338.81 338.61		AA16666 AA16666T	B D	1.00-1.00 1.00-1.00	18 6[R]	
- - - 2.0	Soft grey blue sandy gravelly SILT . Gravel is s angular	subangular to	× × × × × × × × × × × × × × × × × × ×	2 2 2			AA16667	В	2.00-2.00		
	Becoming stiff/very stif from 2.2mbgl		· · × · × · × · × · × · × · × · × · × ·				AA16667T	D	2.00-2.00		
- - - - - - -	Obstruction -possible bedrock End of Trial Pit at 2.80m			2.80	337.21		AA16668 AA16668T	B D	2.80-2.80 2.80-2.80		
- - - - - - - -											
Grou No G	Indwater Conditions Groundwater Observed										
Stab No ir	ility Istability Observed										
Gen	eral Remarks										

IGSL	TRIAL PIT RECORD								312			
CONTRACT Barnastooka Windfarm						TRIAL P	IT NO.	TP0	91 t 1 of 1			
LOGGED BY C.Killaly	CO-ORDINAT	ES	509,69 569,92	92.80 E 25.91 N		DATE ST	TARTEL OMPLE	26/03 TED 26/03	/2015 5/2015			
CLIENT ESBI ENGINEER ESBI	GROUND LEV	/EL (m)	343.3	1		EXCAVA METHOD	TION	13 Tc	nne Exc	avator		
							Sample	s	(a)	neter		
Geotechnical Descrip	btion	Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetroi (KPa)		
^{0.0} Soft black brown fibrous PEAT		<u>\\</u> _ <u>\\</u> _										
Soft grey brown sandy gravelly CLAY.	Gravel is angular		0.40	342.91		AA16663 AA16663T	B D	0.40-0.40 0.40-0.40	28 10[R]			
Soft grey blue very sandy very gravelly cobble content	SILT with medium	× × × × × × × × × × × × × × × × × × ×	0.80	342.51								
- - - - - -		*. *. *. *. *. *. *. *. *. *. *. *. *. *				AA16664 AA16664T	B D	1.20-1.20 1.20-1.20				
2.0 Obstruction -possible bedrock		Q.X.X X X X X X X X X X X X X X X X X X	2.20	341.11		AA16665	В	2.20-2.20				
							D	2.20-2.20				
3.0 												
_ 4.0 												
- - - -												
Groundwater Conditions No Groundwater Observed	oundwater Conditions Groundwater Observed											
Stability No instability Observed												
General Remarks	eral Remarks											

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									REPORT NU	JMBER		
	BSL	I	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Barnastooka Windfarm	1					TRIAL PI	T NO.	TP0 Sheet	92 : 1 of 1	
LOG	GED BY	C.Killaly	CO-ORDINATI	ES	509,64 569,83	48.28 E 38.94 N		DATE ST	ARTED	25/03 ED 25/03	/2015 /2015	
	NT	ESBI ESBI	GROUND LEV	/EL (m)	342.62	2		EXCAVA METHOD	TION	13 To	nne Exc	avator
			1					:	Samples	;	(E	neter
		Geotechnical Description				Ę	strike				est (KPa	enetron
				Legend	Depth (m)	Elevatio	Water S	Sample Ref	Type	Depth	Vane Te	Hand Pe (KPa)
0.0	Soft blac	k brown fibrous PEAT (H4-H7)		<u> </u>								
-				<u> \ 1/ \ 1/</u>							10	
-				<u>v vi v</u> <u>vi vi</u>							6[R]	
- 				<u> </u>	1 20	241 42		AA16660 AA16660T	B D	1.00-1.00	4 0[R]	
-	Soft grey	/ brown sandy gravelly CLAY. Gravel	is angular I is angular	ו••••••••••••••••••••••••••••••••••••	1.40	341.22						
-			Ū	×								
2.0				* ×° × × × × × × × × ×	:			AA16661	В	2.00-2.00		
-				· ×· × · ×· · ×. × ×°. ×				AA16661T	D	2.00-2.00		
-				× ox ×o × ×								
- - 3.0	Trial Pit	terminated		· .× · * · . × . • × · . × .	3.00	339.62		AA16662	В	3.00-3.00		
-	End of T	rial Pit at 3.00m						AA16662T	D	3.00-3.00		
-												
-												
- - -												
-												
-												
Grou Grou	oundwater Conditions oundwater observed between GL and 1.4mbgl											
Stab	ility											
No ir	istability O	bserved										
Gene	eral Rema	rks										

6	An									REPORT NU	JMBER		
	JSL	т	RECO	RD					183	312			
CON	TRACT	Barnastooka Windfarm						TRIAL PI	T NO.	TP0	93		
LOG	GED BY	C.Killaly	CO-ORDINATI	ES	509,56 569,86	63.41 E 61.54 N		DATE ST	ARTE	25/03 TED 25/03	/2015 /2015		
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	342.67	7		EXCAVA METHOD		13 To	nne Exc	cavator	
									Sample	s	Pa)	ometer	
		Geotechnical Description		Legend	Depth (m)	Elevation	₩ater Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetrc (KPa)	
0.0	Very sof Medium and bout Soft grey content.	t black brown fibrous PEAT (H6-H7) dense grey sandy GRAVEL with med der content. Gravel is angular / blue sandy very gravelly SILT with m Gravel is angular	ium cobble edium cobble	• • • • • • • • • • • • • • • • • • •	1.60 2.00	341.07 340.67	(Slow)	AA16657 AA16657T AA16658 AA16658T	B D D	1.00-1.00 1.00-1.00 2.00-2.00 2.00-2.00	8 0[R] 4 0[R] 2 0[R]		
- 3.0	End of T	rial Pit at 3.00m		× × × × × × × × × × × × × × × × × × ×	3.00	339.67		AA16659 AA16659T	B D	3.00-3.00 3.00-3.00			
Grou Grou No in Gene	General Remarks												



									REPORT N	JMBER	
IGSL	Т	RD					18	312			
CONTRACT	Barnastooka Windfarm						TRIAL P	PIT NO.	TPT	026A	
LOGGED BY	F.C	CO-ORDINAT	ES	507,6 ⁻ 572,04	19.01 E 15.97 N		DATE S	TARTE	Shee D 30/04	t 1 of 1 1/2015 1/2015	
CLIENT	ESBi	GROUND LEV	/EL (m)	343.29	9		EXCAVA	ATION	13 To	onne Exc	cavator
ENGINEER	ESBi										
								Sample	es	(Pa)	ometer
	Geotechnical Description		_		uc	Strike				est (h	enetr
			Legenc	Depth (m)	Elevati	Water 8	Sample Ref	Type	Depth	Vane T	Hand F (KPa)
^{0.0} Soft blac	ck fibrous PEAT (H4-H7)										
-							AA32151	В	0.25-0.25		
Soft to fi	rm very gravelly sandy SILT with cobb	les. Cobbles	*0 × ×	0.45	342.84						
- 1.0				e							
-							AA32152	В	1.20-1.20		
-			××××								
-			* ° ° ; * ° ° ;								
-			X X X X X X X X X X X X X X X X X X X								
2.0											
Obstruct	tion - Possible boulders/rock		× ×	2.30	340.99		AA32153	В	2.20-2.20		
End of T	rial Pit at 2.30m										
-											
- 3.0											
-											
-											
-											
-											
4.0											
-											
-											
-											
-	Conditions										
No Groundwater	er Observed										
Stability No instability O	bserved										
General Rema	arks										

TRIAL PIT RECORD									REPORT NU	JMBER 312		
CON	TRACT	Barnastooka Windfarm							IT NO.	TPT	027A	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,32 571,72	22.00 E 27.03 N		DATE SI	TARTEI OMPLE	Shee 0 07/04 TED 07/04	t 1 of 1 /2015 /2015	
CLIE ENGI	NT NEER	ESBi ESBi	GROUND LEV	/EL (m)	344.89	9		EXCAVA METHOD	TION	13 To	onne Exc	avator
									Sample	s	Pa)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	₩ater Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetro (KPa)
- 0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> \/</u> \//	0.30	344 50	(Rapid)					
-	Soft brov Sand is o	vn sandy gravelly CLAY with rootlets t coarse. Gravel is subrounded.	hroughout.		0.50	344.33		AA21694	В	0.30-0.30	12 2[R]	
- - - - 1.0	Soft to fir cobbles a subangu subangu	Soft to firm blue/grey sandy gravelly SILT with occasional cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded. Cobbles and boulders are subangular.			0.70	344.19						
-				$\begin{array}{c} & \times & \times \\ & \times & \times & \times \\ & \times & \times & \times \\ & \times & \times$				AA21695	В	1.30-1.30		
2.0	Angular	grey GRAVEL		× × × × × × × × × × × × × × × × × × ×	2.20	342.69		AA21696	В	2.30-2.30		
-	Obstruct End of T	ion -possible bedrock rial Pit at 2.20m			2.60	342.29						
- 3.0 - - - -	Obstruction -possible bedrock End of Trial Pit at 2.20m											
- - - - -	0											
Grou Rapio	ndwater (d water ing	Conditions rress from surface										
Stab Trial	ility Pit was un	stable										
Gene	eral Remarks											

JIGGL .	REPORT NU	jmber 312							
CONTRACT Barnastooka Windfarm					TRIAL P	IT NO.	TPT	028A	
LOGGED BY F.C	CO-ORDINATES GROUND LEVEL (m)	507,24 572,34 397.1	44.99 E 43.02 N 1		DATE ST DATE CO EXCAVA	TARTED	Shee 0 09/04 TED 09/04 13 To	t 1 of 1 /2015 /2015 onne Exr	cavato
ILENT ESBI		1			METHO)			
						Sample	s	Pa)	ometer
Geotechnical Description	n puede	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr
.0 Soft dark brown fibrous PEAT (H4-H7) Soft grey very gravelly sandy SILT with col boulders. Cobbles and boulders are subro	bbles and $\sqrt{2} \times \sqrt{2} \sqrt{2} \times \sqrt{2} \sqrt{2} \sqrt{2} \sqrt{2} \sqrt{2} \sqrt{2} \sqrt{2} \sqrt{2}$	0.50	396.61	(Moderate)	AA25444 AA25444T	B D	0.40-0.40 0.40-0.40	18 0[R]	
.0 subangular.				(Seepage)	AA25445 AA25445T AA25446 AA25446T	B D D	1.80-1.80 1.80-1.80 2.40-2.40 2.40-2.40		
End of Trial Pit at 3.00m	^~ <u>```</u> .	3.00	394.11						
.0									
groundwater Conditions									
loderate water at 0.3mbgl, Slight water seepage	e at 2.40mbgl								
tability									
lo Instability Observed									
eneral Remarks									

										REPORT NU	JMBER	
	TRIAL PIT RECORD										312	
CON	ITRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TPT	029A	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,20 572,08	69.94 E 33.98 N		DATE S	TARTE	Shee 0 09/04 TED 09/04	t 1 of 1 /2015 /2015	
CLIE	NT	ESBi	GROUND LE	/EL (m)	385.22	2		EXCAVA		13 To	nne Exc	avator
ENG	INEER	ESBi		1				METHO	D			
									Sample	s	(Pa)	ometer
		Geotechnical Description		pue	£	ation	er Strike	ple		÷	e Test (k	d Penetr a)
				Lege	(m) Depi	Elev	Wate	Sam Ref	Type	Depi	Van	Han (KPa
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> \\/ \\/</u>								
	Soft blue coarse. (subangu	e/grey sandy gravelly SILT with cobble Gravel is subangular to subrounded. C lar to subrounded.	s. Sand is cobbles are		0.30	384.92		AA25437 AA25437T	B D	0.30-0.30 0.30-0.30	28 8[R]	
2.0				૾ઌૢૼ૾૾ૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢઌૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢ				AA25438 AA25438T	B D	1.80-1.80 1.80-1.80		
- - - - - - - - - - -	End of T	End of Trial Pit at 3.10m			3.10	382.12		AA25439 AA25439T	B D	3.00-3.00 3.00-3.00		
G G G G F O	undwater	Conditions										
	Groundwate	er Observed										
J di Stab	oility nstability Ol	bserved										
Gen	eral Rema	rks										
IGSL TP LOG												

TRIAL PIT RECORD											^{омвек} 312	
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TPT Shee	030A	
LOG	GED BY	F.C	CO-ORDINATE	S	506,41 571,29	13.98 E 97.04 N		DATE S DATE C	TARTED	0 09/04	1/2015 1/2015	
CLIE ENGI	NT NEER	ESBi ESBi	GROUND LEV	EL (m)	343.94	1		EXCAVA METHO	ATION D	13 To	onne Exc	avator
									Samples	3	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)			0.20	242.74						
-	Light bro	wn fibrous PEAT (H4-H5)			0.20	343.74		AA25433	В	0.30-0.30	22 6[R]	
-	End of T	ion - possible boulders/bedrock rial Pit at 0.40m						AA25433 I	D	0.30-0.30		
-												
1.0												
-												
-												
2.0												
-												
-												
-												
3.0												
-												
-												
-												
4.0												
-												
-												
-												
Grou No G	indwater roundwate	Conditions Pr Observed										
Stab No in	ility stability O	bserved										
Gene	eral Rema	rks										

										REPORT N	UMBER	
IGS	Ŀ	т	RIAL PIT I	RECO	RD					18	312	
CONTRA	АСТ	Barnastooka Windfarm						TRIAL P	IT NO.	TPT	031A	
			CO-ORDINAT	ES	505 90)3 16 F		- SHEET	TADTER	Shee	t 1 of 1	
LOGGE	D BY	C.Killaly			571,20	08.02 N		DATE C	OMPLE	TED 30/03	3/2015 3/2015	
CLIENT		ESBi	GROUND LE	/EL (m)	369.19	9		EXCAVA METHO	ATION D	13 To	onne Exc	avator
ENGINEE	ER	ESBi							_			
									Sample	5	a)	neter
		Geotechnical Description					ike				t (KF	netroi
				pue	Ę	ation	er Sti	ple	(h)	÷	e Tes	d Per
				Lege	Dep (m)	Elev	Wat	San Ref	Type	Dep	Van	Han (KP
^{0.0} So	oft blac	k fibrous PEAT with rootlets (H4-H7)					(Slow)					
Sc	oft brov	n sandy gravelly CLAY with rootlets			0.25	368.94		AA16700 AA16700T	B	0.20-0.20	60 18[R]	
				- <u>+</u>	0.60	368 59						
So	oft/firm	grey blue sandy gravelly SILT. Grave	l is subangular	ו••ו ו•ו	0.00	000.00						
10				×								
	oomin	a firm a time a		× • × × • ×				A A 21651	Р	1 20 1 20		
B	ecomin	g firm/suff from 1.2mbgl		× · × · × · × · × · × · × · × · × · × ·				AA21651 AA21651T	D	1.20-1.20		
OI	bstructi nd of Ti	on -possible bedrock rial Pit at 1 50m			1.50	367.69						
2.0												
3.0												
-40												
4.0												
Ground	water (Conditions										
Groundw	vater ob	served between GL and 0.6mbgl										
Stability No instat	/ bility Ot	oserved										
General	Rema	rks										

Am									REPORT NU	JMBER	
IGSL	T	FRIAL PIT I	RECO	RD					183	312	
CONTRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TPT	032A	
LOGGED BY	F.C	CO-ORDINAT	ES	507,03 571,79	38.25 E 96.83 N		DATE S	TARTEI	C 15/05 TED 15/05	t 1 of 1 5/2015 5/2015	
CLIENT	ESBi	GROUND LEV	/EL (m)	354.4	7		EXCAVA		13 Tc	nne Exc	cavato
	ESBi										
								Sample	s	a)	meter
	Geotechnical Description				_	trike				st (KI	netro
			-egend	Depth (m)	Elevation	¥ ater St	Sample Ref	Lype	Depth	/ane Te	Hand Pe
0.0 Soft blad	ck fibrous PEAT (H4-H7)					(Seepage)	07 E			-	
Soft blue to coarse subroun	e/grey sandy gravelly SILT with cobbl e. Gravel and cobbles are subangula ded.	es. Sand is fine r to		0.20	354.27		AA20482	В	0.20-0.20	18 8[R]	
			* * * * * * * * * * * * * * * * * * *								
.0			× · · ×								
0			(x, y) = (x, y)				4 4 20 4 9 2	Р	2 00 2 00		
							AA20483	В	2.00-2.00		
	Trial Dit at 2 00m		× · · · · · ·	3.00	351.47						
End of I	nai Pit at 3.00m										
.0											
Froundwater Vater seepage	Conditions ∋ from G.L										
i tability lo instability O	bserved										
eneral Rema	arks										





REPORT NUMBER

GDT 15/7/15 18312 FINAL TP LOC.GPJ IGSL

TP LOG . Igsl



18312 FINAL TP LOC.GPJ IGSL.GDT 15/7/15 TP LOG . Igsl



										REPORT N	JMBER	
	35L	т	RIAL PIT I	RECO	RD					18	312	
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TPT	037A	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,99 572,3	90.03 E 59.03 N		DATE S		Shee D 06/05	t 1 of 1 5/2015	
CLIE	NT	FSBi		/EL (m)	393.6	2		EXCAVA		13 To	nne Exc	cavator
ENG	INEER	ESBi						METHO	D			
									Sample	S	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetro (KPa)
0.0	Soft brow	wn/black fibrous PEAT (H4-H7)		<u></u>			-				-	
-				<u>1/ 1/ 1/ 1/</u>								
								AA34752	В	0.50-0.50	16 4[R]	
- - 1.0 -	Soft grey coarse.	/ sandy gravelly SILT with rootlets to 1 Gravel is subangular.	I.40m. Sand is	<u> <u> </u> <u></u></u>	1.00	392.62		AA34753	В	1.00-1.00	10 0[R]	
-				* · · × · · · · · · · · · · · · · · · ·								
- -				× · · × · ·								
2.0	Obstruct	ion Dossiblo rock		×	2.20	391.42						
-	End of T	rial Pit at 2.20m										
-												
3.0												
-												
-												
4.0												
-												
Grou No G	indwater (Groundwate	Conditions er Observed										
Stab No in	ility istability O	bserved										
Gene	eral Rema	rks										
8												

	Array						R	EPORT N	UMBER	
	JSL T	RIAL PIT RECO	ORD					18	312	
CON	TRACT Barnastooka Windfarm					TRIAL P	PIT NO.	TP1 Show	F038A	
LOG	GED BY F.C	CO-ORDINATES	507,7 572,3	66.02 E 15.01 N		DATE S		06/0 D 06/0	5/2015 5/2015	
CLIE	INT ESBi	GROUND LEVEL (m)	331.5	1		EXCAVA METHO	ATION D	13 T	onne Exc	cavator
							Samples		â	leter
	Geotechnical Description	gend	epth 1)	evation	ater Strike	ample ef	ype	epth	ane Test (KPa	and Penetrom (Pa)
0.0	Soft black fibrous PEAT (H4-H7)				3	ο Υ Ο	É.		>	ΞŸ
	Silty angular COBBLES and BOULDERS	× × ×	0.30	331.21						
	Obstruction End of Trial Pit at 0.50m		0.50	331.01						
1.0										
_										
2.0										
3.0										
4.0										
Gro No G	undwater Conditions Groundwater Observed									
Stab No ir	ility nstability Observed									
Gen	eral Remarks									

REPORT NUMBER

(Arra)									REPORT NU	JMBER		
	3SL	Т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Barnastooka Windfarm						TRIAL PI	T NO.	TPR	001	
LOG	GED BY	F.C	CO-ORDINATI	ES	507,02 572,15	23.99 E 53.99 N		DATE ST	ARTE	0 01/05 TED 01/05	2015 2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	396.00)		EXCAVA METHOD	TION	13 To	nne Exc	avator
			I						Sample	s	a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (Kl	Hand Penetrc (KPa)
2.0	 ^{0.0} Soft dark brown fibrous PEAT (H4-H7) ^{1.0} Soft grey very gravelly sandy SILT with cobbles and boulders. Cobbles and boulders are subangular to subrounded. 2.0 (Medium dense) Brown coarse GRAVEL with cobbles and boulders. Cobbles and boulders are subangular to subrounded. Obstruction - Possible rock End of Trial Pit at 2.40m 3.0 				0.90 2.10 2.40	395.10 393.90 393.60		AA25424 AA25424T AA25425 AA25425T	B D D	1.00-1.00 1.00-1.00 2.00-2.00 2.00-2.00	40 10[R] 22 6[R] 18 2[R]	
4.0 	Indwater (Conditions r Observed										
Stab	ility											
No in	stability Ol	oserved										
Gene	eral Rema	rks										

REPORT NUMBER TRIAL PIT RECORD 18312 1920 TRIAL PIT NO. **TPR002** CONTRACT Barnastooka Windfarm SHEET Sheet 1 of 1 **CO-ORDINATES** 507,157.97 E DATE STARTED 01/05/2015 LOGGED BY F.C 572,113.98 N DATE COMPLETED 01/05/2015 **GROUND LEVEL (m)** 390.71 EXCAVATION 13 Tonne Excavator CLIENT ESBI METHOD ENGINEER ESBI Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation Sample Ref Legend Depth Depth (m) Type 0.0 Soft dark brown/black fibrous PEAT (H4-H7) $\frac{1}{\sqrt{1}}$ $\frac{\sqrt{1}}{\sqrt{1}}$ $\frac{\sqrt{1}}{\sqrt{1}}$ <u>\\</u> \\ AA25422 В 0.40-0.40 18 <u>// \// \/</u> AA254221 D 0.40-0.40 0[R] <u>\\</u> \\ <u>// \// \/</u> AA25423 В 0.80-0.80 0.90 389.81 • × Soft grey very gravelly sandy SILT with cobbles and boulders. Cobbles and boulders are subangular to ×00 AA25423T D 0.80-0.80 . 1.0 subrounded. k . Oð 1.70 389.01 (Medium dense) Grey/brown coarse GRAVEL with cobbles and boulders. Cobbles and boulders are subangular to Y 1.90 388.81 subrounded. (Slow) 2.0 Obstruction - Possible rock End of Trial Pit at 1.90m 3.0 4.0 Groundwater Conditions Water ingress at 1.90m Stability No instability Observed **General Remarks**

.GDT 15/7/15

18312 FINAL TP LOC.GPJ IGSL

IGSL TP LOG



REPORT NUMBER

GDT 15/7/15 18312 FINAL TP LOC.GPJ IGSL

TP LOG . Igsl

	Arra								REPORT NU	JMBER	
		RIAL PIT	RECO	RD					183	312	
CON	TRACT Barnastooka Windfarm						TRIAL P	PIT NO.	TPR	004	
LOG	GED BY F.C	CO-ORDINAT	ËS	506,7 571,60	75.01 E 09.99 N		DATE S	TARTE	 Snee 08/04 TED 08/04 	/2015 /2015	
CLIE	NT ESBI	GROUND LEV	VEL (m)	342.6	9		EXCAVA		13 Tc	onne Exc	cavator
ENG	INEER ESBI										<u> </u>
								Sample	s	Pa)	omete
	Geotechnical Description		_		5	Strike				est (K	enetro
			egend	epth 1)	levatio	ater S	ample ef	ype	epth	ane T	and P (Pa)
0.0	Soft black/brown fibrous PEAT (H4-H7)			05 05	ш	\$	S R	É.		>	т÷
-	····· ()		$\frac{1}{1} \frac{\sqrt{1}}{\sqrt{1}} \frac{\sqrt{1}}{\sqrt{1}}$								
-				0.00	0.40.00					12	
	Soft to firm blue/grey sandy gravelly SILT with cobbles,boulders and rootlets. Sand is fine to c	occasional oarse. Gravel	*00 [*] * ;	0.60	342.09		AA25428 AA25428T	B D	0.60-0.60 0.60-0.60	0[R]	
-	is angular to subangular. Cobbles and boulders subrounded.	s are	$\times 0^{\times} \times 0^{\times}$	X V							
-											
E				k V							
-			×0~ × ×. Ø×. ₹								
Ē			× × × ×								
2.0							AA25429 AA25429T	B D	2.00-2.00 2.00-2.00		
-			× Ø ×	2.50	240.10						
Ē	Obstruction - possible boulders/bedrock End of Trial Pit at 2.50m			2.50	540.19						
-											
3.0											
-											
-											
4.0											
-											
Grou	Indwater Conditions										
	nounuwater Observed										
Stah	ility										
No ir	Istability Observed										
Gen	eral Remarks										

REPORT NUMBER TRIAL PIT RECORD 18312 1920 TRIAL PIT NO. **TPR005** CONTRACT Barnastooka Windfarm SHEET Sheet 1 of 1 **CO-ORDINATES** 506,672.03 E DATE STARTED 31/03/2015 LOGGED BY C.Killaly 571,419.98 N DATE COMPLETED 31/03/2015 **GROUND LEVEL (m)** 331.69 EXCAVATION METHOD 13 Tonne Excavator CLIENT ESBI ENGINEER ESBI Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation Legend Sample Ref Depth Depth (m) Type 0.0 Soft black fibrous PEAT with rootlets (H4-H7) 11 0.20 331.49 0 Soft brown sandy gravelly CLAY with rootlets 10 - . 0[R] <u>170</u> <u>.</u>... 0.50-0.50 0.50-0.50 AA21657 В $\frac{1}{2}$ AA21657T D 0.70 330.99 Firm grey brown sandy very gravelly SILT with medium cobble and boulder content. Gravel is subangular to angular 1.0 4 × Oð - <u>Ø</u>× Ē AA21658 1.50-1.50 В 1.60 330.09 Obstruction -possible bedrock End of Trial Pit at 1.60m D 1.50-1.50 AA21658T 2.0 3.0 4.0 **Groundwater Conditions** No Groundwater Observed Stability No instability Observed **General Remarks**

GDT 15/7/15

18312 FINAL TP LOC.GPJ IGSL

IGSL TP LOG

									REPORT N	UMBER	
	3SL	Т	RIAL PIT REC	ORD					18	312	
CON	NTRACT	Barnastooka Windfarm						PIT NO.	TPF	R006	
LOG	GED BY	C.Killaly	CO-ORDINATES	506,5 571,4	71.06 E 09.91 N		DATE S	TARTE	D 31/03	3/2015 3/2015	
CLIE	ENT	ESBI	GROUND LEVEL (r	n) 343.0	7		EXCAV	ATION	13 To	onne Exc	cavator
ENG	GINEER	ESBI						Sample	es		leter
		Geotechnical Description	Leaend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa	Hand Penetrom (KPa)
0.0	Soft blac	k brown fibrous PEAT (H4-H7)		<u>,</u>							
- - - - - - - - - - - - - - - - - - -	Obstruct End of T	ion -possible bedrock rial Pit at 1.30m		: N/2 :	341.77		AA21656 AA21656T	BD	0.60-0.60		
-											
JT 15/7/15											
GSI-GSI GSI-GSI No (undwater Groundwate	Conditions er Observed		<u> </u>	1	<u> </u>					
LOC.GPJ											
L INAL No ii	bility nstability O	bserved									
18312 Gen	eral Rema	irks									
IGSL TP LOG											

										REPORT N	UMBER	
	35L	ſ	FRIAL PIT F	RECO	RD					18	312	
CON	ITRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TPF	R007	
LOG	GED BY	JOC	CO-ORDINATI	ES	506,3 571,4	58.02 E 49.21 N		DATE S	TARTE	D 03/07	et 1 of 1 7/2015 7/2015	
CLIE		ESBI	GROUND LEV	/EL (m)	369.0	7		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
ENG		E301							Sample	2S		eter
		Geotechnical Description					trike				st (KPa	netrom
				Legend	Depth (m)	Elevation	Water St	Sample Ref	Type	Depth	Vane Te	Hand Pe (KPa)
0.0	Soft blac	ck fibrous PEAT (H4-H7)		<u> </u>								
-				<u>\\/, \\/,</u> <u>\/, \\/, \\</u>				A A 11/10	P	0.50.0.50		
-				<u>\\/, \\/</u> <u>// \\/, \\</u>			1	AA11419	D	0.50-0.50		
	Light bro Cobbles	own silty GRAVEL with a high cobble are subangular to subrounded.	content.	×	0.90	368.17	(Slow)	AA11420	В	1.00-1.00	9	
-	(Medium BOULDI	n dense) Grey slightly gravelly COBBI ERS. Cobbles and boulders are suba	LES and ngular to		1.20	367.87					-[[K]	
-	End of T	rial Pit at 1.50m			1.50	367.57						
-												
-												
-												
-												
3.0												
-												
-												
4.0												
-												
-												
-												
Grou Slow	undwater ingress at	Conditions t 0.90m										
Stab	nility											
No ir	nstability of	oserved										
Gen	eral Rema	arks										

	And									REPORT N	UMBER	
	BSL	I	RIAL PIT I	RECO	RD					18	312	
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TPF	8008	
LOG	GED BY	JOC	CO-ORDINAT	ES	506,23 571,44	38.11 E 19.64 N		DATE S	TARTE	D 03/07	et 1 of 1 7/2015 7/2015	
CLIE	NT	ESBI	GROUND LEV	/EL (m)	379.0	7		EXCAV	ATION	13 To	onne Exc	cavator
ENG	INEER	ESBI		1								
									Sample	S	a)	neter
		Geotechnical Description					ike				st (KP	netroi
				pue	Ę	ation	er Str	ple	0	Ę	e Tes	d Per a)
				Lege	(m)	Elev	Wat	Sam Ref	Type	Dep	Van	Han (KPa
0.0	Soft blac	ck fibrous PEAT (H4-H6)		$\frac{\langle 1_{2} \rangle \langle 1_{2}}{\langle 1_{2} \rangle \langle 1_{2} \rangle}$								
_	Soft brow	wn gravelly SILT with a high cobble co	ontent. Cobbles	1/ .1/ .1 1/ X 1/ X	0.50	378.57		AA11416	В	0.40-0.40		
-	are suba	angular to subrounded.		× × ×								
-			0000150		1.00	378.07			5	1 00 1 00		
-	(Loose to and BOU	o medium dense) Grey brown graveli JLDERS. Cobbles and boulders are a	angular to					AA11417	В	1.00-1.00	-[R]	
-	End of T	rial Pit at 1 40m			1.40	377.67		AA11418	в	1 40-1 40		
E												
E												
2.0												
-												
-												
-												
-												
3.0												
_												
-												
-												
4.0												
-												
E												
_												
ŀ												
Grou	undwater	Conditions		1	l	1	L	1				I
Stab No in	ility istability ot	oserved										
Gene	eral Rema	arks										
1												

	TRIAL PIT RECORD 18312												
CON	TRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TPS	001		
LOG	GED BY	C.Killaly	CO-ORDINAT	ES				DATE ST	TARTEL	D 25/03	2015		
CLIE	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)				EXCAVA		13 To	nne Exc	avator	
									Sample	s	a)	neter	
		Geotechnical Description		Legend	Depth (m)	Elevation	₩ater Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetror (KPa)	
0.0	Very sof	t black brown fibrous PEAT (H5-H7)					(Slow)	0712			-		
-	Soft gre	y brown sandy very gravelly CLAY with nd boulder content. Gravel is angular	n low medium		0.60			AA16651 AA16651T	B D	0.50-0.50 0.50-0.50			
1.0 								AA16652 AA16652T	B D	1.00-1.00 1.00-1.00	10 0[R]		
- - - 2.0 -	Soft gre content.	y blue sandy very gravelly SILT with m Gravel is angular	edium cobble	1. × × × × × × × × × × × × × × × × × × ×	1.60			AA16653 AA16653T	B D	2.00-2.00 2.00-2.00			
- - - - - 3.0	End of 1	rial Pit at 3.00m		×.~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	3.00			AA16654 AA16654T	B	3.00-3.00			
-													
- 4.0 													
Grou Grou	Indwater ndwater o	Conditions bserved between GL and 0.6mbgl					<u> </u>						
Stab No in	ility Istability O	bserved											
Gene	eral Rema	ırks											

										JMBER	
IGSL	1	RIAL PIT	RECO	RD					18	312	
CONTRACT	Barnastooka Windfarm						TRIAL P	IT NO.	TPS	002	
OGGED BY	C.Killaly	CO-ORDINAT	ËS	509,52 569,90	28.95 E 05.99 N		DATE S	TARTE	Shee 25/03 TED 25/03	t 1 of 1 3/2015 3/2015	
LIENT	ESBI	GROUND LEV	VEL (m)	335.1	0		EXCAVA		13 Tc	onne Exc	cavato
NGINEER	ESBI							Somelo			er
								Sample	5	(Pa)	romet
	Geotechnical Description		-egend	Depth (m)	Elevation	₩ater Strike	Sample Ref	Type	Jepth	/ane Test (ŀ	Hand Penet
^{0.0} Very soft	t/soft black brown fibrous PEAT (H4-	H7)				(Slow)				-	- `
			<u> </u>							12	
										0[R]	
.0			$\frac{N_{12}}{N_{12}} \frac{N_{12}}{N_{12}}$				AA16655	В	1 00-1 00	6	
Soft grey	/ blue sandy very gravelly SILT with n	nedium cobble	*0.×`×`;	1.20	333.90		AA16655T	D	1.00-1.00	0[R]	
content.	Gravel is angular		× · · · · · · · · · · · · · · · · · · ·								
			× ~ ~ , , , , , , , , , , , , , , , , ,								
			, , , , , , , , , , , , , , , , , , ,					_			
2.0							AA16656 AA16656T	B D	2.00-2.00 2.00-2.00		
			× × ×	2 50	332.60						
End of T	rial Pit at 2.50m			2.50	552.00						
3.0											
ł.0											
iroundwater (Conditions										
Groundwater of	bserved between GL and 1.2mbgl										
Stability Trial Pit unstabl	le from Ground Level										
Seneral Rema	irks										

An									REPORT N	UMBER	
IGSL	T	RIAL PIT R	RECO	RD					18	312	
CONTRACT	Barnastooka Windfarm						TRIAL P	PIT NO.	TPS	003	
LOGGED BY	F.C	CO-ORDINATE	S				DATE S	TARTE	Shee D 15/04	t 1 of 1 1/2015 1/2015	
CLIENT	ESBI	GROUND LEV	EL (m)				EXCAVA	ATION	13 To	onne Exc	cavator
ENGINEER	ESBI										
								Sample	es	Pa)	ometer
	Geotechnical Description		egend	lepth n)	levation	∳ater Strike	ample tef	ype	epth	'ane Test (K	land Penetr <pa)< td=""></pa)<>
^{0.0} Soft bro	wn/black fibrous PEAT (H4-H7)			05	ш	(Seepage)	S R	-		>	τe
- - - -			<u>, ,, ,</u> <u>,,, ,, ,</u>				AA27939	В	0.50-0.50	24	
- Obstruc - End of 1	tion - Possible boulders/bedrock Frial Pit at 0.70m			0.70			AA279391	D	0.50-0.50	4[K]	
- - -											
- - -											
_ 2.0 - -											
-											
3.0 											
- - 4.0 -											
Groundwater Water seepage	Conditions e from G.L			<u> </u>	<u> </u>	<u> </u>	1	<u> </u>		<u> </u>	<u> </u>
Stability No instability C	Diserved										
General Rema	arks										

Appendix 3

APEX Geophysical Report

REPORT ON THE

GEOPHYSICAL SURVEY

AT

BARNASTOOKA WIND FARM

FOR

IGSL/ESBI

15th July 2015



APEX Geoservices Limited Unit 6 Knockmullen Business Pk., Gorey, Co. Wexford, Ireland

T: 0402 21842 F: 0402 21843 E: info@apexgeoservices.ie W: www.apexgeoservices.com Geophysical Investigation, Barnastooka Wind Farm for IGSL & ESBi



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 GEOSERVICES 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	AGL14327		
Author	CHECKED	REPORT STATUS	Date
EURGEOL SHANE O`ROURKE P.GEO., M.SC (GEOPHYSICS)	Tony Lombard, M.Sc. (GEOPHYSICS)	V.02	15 [™] July 2015

Geophysical Investigation, Barnastooka Wind Farm for IGSL & ESBi



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1. EXECUTIVE SUMMARY

APEX Geoservices Limited was requested by IGSL & ESBi to carry out a geophysical investigation as part of the ground investigation prior to the development of the Barnastooka Wind Farm, 15km east of Kenmare.

Barnastooka Wind Farm involves the design and construction of fourteen wind turbines (T25-T38) and associated infrastructure on the site.

The geophysical investigation consisted of Electrical Resistivity Tomography, Seismic Refraction, and MASW at the turbine bases to provide geotechnical parameters on the sub-peat soils and bedrock.

Peat probing has been carried out upon each of the ERT Profiles and this shows a thin covering of peat which has been plotted on each of the sections.

The centre of Turbine T25 has been interpreted as medium dense-very dense clayey gravel from 0.2-3.7m followed by slightly weathered-fresh sandstone/shale.

The centre of Turbine T26 has been interpreted as very dense clayey gravel from 0.5-1.4m followed by slightly weathered-fresh sandstone.

The centre of Turbine T27 has been interpreted as very dense clayey gravel from 0.4-2.2m followed by slightly weathered-fresh sandstone.

The centre of Turbine T28 has been interpreted as loose-very dense clayey gravel from 0.4-3.0m followed by slightly weathered-fresh sandstone.

The centre of Turbine T29 has been interpreted as very dense clayey gravel from 0.7-2.5m followed by slightly weathered-fresh sandstone.

The centre of Turbine T30 has been interpreted as very dense clayey gravel from 1.7-3.5m followed by slightly weathered-fresh sandstone.

The centre of Turbine T31 has been interpreted as loose-very dense clayey gravel from 0.4-3.5m followed by slightly weathered-fresh sandstone.

The centre of Turbine T32 has been interpreted as medium dense-very dense clayey gravel from 0.4-4.2m followed by slightly weathered-fresh sandstone.

The centre of Turbine T33 has been interpreted as medium dense-very dense clayey gravel from 0.3-3.2m followed by slightly weathered-fresh sandstone.

The centre of Turbine T34 has been interpreted as medium dense-very dense clayey gravel from 0.4-3.5m followed by slightly weathered-fresh sandstone.

The centre of Turbine T35 has been interpreted as dense-very dense clayey gravel from 0.5-2.7m followed by slightly weathered-fresh sandstone.



The centre of Turbine T36 has been interpreted as very dense clayey gravel from 0.3-1.3m followed by slightly weathered-fresh sandstone.

The centre of Turbine T37 has been interpreted as medium dense-very dense clayey gravel from 0.6-3.2m followed by slightly weathered-fresh sandstone.

The centre of Turbine T38 has been interpreted as medium dense-very dense clayey gravel from 0.7-2.9m followed by slightly weathered-fresh sandstone.

Sharp lithological contacts and/or faults may result in zones of lower quality bedrock (increased weathering/fracturing) being present that could increase the risk to excavation.

Changes in bedrock lithology with depth may represent a perpendicular change in bedrock properties. These lithological boundaries would pose a possible risk to the excavation of the turbine foundation due to lateral variations in the bedrock quality.

Soil Resistivity measurements have been carried out at T33 and T36.



2. INTRODUCTION

APEX Geoservices Limited was requested by IGSL & ESBi to carry out a geophysical investigation as part of the ground investigation prior to the development of the Barnastooka Wind Farm, 15km east of Kenmare.

Barnastooka Wind Farm involves the design and construction of fourteen wind turbines and associated infrastructure on the site. The turbine bases investigated were T25-T38.

The geophysical investigation consisted of Electrical Resistivity Tomography, Seismic Refraction and MASW at the turbine bases to provide geotechnical parameters on the sub-peat soils and bedrock. Soil Resistivity measurements were carried out at bases T33 and T36.

This report details the findings from the turbine bases investigation utilising ERT, seismic refraction and MASW.

2.1 Survey Objectives

The objectives of the investigation were to:

- Provide information on the type and thickness of the overburden
- Estimate the overburden stiffness
- Assess the depth to and quality of the bedrock
- Identify the type of bedrock
- Measure the soil resistivity values at two locations

2.2 Site Background

The site is located 15km east of Kenmare and 5km north of the Slaheny River Bog, and is also approximately 6km west of the Cork-Kerry border.

The majority of the site is set in a mountainous area with undulating topography ranging from 230 mOD in the north of the site, to 460 mOD in the south of the site. The surrounding land is used both for agriculture and for forestry. Several bogs exist in the area; the Doughill and Slaheny Bogs to the south and the Sillahertane Bog the north-east.





Fig 2.1: Location map.

2.2.1 Geology

Bedrock geology for the site comprises the Bird Hill Formation (Fig.2.2) which is made up of purple siltstone and fine sandstone and strikes approximately east-west, and dips steeply to the north. It is offset by several sinistral faults that trend north-south. These faults also offset the Slaheny Sandstone Formation to the north which is made up of cross-bedded sandstones and siltstone.

The turbine bases are located in the Bird Hill Formation, but may encounter the Slaheny Sandstone Formation at depth because this formation dips 40° to the south at the Bird Hill-Slaheny contact. A number of the turbine bases are close to the geological faults which transect the site in a north-south orientation.





Fig 2.2: The GSI bedrock map showing the geology as the Bird Hill Formation (light brown).

2.2.2 Soils

The soil for the predominant part of the site is a layer of blanket peat on rock, with some Devonian sandstone till to the east of the site (Fig.2.3).





Fig. 2.3: The Teagasc soil map with blanket peat (brown), rock at surface (grey), and Devonian sandstone till (magenta).

2.2.3 Aquifer

The site of the Barnastooka Wind Farm is described as a "Poor Aquifer – Bedrock which is Generally Unproductive except in Local Zones" (Fig.2.4).





Fig. 2.4: Aquifers map for the site. Green = Poor Aquifer – Bedrock which is Generally Unproductive except in Local Zones. Cyan = Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones.

2.2.4 Vulnerability

The vulnerability for the site is either high or extreme, and also contains sections where there is rock near to the surface (Fig.2.5).





Fig. 2.5: Vulnerability map for the site. Green = High. Red = Extreme. Grey = Rock at or near the surface.

2.2.5 Direct Investigation Data

No. 2 rotary core boreholes have been carried out by the client on either side of each base centre, and summary logs for these boreholes have been incorporated into the geophysical sections and consulted during the geophysical interpretation.



2.3 Survey Rationale

The following techniques have been employed to achieve the objectives of the survey:

Electrical Resistivity Tomography (ERT) soundings will outline variations in overburden/bedrock type and depth to the top of the bedrock along profiles which were 93m in length. ERT profiles will also map any sharp lateral changes in bedrock topography, and changes in bedrock lithology.

Seismic Refraction Profiling will confirm the depth to the top of the bedrock based upon an increase in seismic velocity for the more competent rock, compared to less competent overburden. When combined with the resistivity method, it is possible to interpret variations in seismic velocity as variations in overburden / bedrock type.

The **MASW** method is used to estimate shear-wave (S-wave) velocities in the ground material to indicate possible soft zones. Overburden material with an S-wave velocity of <175 m/s is generally classified as soft. The depth of investigation for this method will depend on the source type and geophone spacing.

The **Soil Resistivity Measurements**, using the Wenner Array, as described in IEEE Std 81-1983 (Guide for measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Ground System) is a standard method used for measuring vertical variations in subsurface resistivity. These measurements are used in the design of earthing systems. For ESBI, the "A" spacings are used are 0.3, 0.5, 0.7, 1, 2, 3, 4, 5, 7, 10, 15, 20, 30, 40, 50, 60, 80 and 100m.



3. RESULTS

The findings from the investigation have been presented in ACAD Drawing No's AGL14327_T25_01 to AGL14327_T38_01 and corresponding A4 report tables.

3.1 ERT

Two orthogonal Electrical Resistivity Tomography (ERT) profiles were acquired at each turbine base. Each of the profiles, 93m in length with a 3m electrode spacing, image to a depth of 15m.

The resistivity values are in the range 100 - 1700 Ohm.m and the results and interpretation are shown in Drawings AGL14327_T25_01 to AGL14327_T38_01.

Resistivity	Interpretation				
100-314	Sandy Gravelly CLAY				
314-985	Clayey GRAVEL/GRAVEL				
459-1700	SANDSTONE				
214-673	SILTSTONE				
100-214	SHALE				

The resistivity data has been generally interpreted on the following basis:

3.2 Seismic Refraction Profiling

Two P-wave seismic refraction profiles were recorded at each of the turbine bases. These were each 46m in length with a 2m geophone spacing, with the exception of Profile S1 at T29, Profiles S1-S2 at T37 and Profile S1 at T38 which were 23m in length.

The locations are indicated on Drawing No's AGL14327_T25_01 to AGL14327_T38_01.

The tomographically processed seismic data indicates p-wave velocities in the range 300–4000 m/s for the fourteen turbine bases over a depth range of 0-25m (Appendix B).



3.3 MASW

Two 1D MASW profiles were acquired with a 1m geophone spacing, and centered at each proposed turbine location.

Data was recorded to 1 second and 1D end shots for each profile were selected for office based data analysis.

The data describes the estimated stiffness of the overburden layers and velocity of the top of the top of rock.

The data shows S-wave velocities in the range 175-1200 m/s over a depth range of 1.5m – 11m bgl.

The results and interpretation are shown in detail in Appendix A (Turbine Summaries). For T26-T30, T33 & T36-T38 an insufficient surface wave was generated to allow MAWS processing. This is sometimes the case in areas of very shallow bedrock. For these profiles the shear wave velocities were calculated from the seismic refraction results (all of excellent quality) using a Poissons Ratio of 0.46 (a Poissons Ratio of 0.46 was found to be the most applicable based on the results for turbines with a sufficient surface wave).



The following table summarises shear wave velocity, soil cohesion and bedrock type.

Fig.3.1. Shear-wave velocity and corresponding soil cohesion.



3.4 Soil Resistivity Testing

Soil resistivity measurements were taken at T33 & T36 as follows:

T33 "A"		
Spacing	Resistance (ohms)	Resistivity (Ohm-m)
0.3	94.38	177.81
0.5	99.25	311.65
0.7	97.52	428.70
1	73.6	462.21
2	46.83	588.18
3	34.87	656.95
4	27.27	685.02
5	23.01	722.51
7	17.84	784.25
10	15.2	954.56
15	13.2	1243.44
20	11.65	1463.24
30	9.5	1789.80
40	7.045	1769.70
50	5.95	1868.30
60	5.241	1974.81
80	3.761	1889.53
100	2.945	1849.46

T36 "A"		
Spacing	Resistance (ohms)	Resistivity (Ohm-m)
0.3	119.6	225.33
0.5	59.64	187.27
0.7	52.5	230.79
1	52.65	330.64
2	47.37	594.97
3	44.95	846.86
4	42.04	1056.04
5	37.81	1187.23
7	32.78	1441.01
10	25.04	1572.51
15	15.48	1458.22
20	9.102	1143.21
30	8.378	1578.42
40	3.912	982.69
50	2.577	809.18
60	2.439	919.02
80		
100	1.904	1195.71



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5. APPENDIX A: DRAWINGS & TURBINE SUMMARIES

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

T25			
AGL14327_T25_01	Fig.1 Barnastooka Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:20000 1:1250 1:750 1:750	@ A3 @ A3 @ A3 @ A3
AGL14327_T25_02	Geophysical Investigation Summary T25	A4 Spre	adsheet
T26			
AGL14327_T26_01	Fig.1 Barnastooka Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:20000 1:1250 1:750 1:750	@ A3 @ A3 @ A3 @ A3
AGL14327_T26_02	Geophysical Investigation Summary T26	A4 Spre	adsheet
T27			
AGL14327_T27_01	Fig.1 Barnastooka Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:20000 1:1250 1:750 1:750	@ A3 @ A3 @ A3 @ A3
AGL14327_T27_02	Geophysical Investigation Summary T27	A4 Spre	adsheet
T28			
AGL14327_T28_01	Fig.1 Barnastooka Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:20000 1:1250 1:750 1:750	@ A3 @ A3 @ A3 @ A3
AGL14327_T28_02	Geophysical Investigation Summary T28	A4 Spre	adsheet
T29			
AGL14327_T29_01	Fig.1 Barnastooka Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:20000 1:1250 1:750 1:750	@ A3 @ A3 @ A3 @ A3
AGL14327_T29_02	Geophysical Investigation Summary T29	A4 Spre	adsheet



Т30		
AGL14327_T30_01	Fig.1 Barnastooka Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:20000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T30_02	Geophysical Investigation Summary T30	A4 Spreadsheet
T31 AGL14327_T31_01	Fig.1 Barnastooka Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:20000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T31_02	Geophysical Investigation Summary T31	A4 Spreadsheet
T32 AGL14327_T32_01	Fig.1 Barnastooka Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:20000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T32_02	Geophysical Investigation Summary T32	A4 Spreadsheet
T33 AGL14327_T33_01	Fig.1 Barnastooka Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:20000 @ A3 1:2000 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T33_02	Geophysical Investigation Summary T33	A4 Spreadsheet
T34 AGL14327_T34_01	Fig.1 Barnastooka Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:20000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T34_02	Geophysical Investigation Summary T34	A4 Spreadsheet
T35 AGL14327_T35_01	Fig.1 Barnastooka Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:20000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL1432/_135_02	Geophysical investigation summary 135	A4 Spreausneet



T36		
AGL14327_T36_01	Fig.1 Barnastooka Wind Farm Location	1:20000 @ A3
	Fig.2 Turbine Map	1:2000 @ A3
	Fig.3 ERT Profile R1	1:750 @ A3
	Fig.3 ERT Profile R2	1:750 @ A3
AGL14327_T36_02	Geophysical Investigation Summary T35	A4 Spreadsheet
T37		
AGL14327_T37_01	Fig.1 Barnastooka Wind Farm Location	1:20000 @ A3
	Fig.2 Turbine Map	1:1250 @ A3
	Fig.3 ERT Profile R1	1:750 @ A3
	Fig.3 ERT Profile R2	1:750 @ A3
AGL14327_T37_02	Geophysical Investigation Summary T37	A4 Spreadsheet
Т38		
AGL14327_T38_01	Fig.1 Barnastooka Wind Farm Location	1:20000 @ A3
	Fig.2 Turbine Map	1:1250 @ A3
	Fig.3 ERT Profile R1	1:750 @ A3
	Fig.3 ERT Profile R2	1:750 @ A3
AGL14327_T38_02	Geophysical Investigation Summary T38	A4 Spreadsheet



Geophysical Investigation Summary Drawing No. AGL14327_T25_02

apex 🔷

Site	Barnastooka Wind Farm
Turbine Base	T25

Location (ITM)	
Easting	507777
Northing	572314
Elevation (mOD)	328.4

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.2	314	-	-	1200	-	-	-	-	PEAT	VERY SOFT	Diggable
0.2	2.0	1442	163	600	2000	0.46	53.39	0.16	1.86	Clayey GRAVEL	MEDIUM DENSE	Diggable
2.0	2.8	1442	200	1282	2000	0.49	79.77	0.24	3.73	Clayey GRAVEL	MEDIUM DENSE- DENSE	Diggable
2.8	3.7	985	462	1628	2000	0.46	426.90	1.24	57.30	Clayey GRAVEL	VERY DENSE	Diggable
3.7	4.9	985	560	1965	2700	0.46	847.26	2.47	177.46	Slightly Weathered -Fresh SANDSTONE	VERY POOR	Break / Blast
4.9	6.4	673	698	2670	2700	0.46	1316.18	3.85	370.20	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
6.4	8.0	459	852	3618	2700	0.47	1961.77	5.77	721.11	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
8.0	9.8	214	990	4048	2700	0.47	2644.73	7.77	1177.30	Slightly Weathered -Fresh SHALE	EXCELLENT	Heavy Break / Blast

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Barnastooka Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

T25

Recommendations]



Geophysical Investigation Summary Drawing No. AGL14327_T26_02

apex 🔷

T26

Site	Barnastooka Wind Farm
Turbine Base	T26

Location (ITM)	
Easting	507244
Northing	572069
Elevation (mOD)	384.4

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.5	314	-	865	1200	-	-	-	-	PEAT	VERY SOFT	Diggable
0.5	1.4	314	446	1638	2000	0.46	397.46	1.16	51.14	Clayey GRAVEL	VERY DENSE	Diggable
1.4	2.3	459	746	2740	2700	0.46	1501.80	4.39	458.51	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
2.3	3.2	459	832	3056	2700	0.46	1867.80	5.45	657.10	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
3.2	4.1	459	988	3631	2700	0.46	2636.83	7.70	1160.71	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
4.1	5.0	459	1067	3918	2700	0.46	3071.18	8.97	1492.76	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
5.0	5.9	673	1107	4067	2700	0.46	3308.72	9.66	1688.01	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
5.9	9.7	985	1143	4200	2700	0.46	3529.63	10.31	1877.98	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile





Geophysical Investigation Summary Drawing No. AGL14327_T27_02



Site	Barnastooka Wind Farm
Turbine Base	T27
	•

Location (ITM)	
Easting	507606
Northing	572006
Elevation (mOD)	345.8

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*	interpretation	Quality **	Excavatability
0.0	0.4	314	-	804	1200	-	-	-	-	PEAT	VERY SOFT	Diggable
0.4	1.3	254	359	1318	2000	0.46	257.38	0.75	24.97	Clayey GRAVEL	VERY DENSE	Diggable
1.3	2.2	254	596	2189	2000	0.46	710.32	2.07	133.30	Clayey GRAVEL	VERY DENSE	Diggable
2.2	3.1	314	777	2856	2700	0.46	1631.45	4.76	525.64	Slightly Weathered -Fresh SANDSTONE	FAIR	Break / Blast
3.1	4.0	459	996	3658	2700	0.46	2676.67	7.82	1189.78	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
4.0	4.8	673	1063	3905	2700	0.46	3051.15	8.91	1476.73	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
4.8	5.7	985	1093	4017	2700	0.46	3227.66	9.42	1620.32	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
5.7	9.4	1442	1143	4199	2700	0.46	3527.87	10.30	1876.43	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Barnastooka Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

T27

A possible fault have been marked in the centre of Profile R1, which could be a north-south trending fault which is marked on the geology map. The base centre is chacterised by very dense clayey gravel from 0.4-2.2m bgl followed by slightly weathered-fresh sandstone.

Recommendations	



Geophysical Investigation Summary Drawing No. AGL14327_T28_02



T28

Site	Barnastooka Wind Farm
Turbine Base	T28

Location (ITM)	
Easting	507364
Northing	571722
Elevation (mOD)	342.2

Methodology	
Seismic Refraction	24 ch. @ 1&2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.4	314	-	333	1200	-	-	-	-	PEAT	VERY SOFT	Diggable
0.4	1.4	673	160	587	2000	0.46	51.04	0.15	1.73	Clayey GRAVEL	LOOSE	Diggable
1.4	2.3	985	374	1374	2000	0.46	279.59	0.82	28.62	Clayey GRAVEL	DENSE-VERY DENSE	Diggable
2.3	3.0	1442	621	2281	2000	0.46	771.15	2.25	152.66	Clayey GRAVEL	VERY DENSE	Diggable
3.0	4.1	1442	832	3057	2700	0.46	1870.05	5.46	658.41	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
4.1	5.0	1442	1058	3886	2700	0.46	3021.52	8.82	1453.14	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
5.0	7.8	1442	1114	4091	2700	0.46	3348.49	9.78	1721.62	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
7.8	9.8	1443	1143	4200	2700	0.46	3528.90	10.30	1877.33	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile





Geophysical Investigation Summary Drawing No. AGL14327_T29_02



Site	Barnastooka Wind Farm
Turbine Base	Т29

Location (ITM)	
Easting	507006
Northing	571788
Elevation (mOD)	353.3

Methodology	
Seismic Refraction	24 ch. @ 1&2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.7	314	-	808	1200	-	-	-	-	PEAT	VERY SOFT	Diggable
0.7	1.4	375	397	1457	2000	0.46	314.43	0.92	34.74	Clayey GRAVEL	VERY DENSE	Diggable
1.4	2.5	459	536	1968	2000	0.46	574.03	1.68	93.80	Clayey GRAVEL	VERY DENSE	Diggable
2.5	3.3	673	652	2396	2700	0.46	1148.48	3.35	294.54	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
3.3	4.2	985	731	2686	2700	0.46	1442.98	4.21	429.25	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
4.2	5.2	985	960	3528	2700	0.46	2489.50	7.27	1055.65	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
5.2	6.1	985	1006	3695	2700	0.46	2731.57	7.98	1230.32	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
6.1	8.1	1442	1120	4113	2700	0.46	3383.90	9.88	1751.76	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
8.1	10.0	1442	1143	4200	2700	0.46	3528.90	10.30	1877.33	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



The base centre is chacterised by very dense clayey gravel from 0.7-2.5m bgl followed by slightly weathered-fresh sandstone.

According to the GSI 1:100k Bedrock Geology map the Barnastooka Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

Recommendations



Geophysical Investigation Summary Drawing No. AGL14327_T30_02

apex 🔶

Site	Barnastooka Wind Farm
Turbine Base	Т30

Location (ITM)	
Easting	506691
Northing	571605
Elevation (mOD)	348.1

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	1.7	314	-	854	2000	-	-	-	-	PEAT	VERY SOFT	Diggable
1.7	2.5	314	424	1557	2000	0.46	359.04	1.05	43.24	Clayey GRAVEL	VERY DENSE	Diggable
2.5	3.5	314	537	1972	2000	0.46	576.29	1.68	94.41	Clayey GRAVEL	VERY DENSE	Diggable
3.5	4.6	459	632	2323	2700	0.46	1079.36	3.15	265.87	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
4.6	5.6	459	788	2894	2700	0.46	1675.56	4.89	549.29	Slightly Weathered -Fresh SANDSTONE	FAIR	Break / Blast
5.6	6.6	673	876	3219	2700	0.46	2073.09	6.05	780.47	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
6.6	8.7	985	1130	4152	2700	0.46	3448.85	10.07	1807.58	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
8.7	10.8	1442	1139	4184	2700	0.46	3501.81	10.23	1853.61	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Barnastooka Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

T30



Geophysical Investigation Summary Drawing No. AGL14327_T31_02



Site	Barnastooka Wind Farm
Turbine Base	T31

Location (ITM)	
Easting	506385
Northing	571288
Elevation (mOD)	345.1

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.4	314	-	402	1200	-	-	-	-	PEAT	VERY SOFT	Diggable
0.4	0.8	985	135	497	2000	0.46	36.65	0.11	1.00	Clayey GRAVEL	LOOSE	Diggable
0.8	1.1	1442	203	593	2000	0.43	82.12	0.24	3.68	Clayey GRAVEL	MEDIUM DENSE	Diggable
1.1	1.5	1442	421	977	2000	0.39	354.01	0.98	38.78	Clayey GRAVEL	DENSE-VERY DENSE	Diggable
1.5	2.0	1442	524	1169	2000	0.37	550.04	1.51	79.08	Clayey GRAVEL	DENSE-VERY DENSE	Diggable
2.0	2.7	1442	547	1395	2000	0.41	597.36	1.68	94.50	Clayey GRAVEL	VERY DENSE	Diggable
2.7	3.5	1442	619	1858	2000	0.44	765.21	2.20	146.94	Clayey GRAVEL	VERY DENSE	Diggable
3.5	4.4	1442	1051	2430	2700	0.39	2980.75	8.26	1302.57	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
4.4	7.7	1442	948	3484	2700	0.46	2427.83	7.09	1012.86	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
7.7	9.6	1442	1143	4200	2700	0.46	3529.04	10.30	1877.45	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Barnastooka Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



The base centre is chacterised by loose-very dense clayey gravel from 0.4-3.5m bgl followed by slightly weathered-fresh sandstone.

Recommendations



Geophysical Investigation Summary Drawing No. AGL14327_T32_02

apex 🔷

Site	Barnastooka Wind Farm
Turbine Base	Т32

Location (ITM)	
Easting	505904
Northing	571196
Elevation (mOD)	367.5

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*	interpretation	Quality **	Excavatability
0.0	0.4	314	-	578	1200	-	-	-	-	PEAT	VERY SOFT	Diggable
0.4	1.7	1442	244	898	2000	0.46	119.52	0.35	7.04	Clayey GRAVEL	MEDIUM DENSE to DENSE	Diggable
1.7	2.4	1442	228	1311	2000	0.48	103.67	0.31	5.72	Clayey GRAVEL	DENSE	Diggable
2.4	3.2	1442	293	1629	2000	0.48	171.38	0.51	13.10	Clayey GRAVEL	DENSE to VERY DENSE	Diggable
3.2	4.2	1442	464	2014	2000	0.47	431.01	1.27	59.25	Clayey GRAVEL	VERY DENSE	Diggable
4.2	5.4	1442	589	2401	2700	0.47	935.87	2.75	212.02	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
5.4	6.8	1442	923	2800	2700	0.44	2299.58	6.62	904.29	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
6.8	9.8	985	1021	3750	2700	0.46	2813.22	8.21	1291.58	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Barnastooka Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

T32



Geophysical Investigation Summary Drawing No. AGL14327_T33_02



Site	Barnastooka Wind Farm
Turbine Base	Т33

Location (ITM)	
Easting	506096
Northing	571517
Elevation (mOD)	389.8

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*	incorpretation	Quality **	Excavatability
0.0	0.3	314	-	425	1200	-	-	-	-	PEAT	VERY SOFT	Diggable
0.3	1.4	673	187	689	2000	0.46	70.31	0.21	2.93	Clayey GRAVEL	MEDIUM DENSE	Diggable
1.4	2.3	985	323	1186	2000	0.46	208.56	0.61	17.65	Clayey GRAVEL	DENSE	Diggable
2.3	3.2	1442	506	1859	2000	0.46	512.20	1.50	77.72	Clayey GRAVEL	VERY DENSE	Diggable
3.2	4.1	1442	672	2467	2700	0.46	1217.73	3.56	324.41	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
4.1	5.1	1442	836	3070	2700	0.46	1885.96	5.51	667.67	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
5.1	6.0	1442	847	3112	2700	0.46	1936.97	5.66	697.73	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
6.0	7.9	1442	882	3241	2700	0.46	2101.19	6.14	798.00	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
7.9	9.8	1442	1143	4200	2700	0.46	3528.90	10.30	1877.33	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Barnastooka Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

Discussion

The base centre is chacterised by medium dense-very dense clayey gravel from 0.3-3.2m bgl followed by slightly weathered-fresh sandstone.

Recommendations



Geophysical Investigation Summary Drawing No. AGL14327_T34_02



Barnaslooka Wind Farm
T34

Location (ITM)	
Easting	506367
Northing	571771
Elevation (mOD)	390.6

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Velocity (m/s)		Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Bock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*	interpretation	Quality **	Excavatability
0.0	0.4	314	-	481	1200	-	-	-	-	PEAT	VERY SOFT	Diggable
0.4	1.4	1442	196	721	2000	0.46	76.93	0.22	3.40	Clayey GRAVEL	MEDIUM DENSE	Diggable
1.4	2.0	1442	236	988	2000	0.47	111.16	0.33	6.32	Clayey GRAVEL	MEDIUM DENSE	Diggable
2.0	2.6	1442	333	1192	2000	0.46	222.11	0.65	19.53	Clayey GRAVEL	DENSE	Diggable
2.6	3.5	1442	599	1764	2000	0.43	717.96	2.06	131.84	Clayey GRAVEL	VERY DENSE	Diggable
3.5	4.5	1442	704	2393	2700	0.45	1340.01	3.89	376.71	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
4.5	5.6	1442	983	2972	2700	0.44	2609.27	7.51	1113.29	Slightly Weathered -Fresh SANDSTONE	FAIR	Break / Blast
5.6	9.9	985	1061	3897	2700	0.46	3038.41	8.87	1466.57	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Barnastooka Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

T34


Geophysical Investigation Summary Drawing No. AGL14327_T35_02

apex 🔷

Site	Barnastooka Wind Farm
Turbine Base	T35

Location (ITM)	
Easting	506663
Northing	571988
Elevation (mOD)	390.5

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.5	314	-	624	1200	-	-	-	-	PEAT	VERY SOFT	Diggable
0.5	1.6	673	319	1173	2000	0.46	204.06	0.60	17.02	Clayey GRAVEL	DENSE	Diggable
1.6	2.2	985	253	1766	2000	0.49	128.00	0.38	8.15	Clayey GRAVEL	DENSE-VERY DENSE	Diggable
2.2	2.7	1442	422	2273	2000	0.48	356.68	1.06	43.85	Clayey GRAVEL	VERY DENSE	Diggable
2.7	3.9	1442	560	2632	2700	0.48	846.52	2.50	181.34	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
3.9	5.0	1442	711	3433	2700	0.48	1363.69	4.03	398.85	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
5.0	6.2	1442	1099	4037	2700	0.46	3260.38	9.52	1647.51	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
6.2	9.7	1442	1144	4203	2700	0.46	3533.52	10.32	1881.39	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Barnastooka Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

T35



Geophysical Investigation Summary Drawing No. AGL14327_T36_02



Site	Barnastooka Wind Farm T36				
Turbine Base	Т36				

Location (ITM)	
Easting	507568
Northing	572430
Elevation (mOD)	367.1

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.3	314	-	807	2000	-	-	-	-	PEAT	VERY SOFT	Diggable
0.3	1.3	459	487	1789	2000	0.46	474.33	1.39	68.47	Clayey GRAVEL	VERY DENSE	Diggable
1.3	2.2	673	740	2719	2700	0.46	1478.93	4.32	447.04	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
2.2	3.1	673	915	3361	2700	0.46	2259.18	6.60	899.41	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
3.1	4.0	985	1142	4194	2700	0.46	3519.24	10.28	1868.86	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
4.0	4.9	985	1143	4200	2700	0.46	3528.59	10.30	1877.06	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
4.9	5.8	985	1143	4200	2700	0.46	3528.90	10.30	1877.33	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
5.8	7.7	985	1143	4200	2700	0.46	3528.90	10.30	1877.33	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
7.7	9.6	1442	1143	4200	2700	0.46	3528.90	10.30	1877.33	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Barnastooka Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

The base centre is chacterised by very dense clayey gravel from 0.3-1.3m bgl followed by slightly weathered-fresh sandstone.

Recommendations



Geophysical Investigation Summary Drawing No. AGL14327_T37_02



Site	Barnastooka Wind Farm
Turbine Base	Т37
h	

Location (ITM)	
Easting	507217
Northing	572336
Elevation (mOD)	395.3

Methodology	
Seismic Refraction	24 ch. @ 1m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated Excavatability
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*	incorpretation	Quality **	
0.0	0.6	314	-	605	1200	-	-	-	-	PEAT	VERY SOFT	Diggable
0.6	1.4	459	254	933	2000	0.46	128.90	0.38	7.98	Clayey GRAVEL	MEDIUM DENSE to DENSE	Diggable
1.4	2.3	673	331	1216	2000	0.46	219.23	0.64	19.16	Clayey GRAVEL	DENSE-VERY DENSE	Diggable
2.3	3.2	985	497	1825	2000	0.46	493.48	1.44	73.08	Clayey GRAVEL	VERY DENSE	Diggable
3.2	4.2	985	802	2946	2700	0.46	1736.38	5.07	582.57	Slightly Weathered -Fresh SANDSTONE	FAIR	Break / Blast
4.2	5.1	985	1134	4167	2700	0.46	3473.83	10.14	1829.24	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
5.1	6.0	985	1141	4191	2700	0.46	3513.74	10.26	1864.04	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
6.0	7.9	1212	1143	4200	2700	0.46	3528.90	10.30	1877.33	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
7.9	9.9	1212	1143	4200	2700	0.46	3528.90	10.30	1877.33	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Barnastooka Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

The base centre is chacterised by medium dense-very dense clayey gravel from 0.6-3.2m bgl followed by slightly weathered-fresh sandstone.

Recommendations



Geophysical Investigation Summary Drawing No. AGL14327_T38_02



naslooka wind Farm
T38

Location (ITM)	
Easting	506955
Northing	572364
Elevation (mOD)	396.0

Methodology	
Seismic Refraction	24 ch. @ 1&2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated Excavatability
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	
0.0	0.7	314	-	585	1200	-	-	-	-	PEAT	VERY SOFT	Diggable
0.7	1.3	985	234	859	2000	0.46	109.25	0.32	6.07	Clayey GRAVEL/GRAVEL	MEDIUM DENSE	Diggable
1.3	2.1	985	370	1361	2000	0.46	274.41	0.80	27.75	Clayey GRAVEL/GRAVEL	DENSE-VERY DENSE	Diggable
2.1	2.9	673	474	1740	2000	0.46	448.49	1.31	62.42	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.9	3.8	459	716	2629	2700	0.46	1382.63	4.04	400.04	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
3.8	4.6	673	819	3009	2700	0.46	1811.02	5.29	624.47	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
4.6	5.5	985	1046	3842	2700	0.46	2953.15	8.62	1399.29	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
5.5	7.2	985	1143	4200	2700	0.46	3528.90	10.30	1877.33	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
7.2	9.0	985	1143	4200	2700	0.46	3528.90	10.30	1877.33	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Barnastooka Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

Discussion

The base centre is chacterised by medium dense-very dense clayey gravel from 0.7-2.9m bgl followed by slightly weathered-fresh sandstone.

Recommendations



6. APPENDIX B: SEISMIC PLATES

The following figures show the seismic refraction data acquired at each of the fourteen proposed turbine bases:



Fig.6.1. Tomographic Inversion of Profile S1 at Turbine Base T25.



Fig.6.2. Tomographic Inversion of Profile S2 at Turbine Base T25.





Fig.6.3. Tomographic Inversion of Profile S1 at Turbine Base T26.



Fig.6.4. Tomographic Inversion of Profile S2 at Turbine Base T26.





Fig.6.5. Tomographic Inversion of Profile S1 at Turbine Base T27.



Fig.6.6. Tomographic Inversion of Profile S2 at Turbine Base T27.





Fig.6.7. Tomographic Inversion of Profile S1 at Turbine Base T28.



Fig.6.8. Tomographic Inversion of Profile S2 at Turbine Base T28.





Fig.6.9. Tomographic Inversion of Profile S1 at Turbine Base T29.



Fig.6.10. Tomographic Inversion of Profile S2 at Turbine Base T29.





Fig.6.11. Tomographic Inversion of Profile S1 at Turbine Base T30.



Fig.6.12. Tomographic Inversion of Profile S2 at Turbine Base T30.





Fig.6.13. Tomographic Inversion of Profile S1 at Turbine Base T31.



Fig.6.14. Tomographic Inversion of Profile S2 at Turbine Base T31.





Fig.6.15. Tomographic Inversion of Profile S1 at Turbine Base T32.



Fig.6.16. Tomographic Inversion of Profile S2 at Turbine Base T32.





Fig.6.17. Tomographic Inversion of Profile S1 at Turbine Base T33.



Fig.6.18. Tomographic Inversion of Profile S2 at Turbine Base T33.





Fig.6.19. Tomographic Inversion of Profile S1 at Turbine Base T34.



Fig.6.20. Tomographic Inversion of Profile S2 at Turbine Base T34.





Fig.6.21. Tomographic Inversion of Profile S1 at Turbine Base T35.



Fig.6.22. Tomographic Inversion of Profile S2 at Turbine Base T35.





Fig.6.23. Tomographic Inversion of Profile S1 at Turbine Base T36.



Fig.6.24. Tomographic Inversion of Profile S2 at Turbine Base T36.





Fig.6.25. Tomographic Inversion of Profile S1 at Turbine Base T37.



Fig.6.26. Tomographic Inversion of Profile S2 at Turbine Base T37.





Fig.6.27. Tomographic Inversion of Profile S1 at Turbine Base T38.



Fig.6.28. Tomographic Inversion of Profile S2 at Turbine Base T38.



7. APPENDIX C: DETAILED METHODOLOGY

A combination of a number of geophysical techniques was used to provide the high quality interpretation and reduce any ambiguities, which may otherwise exist. The data was acquired from 23^{rd} March to 1^{st} April 2015.

7.1 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.

7.1.1 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. The 2D-resistivity profiling method involves the use of 32 electrodes connected to a resistivity meter, using computer software to control the process of data collection and storage.



7.1.2 Data Collection

Profiles were recorded using a Tigre resistivity meter, imaging software, one 32 takeout multicore cable and up to 32 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 survey. A 3m electrode spacing was used throughout, with each profile 93m in length which has a depth of penetration of 15m. Two orthogonal profiles were acquired at each of the turbine bases.

7.1.3 Data Processing

The field readings were stored in computer files and inverted using the RES2DINV package (Campus Geophysical Instruments, 1997) 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. Distance is indicated along the



horizontal axis of the profiles. Profiles have been contoured using the same contour intervals and colour codes.

7.2 Seismic refraction profiling

7.2.1 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 (Vp) of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher Vp velocities while soft, loose or fractured materials have lower Vp velocities. Readings are taken using geophones connected via multicore cable to a seismograph.

7.2.2 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 (1-2m spacing). Equipment was carried was operated by a two-person crew. Two orthogonal profiles were acquired at each of the turbine bases.

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)

Shots from seven different positions were taken (2 x off-end, 2 x end, 3 x middle) to ensure optimum coverage of all refractors. All profiles were surveyed to Irish National Grid using a ProXR dGPS system.





7.2.3 Data Processing

The recorded data was interpreted using the ray-tracing and tomographic inversion methods, to acquire depths to layer boundaries and the P-wave velocities of these layers, using the SeisImager/2D programme from Geometrics.

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

The time-term method uses a least squares approach to calculate delay times to determine a discrete layer solution for the data.

In the reciprocal method delay times are calculated manually to also determine a discrete layer solution for the data.

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.

7.3 Multichannel Analysis of Surface Waves (MASW)

MASW profiling was carried out to provide information on overburden material stiffness or density and on the bedrock quality.

7.3.1 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 the 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,

(v)the dispersion curve in inverted using a modeling and least squares minimization process to produce a subsurface profile of the variation of Surface wave and shear wave velocity with depth.

7.3.2 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. Two orthogonal profiles were acquired at each of the turbine bases, with a 1m geophone spacing.



7.3.3 Data Processing

MASW processing was carried out using the SURFSEIS processing package developed by Kansa 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.

7.3.4 Relocation

All data were referenced using a ProXR dGPS system with sub 1m accuracy. All positions within this report are given in ITM coordinates.

7.4 Soil Resistivity

7.4.1 Principles

The method used is the four point method as described in IEEE Std 81-1983 (Guide for measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Ground System); with a modification in the "a" spacings as detailed below as specified by the client ESBi.

This method utilizes the equally spaced Wenner Array to determine the apparent resistivity of the ground material using four electrodes placed in a line in the ground and a current is passed through the two outer electrodes. The potential difference (V) is measured across the two inner electrodes. The measured potential is divided by the current value (I) to obtain the resistance (R) using the following formula: V/I=R.

The resistivity is determined from the measured resistance at each electrode spacing using the following standard formula for the Wenner array:

Resistivity (ohm-m) n = R * 2 * Pi * inter-electrode spacing.

Single measurements were taken with the four electrodes having inter-electrode separations ('a' spacing) of 0.3, 0.5, 0.7, 1, 2, 3, 4, 5, 7, 10, 15, 20, 30, 40, 50, 60, 80 and 100m.

(IEEE Std 81-1983 states that use of an electrode spacing of a m gives approximately the average resistivity of the soil to a m, although general geophysical experience indicates that the effective depth of penetration for the Wenner array is approximately a/2 m).

7.4.2 Data Collection

One set of Soil Resistivity Measurements were recorded at turbines T33 and T36 as shown on Drawings AGL14327_T33_01 & AGL14327_T36_01.

7.4.3 Data Processing

The field readings were converted to apparent resistivities using the formula Resistivity = R * 2 * Pi *a where :

- R = measured resistance (ohms)
- a = inter-electrode spacing



The results are summarised in Appendix D.

7.4.4 Relocation

All data were referenced using a Pro-XR GPS system with c.1m accuracy.

Appendix 4

Laboratory Test Records (Soils)

IGSL Ltd Materials Unit J5, M Newhall, N Co. Kildar 045 84617	Laboratory 17 Business F Naas e 76	Park	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										ISO 17025 ACREDIED TESTING DETAILED IN SCOPE REG NO.1337		
	Report No. Customer Samples Re	No. sted:	18312 30/06/15		Contract N	lame:	Barnastoo	ka Windfar	m						
BH/TP	Sample No.	Depth (m)	oth (m) Lab. Ref	Sample	Moisture	Liquid	Plastic	Plasticity	%	Preparation	Liquid Limit	Classification (BS5930)	Description		
TD016	AA21680	1.6	A15/2040	Туре	Content %	Limit %	LIMIT %		<425μm	W/S	Clause		Purple/Brown slid	abtly sandy gravelly. SILT	
TP023	AA21000	1.0	Δ15/2049	B	12	20			29	WS	4.4		Purple/Brown slightly sandy, gravelly, SiL I		
TP029	AA16699	1.0	A15/2051	B	8.9	21	NP	NP	56	WS	4.4		Dark brown/purple slightly sandy, slightly gravelly, SILT		
TP029A	AA25439	3.0	A15/2062	B	9	21	NP	NP	39	WS	4.4		Purple/brown slightly sandy, gravelly, SILT with some cobbles		
TP040	AA25449	1.9	A15/2060	B	9.5	23	NP	NP	33	WS	4.4		Purple/brown slightly sandy, gravelly, SILT		
TP051	AA21693	1.6	A15/2053	В	11	26	NP	NP	57	WS	4.4		Dark brown silty, very sandy, GRAVEL		
TP079	AA16690	2.0	A15/2054	В	19	34	NP	NP	44	WS	4.4		Purple/brown very sandy gravelly SILT		
TP080	AA16687	2.8	A15/2055	В	9.9	29	NP	NP	43	WS	4.4		Purple/Brown slightly sandy, gravelly, SILT		
TP087	AA16667	2.0	A15/2056	В	8.8	26	NP	NP	45	WS	4.4		Purple/brown silty, very sar	idy, GRAVEL with some cobbles	
TP097	AA27944	2.8	A15/2057	В	9.3		NP	NP					Mottled purple/brown slight	ly sandy, gravelly, SILT	
TPS2	AA16656	2.0	A15/2056	В	15	25	NP	NP	59	WS	4.4		Mottled pink/brown slightly	sandy, slightly gravelly, SILT	
TPR001	AA25425	2.0	A15/2063	В	13	32	NP	NP	68	WS	4.4		Purple/brown sar	ndy, slightly gravelly, SILT	
Notes: Preparation: WS - Wet sieved Sample Type: B - bulk disturbed Remarks: AR - As received U - Undisturbed NP - Non plastic Opinions and interpretations are outside the scope of accreditation. Liquid Limit 4.3 Cone Penetrometer definitive method Opinions and interpretations are outside the scope of accreditation.									ined for one month.						
			-	-	Persons autho	rized to appro	ve reports			Approved	by		Date	Page	
IGSL Ltd Materials Laborator					J Barrett (Dep. Quality H Byrne (Quality M				Vlanager) H.Byrne (08/07/15	1 of 1		
































IGSL Unit F

Naas Co Kildare Ireland

M7 Business Park

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. U

Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA

Tel: +44 (0) 1244 833780 Fax: +44 (0) 1244 833781



Attention :	Darren Keogh
Date :	13th July, 2015
Your reference :	18312
Our reference :	Test Report 15/9565 Batch 1
Location :	Barnastdoka Windfarm
Date samples received :	3rd July, 2015
Status :	Final report
Issue :	1

Seven samples were received for analysis on 3rd July, 2015 of which seven were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc Project Manager

Jones Environmental Laboratory

Client Name:	IGSL						Report :	Solid					
Reference:	18312 Bornostdo	ko Windfo							- 1-050	: T			
Contact:	Darren Ke	eogh					Solids: V=	oog voc ja	r, J=250g gi	ass jar, 1=p	iastic tud		
JE Job No.:	15/9565	0											
J E Sample No.	1	2	3	4	5	6	7						
Sample ID	TP T012	TP T025A	TP T027A	TP T028A	TP T029A	TP T035A	TP T005						
Depth	1.00	1.00	1.30	1.80	1.80	0.50	0.90				Please se	e attached n	otes for all
COC No / misc											abbrevi	ations and ad	cronyms
Containers	J	J	J	J	J	J	J						
Sample Date	02/07/2015	02/07/2015	02/07/2015	02/07/2015	02/07/2015	02/07/2015	02/07/2015						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1				100400	1.1	Method
Date of Receipt	03/07/2015	03/07/2015	03/07/2015	03/07/2015	03/07/2015	03/07/2015	03/07/2015				LOD/LOR	Units	No.
Sulphate as SO4 (2:1 Ext) [#]	0.0102	0.0194	0.0084	0.0143	0.0087	0.0127	0.0046				<0.0015	g/l	TM38/PM20
#		= 00		= 10		0.45					0.04		Th (70 / D) (1 /
рН‴	5.44	7.06	5.71	7.43	6.18	6.45	6.35				<0.01	pH units	TM73/PM11

Jones Environmental Laboratory

Client Name:IGSLReference:18312Location:Barnastdoka WindfarmContact:Darren Keogh

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason					
	No deviating sample report results for job 15/9565										

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/9565

SOILS

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

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

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

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

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

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

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

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

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

WATERS

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

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

DILUTIONS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
СО	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
ТВ	Trip Blank Sample
OC	Outside Calibration Range

Jones Environmental Laboratory

JE Job No: 15/9565

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen. Samples are extracted using an orbital shaker.	Yes		AD	Yes
ТМ73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No

Method Code Appendix

Appendix 5

Laboratory Test Records (Rock)

1.1	· · · · · ,		Тезстеро	11		ISO 170		
Newhall,	//7 Business Park Naas		Ten per cent Fine	s Value				
Co. Kilda 045 8461	re 76	Tested in accordance with BS812:Part 111:1990						
	Report No.	R65992						
	Customer:	ESB Wind	Development Ltd					
	Contract No.	18312						
	Contract Name:	Barnastooka V	Vindfarm					
	Sample No.	A15/2884						
	Customer Ref.	RCR1 @ 5.	8- 6.6m					
	Material Type:	Aggregate						
	Date Received:	30/06/15						
	Date Tested:	30/06/15						
	Location:	RCR1 @ 5.	8- 6.6m					
	Sample Certificate:	Not provide	d					
	Description:	14-10mm a	ggregate					
	Condition of aggregate tested:	Soaked						
	Ten per cent Fines Value (kN):	160						
The result relates to the specimens tested. Any remaining material will be retained for Sampling and opinions and interpretations		one month. are outside the	scope of accreditation.	Approved s	signatories H Byrne (Qua	ality Manager)		
			Approved by	<u> </u>	Date	Page		

IGSL Ltd Materials Laboratory		Test Repo	rt		ISO 1702		
Unit J5, M7 Business Park Newhall, Naas		Ten per cent Fine	s Value				
Co. Kildare 045 846176	Tested in accordance with BS812:Part 111:1990						
Report No.	R65993						
Customer:	ESB Wind	Development Ltd					
Contract No.	18312						
Contract Name:	Barnastooka \	Vindfarm					
Sample No.	A15/2885						
Customer Ref.	TPB001 @	1.6m					
Material Type:	Aggregate						
Date Received:	30/06/15						
Date Tested:	30/06/15						
Location:	TPB001 @	1.6m					
Sample Certificate:	Not provide	d					
Description:	14-10mm a	ggregate					
Condition of aggregate tested:	Soaked						
Ten per cent Fines Value (kN):	180						
The result relates to the specimens tested. Any remaining material will be retained for Sampling and opinions and interpretations	one month. are outside the	scope of accreditation.	Approved s	signatories H Byrne (Qua	ality Manager)		
		Approved by	l	Date	Page		
IGSL Materials Labora	itory	H Byrne		08/07/15	1 of 1		

IGSL Ltd Materials Laboratory	Test Repo	ort				
Unit J5, M7 Business Park Newhall, Naas	Slake Durab	ility		IV NAB ACCREDITED		
Co. Kildare 045 846176	Tested in accordance with IS	RM Part 2 (1	981)	TESTING DETAILED IN SCOPE REG NO.1331		
Report No.	R65994					
Contract No.	18312	18312				
Contract Name:	Barnastooka Windfarm	ı				
Client:	ESB Wind Developmen	ESB Wind Development Ltd				
Sample No	A15/2894					
Client Pof	A 13/2004					
	PCP1 5 8 6 1					
Sample Certificate	Approved / Provided					
Data Received	30/06/2015					
	30/06/2015					
Slake Durability	30/00/2013					
	00.2					
	90.5					
Cycle 2	97.4					
Description of the rock						
Pre Test: Grey Sand	stone					
Post Test: Grey Sand	Istone					
The slaking fluid is tap water at 20°C	C unless otherwise stated in this rep	oort.				
The results relate to the specimens tested. Any remaining material will be retained for or Sampling and opinions and interpretations ar	ne month. re outside the scope of accreditation.	Persons au J Barr	thorised to ett (Dep Qua	approve report		
	Approved by	нв	Byrne (Quality Date	Manager) Page		
IGSL Materials Laborat	tory H Byrne		08/07/15	1 of 1		

IGSL Ltd Materials Laboratory		Test Repo	rt				
Unit J5, M7 Business Park Newhall, Naas		Slake Durabi	lity		I N ABB		
Co. Kildare 045 846176	Teste	d in accordance with IS	RM Part 2 (1	981)	TESTING DETAILED IN SCOPE REG NO. 1331		
Report No.		R65995					
Contract No.		18312					
Contract Name:		Barnastooka Windfarm					
Client:		ESB Wind Developmen	nt Ltd				
Commis No.		445/0005					
		A15/2885					
		TPB001 @ 1.6m					
		IPB001 @ 1.6m					
Sample Certificate							
Date Received	30/06/2015						
Date Tested		30/06/2015					
Slake Durability							
Cycle 1		99.2					
Cycle 2		98.3					
Description of the rock							
Pre Test: Grey Sand	stone						
Post Test: Grey Sand	stone						
The slaking fluid is tap water at 20°C	Cunless oth	erwise stated in this repo	ort.				
The results relate to the specimens tested.			Persons au	thorised to	approve report		
Any remaining material will be retained for or Sampling and opinions and interpretations ar	ne month. re outside the s	cope of accreditation.	J Barr н в	ett (Dep Qua	lity Manager)		
		Approved by		Date	Page		
IGSL Materials Laborat	ory	H Byrne		08/07/15	1 of 1		

				STRENG	TH INDEX TEST DAT	A			ata
Contract: B	arnastooka	Windfarm	Sample Type: Co Contract no. 183	ore 12					IGSL
	L. 1/7/13	D (Diamatar)	D (failure load)	Г	la (index strength)	lo(EQ) (index strength)	*1100		
RC NO.	Depth	D (Diameter)		Г	IS (Index strength)	IS(50) (Index Strength)	MDo	Tuno	Orionation
DOD4	111	70	KIN 4.0	4 000	101pa	Nipa	IVIF a	туре	Onenation
RCRI	0.0	70	4.0	1.222	0.00	0.80	10	PL	90 90
DODO	9.0	78	0.0	1.222	0.99	1.20	24	PL	90
RCR2	8.5	78	16.0	1.222	2.63	3.21	64	PL	90*
D 0000	11.5	78	12.0	1.222	1.97	2.41	48	PL	90°
RC26B	5.0	78	8.0	1.222	1.31	1.61	32	PL	90°
	6.5	78	14.0	1.222	2.30	2.81	56	PL	90°
RC28A	6.0	78	12.0	1.222	1.97	2.41	48	PL	90°
RC28B	5.0	78	8.0	1.222	1.31	1.61	32	PL	90°
RC29A		No	UCS Possible - C	arried ou	t 6x no. Point Load Te	sts Instead		PL	90°
	5.6	78	6.0	1.222	0.99	1.20	24	PL	90°
	5.7	78	2.0	1.222	0.33	0.40	8	PL	90°
	5.8	78	2.0	1.222	0.33	0.40	8	PL	90°
	6.9	78	4.0	1.222	0.66	0.80	16	PL	90°
	7.1	78	6.0	1.222	0.99	1.20	24	PL	90°
	7.3	78	2.0	1.222	0.33	0.40	8	PL	90°
RC29B	4.0	78	1.0	1.222	0.16	0.20	4	PL	90°
	6.0	78	2.0	1.222	0.33	0.40	8	PL	90°
RC30A	7.5	78	17.0	1.222	2.79	3.41	68	PL	90°
RC30B	9.0	78	9.0	1.222	1.48	1.81	36	PL	90°
RC31A	7.0	78	5.0	1.222	0.82	1.00	20	PL	90°
RC31B	4.2	78	10.0	1.222	1.64	2.01	40	PL	90°
RC33A	5.0	78	18.0	1.222	2.96	3.61	72	PL	90°
RC33B	6.0	78	4.0	1.222	0.66	0.80	16	PL	90°
RC34A	4.0	78	6.0	1.222	0.99	1.20	24	PL	90°
RC34B	7.0	78	2.0	1.222	0.33	0.40	8	PL	90°
RC35A	5.0	78	18.0	1.222	2.96	3.61	72	PL	90°
S	tatistical Su	mmary Data	ls(50)	UCS*	*UCS	Normal Distribution Curve		Ab	breviations
Number of	Samples Te	ested	25	25	0.5 -		_	i	irregular
Minimum			0.20	4				a	axial
Average			1.56	31	0.4 + / \			b	block
Maximum			3.61	72				ď	diametral
Standard D			1 10	22	0.3 +/			ŭ	alametra
Linner 95%	Confidence	Limit	3 71	74 23				annro	y orientation to
Lower 95%	Confidence	Limit	-0.60	11 00	0.2 7			appio	nlanes of
LOWEI 93%	Connuence	; Linnt	-0.00	-11.90	0.1			wool	planes Ul
Commonto									unknown
*UCS taker	<u>.</u> Dook y Doir	at Load Ic(50): k=		20	0 +	+ $+$ $+$			norpondicular
	I do k X FUII	$K = \frac{1}{100}$		20	0 50	100 150 200	250 300		perpendicular
									paraller

Uniaxial	Compression	Test Report S	Sheet I.G.S.L.
Sample Identification			
Contract Name: Job Number: Hole No: Depth (m):	Barnastooka Windf 18312 RC26A 4.8m	farm	
Sample Description			
Colour: Grain size: Weathering Grade: Rock Type:	Purple Fine grained Fresh SILTSTONE		
Weathering Grade Criteria I. Fresh: II. Slightly weathered: III. Moderately weathered: IV. Highly weathered:	Uncha Slight discolouration, si Considerable weakening, p Considerable weake	anged from original state light weakening venetrative discolouration ning, penetrative discoloura	ation, breaks in hand
Sample Measurements			Sketch of Failure Surfaces
Length Diameter (Ø)	184 78.1	mm	
Load Rate Load at Failure (P)	3.3 102	kN/min kN	
Strength Calculations			
Uniaxial Compressive Stren	gth =	<u> </u>	2000 .19385
	=	1000 x P ∏ x (Ø/2)^2	
	=	21.29	(Mpa)
Bulk Density	=	2.66	(Mg/m ³)
Notes:			

Uniaxial	Compression	Test Report S	heet I.G.S.L.
Sample Identification			
Contract Name: Job Number: Hole No: Depth (m):	Barnastooka Windf 18312 RC28A 3.5m	arm	
Sample Description			
Colour: Grain size: Weathering Grade: Rock Type:	Green Fine grained Fresh SANDSTONE		
Weathering Grade Criteria I. Fresh: II. Slightly weathered: III. Moderately weathered: IV. Highly weathered:	Uncha Slight discolouration, sl onsiderable weakening, p Considerable weaker	nged from original state ight weakening enetrative discolouration ning, penetrative discolourat	tion, breaks in hand
Sample Measurements			Sketch of Failure Surfaces
Length Diameter (Ø)	198 78.1	mm	
Load Rate Load at Failure (P)	3.3 127	kN/min kN	
Strength Calculations			
Uniaxial Compressive Streng	th =	<u> </u>	<u>2000</u> 19385
	=	1000 x P ∏ x (Ø/2)^2	
	=	26.51	(Mpa)
Bulk Density	=	2.67	(Mg/m ³)
Notes:			

Uniaxial (Compression	Test Report Sh	eet I.G.S.L.
Sample Identification			
Contract Name: Job Number: Hole No: Depth (m):	Barnastooka Windfa 18312 RC30A 5.5m	arm	
Sample Description			
Colour: Grain size: Weathering Grade: Rock Type:	Purple Fine grained Fresh SANDSTONE/SILTST	ONE	
Weathering Grade Criteria I. Fresh: II. Slightly weathered: III. Moderately weathered: IV. Highly weathered:	Uncha Slight discolouration, sli nsiderable weakening, pa Considerable weaker	nged from original state ght weakening enetrative discolouration ing, penetrative discolouration	n, breaks in hand
Sample Measurements			Sketch of Failure Surfaces
Length Diameter (Ø)	204 78	mm	
<u>Testing</u> Load Rate Load at Failure (P)	3.3 157	kN/min kN	
Strength Calculations			
Uniaxial Compressive Strengt	h =	<u> </u>	00 94
	=	1000 x P ∏ x (Ø/2)^2	
	=	32.86	(Mpa)
Bulk Density	=	2.67	(Mg/m ³)
<u>Notes:</u>			

Uniaxia	I Compression	Test Report S	Sheet I.G.S.L.
Sample Identification			
Contract Name: Job Number: Hole No:	Barnastooka Wind 18312 RC31B	farm	
Depth (m):	6.6m		
Sample Description			
Colour:	Purple		
Grain size:	Fine grained		
Weathering Grade:	Fresh		
Rock Type:	SANDSTONE		
Weathering Grade Criteria I. Fresh: II. Slightly weathered: III. Moderately weathered: IV. Highly weathered:	Uncha Slight discolouration, s Considerable weakening, p Considerable weake	anged from original state light weakening penetrative discolouration ning, penetrative discoloura	tion, breaks in hand
Sample Measurements		_	Sketch of Failure Surfaces
Length Diameter (Ø) <u>Testing</u>	<u>197</u> 78	mm	
Load Rate Load at Failure (P)	3.3 84	kN/min kN	
Strength Calculations			
Uniaxial Compressive Stre	ngth =	84 477	000
	=	1000 x P ∏ x (Ø/2)^2	
	=	17.58	(Mpa)
Bulk Density	=	2.66	(Mg/m ³)
<u>Notes:</u>			

Uniaxial	Compression	Test Report S	heet I.G.S.L.
Sample Identification			
Contract Name: Job Number: Hole No: Depth (m):	Barnastooka Windf 18312 RC33A 5.8m	arm	
Sample Description			
Colour: Grain size: Weathering Grade: Rock Type:	Purple Fine grained Fresh SANDSTONE		
<u>Weathering Grade Criteria</u> I. Fresh: II. Slightly weathered: III. Moderately weathered: IV. Highly weathered:	Uncha Slight discolouration, sl Considerable weakening, p Considerable weaker	inged from original state ight weakening enetrative discolouration ning, penetrative discoloura	tion, breaks in hand
Sample Measurements			Sketch of Failure Surfaces
Length Diameter (Ø)	162 78.1	mm	
Load Rate Load at Failure (P)	3.3 84	kN/min kN	
Strength Calculations			
Uniaxial Compressive Stren	gth =	<u> </u>	000 19385
	=	1000 x P ∏ x (Ø/2)^2	
	=	17.53	(Mpa)
Bulk Density	=	2.64	(Mg/m ³)
Notes:			

Uniaxia	I Compression	n Test Report S	Sheet I.G.S.L.
Sample Identification			
Contract Name: Job Number: Hole No: Depth (m):	Barnastooka Wind 18312 RC34A 5.3m	farm	
Sample Description			
Colour: Grain size: Weathering Grade: Rock Type:	Green Fine grained Fresh SANDSTONE		
Weathering Grade Criteria I. Fresh: II. Slightly weathered: III. Moderately weathered: IV. Highly weathered:	Unch Slight discolouration, s Considerable weakening, p Considerable weake	anged from original state slight weakening penetrative discolouration ening, penetrative discoloura	ation, breaks in hand
Sample Measurements			Sketch of Failure Surfaces
Length Diameter (Ø)	184 78	mm	
<u>Testing</u> Load Rate Load at Failure (P)	3.3 129	kN/min kN	
Strength Calculations			
Uniaxial Compressive Stre	ngth =	<u> </u>	9000 75.94
	=	1000 x P ∏ x (Ø/2)^2	
	=	27.00	(Mpa)
Bulk Density	=	2.65	(Mg/m ³)
<u>Notes:</u>			

Uniaxial	Compression	Test Report	Sheet I.G.S.L.
Sample Identification			
Contract Name: Job Number: Hole No: Depth (m):	Barnastooka Windf 18312 RC35A 5.1m	arm	
Sample Description			
Colour: Grain size: Weathering Grade: Rock Type:	Green/blue Fine grained Fresh SANDSTONE		
Weathering Grade Criteria I. Fresh: II. Slightly weathered: III. Moderately weathered: IV. Highly weathered:	Uncha Slight discolouration, sl considerable weakening, p Considerable weaker	inged from original state ight weakening enetrative discolouration ning, penetrative discolour	ation, breaks in hand
Sample Measurements			Sketch of Failure Surfaces
Length Diameter (Ø)	214 78.1	mm	
Load Rate Load at Failure (P)	3.3 411	kN/min kN	
Strength Calculations			
Uniaxial Compressive Streng	th =	41 4788	.1000 3.19385
	=	1000 x P ∏ x (Ø/2)^2	
	=	85.79	(Mpa)
Bulk Density	=	2.67	(Mg/m ³)
<u>Notes:</u>			

Appendix 6

Site Plan / Drawings

ROTARY CORE DRILLHOLES As Built Coordinates

	E	N	Elev.
RC25A	507791	572314	326.778
RC25B	507765.8	572315	331.501
RC26A	507248	572058	382.48
RC26B	507239	572077.9	385.68
RC27A	507614	572000.9	344.85
RC27B	507596	572007	346.316
RC28A	507364	571710	340.727
RC28B	507364	571733	345.122
RC29A	507005.9	571777	351.499
RC29B	507006	571799	354.408
RC30A	506696	571597	346.755
RC30B	506686	571615	348.698
RC31A	506387.1	571277	343.868
RC31B	506380.9	571277	345.89
RC32A	505908.1	571182.9	365.534
RC32B	505902	571208	369.336
RC33A	506100	571507	388.88
RC33B	506094	571528	390.844
RC34A	506375.9	571763.1	389.075
RC34B	506358.9	571779	392.331
RC35A	506668.9	571980.1	389.176
RC35B	506658.1	571997.3	391.998
RC36A	507574	572441	364.69
RC36B	507563.9	572421	368.469
RC37A	507211	572349	392.999
RC37B	507221	572326	396.635
RC38A	506958	572376.9	392.549
RC38B	506952.9	572354	396.454
	507101	572121	202.41
RCRI	507101	572121	392.41 241 702
	506627	571054	341.703
RCR3	500025	5/1415	339.123
nUK4	500292	5/1452.8	374.238
RCSUB1	509526.7	569823.7	340.876
RCSUB2	509468.2	569860	339.13

TRIAL PIT As Built Coordinates

	E	N	Elev.
TP001	508624.7	572488.2	193.292
TP002	508579.6	572427.8	187.548
TP003	508524	572344	189.098
TP004	508480	572256.1	195.355
TP005	508420	572173	196.413
TP006	508364.5	572094.9	200.512
TP007	508295.9	572028.1	204.022
TP008	508198.9	571984.7	209.26
TP009	508117.6	571902.5	217.205
TP010	508144.8	571809.7	223.17
TP011	508095.4	571725.4	232.179
TP012	508027.1	571641.7	238.312
TP013	507965 7	571555 7	245 694
TP014	507907.9	571490	265.251
TP015	507807	571463	282 72
TP016	507704	571442.9	284 581
TP017	507594	571/133	204.301
TP018	507486 1	571/138	292.274
TD010	507385	571/170	207.007
TD020	507303	571/105	200 21/
TD020	5071917	57150/ 2	210 10
TD021	507181.7	571304.5	212 520
	507082	571490	214 221
TP025	500979	571464	210.005
	500885.1	571450	212.002
TP025	506782	571442	322.315
TP026	506684	5/139/	329.592
TP027	506591	5/1301	337.296
1028	506507	5/1319	339.597
TP029	506326.1	5/1240.2	341.458
TP030	506234	5/1191	341.322
TP031	506139	571152.8	342.705
TP032	506036	571150	352.206
TP033	505925	571335	382.261
TP034	505967	571335	377.509
TP035	506010.7	571421.1	375.701
TP036	506121.2	571570.4	399.929
TP037	506194	571629	400.414
TP038	506262	571696	398.541
TP039	506413	571816.9	389.208
TP040	506490	571856	385.196
TP041	506552	571902	385.991
TP042	506828	571534	333.597
TP043	506892	571600	335.818
TP044	506941	571676	341.608
TP045	506996	571730.1	345.637
TP046	507134.8	571765.1	347.01
TP047	507223	571753.1	349.291
TP048	507426	571751	345.815
TP049	507520	571799	346.694
TP050	507559	571886	350.974
TP051	507585	571960	348.233
TP052	507636	572131	344.921
TP053	507730	572175	331.419
TP054	507642	572241	353.48
TP055	507550	572201	363.1
TP056	507456.9	572156	367.994
TP057	507360	572125	378.108
TP058	507604	572315.9	363.015
TP059	507505.9	572419	372.829
TP060	507420	572389	386.098
TP061	507331.1	572368.9	393.225
TP062	507167	572308	394.696
TP063	507073	572338.1	392.291

TRIAL PIT As Built Coordinates

	E		Elev.
TP072	509750.1	570867	333.92
TP079	509738	570767	335.18
TP080	509711.9	570669.9	337.143
TP081	509666.5	570583.5	335.891
TP082	509634.1	570489.9	336.346
TP083	509639.7	570389.1	337.947
TP084	509658	570291	336.654
TP085	509730	570222	339.184
TP086	509743	570124	333.267
TP087	509750.6	570013.4	340.01
TP091	509692.8	569925.9	343.314
TP092	509648.3	569838.9	342.616
TP093	509563.4	569861.5	342.665
TPT025A	507775	572271	330.024
TPT026A	507619	572046	343.29
TPT027A	507322	571727	344.885
TPT028A	507245	572343	397.114
TPT029A	507269.9	572084	385.22
TPT030A	506414	571297	343.944
TPT031A	505903.2	571208	369.188
TPT032A	507038.3	571796.8	354.47
TPT033A	506075.2	571494.5	390.337
TPT034A	506342.9	571744	391.559
TPT035A	506635	571796.8	389.351
TPT036A	507581	572404	366.827
TPT037A	506990	572359	393.623
TPT038A	507766	572315	331.506
TPR001	507024	572154	395.995
TPR002	507158	572114	390.713
TPR003	506827	571699	345.984
TPR004	506775	571610	342.69
TPR005	506672	571420	331.691
TPR006	506571.1	571409.9	343.074
TPR007	506358	571449.2	369.071
TPR008	506238.1	571449.6	379.07
TPS001			
TPS002	509528.9	569906	335.095
TPS003			



APPENDIX B

Grousemount Wind Farm Site Investigation Report IGSL Ltd

Grousemount Wind Farm Site Investigation

Geotechnical Site Investigation Report (Factual)

Project No. 18387

July 2015



M7 Business Park Naas Co. Kildare Ireland

T: +353 (45) 846176 E: info@igsl.ie W: www.igsl.ie

Copies	Rev.	Date of Issue	Prepared By:	Approved By:
Draft – by email (PDF)	А	16-07- 2015	Ciaran Killaly Chartered Geotechnical Engineer BE CEng MIEI	John Lawler BSc MSc P.Geo. EurGeol FGS
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Figure 1 - Site Location Plan

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Appendix 1	- Trial Pit Records
Appendix 2	- APEX Geophysical Report
Appendix 3	- Site Plan / Drawings

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 (**Grousemount Wind Farm**) have been carried out by IGSL 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 5930:1999 +A2:2010 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 14688-1:2002 Geotechnical Investigation and Testing Identification and Classification of Soil, Part 1: Identification and Description
- EN ISO 14688-2:2004 Geotechnical Investigation and Testing Identification and Classification of Soil, Part 2: Classification Principles
- EN ISO 14689-1:2004 Geotechnical Investigation and Testing Identification & Classification of Rock, Part 1: Identification & Description

Reporting

This report has been prepared for ESB International and the information should not be used without prior written permission of either party. IGSL Ltd accepts no responsibility or liability for this document being used other than for the purposes for which it was intended. 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.

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 variations 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.

Rotary Drilling Procedures

Rotary drilling methods are used to recover very heavily over-consolidated glacial till and bedrock samples in line with Section 3.5 of IS EN 1997-2:2007 and IS EN ISO 22475-1. Open hole drilling methods (odex or symmetrix) are utilized to advance the drillholes through granular dominant superficial deposits, with coring in hard ('cemented') fine grained or cohesive glacial deposits and bedrock. In this particular project, the key objective of the rotary coring operations was to advance and sample the high strength glacial till and underlying granite bedrock.

In-Situ Testing

Standard penetration tests are conducted by IGSL 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) 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).

Groundwater

The depth of entry of any influx of groundwater is recorded during the course of boring or drilling 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.

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.

Where appropriate Class 1 thin wall undisturbed tube samples (UT100) are 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.

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

Table A -	- Details	of Sample	Ouality	Requirements
Labic II	Detunis	or Sumple	Zuunty	itequil emente

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.

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 hittils 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 company policy to discard soil samples one month after submission of our final report.

1. INTRODUCTION

At the instruction of ESB International, IGSL has undertaken a programme of geotechnical site investigation works for a proposed Wind Farm Development in the townlands of Ballagh, Grousemount and Knockanruddig, approximately 9km east of the village of Kilgarvan, on the Cork/Kerry border (Figure 1). It is understood that the scheme will involve the construction of twenty four turbines and associated infrastructure. The proposed development is to include the development of an extensive network of access tracks together with a substation and rock borrow pits.

Figure 1 – Site Location Plan



Taken from Google Maps, 2015

The investigations comprised rotary coreholes, trial pitting and a geophysical survey. Reporting of the rotary core drilling will not be included in this preliminary version of the factual report. The investigations were executed in accordance with BS 5930, Code of Practice for Site Investigations (1999+A2:2010) and EN 1997-2 Eurocode 7 Part 2 Ground Investigation & Testing. The 'as-built' co-ordinates and ground levels are shown on the exploratory hole logs with a full list of the coordinates provided in Appendix 3. Exploratory hole drawings are to be included in future versions of this report.

This draft report presents the factual geotechnical data acquired from the 2015 investigation featuring the trial pits and the draft geophysical report.

2. CONTRACT OUTLINE & OBJECTIVES

This contract is currently underway, being carried out in one phase. It comprises rotary core drillholes and machine excavated trial pits.

The primary objectives of the works are as follows:

- Determine the composition, consistency and strength / stiffness of the superficial soils
- Establish the rockhead elevation, weathering profile, discontinuity characteristics and strength of the bedrock
- Recover samples for geotechnical laboratory testing in accordance with the requirements of the Employer's Representative

This factual report presents the trial pit and geophysical records. The results of laboratory testing will follow in a future version of this report.

3. FIELDWORK

3.1 General

The geotechnical investigations reported in this draft report were carried out in April and May 2015 and comprised the following:

o Trial Pits (186 No.)

TP (156 No.) TP-T (24 No.) TP-B (6 No.)

- o Associated sampling & in-situ testing
- o Geophysical Survey
- Setting out & surveying

3.2 Trial Pitting

The trial pits were undertaken using a 13 tonne tracked hydraulic excavator. The pits were logged and sampled by an IGSL geotechnical engineer. Representative disturbed bulk samples were taken as the pits were excavated, these were placed in heavy-duty polyethylene bags and tubs and returned to the site laboratory for examination and laboratory testing.

The trial pits were backfilled with the as-dug arisings and reinstated to the satisfaction of the Employer's Representative. The trial pit logs are presented in Appendix 1 and include engineering descriptions of the soils encountered, samples recovered, groundwater strikes and stability of the pit sidewalls.

3.3 Geophysical Surveying

APEX Geoservices carried out the geophysical survey at the site. The key aim of the survey was to map rockhead and to identify any anomalous ground conditions. A combination of techniques was utilised. It included 2D Electrical Resistivity Tomography [ERT], Seismic Refraction Profiling and Multichannel Analysis of Surface Waves [MASW]. The preliminary findings of the geophysical survey are incorporated in Appendix 2.

3.4 Surveying of Exploratory Locations

Following completion of the exploratory boreholes and trial pits, surveying was carried out using Realtime Kinetic GPS techniques. Co-ordinates (x, y) were measured to national grid and ground level (z) established relative to OD Malin Head. The co-ordinates and ground levels are shown on the exploratory hole logs. The 'as-constructed' locations are listed in Appendix 3. The exploratory hole plan is to be included in a future version of this report.

References

- 1. BS 5930 (1999) Code of Practice for Site Investigation, British Standards Institution (BSI).
- **2.** Site Investigation Practice: Assessing BS 5930 (1986), Geological Society Special Publication, No. 2.

Appendix 1

Trial Pit Records

											REPORT NUMBER			
	BSL	т	RIAL PIT F	RECO	RD					18312				
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP0	64			
LOG	GED BY	F.C	CO-ORDINATE	S	509,22 571,48	24.03 E 39.99 N		DATE S	TARTED	Shee 16/04	t 1 of 1 1/2015			
	NT	ESBI	GROUND LEV	EL (m)	318.44	1		EXCAVA METHO	ATION D	13 To	onne Exc	avator		
LIVO									Samples	5	a)	meter		
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)		
_ 0.0 _ _ _ _	Soft dark	: brown fibrous PEAT (H4-H7)								0.50.0.50	40 46 40			
- - - 1.0	Obstructi End of T	ion - Possible boulders/bedrock rial Pit at 0.70m		<u>\\/</u> \\/	0.70	317.74		AA32070 AA32070	D	0.50-0.50				
-														
- - - 2.0														
- - - - -														
3.0 														
4.0														
- - -														
Grou No G	Indwater (Broundwate	Conditions or Observed												
Stab No in	ility istability ob	served												
Gene	eral Rema	rks												

									REPORT NU	JMBER		
BSL	Т	RIAL PIT I	RECO	RD					18312			
TRACT	Grousemount Wind Farm							IT NO.	TP0	65		
GED BY	F.C	CO-ORDINAT	ES	509,26 571,4	61.67 E 15.66 N		DATE S	TARTED	16/04 TED 16/04	/2015 /2015		
NT INEER	ESBI ESBI	GROUND LE	/EL (m)	327.62	2		EXCAVA METHO	ATION D	13 To	nne Exc	avator	
								Samples		Pa)	ometer	
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)	
Soft dark	Brown fibrous PEAT (H4-H7)											
Stiff very Cobbles	gravelly SILT with frequent cobbles a and boulders are angular.	nd boulders.	<u>,,, ,,,</u> x0, x x0, x x0, x	0.40	327.22		AA32068 AA32068	B D	0.30-0.30 0.30-0.30	40 52 42		
Angular (weathere	gravelly COBBLES and BOULDERS (ed rock)	Possible		0.90	326.72		AA32069 AA32069	B D	0.80-0.80 0.80-0.80			
Obstructi End of T	on - Possible boulders/bedrock rial Pit at 1.20m			1.20	326.42							
Indwater (Groundwate	Conditions r Observed				·		- I		·			
ility												
istability ob	served											
eral Rema	rks											
	TRACT GED BY INT INEER Soft dark Stiff very Cobbles Angular of weathere Obstructi End of T	TRACT Grousemount Wind Farm GED BY F.C INT ESBI Geotechnical Description Geotechnical Description Soft dark Brown fibrous PEAT (H4-H7) Stiff very gravelly SILT with frequent cobbles a Cobbles and boulders are angular. Angular gravelly COBBLES and BOULDERS (weathered rock) Obstruction - Possible boulders/bedrock End of Trial Pit at 1.20m indwater Conditions iroundwater Observed iiity istability observed eral Remarks	TRIAL PIT I TRACT Grousemount Wind Farm GED BY F.C COORDINAT GROUND LEX INTER ESBI Geotechnical Description Soft dark Brown fibrous PEAT (H4-H7) Stiff very gravelly SLT with frequent cobbles and boulders. Cobbles and boulders are angular. Angular gravelly COBBLES and BOULDERS (Possible weathered rock) Obstruction - Possible boulders/bedrock End of Trial Pit at 1.20m indwater Conditions proundwater Observed iiity istability observed aral Remarks	TRAC I COUSEMOUNT WIND Farm TRAC COUSEMOUNT WIND Farm GED BY F.C. TG ESBI Geotechnical Description Geotechnical Description Geotechnical Description Geotechnical Description Angular gravelly SILT with frequent cobbles and boulders. Angular gravelly COBBLES and BOULDERS (Possible Angular gravelly COBBLES and BOULDERS (Possible Compared Tock) Dostruction - Possible boulders/bedrock End of Trial Pit at 1.20m Indivater Conditions Groundwater Observed Ity Istability observed Ity Ity Ity Ity Ity Ity Ity Ity Ity	TRAC TO CONSISTENT OF THE SET OF	TRAL PIT RECORD TRAC Grousemount Wind Fam Geb BY F.C CO-ORDINATES G09,261.67 E Immer ESBI Co-ORDINATES G00ND LEVEL (m) 327.62 Soft dark Brown fibrous PEAT (H4-H7) E Soft Soft Soft Soft Soft Soft Soft Soft	TRAC TO TRUCTURE T	TRUE PERCECCION TRUE PERCECCION TRUE PERCECCION TRUE PERCECCION TRUE PERCECCION TRUE PERCECCION TRUE PERCECCION TRUE PERCECION TRUE PE	TRIAL PIT RECORD String colspan="2">TRIAL PIT RECORD TRIAL PIT RECORD TRIAL PIT RECORD TRIAL PIT RECORD TRIAL PIT RECORD String colspan= 2 TRIAL PIT RECORD TRIAL PIT RECORD <td>Carbon Carbon Carbon Carbon TARLA PIT RECORD TABLA PIT NO. TABLA PIT NO.<</td> <td>Control Description <thdescription< th=""></thdescription<></td>	Carbon Carbon Carbon Carbon TARLA PIT RECORD TABLA PIT NO. TABLA PIT NO.<	Control Description Description <thdescription< th=""></thdescription<>	



-									REPORT NU	JMBER	
igsl		TRIAL PIT I	RECO	RD					183	312	
ONTRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP0	67	
OGGED BY	JL	CO-ORDINAT	ES	509,4 571,0	59.02 E 56.04 N		DATE SI	TARTE	D 15/04/2015 TED 15/04/2015		
LIENT	ESBI	GROUND LEV	/EL (m)	319.3	2		EXCAVA		13 Tc	onne Exc	cavato
NGINEER	ESBI										
								Sample	es	(ac	meter
	Geotechnical Description		gend	.pth)	evation	ater Strike	mple	be	pth	ne Test (KI	nd Penetro
Coft bla				D D	<u><u></u></u>	Ň	Re Re	Tyl	De	Va	На
Soft bla	aty CLAY with frequent organics			0.20	319.12		AA32059	В	0.20-0.20		
2011 00				0.50	318 82		AA32059T	D	0.20-0.20	40 -[R]	
Soft da Grey br	rk brown pseudofibrous PEAT (H6-H own silty GRAVEL with occasional c	7) obbles and	No ged	0.60	318.72		AA32060 AA32060T	B D	0.55-5.55 0.55-0.55	46 -[R]	
boulder	s (up to 500mm)		0 - 0					-		50 -[R]	
			Seg ?								
			20 - 00 0 - 00			1					
			De la			(Slow)	AA32061	В	1.55-1.55		
			10 0 0 0 0				AA32061T	D	1.55-1.55		
0			XO YO								
			20 × 0 /	2.30	317.02						
End of	Trial Pit at 2.30m										
)											
0											
oundwater	Conditions										
oundituter	Conditions										
tability											
eneral Rem	arks										



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TP LOG



REPORT NUMBER

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TP LOG IGSL

	3SL	т		18312								
CON	TRACT	Grousemount Wind Farm						TRIAL P	T NO.	TP0	70	
LOG	GED BY	F.C	CO-ORDINATI	ES	509,7 ⁷ 570,89	13.13 E 94.95 N		DATE ST	TARTED	15/04 TED 15/04	/2015 /2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (M)	327.20	,		EXCAVA METHOD	TION	13 To	nne Exc	avator
									Samples	;	a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)
0.0	Very sof	t black PEAT (H4-H7)		<u> \\ /</u> / <u>/ \\ /</u>			-					
-	Purple v Grey silt	ery gravelly SILT y GRAVEL with occasional cobbles ar	nd boulders		0.40 0.50	326.80 326.70		AA32051 AA32051	B D	0.50-0.50 0.50-0.50	22 30 24	
1.0 2.0 								AA32052 AA32052	B D	1.50-1.50 1.50-1.50		
- - - - - - - - - - - - - - - - - -	.0 End of Trial Pit at 3.00m				3.00	324.20		AA32053 AA32053	B D	3.00-3.00 3.00-3.00		
- - - - - - - - - - - - - -												
Grou Rapio	i ndwater (d water ing	Conditions gress from G.L		<u> </u>		<u> </u>		<u> </u>		1		L
Stab No in	ility Istability O	bserved										
Gene	eral Rema	rks										





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. Igsl



TRIAL PIT RECORD

REPORT NUMBER

Hand Penetrometer (KPa)

	A									REPORT NU	JMBER	
	J.SL	т	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP0	7 4	
LOG	GED BY	F.C	CO-ORDINATI	ES	509,82 570,69	23.02 E 92.03 N		DATE ST	TARTED	17/04 17/04	/2015 /2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	357.38	3		EXCAVA METHO	TION D	13 To	nne Exc	avator
									Samples	\$	Pa)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetro (KPa)
0.0	Soft dark	brown fibrous PEAT (H4-H7)			0.30	357 08					44	
- - -	Dark bro Grey silty boulders	wn sandy gravelly SILT with occasion.	al cobbles occasional	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	0.50	356.88		AA32076	D	0.40-0.40	48 50	
- 	Angular	Possible		1.20	356.18		AA32077	D	1.00-1.00			
- - - - 2.0	Angular gravelly COBBLES and BOULDERS (Possible weathered rock)							AA32078	D	2.00-2.00		
-	Obstructi End of T	on - Possible boulders/bedrock rial Pit at 2.40m			2.40	354.98						
3.0 - - - - -												
4.0 												
Grou No G	ndwater (roundwate	Conditions r Observed		1		<u> </u>		<u> </u>				
Stab No in	ility stability Ol	oserved										
Gene	eral Rema	rks										

	J- BSL	т			18312									
CON	TRACT	Grousemount Wind Farm							IT NO.	• TP075 Sheet 1 of 1				
LOG	GED BY	F.C		ES /FL (m)	509,88 570,6 377 3	85.91 E 14.00 N 6		DATE S	DATE STARTED 13/04/2015 DATE COMPLETED 13/04/2015					
CLIE ENGI	NT NEER	ESBI ESBI	GROOND EEV		011.0			METHO	ATION D	13 To	onne Exc	avator		
									Sample	6	a)	meter		
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)		
0.0	Soft blac	k fibrous PEAT (H5-H6)		<u></u>	0.20	277.06								
-	Angular Soft brov	shaley GRAVEL vn gravelly SILT with rootlets. Gravel i	s subangular.	° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° °	0.40	376.96		AA27911 AA27911T AA27912	B D B	0.30-0.30 0.30-0.30 0.50-0.50	26 80[R]			
-	Soft to fil Gravel is	m blue/grey sandy gravelly SILT. San subangular to subrounded.	id is coarse.	×o. × × × × × × × × × × × × × × × × × ×	0.00	570.70		AA27912T	D	0.50-0.50				
- - -	Angular rockhead	COBBLES and BOULDERS (Possible	weathered	× · · · · · · · · · · · · · · · · · · ·	1.10	376.26								
- - -	Obstruct End of T	ion - Possible boulders/bedrock rial Pit at 1.50m			1.50	375.86		AA27913 AA27913T	B D	1.40-1.40 1.40-1.40				
- 2.0														
-														
-														
- - - 3.0														
-														
-														
-														
- 4.0 - -														
-														
-														
Grou No G	indwater (iroundwate	Conditions er Observed								-1				
<u></u>														
Stab No in	iiity istability Ol	oserved												
Gene	eral Rema	rks												

	And									REPORT NU	JMBER		
	35L	Т	RIAL PIT I	RECO	RD					18312			
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP0	76		
LOG	GED BY	F.C	CO-ORDINAT	ES	509,92 570,52	28.97 E 23.98 N		DATE S	TARTED	14/04	/2015 5/2014		
	NT	ESBI ESBI	GROUND LE	/EL (m)	390.08	3		EXCAVA METHO	TION D	13 To	nne Exc	avator	
			I						Samples	\$	a)	meter	
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetro (KPa)	
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u>, ,, ,</u>									
-	Soft brov Firm to s	vn gravelly SILT with rootlets. Gravel i tiff blue/grey sandy gravelly SILT. Sar	s subangular.	<u>\\/; \\/;</u> ×o × × , , x ×o, · ×	0.40 0.60	389.68 389.48		AA27920 AA27920T	B D	0.40-0.40 0.40-0.40	26 1[R]		
-	Gravel is	subangular to subrounded.		× ^.× , × ^. × , × ₀ . × ,									
_ 1.0 _	Obstruct End of T	ion - Possible boulders/bedrock rial Pit at 1.10m		× .× ;	1.10	388.98		AA27921 AA27921T	B D	1.00-1.00 1.00-1.00			
-													
-													
2.0													
-													
-													
- 3.0													
-													
-													
- - 													
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Grou No G	indwater (Groundwate	Conditions r Observed				I		1					
Stab	ility												
No ir	istability Ol	oserved											
Gene	eral Rema	rks											





TRIAL PIT RECORD

18312

CON	ITRACT	Grousemount Wind Farm						TRIAL P SHEET	IT NO.	TP0 Shee	78 et 1 of 1	
LOG	GED BY	F.C	CO-ORDINAT	ES	510,0 570,3	17.94 E 45.01 N		DATE S	TARTED OMPLET	14/02 ED 14/01	2/2015 1/2016	
CLIE ENG	INEER	ESBI ESBI	GROUND LE	VEL (m)	402.7	7		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
									Samples		a)	neter
		Geotechnical Descripti	on	Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetror (KPa)
0.0 	Soft blac Soft redo cobbles subangu	k fibrous PEAT (H4-H7) dish/light brown sandy gravelly S and rootlets. Sand is coarse. Gr lar. Cobbles are angular.	ILT with occasional avel is angular to	<u> <u> </u> <u></u></u>	0.40	402.37		AA27925 AA27925T	B D	0.40-0.40 0.40-0.40	38 12[R]	
- - 1.0 - - - - -	Firm to s Sand is Cobbles	tiff blue/grey sandy gravelly SIL fine to coarse. Gravel is angular are angular to subangular.	T with cobbles. to subangular.	× · · · · · · · · · · · · · · · · · · ·	1.10	401.67		AA27926 AA27926T	B D	1.00-1.00 1.00-1.00		
- 2.0 - - - - -	Obstruct End of T	ion (Possible boulders/bedrock) rial Pit at 2.00m			2.00	400.77		AA27927 AA27927T	B D	1.90-1.90 1.90-1.90		
3.0 												
- 4.0 												
Grou No C	undwater Groundwate	Conditions Pr Observed		1	I	ı						1
No ir	nstability O	bserved										
62F IP LOG 165E	eral Rema	rks										

(A	1000									REPORT N	IUMBER	
20 102	J. BL	Т	RIAL PIT F	RECO	RD					18	312	
CONTR	RACT	Grousemount Wind Farm							PIT NO.	TP()88	
LOGGE	ED BY	F.C	CO-ORDINATE	ES	509,76 569,94	62.01 E 45.01 N		DATE S		D 14/0	9/2014 3/2020	
CLIENT	т	ESBI	GROUND LEV	'EL (m)	348.0	1		EXCAV		13 T	onne Exc	cavator
ENGINE	EER	ESBI										L
									Sample	es)a)	meter
		Geotechnical Description		egend)epth m)	levation	Vater Strike	iample čef	ype	Jepth	ane Test (K	land Penetro KPa)
0.0	Soft blac	k/brown fibrous PEAT (H4-H7)					>	0.1				
-				<u>v vv v</u>								
	Obstruct	ion - Possible boulders/bedrock		<u>', \', \</u>	0.60	347.41		AA27935	В	0.50-0.50) 32	
Ē	End of T	rial Pit at 0.60m						14270001		0.00-0.00	10[R]	
1.0												
-												
2.0												
-												
-												
-												
3.0												
-												
4.0												
-												
-												
Ground No Gro	dwater (oundwate	Conditions Pr Observed		1	1	I	1		1		1	I
Stabilit No insta	ty ability Of	oserved										
Genera	al Rema	rks										
- 100												

										REPORT N	UMBER	
	J SSL	т	RIAL PIT RE		18312							
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP0	89	
LOG	GED BY	F.C	CO-ORDINATES		509,85 569,92	58.95 E 29.03 N		DATE S		Shee D 14/10 TED 14/00	t 1 of 1)/2014	
			GROUND LEVEL	. (m)	353.61	l		EXCAVA		13 To	Tonne Excavator	
ENG	INEER	ESBI						METHO	D			
									Sample	s	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetro (KPa)
0.0	Soft blac	ck fibrous PEAT (H4-H7)	<u></u>	<u>/ \//</u>								
- - -	Obstruct	ion - Possible boulders/bedrock			0.50	353.11		۵۵27034	в	0 50-0 50	28	
-	End of T	rial Pit at 0.50m						AA27934T	D	0.50-0.50	6[R]	
- -												
-												
2.0												
- -												
-												
3.0												
- - -												
-												
- - -												
-		•										
No G	undwater Groundwate	Conditions or Observed										
Stab No ir	iility hstability O	bserved										
Gen	eral Rema	rks										

TF	RIAL PIT RECO	RD		18312					
CONTRACT Grousemount Wind Farm					TRIAL P	IT NO.	TP090		
OGGED BY F.C CLIENT ESBI	CO-ORDINATES GROUND LEVEL (m)	509,99 569,90 361.1	52.33 E 08.52 N 7	OATE STARTED14DATE COMPLETED14EXCAVATION13METHOD13			1/11/2014 1/07/2018 3 Tonne Excavator		
						Sample	s	a)	neter
Geotechnical Description	egend	Depth (m)	Elevation	₩ater Strike	Sample Ref	Type	Jepth	/ane Test (KP	Hand Penetron
^{.0} Soft black fibrous PEAT (H4-H7) Soft to firm blue/grey sandy gravelly SILT with c cobbles and boulders. Sand is coarse. Gravel is subangular. Cobbles and boulders are angular.	1/2 1/2 1/2 1/2 1/2 1/2	0.40	360.77	(Rapid)	AA27932 AA27932T	B D	0.40-0.40 0.40-0.40	20 4[R]	-
Obstruction - Possible boulders/bedrock	××××××××××××××××××××××××××××××××××××××	1.80	359.37		AA27933 AA27933T	B D	1.40-1.40 1.40-1.40		
.0									
0									
roundwater Conditions apid water ingress from G.L									
Stability Io instability Observed General Remarks									

										REPORT NI	JMBER	
	J) BSL	т	RIAL PIT RE	CO	RD					183	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	T NO.	TP0	94	
LOG	GED BY	F.C	CO-ORDINATES		509,53 569,77	87.96 E 76.08 N		DATE ST		14/08	/2014 /2021	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEVEL	. (m)	350.01	1		EXCAVA METHOD	TION	13 To	nne Exc	avator
									Sample	3	a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	 ₩ater Strike 	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)
0.0	Soft blac	k brown fibrous PEAT (H4-H7)					(Rāpid)	AA27936 AA27936T	B D	1.00-1.00 1.00-1.00	26 8[R] 2[R] 6 0[R]	
- 2.0 - - - -	Soft brow Gravel is Obstruct End of T	wn/grey sandy very gravelly SILT. San s angular to subangular. ion - Possible boulders/bedrock rial Pit at 2.30m	d is coarse. (9)	× × × × × × × × × × × × × × × × × × ×	1.80 2.30	348.21 347.71		AA27937 AA27937T	B D	2.00-2.00 2.00-2.00		
- - - - - - - - - - - - - - - - - - -												
Grou Rapic	indwater d water ing ility as unstabl eral Rema	Conditions gress from G.L e due to water ingress rks										

Andrew									F	REPORT NUMBER				
	BSL	т	RIAL PIT F	RECO	RD					18312				
CON	TRACT	Grousemount Wind Farm							IT NO.	TP0	95			
LOG	GED BY	F.C	CO-ORDINATE	ES	509,44 569,7 <i>1</i>	46.01 E 14.04 N		DATE S	TARTED	14/07 TED 14/11	7/2014 /2021			
	NT	ESBI ESBI	GROUND LEV	/EL (m)	366.97	7		EXCAVA METHO	ATION D	13 Tc	onne Exc	avator		
			I						Samples		(8	leter		
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa	Hand Penetrom (KPa)		
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> </u>										
- - - -	Soft brow cobbles	vn/grey sandy very gravelly SILT with and boulders	occasional	* X X * X X * X X * X X X X X X	0.20	366.77					28 8[R]			
- - 1.0 -	Obstruct	ion - Possible boulders/bedrock		× · <u>×</u> • × · <u>×</u> • × · × • × · ×	1.20	365.77		AA27938 AA27938T	B D	1.00-1.00 1.00-1.00				
-	End of T	rial Pit at 1.20m												
2.0 														
-														
3.0 														
- - 4.0 - -														
- - -														
Grou No G	andwater (Groundwate	Conditions Pr Observed												
Stab No in	ility istability O	oserved		_	_		_		_		_			
Gene	eral Rema	rks												

(т	CORD										
	BSL			10312								
CON	ITRACT Grousemount Wind Farm						TRIAL P	IT NO.	Sheet 1 of 1			
LOG	GED BY F.C	CO-ORDINAT	TES				DATE S	TARTE OMPLE) 15/04 TED 15/04	l/2015 l/2015		
	INT ESBI	GROUND LE	VEL (m)				EXCAVA METHO	ATION D	13 To	onne Exc	cavator	
2.10								Sample	s		eter	
	Geotechnical Description					ike				t (KPa)	letrome	
	p		Legend	Depth (m)	Elevation	Water Str	Sample Ref	Type	Depth	Vane Tes	Hand Per (KPa)	
0.0	Soft black fibrous PEAT (H4-H7)		<u><u> </u></u>									
-			<u> </u>					_		10		
-			$\frac{\langle 1, \rangle}{\langle 1, \rangle} \frac{\langle 1, \rangle}{\langle 1, \rangle}$	0.80		1	AA27940 AA27940T	. D B	0.50-0.50 0.50-0.50	16 6[R]		
- 	Soft blue/grey sandy gravelly SILT with cobble coarse. Gravel is angular to subangular. Cobbl subangular to subrounded.	s. Sand is les are				(Rapid)						
-												
-			× · ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	1 70			AA27941	В	1.50-1.50			
-	Obstruction - Possible boulders/bedrock End of Trial Pit at 1.70m			1.70			NA279411	D	1.50-1.50			
2.0												
-												
-												
-												
-												
-												
4.0												
-												
-												
Grou	Inductor Conditions											
Rapi	d water ingress from 0.80m											
Stah	ility											
Pit w	as unstable due to water ingress											
Gen	eral Remarks											



18387.GPJ IGSL.GDT 16/7/15 IGSL

TP LOG

ED?	-	TRIAL PIT F		REPORT NUMBER									
CONTRACT	Grousemount Wind Farm						TRIAL P	IT NO.	IO. TP098				
	F.C	CO-ORDINATE	ES EL (m)	509,1 569,6 391.5	58.04 E 46.98 N 8		Sheet Sheet DATE STARTED 15/0 DATE COMPLETED 15/0 EXCAVATION 13 T)4/2015)4/2015 Fonne Excavator			
	ESBI ESBI						METHO	5	13 10				
								Samples	6	Pa)	meter		
	Geotechnical Description		egend	Jepth m)	Elevation	Vater Strike	Sample Ref	_ype	Jepth	/ane Test (K	Hand Penetro		
0.0 Soft bla	ack fibrous PEAT (H4-H7)				ш	>	0.12	-					
Angula	r GRAVEL and COBBLES			0.30	391.28		AA27946	В	0.50-0.50	24 6[R]			
Obstruc End of	ction - Possible boulders/bedrock Trial Pit at 0.80m			0.80	390.78		AA279461 AA27945 AA27945T	B D	0.50-0.50 0.60-0.60 0.60-0.60				
.0													
5.0													
.0													
iroundwater	Conditions												
lo Groundwa	ter Observed												
Stability Io instability (Dbserved												
eneral Rem	arks												

	Am									REPORT NU	JMBER	
	35L	Т	RIAL PIT F		18312							
CON	TRACT	Grousemount Wind Farm							IT NO.	TP0	99	
LOG	GED BY	F.C	CO-ORDINATI	ES	509,05 569,79	57.04 E 94.96 N		DATE ST	TARTED	15/04 ED 15/04	/2015 /2015	
	NT	ESBI ESBI	GROUND LEV	/EL (m)	387.3′	1		EXCAVA METHOD	TION D	13 To	onne Exc	avator
			1						Samples		a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetro (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)		17 717 71 717 717 717 717								
-	Soft light	brown/red sandy gravelly silty CLAY.	Sand is fine		0.80	386.51		AA27948 AA27948T	B D	0.50-0.50 0.50-0.50	18 6[R]	
1.0 	to coarse	. Graver is angular to subangular.		× a a				AA27949 AA27949T	B D	1.00-1.00 1.00-1.00		
-	Angular	GRAVEL and COBBLES			1.30	386.01						
- - -	Obstruct	ion - Possible boulders/bedrock			1.70	385.61						
2.0	End of I	riai Pitat 1.70m										
-												
-												
-												
3.0 												
-												
-												
4.0												
-												
-												
Grou	Indwater (Conditions										
No G	Froundwate	r Observed										
Stab No in	ility istability Ol	oserved										
Gene	eral Rema	rks										

	F										REPORT NUMBER			
	35L	т	RIAL PIT F	RECO	RD					18312				
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	00			
LOG	GED BY	F.C	CO-ORDINATE	ES	508,97 569,86	72.05 E 64.97 N		DATE S	TARTED OMPLET	15/04 ED 15/04	/2015 /2015			
		ESBI	GROUND LEV	'EL (m)	393.38	3		EXCAVA METHO	TION	13 To	nne Exc	avator		
									Samples		a)	neter		
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetror (KPa)		
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u>, , , ,</u>										
-	Soft light to coarse	brown/red sandy gravelly silty CLAY. Gravel is subangular to subrounded	Sand is fine	\'\ \\' _	0.50	392.88		AA27950 AA27950T	B D	0.50-0.50 0.50-0.50	36 12[R]			
1.0 	Obstructi	on - Possible boulders/bedrock			1.20	392.18		AA17701 AA17701T	B D	1.00-1.00 1.00-1.00				
- - -	End of T	rial Pit at 1.20m												
- - -														
2.0														
-														
-														
- 3.0														
-														
-														
4.0														
-														
- - -														
-														
No G	Froundwater (r Observed												
Stab No in	ility istability Ob	oserved												
Gene	eral Rema	rks												



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										REPORT N	UMBER	
	J.J. BSL	Т	RIAL PIT RI		18312							
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	02	
					509 09	2 05 5		SHEET		Shee	t 1 of 1	
LOG	GED BY	F.C)	569,74	19.96 N		DATE S	OMPLE	TED 16/04	4/2015	
	NT NEER	ESBI ESBI	GROUND LEVE	L (m)	396.96	0		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
									Sample	S	(a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)	<u>\</u>									
-	Obstruct End of T	ion - Possible boulders/bedrock rial Pit at 0.50m	2 //		0.50	396.46		AA17706 AA17706T	B D	0.50-0.50 0.50-0.50	40 12[R]	
- - 1.0												
-												
-												
- 2.0												
-												
3.0												
-												
-												
4.0 												
-												
Grou No G	indwater roundwate	Conditions er Observed				1	I	1		1		ı
Stab	ility stability ot	oserved										
Gene	eral Rema	irks										
2												

										REPORT N	JMBER	
	35L	т	RIAL PIT F	RECO	RD					18312		
CON	TRACT	Grousemount Wind Farm							TRIAL PIT NO. TP103			
LOG	GED BY	FC	CO-ORDINATI	ES	508,88	35.90 E		DATE ST	ARTE	ED 16/04/2015		
	NT	ESBI	GROUND LEV	/EL (m)	397.0	1		DATE COMPLETED16/04EXCAVATION13 To			1/2015 onne Excavator	
ENG	NEER	ESBI						METHOD)			
									Sample	6	a)	meter
		Geotechnical Description				Ē	trike				est (KF	enetro
				-egend	Depth m)	Elevatio	Nater S	Sample Ref	Lype	Depth	/ane Te	Hand Pe KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)						0) E			-	± 🗸
				<u>1/ 1/ 1/ 1/</u>							20 4[R]	
											.6.2	
1.0				<u>// \// \</u>				AA17707 AA17707T	B D	1.00-1.00 1.00-1.00		
	Soft light	brown/red sandy gravelly silty CLAY.	Sand is fine		1.30	395.71					10 0[R]	
	10 00010			× 				AA17708 AA17708T	B D	1.50-1.50 1.50-1.50		
-	Medium is angula	dense silty sandy GRAVEL. Sand is c ar. (Possible weathered rock)	oarse. Gravel		1.80	395.21						
2.0	Obstruct	ion - Possible boulders/bedrock		×0 ×0.	2.20	394.81						
	End of T	rial Pit at 2.20m										
- 												
-												
4.0												
-												
Grou No G	indwater	Conditions or Observed		I	<u> </u>		L			<u> </u>		
Stab No in	ility stability ot	bserved										
Gene	eral Rema	rks										


18387.GPJ IGSL.GDT 16/7/15

TP LOG . Igsl

alex										REPORT NU	JMBER	
	J.J. JSL	т	RIAL PIT I	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm						TRIAL PI	ΓNO.	TP1	05	
LOG	GED BY	F.C	CO-ORDINAT	ËS	508,72 569,68	26.01 E 36.07 N		DATE ST	ARTE	D 16/04 TED 16/04	/2015 //2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	VEL (m)	387.24	1		EXCAVA METHOD	TION	13 To	onne Exc	cavator
									Sample	s	a)	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetroi (KPa)
0.0 	0.0 Soft black fibrous PEAT (H4-H7) 1.0 Soft to firm blue/grey sandy very gravelly SILT with cobbles Sand is fine to coarse. Gravel is angular to subangular. Cobbles are angular. 2.0 Soft of Trial Pit at 3.00m 3.0 End of Trial Pit at 3.00m 4.0 Groundwater Conditions Water seepage from G.L				1.30	385.94	(Seepage)	AA17711 AA17711T AA17712 AA17712T	B D D	1.00-1.00 1.00-1.00 2.50-2.50 2.50-2.50	28 10[R] 14 4[R] 10 0[R]	
Grou Wate	ndwater (r seepage	Conditions from G.L]				·				·
Stab No in	ility stability ob	oserved										
Gene	eral Rema	rks										

	And									REPORT N	UMBER	
	BSL	1	RIAL PIT R	ECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	06	
LOG	GED BY	F.C	CO-ORDINATES	S	508,98 569,68	54.77 E 36.05 N		DATE S	TARTE	D 16/04 TED 16/04	4/2015 4/2015	
CLIE	NT	ESBI	GROUND LEVE	EL (m)	401.19	9		EXCAVA METHO		13 To	onne Exc	cavator
ENG		ESBI							Sample	S		eter
		Geotechnical Description				c	trike				est (KPa)	enetrome
				Legend	Depth (m)	Elevatio	Water S	Sample Ref	Type	Depth	Vane Te	Hand Pe (KPa)
0.0	Soft blac	k/brown fibrous PEAT (H4-H7)	2	<u>, , , , ,</u>								
-			2									
			2					AA17714 AA17714T	B D	0.60-0.60 0.60-0.60	32 10[R]	
-	Medium	dense silty angular GRAVEL	8		0.90	400.29					12 2[R]	
	Obstruct	ion - Possible boulders/bedrock	×		1.30	399.89						
-	End of T	rial Pit at 1.30m										
-												
2.0												
_												
-												
3.0												
-												
-												
-												
4.0												
-												
-												
-												
Grou No G	undwater Groundwate	Conditions or Observed										
Stab No ir	ility istability O	bserved										
Gen	eral Rema	rks										

	And								I	REPORT NI	JMBER	
	JSL JSL	т	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm							T NO.	TP1	07	
LOG	GED BY	F.C	CO-ORDINATI	ES	508,91 569.61	I3.19 E		DATE ST	ARTED	16/04	/2015	
	NT	ESDI	GROUND LEV	/EL (m)	401.8	1		DATE CO		16/04 13 To	/2015	avator
ENG	NEER	ESBI						METHOD)			
									Samples	3	a)	meter
		Geotechnical Description				_	trike				est (KF	enetro
				Legend	Depth (m)	Elevatio	Water S	Sample Ref	Type	Depth	Vane Te	Hand Pé (KPa)
- 0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> </u>								
-												
-											20 0.6[R]	
-				<u> </u>								
-	Firm to s	tiff blue/grev sandy gravelly SILT with	occasional	<u>~ ~ ~</u> ~	1.20	400.61		AA17715 AA17715T	B D	1.00-1.00	12 0[R]	
-	cobbles. Cobbles	Sand is fine. Gravel is angular to sub- are angular.	angular.	x								
-				× × ×								
- 2.0				×. ×								
-				2×. *. •.								
-				× 0; × × 0; × × 0;				AA17716	В	2.50-2.50		
	End of T	rial Pit at 2.70m		UX -,)	2.70	399.11		AA17716T	D	2.50-2.50		
- 												
-												
-												
-												
4.0												
-												
-												
-												
Grou No G	ndwater (roundwate	Conditions er Observed				ľ					ľ	
Stab i No in	ility stability Ol	bserved										
Gene	eral Rema	rks										

										REPORT N	UMBER	
	3SL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	08	
LOG	GED BY	F.C	CO-ORDINAT	ES	508,88 569,52	82.56 E 24.88 N		DATE SI	TARTEI OMPLE	D 16/04 TED 16/04	4/2015 4/2015	
CLIE	NT	ESBI	GROUND LEV	/EL (m)	402.9	7		EXCAVA METHOD		13 To	onne Exc	cavator
ENG	NEEK	ESBI							Sample	s	a)	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetror (KPa)
0.0 - 1.0 - 2.0 - 3.0 - 4.0	Soft blac Soft to fir cobbles. subangu	k fibrous PEAT (H4-H7) m blue/grey sandy gravelly SILT with Sand is fine to coarse. Gravel is angu lar. Cobbles are angular.	occasional Jar to	コンシュンシュンシュンシュンシャン、 ゆ、 ゆ、 ゆ、 ゆ、 ゆ、 ゆ、 や、	1.40	401.57		AA17717 AA17717T AA17718 AA17718T	B D D	1.00-1.00 1.00-1.00 2.50-2.50 2.50-2.50	22 8[R] 10 2[R] 8 0[R]	
Grou No G	indwater (iroundwate	Conditions r Observed										
Stab No in	ility stability Ol	oserved										
Gene	eral Rema	rks										

	Am									REPORT N	JMBER	
	BSL	Т	RIAL PIT RE	ECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	09	
LOG	GED BY	F.C	CO-ORDINATES	6	508,94 569,44	47.88 E 42.86 N		DATE S		Shee D 16/04 TED 16/04	t 1 of 1 1/2015 1/2015	
	NT	ESBI	GROUND LEVE	L (m)	412.0 [,]	1		EXCAVA	TION	13 To	onne Exc	cavator
									Sample	S	a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)
0.0 - - - - - - - - - - - - -	Soft blac	k fibrous PEAT (H4-H7) dense very silty angular GRAVEL	2 1 1 1 1 1 1 1 1 1 1 1 1 1		1.90	410.11	(Seepage)	AA17719 AA17719T AA17720 AA17720T	B D B D	1.00-1.00 1.00-1.00 2.50-2.50 2.50-2.50	28 10[R] 16 4[R] 10 1[R] 8 0[R]	
- - Grou	Indwater (Conditions										
vale	, scepaye											
Stab Pit si	ility des collaps	sing from 1.90m										
Gene	eral Rema	rks										

1										REPORT N	UMBER	
lge	ア SL	т	RIAL PIT F	RECO	RD					18	312	
CONTR	RACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	10	
				FS	509.02	34 94 F				Shee	t 1 of 1	
LOGGE	ED BY	F.C			569,39	95.10 N		DATE S	OMPLE	TED 17/04	4/2015 4/2015	
CLIENT	Г	ESBI	GROUND LEV	/EL (m)	426.62	2		EXCAV		13 To	onne Exc	cavator
ENGINE	ER	ESBI										
									Sample	S	(R	leter
		Controphysical Departmention					é				(KPå	etron
		Geolechnical Description		р	_	tion	- Stril	e			Test	Pene
				eger	Depth m)	Eleva	Vate	samp Ref	Jype	Depth	/ane	land KPa)
_ ^{0.0} S	Soft blac	k fibrous PEAT (H4-H7)						0712			/	
				<u>1, 1, 1, 1</u>								
N	Medium	dense silty peaty angular GRAVEL (P	ossible	∞ ∞ ∞	0.40	426.22		AA17721	В	0.40-0.40	16	
- W	veathere	ed rock)		X X X X X	•			AA17721T	D	0.40-0.40	4[R]	
-				X X X								
1.0												
-				XX77 X								
	Obstruct	ion - Possible boulders/bedrock		1,0 x 2	1.50	425.12						
	End of T	rial Pit at 1.50m										
2.0												
3.0												
-												
4.0												
-												
-												
[]												
Ground	dwater	Conditions										
No Grou	undwate	er Observed										
en												
Stability No insta	t y ability O	bserved										
Genera	al Rema	rks										
2												
2												



	TRIAL PIT RECORD											
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	12	
LOG	GED BY	F.C	CO-ORDINAT	ËS	508,96 569,37	63.24 E 17.66 N		DATE ST	TARTED	0 17/04 TED 17/04	/2015 /2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	VEL (m)	421.72	2		EXCAVA METHOD	TION)	13 Tc	nne Exc	avator
									Samples	5	(ac	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetro (KPa)
0.0 - - - - - - -	Soft blue Soft blue Sand is	k fibrous PEAT (H4-H7) /grey sandy gravelly SILT with occasion fine to coarse. Gravel is subangular. Co o subangular	onal cobbles. cobbles are	↓ ↓↓ ↓ ↓ ↓↓ ↓↓ ↓ ↓↓ ↓↓ ↓↓ ↓↓ ↓↓ ↓↓ ↓ ↓↓ ↓↓ ↓ ↓↓ ↓↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	0.70	421.02		AA17726 AA17726T	B D	0.50-0.50 0.50-0.50	24 8[R]	
1.0 	Obstruct End of T	ion - Possible boulders/bedrock irial Pit at 1.60m		× 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,	1.60	420.12		AA17727 AA17727T	B D	1.20-1.20 1.20-1.20		
2.0												
- - - - - -												
- - - - - - - -												
Grou No G	indwater roundwate	Conditions er Observed				·		· · · ·				
Stab No in	ility stability O	bserved										
Gene	eral Rema	rks										

	Т	RIAL PIT	RECO	RD					REPORT NU	JMBER 312	
CON	ITRACT Grousemount Wind Farm						TRIAL P	IT NO.	TP1	13	
LOG	GGED BY F.C	CO-ORDINAT	ES	508,99 569,22	91.13 E 23.03 N		DATE ST		Shee 17/04 TED 17/04	t 1 of 1 1/2015 1/2015	
CLIE	ENT ESBI INEER ESBI	GROUND LE	VEL (m)	424.49	9		EXCAVA METHO	TION	13 Tc	onne Exc	avato
								Samples	3	Pa)	meter
	Geotechnical Description		egend	Jepth m)	Elevation	Vater Strike	Sample Ref	Type	Jepth	/ane Test (K	Hand Penetro
.0	Soft black fibrous PEAT (H4-H7)			0.20	424.29	>	012	F		/	
	Soft brown sandy gravelly SILT with cobbles a Sand is coarse. Gravel is angular to subangula and boulders are angular to subangular.	nd boulders. ar. Cobbles					AA17728 AA17728T	B D	0.20-0.20 0.20-0.20	34 14[R]	
.0			· X · X · X · X	1.30	423.19		AA17729	В	1.20-1.20		
	Obstruction - Possible boulders/bedrock End of Trial Pit at 1.30m						AA177291	D	1.20-1.20		
0											
0											
8.0											
.0											
rou	undwater Conditions										
10 G	Groundwater Observed										
itab lo ir	bility Instability Observed										
ene	eral Remarks										

TRIAL PIT RECORD											JMBER 312	
CON		Grousemount Wind Farm						TRIAL P	IT NO.	TP1	14	
								SHEET		Shee	t 1 of 1	
LOG	GED BY	F.C	CO-ORDINAT	ES	509,0 569,1	58.03 E 50.91 N		DATE S	TARTED	20/04 TED 20/04	/2015 I/2015	
CLIE ENG	INT INEER	ESBI ESBI	GROUND LEV	/EL (m)	427.9	6		EXCAVA METHO	ATION D	13 To	nne Exc	avator
									Sample	5	(Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (h	Hand Penetr (KPa)
0.0	Soft brow	vn/black fibrous PEAT (H4-H7)										
- - - -				<u>vv vv v</u>							20 6[R]	
1.0	Soft to fi	m blue/grey sandy gravelly SILT. Sar	nd is fine.	<u>\\ /, \\ /, \\ /</u> / <u>/ \\ // \\ // \\ /</u> ×o. ·× · · >	1.10	426.86		AA17730 AA17730	B D	1.00-1.00 1.00-1.00	12 2[R]	
-	Gravel is	: subangular.		× × × × × × × × × × × × × × × × × × ×	: : :							
2.0 	Obstruct	ion - Possible boulders/bedrock		ו··· ו··· ×··· ×··· ×··· ×··· ×··· ×·	2.40	425.56		AA17731 AA17731	B D	2.00-2.00 2.00-2.00		
-	End of I	riai Pit at 2.40m										
- 3.0 - - -												
- 4.0 - - -												
- - -												
Grou No G	undwater (Groundwate	Conditions Pr Observed										
Stab No ir	ility nstability Ol	oserved		_	_	_	_		_		_	_
Gene Move	e ral Rema ed 20m on	rks instruction of archaeologist										

RE									REPORT NU	JMBER		
	BSL	Т	RIAL PIT I	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm						TRIAL PI	T NO.	TP1	15	
LOG	GED BY	F.C	CO-ORDINAT	ES	509,1 <i>°</i> 569,06	17.99 E 67.14 N		DATE ST	ARTE	20/04 TED 20/04	/2015 /2015	
	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	430.07	7		EXCAVA METHOD		13 To	nne Exc	avator
									Sample	s	(e	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetron (KPa)
0.0	Soft brow	vn/black fibrous PEAT (H4-H7)		$\frac{\langle 1_{j} \rangle \langle 1_{j} \rangle}{\frac{1_{j}}{2} \langle 1_{j} \rangle \langle 1_{j} \rangle} $								
- · · · · · · · · · · · · · · · · · · ·	Soft brow rootlets. subround subround	vn sandy gravelly SILT with cobbles,b Sand is coarse. Gravel is subangular ded. Cobbles and boulders are subang ded.		0.30	429.77		AA17732 AA17732	B D	0.30-0.30 0.30-0.30	28 10[R]		
1.0 X X X X 1.0 X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X X									B D	1.50-1.50 1.50-1.50		
- - 2.0 - -	is fine. G	ravel is subangular. Cobbles are suba	angular.	x x x x x x x x x x x x x x x x x x x								
- - - - 3.0	Fnd of T	rial Pit at 3.00m		QX. QX. QX. QX. QX. QX. QX. QX. QX. QX.	3.00	427.07		AA17734 AA17734	B D	2.60-2.60 2.60-2.60		
-												
4.0 - -												
-												
Grou No G	indwater (roundwate	Conditions or Observed										
Stab Pit ur	ility nstable 0.3	0-1.60m										
Gene	eral Rema	rks										



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TP LOG

	An							REPORT NU	JMBER			
	3SL	т	RIAL PIT I	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP1	17	
LOG	GED BY	F.C	CO-ORDINAT	ES	509,22 568,88	29.53 E 33.45 N		DATE ST	TARTED	20/04	/2015 /2015	
		ESBI	GROUND LE	/EL (m)	446.36	6		EXCAVA METHO		13 To	nne Exc	avator
			I						Sample	3	a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)						AA17738	В	0.50-0.50	30	
-10	Soft to fi boulders subangu	m brown sandy gravelly SILT with oc and rootlets. Sand is coarse. Gravel i lar. Boulders are subangular.	casional s angular to	*0~×. *	0.70	445.66		AA17738	D	0.50-0.50	6[R]	
1.0	Soft to fi Gravel is	rm blue/grey sandy SILT with cobbles subangular. Cobbles are subangular.	. Sand is fine.		1.20	445.16		AA17739 AA17739	B D	1.00-1.00 1.00-1.00		
2.0	Obstruct End of T	ion - Possible boulders/bedrock rial Pit at 2.10m		× × × × × × × × × × × × ×	2.10	444.26		AA17740 AA17740	B D	2.00-2.00 2.00-2.00		
-3.0												
4.0												
Grou No G	indwater Groundwate	Conditions Pr Observed										
Stab No in	ility istability O	oserved										
Gene	eral Rema	rks										



REPORT NUMBER



										REPORT NU	JMBER	
	35L	Т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL PI	T NO.	TP1	20 t 1 of 1	
LOG	GED BY	F.C	CO-ORDINATE	ES	509,19 568,67	93.58 E 77.44 N		DATE ST		21/04	/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	′EL (m)	457.16	3		EXCAVA METHOE	TION	13 Tc	nne Exc	avator
									Samples	3	Pa)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetro (KPa)
- 0.0 	Soft blac Soft to fi Sand is Cobbles	rm blue/grey very sandy gravelly SILT fine to coarse. Gravel is subangular to are subangular.	with cobbles. subrounded.	コ < コ < コ < コ < コ < コ < コ < コ < コ < コ <	1.30	455.86	ب (Rapid)	AA17746 AA17746	B D B	1.00-1.00 1.00-1.00 2.50-2.50 2.50-2.50	26 14[R] 10 0[R]	
Grou Rapio	indwater d water ing	Conditions gress at 1.30m		<u>ı </u>		<u> </u>		I				
Stab Pit ur	ility nstable du	e to water ingress										
Gene	eral Rema	rks										

REPORT NUMBER												
	BSL	Т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	21	
LOG	GED BY	F.C	CO-ORDINATI	ES	509,12 568,59	26.06 E 93.96 N		DATE S		21/04	/2015 /2015	
		ESBI FSBI	GROUND LEV	/EL (m)	458.92	2		EXCAVA		13 Tc	onne Exc	avator
									Samples	6	(eter
		Geotechnical Description		egend)epth m)	Elevation	Vater Strike	ample Ref	ype	Jepth	/ane Test (KPa	łand Penetrom KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)			05	ш	>	о ш	H		>	τe
- - - - -	Soft to fi is coarse	m blue/grey sandy gravelly SILT with e. Gravel is subangular. Cobbles are s	cobbles. Sand ubangular.		0.20	458.72		A A 177/18	в	1 20 1 20	24 10[R]	
	Obstruct	ion - Possible boulders/bedrock			1.70	457.22		AA17748	D	1.20-1.20		
2.0												
- - - - 3.0												
- 4.0												
Grou No G	indwater Groundwate	Conditions r Observed		·		<u>.</u>		·				
Stab No in	ility istability O	oserved										
Gene	eral Rema	rks										

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CON	TRACT	Grousemount Wind Farm							IT NO.	TP12	22	
LOG	GED BY	F.C	CO-ORDINAT	ES	509,38 568,99	35.03 E 95.00 N		DATE ST	TARTEI OMPLE	Sheet D 21/04 TED 21/04	/2015 /2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	471.48	3		EXCAVA METHOE	TION)	13 To	nne Exc	cavator
									Sample	s	(a	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)
0.0	Soft blac Soft to fi coarse.	ck fibrous PEAT (H4-H7) rm brown sandy gravelly SILT with roo Gravel is angular to subangular.	otlets. Sand is	<u> </u>	0.20	471.28	(Seepage)				10 0[R]	
- - - - - - -	Soft to fi is fine. G subangu	rm blue/grey sandy gravelly SILT with Gravel is subangular to subrounded. Co Ilar.	cobbles. Sand bbbles are	× × × × × × × × × × × × × × × × × × ×	0.80	470.68		AA22709 AA22709	B D	0.80-0.80 0.80-0.80		
				૱ૢૼ૱૽ૼ૱ૢૼ૱૽ૼ૱ૢ૱૱ૢ૱૽ૢૼ૱૽ૼ૱૽ૣ ૾ઌૼૢઽઌૼ૾ઌૼૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢૢઌૺૢઌૼૢૢૢૢૢૢૢૢૢૢૢ				AA22710 AA22710	B D	2.30-2.30 2.30-2.30		
- 3.0 	End of T	rial Pit at 3.00m			3.00	468.48						
- - - - - - -												
Grou Wate	ndwater r seepage	Conditions from G.L										
Stab Slight	ility t collapse	of side walls										
Gene	eral Rema	arks										

	BSL	I	RIAL PIT I	RECO	RD					REPORT N	jmber 312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP1	23	
LOG	GED BY	F.C	CO-ORDINAT	ES /EL (m)	509,43 569,0 478.0	38.03 E 79.94 N 8		DATE S		21/04 TED 21/04	1/2015 1/2015	cavator
ENG		ESBI		1				METHO	D			
									Sample	8	a)	meter
		Geotechnical Description		egend)epth m)	levation	Vater Strike	iample tef	ype	Jepth	'ane Test (KI	land Penetro KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)					>	0 E				10
- - -	Angular weathere	GRAVEL,COBBLES and BOULDER ed rock)	S (Possible		0.50	477.58		AA22708 AA22708	B D	0.50-0.50 0.50-0.50	32 8[R]	
1.0	Obstruct End of T	ion - Possible boulders/bedrock irial Pit at 1.00m		¥_0_	1.00	477.08					1	
- - -											1	
2.0											1	
- - -											1	
3.0											1	
- - -											1	
- - - 4.0											1	
-											1	
-												
No G	Groundwater	er Observed										
Stab No ir	i lity istability Ol	bserved										
Gen	eral Rema	rks										

and the second s	And												
	BSL	I								18	312		
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1 Shee	24 t 1 of 1		
LOG	GED BY	F.C	CO-ORDINATE	ES	509,47 569,16	74.51 E 62.69 N		DATE S	TARTED	22/04 ED 22/04	k/2015 k/2015		
	NT	ESBI ESBI	GROUND LEV	'EL (m)	487.50)		EXCAVA METHO	ATION D	13 To	onne Exc	avator	
									Samples		(1	ieter	
		Geotechnical Description				Ę	strike				est (KPa	enetrom	
				Legend	Depth (m)	Elevatic	Water S	Sample Ref	Type	Depth	Vane To	Hand P (KPa)	
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> \\/</u>									
-	Angular weathere	GRAVEL,COBBLES and BOULDERS ed rock)	6 (Possible		0.20	487.30		AA22709 AA22709	B D	0.20-0.20 0.20-0.20	26 10[R]		
-	Obstruct End of T	ion - Possible boulders/bedrock irial Pit at 0.20m			0.50	407.00							
- 1.0													
-													
-													
2.0													
-													
-													
- - 3.0													
-													
-													
- - 													
-													
-													
-													
Grou No G	indwater Groundwate	Conditions er Observed				<u>ı </u>		<u> </u>					
Stab No in	ility Istability O	bserved											
Gene	eral Rema	rks											

(st	Array									REPORT N	UMBER	
(2)]G	SL .	٦	FRIAL PIT I	RECO	RD					18	312	
CONT	RACT Grousemount Wi	nd Farm						TRIAL P	IT NO.	TP1	25	
LOGG	GED BY F.C		CO-ORDINAT	ËS	509,52 569,23	26.99 E 36.98 N		DATE S	TARTED	22/04 22/04	1/2015 1/2015	
	T ESBI		GROUND LEV	VEL (m)	487.5	7		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
ENGIN	NEEK ESBI								Complex			er
							0		Samples	5 	KPa)	romet
	Geotechr	ical Description		gend	epth י)	evation	ater Strike	ample ef	/be	epth	ane Test (and Penet (Pa)
0.0	Soft black fibrous PEAT (H	4-H7)			٥£		×	й М	T	ă	, ,	ΞΞ
			0 11 1		0.30	487.27			5			
	Angular GRAVEL,COBBLE blue/grey silt (Possible wea	S and BOULDER thered rock)	S with traces of					AA22710 AA22710	D	0.30-0.30 0.30-0.30	24 8[R]	
1.0	Obstruction - Possible boul	ders/bedrock		60	1.00	486.57						
	End of Trial Pit at 1.00m											
2.0												
3.0												
4.0												
Grour	ndwater Conditions											
No Gr	oundwater Observed											
04 - 1- 11												
No ins	stability Observed											
Gener	ral Remarks											



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TP LOG





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	3SL	Т	RIAL PIT	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	29	
LOG	GED BY	F.C	CO-ORDINAT	ES	508,75 569,15	50.61 E 59.77 N		DATE S	TARTEI OMPL F	Shee D 22/04 TED 22/04	t 1 of 1 /2015 /2015	
CLIE	NT	ESBI	GROUND LE	VEL (m)	392.1	1		EXCAVA		13 Tc	onne Exc	cavator
ENG	NEER	ESBI										
									Sample	s	(Pa)	ometer
		Geotechnical Description		-egend	Depth m)	Elevation	Vater Strike	Sample Ref	Type	Jepth	/ane Test (k	Hand Peneti KPa)
0.0	Soft blac	k fibrous PEAT				ш	>	0.15	F		>	
-				$\frac{l_{\prime}}{\sqrt{l_{\prime}}} \frac{\sqrt{l_{\prime}}}{\sqrt{l_{\prime}}} \frac{\sqrt{l_{\prime}}}{\sqrt{l_{\prime}}}$								
-	Soft to fi	m brown sandy gravelly SILT. Sand is	s coarse.	<u> </u>	0.50	391.61		AA22720 AA22720	B	0.50-0.50	28 10[R]	
-				.×°. × ××,	0 90	301 21		AA22721	В	0.80-0.80	10[14]	
1.0	Soft blue fine. Gra	grey sandy gravelly SILT with cobble vel is angular to subangular to subangular to subrou	s. Sand is nded. Cobbles	× · · · · · · · · · · · · · · · · · · ·	0.00	001.21		AA22721	D	0.80-0.80		
-	are suba	ngular.		×××××								
				× × ×	5							
-				()×. ()×. ()×.								
- 2.0								۵۵22722	B	2 00-2 00		
				10. ×	2 30	380.81		AA22722	D	2.00-2.00		
-	Obstruct End of T	ion - Very large boulders rial Pit at 2.30m			2.50	509.01						
-												
-												
3.0												
-												
-												
4.0												
-												
-												
Grou	Indwater (Conditions										
No G	Groundwate	r Observed										
Stab	ility											
No in	istability Ol	oserved										
Gene	eral Rema	rks										

TI SSL WTRACT Grousemount Wind Farm GGED BY F.C	RIAL PIT	RECO	RD					183	312	
Grousemount Wind Farm			-							
GGED BY F.C						TRIAL PI	T NO.	TP1	30	
	CO-ORDINAT	ËS	508,75 569,05	51.68 E 58.44 N		DATE ST	ARTED	22/04	/2015	
ENT ESBI	GROUND LEV	VEL (m)	384.9′	1		EXCAVA		13 To	nne Exc	cavat
SINEER ESBI		1 1				METHOD)			
							Samples	3	(ac	meter
Geotechnical Description		Legend	Depth (m)	Elevation	₩ater Strike	Sample Ref	Type	Depth	Vane Test (Kl	Hand Penetro
Soft black/brown fibrous PEAT (H4-H7)		$\frac{\langle 1_{i} \rangle \langle 1_{i}}{\langle 1_{i} \rangle \langle 1_{i} \rangle}$			(Rapid)				-	
Soft to firm grey sandy gravelly SILT with cobb coarse. Gravel is angular to subangular. Cobbl subangular.	les. Sand is es are	2 (1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2	0.90	384.01		AA22723 AA22723	B D	0.90-0.90 0.90-0.90	10 0[R]	
		Ö * Ö * Ö * Ö * Ö * Ö * Ö * Ö * Ö * Ö *				AA22724 AA22724	B D	2.60-2.60 2.60-2.60		
End of Trial Pit at 3.00m			3.00	381.91						
undwater Conditions										
id water ingress from G.L										
bility Instable due to water ingress										
neral Remarks										

	Am									REPORT NU	JMBER	
	3SL	Т	RIAL PIT I	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	31	
LOG	GED BY	F.C	CO-ORDINAT	ËS	508,68 568,93	37.26 E 32.93 N		DATE S	TARTEI	Shee D 22/04 TED 22/04	t 1 of 1 /2015 /2015	
CLIE	NT	ESBI	GROUND LEV	VEL (m)	364.0	7		EXCAVA		13 Tc	onne Exc	cavator
ENG	NEER	ESBI										
									Sample	s	(Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (ŀ	Hand Peneti (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u><u> </u></u>								
-												
				<u>, ,, ,</u>	0.60	363.47		AA22725	В	0.50-0.50	30	
-	Soft light Sand is o	brown slightly sandy slightly gravelly coarse. Gravel is subangular.	clayey SILT.	× · × ·	0.00	000.11		AA22725	D	0.50-0.50	10[R]	
-					Ē			4 4 9 9 7 9 9	P	1 00 1 00		
-	Soft to fir	m blue/grey sandy gravelly SILT with gravel is subangular to subrounded. G	cobbles. Sand	10 × ×	1.10	362.97		AA22726 AA22726	D	1.00-1.00		
	subangu	lar.		$() \times ^{\circ}$								
-				× •0;								
-				0×0								
2.0												
-												
-				× · · · · · · · · · · · · · · · · · · ·				۵۵22727	R	2 50-2 50		
				×××××				AA22727	D	2.50-2.50		
-					3.00	361.07						
3.0 	End of T	rial Pit at 3.00m			0.00	001101						
-												
-												
-												
4.0												
-												
-												
-												
-												
Grou No G	indwater (Groundwate	Conditions er Observed				·]		_,l		
Stab	ilitv											
No in	istability Ol	oserved										
Gene	eral Rema	rks										



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TP LOG

									REPORT N	UMBER	
	TI BSL	RIAL PIT F	RECO	RD					18	312	
CON	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	33	
LOG	GED BY F.C	CO-ORDINAT	ES	508,63 568,80	35.94 E)9.81 N		DATE S	TARTE	C 23/04 TED 23/04	4/2015 4/2015	
CLIE	NT ESBI	GROUND LEV	/EL (m)	341.28	3		EXCAVA METHO	ATION D	13 To	onne Exc	avator
ENG	INEER ESBI										J.
								Sample	s	(Pa)	omete
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (ŀ	Hand Peneti (KPa)
0.0	Soft black fibrous PEAT (H4-H7)					-				-	
	Soft blue/grey very sandy gravelly SILT with co occasional boulders. Sand is fine. Gravel is any subangular. Cobbles are subangular. Boulders	obbles and gular to are angular.		0.30	340.98		AA22730 AA22730	B D	0.30-0.30 0.30-0.30	40 22[R]	
2.0	Obstruction - Possible boulders/bedrock End of Trial Pit at 2.00m			2.00	339.28	(Seepage)	AA22731 AA22731	B D	1.70-1.70 1.70-1.70		
3.0											
- - - - - - -											
-											
Grou	undwater Conditions										
Wate	er lying on top of rock										
Stab	ility Istability Observed										
	Istability Observed										
Gene	eral Remarks										
i											

and the second s	TRIAL PIT RECORD 18312													
	TRACT	Grousemount Wind Farm						TRIAL PI	T NO.	TP1	34			
			CO-ORDINAT	ES	508 54	19 87 F		SHEET		Shee	t 1 of 1			
LOG	GED BY	F.C		/ [] (ma)	568,76	62.00 N		DATE CO	OMPLE	red 23/04	/2015			
CLIE ENGI	NT INEER	ESBI ESBI	GROUND LEV	/EL (M)	333.73	9		EXCAVA METHOD	TION)	13 To	nne Exc	avator		
									Sample	6	a)	meter		
		Geotechnical Description		Legend	Depth (m)	Elevation	 ₩ater Strike 	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)		
0.0 -	Soft blac	k fibrous PEAT (H4-H7)					(Rapid)							
-	Large ar	ngular BOULDERS			0.50	333.29		AA22732 AA22732	B D	0.50-0.50 0.50-0.50	34 12[R]			
- - - -	Soft blue cobbles subangu	e/grey very sandy gravelly SILT with o to possible silty sand. Sand is fine. G lar to subrounded. Cobbles are subar	ccasional ravel is ngular.	××××××××××××××××××××××××××××××××××××××	1.00	332.79								
- - - - - 2.0 -	Obstruct	ion - Possible boulders/bedrock		<u>କ</u> ୍ଟ୍ରୁ	2.30	331.49		AA22733 AA22733	B D	1.80-1.80 1.80-1.80				
- - - -	End of T	rial Pit at 2.30m												
3.0 - - - - -														
- - 4.0 -														
- - -														
Grou Rapie	undwater o d water ing	Conditions gress from G.L		1		<u> </u>		<u> </u>						
Stab Pit si	i lity des unstat	ole due to water ingress												
Gene	eral Rema	rks												



TRIAL PIT RECORD

18312

CON	TRACT Grousemount Wind Farm						TRIAL P	IT NO.	TP1	35	
							SHEET		Shee	t 1 of 1	
LOG	GED BY F.C	CO-ORDINATI	ES	508,48 568,74	50.04 E 10.96 N		DATE S	TARTED OMPLET	23/04 ED 23/04	¥/2015 ¥/2015	
CLIE ENG	INT ESBI INEER ESBI	GROUND LEV	/EL (m)	324.54	4		EXCAVA METHO	ATION D	13 To	onne Exc	avator
								Samples		a)	meter
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)
0.0	Soft black fibrous PEAT with boulders. Boulde subangular. Soft blue/grey very sandy gravelly SILT with or possible silty sand. Sand is fine. Gravel is aub subrounded. Cobbles are subangular.	ers are obbles to angular to	× × × × × × × × × × × × × × × × × × ×	0.20	324.34		AA22734 AA22734	B D	0.20-0.20 0.20-0.20	24 10[R]	
	Obstruction - Possible boulders/bedrock End of Trial Pit at 0.80m		*; *;	0.80	323.74		AA22735 AA22735	B D	0.70-0.70 0.70-0.70		
- - -											
-											
- - -											
3.0 - -											
- - -											
4.0 - -											
-											
Grou No G	undwater Conditions Broundwater Observed		<u> </u>	<u> </u>							
Stab No ir	ility Istability Observed										
Gene	eral Remarks										

~	And									REPORT N	UMBER	
	3SL	т	RIAL PIT I	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	PIT NO.	TP1	36	
LOG	GED BY	F.C	CO-ORDINAT	ES	508,35 568,70	59.03 E 00.98 N		DATE S		D 23/04	1 of 1 1/2015 1/2015	
CLIE	NT	ESBI	GROUND LEV	/EL (m)	317.07	7		EXCAVA		13 To	onne Exc	cavator
ENG	NEER	ESBI		1								
									Sample	es	(Pa)	ometer
		Geotechnical Description		8		uo	Strike	۵			「est (}	oeneti
				Legen	Depth (m)	Elevati	Water	Sample Ref	Type	Depth	Vane 1	Hand F (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)										
-	Soft brow fine to co	vn very sandy gravelly SILT with rootle arse. Gravel is subangular to subrour	ets. Sand is nded.	× · · · × · × · · × · ·	0.30	316.77		AA22736 AA22736	B D	0.30-0.30 0.30-0.30	40 18[R]	
_				* · × · · ×	0.80	316 27		AA22737	В	0.70-0.70		
-	Soft blue fine. Gra	/grey very sandy gravelly SILT with co vel is subangular to subrounded. Cob	bbles. Sand is bles are	× × ,	0.00	010.21		AA22737	D	0.70-0.70		
	subangu			× · × ·								
-				×; × ,								
-				ر ر ر ر ر ر ر ر ر ر ر ر ر ر ر ر ر ر ر								
-					e e			AA22738	В	1.90-1.90		
2.0				× × × × × × × × × × × × × × × × × × ×				AA22738	D	1.90-1.90		
-	Obstruct	ion - Large angular boulders rial Pit at 2 30m			2.30	314.77						
_												
-												
3.0												
-												
-												
4.0												
-												
_												
-												
Grou	Indwater (Conditions										
No G	Groundwate	r Observed										
Stab No in	ility Istability Ol	oserved										
Gam	aral Dama	rko										
Gene	erai Kema	INS										



18387.GPJ IGSL.GDT 16/7/15 IGSL

TP LOG



										REPORT NUMBER			
TRIAL PIT RECORD								18312					
CONTRACT Grousemount Wind Farm				TF				TRIAL P	IT NO.	TP139			
LOG	LOGGED BY F.C C		CO-ORDINAT	CO-ORDINATES 508 568			08,091.13 E 68,564.14 N			Sheet 1 of 1 D 27/04/2015 TED 27/04/2015			
CLIE			GROUND LEVEL (m)		342.94			EXCAVATION 13		13 To	Tonne Excavator		
ENGI	NEER	ESBI							J				
								Samples		es	Pa)	ometer	
		Geotechnical Description		egend	epth n)	levation	/ater Strike	ample ef	ype	epth	ane Test (K	and Penetro (Pa)	
0.0	Soft blac	k fibrous PEAT (H4-H7)			<u>م</u> ج	Ē	3	ο Ω Ω	É.		>	ΞΞ	
-				<u>1, \\1, \</u>	0.30	342.64							
-	Soft brov througho subangu	Soft brown sandy gravelly SILT with cobbles and rootlets throughout. Sand is coarse. Gravel and cobbles are subangular.			0.00	042.04		AA32209	В	0.30-0.30	26 8[R]		
- - - - - - - - - - - - - - - - - - -	Soft to fin cobble co	m blue/grey very sandy gravelly SILT ontent	with a high	<u>؞</u> ؆ۣڞ؞۞؞۞؞۞؞۞؞۞؞ۿ؞ ۵	1.10	341.84		AA32210	В	1.00-1.00			
- - - -	Obstruct End of T	on - Large boulders rial Pit at 2.70m		× 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,	2.70	340.24		AA32211	В	2.30-2.30			
- - - - - -													
- 4.0 													
Grou No G	ndwater (roundwate	Conditions r Observed						<u> </u>				ı <u>.</u>	
Stab i No in	ility stability Ol	oserved											
Gene	eral Rema	rks											
									REPORT N	JMBER			
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IGSL	Т	RIAL PIT F	RECO	RD					18	312			
CONTRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	40			
LOGGED BY	F.C	CO-ORDINAT	ES	507,99 568,57	91.04 E 70.02 N		DATE S	TARTE	Shee D 27/04	t 1 of 1 1/2015			
CLIENT	ESBI	GROUND LEV	/EL (m)	338.3	В		EXCAVA		13 To	onne Exc	cavator		
ENGINEER	ESBI		1				METHO	D			1		
								Sample	es	(Pa)	ometer		
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (k	Hand Penetr (KPa)		
_ ^{0.0} Very so	ft/soft black fibrous PEAT (H4-H7)		<u>,,</u>										
- - - -			<u> </u>							24 8[R]			
- 1.0 - - - Soft to f	irm blue/grey very sandy gravelly SILT	with cobbles	<u> </u>	1.30	337.08		AA32212	В	1.00-1.00	20 4[R]			
_ through _ subroun _	out. Sand is fine. Gravel is subangular ided. Cobbles are subangular.	r to	× · · · · · · · · · · · · · · · · · · ·										
2.0 			× · · ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	0.50	225.00		AA32213	В	2.00-2.00				
Obstruc End of	tion - Possible rock Trial Pit at 2.50m			2.50	333.00								
_ 3.0 - - - -													
- - - - 4.0													
- - - -													
- - -													
Groundwater Rapid water in	Conditions gress at 1.30m		<u> </u>	<u> </u>	<u> </u>	<u> </u>					<u> </u>		
Stability Pit sides were	unstable												
General Rema	arks												



REPORT NUMBER



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TP LOG IGSL

6	Ann									REPORT N	JMBER	
	J.J. JSL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	43	
LOG	GED BY	F.C	CO-ORDINATI	ES	507,70 568,58	00.90 E 35.98 N		DATE S	TARTED	28/04 TED 28/04	/2015 /2015	
	NT NEER	ESBI ESBI	GROUND LEV	′EL (m)	347.58	3		EXCAVA METHO	TION	13 To	onne Exc	avator
									Sample	6	a)	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetrol (KPa)
	Soft blac Soft brow boulders subround subround	k fibrous PEAT (H4-H7) vn very sandy gravelly SILT with cobb throughout. Sand is coarse. Gravel is ded. Cobbles and boulders are angula ded.	les and subangular to r to		0.20	347.38		AA32220	В	0.20-0.20	30 10[R]	
- - 1.0 - -	Obstruct End of T	ion - Possible rock rial Pit at 1.10m		*X * * * * *	1.10	346.48		AA32221	В	1.00-1.00		
- - - - 2.0												
-												
- 3.0 - - - -												
- - - - - -												
Grou	Indwater (Conditions										
No G	roundwate	r Observed										
Stab No in	ility stability Ol	oserved										
Gene	eral Rema	rks										





18387.GPJ IGSL.GDT 16/7/15 . Igsl

TP LOG

										REPORT N	JMBER	
	ISL	Т	RIAL PIT I	RECO	RD					18	312	
CONT	RACT	Grousemount Wind Farm						TRIAL P	PIT NO.	TP1	46	
LOGO	GED BY	F.C	CO-ORDINAT	ES	507,3 568,70	11.97 E 64.96 N		DATE S	TARTEI	D 28/02 TED 28/02	2/2015 2/2015	
CLIEN	NT	ESBI	GROUND LEV	/EL (m)	418.9	9		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
ENGIN	NEER	ESBI										L
									Sample	is	(Pa)	omete
		Geotechnical Description		-egend	Depth (m)	Elevation	Nater Strike	Sample Ref	Lype	Jepth	/ane Test (k	Hand Penetr KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)						0, 11				
-					0.40	440.50						
	Large su	Ibangular BOULDERS			0.40	418.59		AA32229	В	0.40-0.40	32 10[R]	
-)							
1.0				100	ļ							
	Soft grey	//black sandy gravelly SILT with cobb	les throughout.	() () () () () () () () () () () () () (1.20	417.79						
	Sanuisi		e subangular.	$\hat{O} \times \hat{O}$								
									_			
- 2.0					0.40	440.00		AA32230	В	1.80-1.80		
	Obstruct End of T	ion - Possible weathered rock rial Pit at 2.10m			2.10	416.89						
-												
- 5.0												
-												
4.0 -												
Grour No Gr	ndwater (oundwate	Conditions er Observed			•							
Stabi	lity	hoon and										
	stability O	uservea										
Gene	ral Rema	irks										

										REPORT N	JMBER	
	IGSL	т	RIAL PIT R	ECO	RD					18	312	
С	ONTRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	47	
L	DGGED BY	F.C	CO-ORDINATES	S	507,20 568,78	05.97 E 37.09 N		DATE S	TARTEI OMPL F	Shee D 28/01	t 1 of 1 /2015 /2015	
С	LIENT	ESBI	GROUND LEVE	EL (m)	434.6	5		EXCAVA		13 To	nne Exc	avator
E	NGINEER	ESBI										
									Sample	es	(Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (h	Hand Penetr (KPa)
0	⁰ Soft bla	ck fibrous PEAT (H4-H7)	2	<u>,</u>								
	Large s	ubangular BOULDERS			0.20	434.45		AA32231	В	0.20-0.20	34 12[R]	
- - - - - - - -	⁰ Soft gre	y sandy gravelly SILT with cobbles thro	bughout		1.00	433.65						
- - - - - - - - - - - - - - -	0		× × × × × × × × × × × × × × × × × × ×		2.00	424.05		AA32232	В	2.00-2.00		
- - - - - - - - - - - - - - - - - - -	0 End of 7	Trial Pit at 3.00m			5.00	431.05						
		Operativismo										
	o Groundwater	er Observed										
Non Lan	a bility b instability C	Dbserved										
GSL IP LUG 1830/	eneral Rema	arks										

6	An									REPORT NU	JMBER	
	asl	т	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP1	48	
LOG	GED BY	F.C	CO-ORDINATE	ES	507,28 568,89	59.05 E 95.74 N		DATE SI		29/04 TED 29/04	/2015 /2015	
CLIE	NT	ESBI	GROUND LEV	′EL (m)	439.8 [,]	1		EXCAVA METHOD		13 To	nne Exc	avator
ENG	NEEK	ESBI							Sample	s	a)	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	 ₩ater Strike 	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetror (KPa)
0.0	Soft blac Soft to fir througho	k fibrous PEAT (H4-H7) m blue/grey sandy gravelly SILT with ut. Sand is fine. Gravel and cobbles a	cobbles	<u>,,,,,,,,</u> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0.20	439.61	(Rapid)	AA32236	В	0.20-0.20	46 14[R]	
- 1.0	througho subangu Stiff grey	ut. Sand is fine. Gravel and cobbles a lar.	les	نو: ۵.۵ م م ۵ م ۵ م ۵ م.۵ م.۵ م ۲۰۰۰ م ۵ م ۵ م ۵ م.۵ م.۵ م.۵ م.۵	1.90	437.91		AA32237	В	1.40-1.40	14[K]	
2.0	througho subangu	ut. Sand is fine. Gravel and cobbles a lar.	re	x, x	3.00	436.81		AA32238	В	2.80-2.80		
3.0 4.0	End of T	rial Pit at 3.00m			3.00	430.01						
Wate Stab	er ingress f	rom G.L										
Pit ur	nstable from	m G.L										
Gene	eral Rema	rks										



TRIAL PIT RECORD

CON	ITRACT Grousemount Wind Farm						TRIAL P	IT NO.	TP1	49	
LOG	GED BY F.C	CO-ORDINATI	ES	507,30 568,89	58.10 E 92.88 N		DATE S		29/04	1 of 1 1/2015	
	INT ESBI	GROUND LEV	′EL (m)	425.2	6		EXCAVA METHO	OMPLET ATION D	ED 29/02 13 To	nne Exc	avator
								Samples		a)	neter
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa	Hand Penetrom (KPa)
0.0	Soft black fibrous PEAT (H4-H7)	0		0.20	425.06						
-	Gravel is angular to subangular.	Sand is coarse.	× · × · ×				AA32239	В	0.20-0.20	20 8[R]	
-	Soft to firm brown/grey sandy gravelly SILT v throughout. Sand is fine. Gravel and cobbles to subrounded.	vith cobbles are subangular		0.60	424.66		AA32240	В	0.50-0.50		
- - -	Obstruction - Possible weathered rock End of Trial Pit at 1.20m		× × ×	1.20	424.06		AA32241	В	1.00-1.00		
-											
2.0											
-											
3.0											
-											
-											
- 4.0 - -											
-											
Grou No G	undwater Conditions Groundwater Observed										
Stab No ir	ility nstability Observed										
Gene	eral Remarks										

										REPORT NU	JMBER	
	JSL	т	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm						TRIAL PI	T NO.	TP1	50	
LOG	GED BY	F.C	CO-ORDINATE	ES	507,38 568,96	38.23 E 58.07 N		DATE ST	ARTED	29/04 TED 29/04	/2015 /2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	′EL (m)	432.38	3		EXCAVA METHOD	TION)	13 Tc	onne Exc	avator
								;	Sample	5	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetro (KPa)
0.0	Soft blac Loose br througho subangu	k fibrous PEAT (H4-H7) own very sandy silty GRAVEL with co ut. Sand is coarse. Gravel and cobble lar to subrounded.	bbles is are	60°00°00°0°0°0°0°0°0°0°0°0°0°0°0°0°0°0°	1.30	431.08		AA32242	В	1.00-1.00	14 2[R] 12 2[R]	
2.0 	End of T	rial Pit at 1.30m			3.00	429.38		AA32243	В	2.50-2.50		
- - - - - - - - - -												
Grou No G	indwater (roundwate	Conditions r Observed						·		<u> </u>		
Stab Pit ur	ility Istable fro	m 1.30m										
Gene	eral Rema	rks										

									REPORT N	JMBER	
IGSL	Т	RIAL PIT I	RECO	RD					18	312	
CONTRA	CT Grousemount Wind Farm						TRIAL P	IT NO.	TP1	51	
LOGGED	BY F.C	CO-ORDINAT	ES	507,10 568,8	06.91 E 15.01 N		DATE S	TARTEI OMPL F	Shee D 28/04	t 1 of 1 /2015 /2015	
CLIENT	ESBI		/EL (m)	450.4	4		EXCAVA		13 To	nne Exc	cavator
ENGINEE	R ESBI		1		I I			J			
								Sample	es	(Pa)	ometer
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
0.0 Sof	t black fibrous PEAT (H4-H7)		<u>,</u>								
										22 8[R]	
1.0 Loc Sar sub	use brown silty sandy GRAVEL with cobble nd is coarse. Gravel is angular to subangula angular.	es throughout. ar. Cobbles are		1.20	449.24		AA32233	В	1.00-1.00	18 4[R]	
2.0	t blue/grey sandy gravelly SILT with cobble	es Sand is		2.60	447.84		AA32234	В	2.00-2.00		
fine	. Gravel and cobbles are subangular.		× · · · · · · · · · · · · · · · · · · ·	e e			AA32235	В	2.80-2.80		
	d of Trial Pit at 3.10m		*****	3.10	447.34						
- 4.0 											
Groundw	ater Conditions										
No Groun	dwater Observed										
Stability Slight colla	apse at 1.50m										
General F	Remarks										

IGSL	TRIAL PIT	RECO	RD					REPORT N	^{јмвек} 312	
CONTRACT Grousemount Wind Farm							IT NO.	TP1	52	
LOGGED BY F.C	CO-ORDINA	TES	507,0 568,8	24.55 E 28.80 N			TARTED	29/04	1/2015	
CLIENT ESBI	GROUND LE	VEL (m)	462.1	6		EXCAVA	ATION	13 To	onne Exc	cavator
							Sample	5		eter
Geotechnical Description					trike				st (KPa	enetrom
		-egend	Depth (m)	Elevatio	Water S	Sample Ref	Type	Depth	Vane Te	Hand Pé (KPa)
0.0 Soft black fibrous PEAT (H4-H7)					-		•			
Soft brown very sandy gravelly SILT with co rootlets. Sand is coarse. Gravel is angular to Cobbles are subangular.	bbles and o subrounded.		0.30	461.86		AA32246	В	0.30-0.30	14 2[R]	
1.0			×			AA32247	В	1.20-1.20		
Obstruction - Possible weathered rock End of Trial Pit at 1.40m		<u> ¥)^:~ </u>	1.40	460.76						
2.0										
3.0										
4.0										
Groundwater Conditions No Groundwater Observed		L	1	11						1
Stability No instability Observed										
General Remarks										



. Igsl

18387.GPJ IGSL.GDT 16/7/15 TP LOG

										REPORT N	JMBER	
	3SL	Т	RIAL PIT I	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	54	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,95 568,97	55.51 E 76.07 N		DATE S	TARTEI	29/04 TED 29/04	k/2015 k/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	VEL (m)	472.40	0		EXCAVA METHO	ATION D	13 To	onne Exc	avator
									Sample	s	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetro (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)										
- - -	Soft brow Gravel is	vn sandy gravelly SILT with rootlets. S subangular.	and is coarse.	$ \begin{array}{c} \underline{1} \\ \underline$	0.40	472.00		AA32250	В	0.40-0.40	32 10[R]	
- - 1.0	Soft brov	vn/grey sandy gravelly SILT. Sand is c	coarse. Gravel	× × × × × × × × × × × × × × × × × × ×	1.00	471.40		AA34701	В	0.80-0.80		
- - - - - -				· · × · · × · × · × · × · × · × · × · ×	2 00	470 40	(Rāpid)					
_ 2.0 - - -	Soft brov boulders boulders	vn/grey sandy gravelly SILT with cobb . Sand is coarse. Gravel is angular. Co are subangular.	les and obbles and	× × × × × × × × × × × × × × × × × × ×	2.00	400.00		AA34702	В	2.20-2.20		
- - -	Obstruct End of T	ion - Possible weathered rock rial Pit at 2.50m			2.50	469.90						
3.0 - - - -												
- 4.0 - - -												
-												
Grou Rapio	Indwater (d water ing	Conditions ress from 1.50m										
Side	ility walls colla	psing due to water ingress.										
Gene	eral Rema	rks										

E		т	RIAL PIT F	RECO	RD				ľ	REPORT NU	лявек 312		
CON	TRACT	Grousemount Wind Farm							T NO.	TP1	55		
LOG	GED BY	F.C	CO-ORDINAT	ES	507,18 569,03	35.06 E 35.50 N		DATE ST	ARTED	29/04 29/04	/2015 /2015		
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	464.46	6		EXCAVA METHOD	TION	13 To	nne Exc	avator	
									Samples	;	(Pa)	ometer	
		Geotechnical Description		Legend	Depth (m)	Elevation	 ▲water Strike 	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)	
0.0	Soft brow	wn fibrous PEAT					(Seepage)				24 10[R]		
- - - - - - - - - - - - - - - - - - -	Soft to fin is fine. G subangu	m blue/grey sandy gravelly SILT with ravel is subangular to subrounded. Co lar.	cobbles. Sand obbles are	× × × × × × × × × × × × × × × × × × ×	1.50	462.96		AA34705	В	1.50-1.50	10 0[R]		
4.0	End of T	rial Pit at 3.10m			3.10	461.36		AA34700		5.00-3.00			
Grou Wate Stab Pit sid	undwater Conditions er seepage from G.L bility sides unstable due to water ingress												
Gene	eral Rema	rks											

									REPORT N	JMBER		
	3SL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	56	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,25 569,15	53.01 E 51.00 N		DATE S		29/04 29/04	k/2015 k/2015	
CLIE		ESBI	GROUND LEV	/EL (m)	465.52	2		EXCAVA METHO		13 To	onne Exc	avator
ENG	NEEK	E981							Samples	3	(E	leter
		Geotechnical Description		-		uo	Strike	0			est (KPa	enetrom
				Legend	Depth (m)	Elevati	Water	Sample Ref	Type	Depth	Vane T	Hand F (KPa)
_ 0.0 _	Soft brow	/n fibrous PEAT (H4-H7)		<u> </u>								
-				$\frac{\sqrt{I_{I}}}{\sqrt{1}} \frac{\sqrt{I_{I}}}{\sqrt{1}}$								
-											28 8[R]	
- - 1.0				<u> </u>	4.00	404.00		AA34707	В	1.00-1.00	14 21R1	
-	Angular (rock)	COBBLES and BOULDERS (Possible	weathered		1.20	464.32					2(r v)	
-	Obstruct	on - Possible rock			1.60	463.92						
-												
- 2.0												
-												
-												
-												
- 3.0												
-												
-												
- 4.0												
-												
-												
	undurate a	Sonditions										
No G	Froundwate	r Observed										
Stab No in	ility Istability Ol	pserved										
Gene	eral Rema	rks										

								REPORT NUMBER				
	3SL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL PI	T NO.	TP1	57	
LOG	GED BY	F.C	CO-ORDINATI	ES	507,17 569,12	74.79 E 22.45 N		DATE ST		Shee 30/04	2015	
CLIE	NT	ESBI	GROUND LEV	/EL (m)	473.80	0		EXCAVA		13 Tc	nne Excavator	
ENG	NEER	ESBI						METHOL)			
									Sample	s	(a ^c	meter
		Geotechnical Description				ц	Strike				est (KI	enetro
				egend)epth m)	Elevatio	Vater S	sample Ref	ype	Jepth	/ane T	land P KPa)
0.0	Soft brow	vn fibrous PEAT (H4-H7)					>	011	F			±~
-				<u>1, 1, 1, 1</u>								
-				<u>1/ 1/ 1/ 1/</u>							16	
-				<u> </u>							6[R]	
- 				$\frac{\sqrt{1}}{\sqrt{1}} \frac{\sqrt{1}}{\sqrt{1}}$							8	
-	Soft to fi	rm blue/grey sandy gravelly SILT with	cobbles	*0	1.20	472.60		AA34709	В	1.20-1.20	2[R]	
-	subround	but. Sand is fine. Gravel is subangular ded. Cobbles are subangular.	to	\times \cdot								
-				× 0, × 0,								
-				* • * • 0 * *O × • %								
-				×× *								
-				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~								
-				× × ×				AA34710	В	2.50-2.50		
-				\times \times \times \times \times \times	3.00	470.80						
- 3.0	End of T	rial Pit at 3.00m										
-												
-												
-												
4.0 												
-												
-												
-												
Grou No G	indwater (Groundwate	Conditions er Observed		1		<u> </u>		<u> </u>			I	
Stab	ility Istability O	bserved										
Gene	eral Rema	rks										



18387.GPJ IGSL.GDT 16/7/15

TP LOG . Igsl

	т	RIAL PIT I	RECO	RD					18:	312	
	TRACT Grousemount Wind Farm						TRIAL P	IT NO.	TP1	59	
		CO-ORDINAT	ES	506,99	97.48 E		BHEET	TARTEI	Shee	t 1 of 1	
LOG	GED BY F.C		/EL (m)	569,2 ⁴	11.86 N		DATE C	OMPLE	TED 30/04	I/2015	
CLIE	NT ESBI NEER ESBI	GROUND LEV	/EE (III)	500.4	5		EXCAVA METHO	ATION D	13 Tc	onne Exc	avator
								Sample	s		eter
	Costochnical Description					é				(KPa)	etrome
	Geolecinical Description		Legend	Depth (m)	Elevation	₩ater Stri	Sample Ref	Type	Depth	Vane Test	Hand Pen (KPa)
0.0	Soft black fibrous PEAT (H4-H7)		$\frac{\langle 1_{1} \rangle \langle 1_{2} \rangle}{\langle 1_{2} \rangle \langle 1_{2} \rangle}$			(Seepage)					
-	Soft to firm brown sandy gravelly SILT with roo coarse. Gravel is angular to subangular.	tlets. Sand is		0.40	500.03		AA34714	В	0.40-0.40	12 0[R]	
- 1.0 	Soft to firm brown sandy gravelly SILT with cob fine. Gravel and cobbles are angular to subang	bles. Sand is ular.	× • • • • • • • • • • • • • • • • • • •	1.10	499.33		AA34715	В	1.00-1.00		
- - - - - - - - - - -			<u>؞ؚ؇ؚ؞؆؞؆؞ڟ؞؇؞؆؞؆؞؆؞</u> ٥؞ٷ؞ <u>؈ٷ</u> ؞ٷ؞ٷ؞ٷ؞ٷ				AA34715	В	2.40-2.40		
3.0 	End of Trial Pit at 3.10m		<u>کي جي</u>	3.10	497.33						
- - - - - - - -											
-	inductor Conditions										
Wate	r seepage from G.L										
Stab Side	ility walls unstable due to water ingress										
Gene	eral Remarks										

									F	REPORT NU	JMBER	
	3SL	т	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP1	60	
LOG	GED BY	F.C	CO-ORDINATI	ES	506,90 569,27	04.45 E 74.06 N		DATE S	TARTED	30/04 30/04	/2015 /2015	
CLIE ENGI	NT	ESBI ESBI	GROUND LEV	/EL (m)	512.34	1		EXCAVA METHO	TION	13 Tc	onne Exc	avator
			1						Samples		Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
0.0 	Soft blac	k fibrous PEAT (H4-H7)										
-	Soft brow	vn sandv gravelly SII T with rootlets. S	Sand is coarse	xo`.x`.	0.60	511.74		AA34717	В	0.50-0.50		
- - - 1.0	Gravel is	angular to subangular.		× <u>\//</u> 0× × × <u>\//</u> 0× × × <u>*</u> × \/								
- - -	Lagashi	aura situ sandu CDAV/EL Sand is sa		× 0 × × · × × · × × · ×	1.40	510.94		AA34718	В	1.30-1.30		
-	angular.	(Possible weathered rock)	arse. Graver is	0x0 0 x0 0 x0 0 x0 0 x0 0 x0 0 x0 0 x0								
- 2.0 -	Obstruct End of T	ion - Possible rock rial Pit at 2.00m		° × ° ° × ×0	2.00	510.34					10 0[R]	
-												
-												
3.0												
-												
- - 4.0												
- - -												
- - -												
Grou	Indwater (Conditions er Observed										
Stab No in	ility istability ob	bserved										
Gene	eral Rema	rks										

Г

	Т	RIAL PIT RI	ECO	RD					REPORT N	JMBER 312	
CON	ITRACT Grousemount Wind Farm						TRIAL P	IT NO.	TP1	61	
LOG	GED BY F.C	CO-ORDINATES	6	506,8 ² 569,30	17.46 E 08.84 N		DATE S	TARTED	30/04 TED 30/04	l/2015 l/2015	
CLIE ENG	INT ESBI	GROUND LEVE	L (m)	524.48	3		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
								Samples	6)a)	meter
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetro (KPa)
0.0	Soft black fibrous PEAT (H4-H7)			0.30	524 18						
-	Angular COBBLES and BOULDERS (Possible rock)	e weathered		0.60	523.88		AA34720	В	0.30-0.30	14 2[R]	
-	End of Trial Pit at 0.60m										
1.0 - -											
2.0											
-											
3.0											
-											
-											
4.0											
- -											
Grou No C	Undwater Conditions Groundwater Observed										
Stat No ir	ility Istability Observed										
Gen	eral Remarks										

	And								1	REPORT NU	JMBER	
	J.J. BSL	т	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	62	
LOG	GED BY	F.C	CO-ORDINATE	ES	506,75 569,38	52.69 E 37.78 N		DATE S	TARTED	30/04 ED 30/04	/2015 /2015	
	NT	ESBI ESBI	GROUND LEV	'EL (m)	535.75	5		EXCAVA METHO	TION	13 Tc	onne Excavator	
									Samples		a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetro (KPa)
- 0.0 - - - -	Soft blac Loose sil (Possible	k fibrous PEAT (H4-H7) ty sandy GRAVEL with cobbles and b e weathered rock)	oulders		0.30	535.45		AA34721	В	0.30-0.30	30 12[R]	
- - - - - - - - - - - - - - - - - - -					2 20	522.45		AA34722	В	1.80-1.80		
- - - - - - - - - - - - - - - - - - -	Obstructi End of T	on - Possible rock rial Pit at 2.30m			2.30	533.45						
- 4.0 												
Grou No G	undwater (Groundwate	Conditions r Observed						/				
Stab No ir	ility nstability Ot	bserved										
Gen	eral Rema	rks										

T IGSL	RIAL PIT F	RECO	RD					REPORT NI 18	JMBER 312	
CONTRACT Grousemount Wind Farm						TRIAL P	IT NO.	TP1	63	
LOGGED BY F.C	CO-ORDINATI	ES	506,71 569,46	15.95 E 33.23 N		DATE S		30/04	1/2015 1/2015	
CLIENT ESBI ENGINEER ESBI	GROUND LEV	′EL (m)	543.54	1		EXCAVA METHO	TION	13 Tc	onne Exc	avator
							Samples	3	(a ^c	meter
Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetro (KPa)
 ^{0.0} Soft brown/black fibrous PEAT (H4-H7) Soft brown sandy very gravelly SILT with cobb rootlets. Sand is coarse. Gravel and cobbles a 	les and re angular.	× × × ×	0.40	543.14		AA34723	В	0.40-0.40	30 8[R]	
1.0 Obstruction - Possible rock End of Trial Pit at 1.10m		**************************************	1.10	542.44	(Seepage)	AA34724	В	1.00-1.00		
2.0										
-4.0										
Groundwater Conditions Water lying on top of rock										
General Remarks	eneral Remarks									

IGSL		TRIAL PIT R	ECOF	RD					REPORT NU	jmber 312	
CONTRAC	Grousemount Wind Farm							IT NO.	TP1	64	
LOGGED	BY F.C ESBI	CO-ORDINATES	S EL (m)	506,69 569,55 547.99	95.47 E 50.30 N 9		DATE SI DATE CO EXCAVA	TARTED OMPLE	0 30/04 TED 30/04 13 Tc	30/04/2015 30/04/2015 13 Tonne Excavator	
ENGINEEF	₹ ESBI							Sample	s		ter
	Contochnical Description					ke				(KPa)	etrome
			Legend	Depth (m)	Elevation	Water Stri	Sample Ref	Type	Depth	Vane Test	Hand Pen (KPa)
0.0 Soft	: black fibrous PEAT (H4-H7) t to firm brown/grey sandy gravelly SILT w lders. Sand is coarse. Gravel, cobbles and jular to subangular.	vith cobbles and d boulders are		1.20	546.79	-	AA34725	В	1.20-1.20	18 6[R] 14 2[R]	
3.0 Enc	l of Trial Pit at 3.00m	× × × × × ×		3.00	544.99		AA34726	В	2.60-2.60		
- 4.0											
Groundwa No Ground	ater Conditions Jwater Observed						<u> </u>				<u> </u>
Stability No instabil	ity Observed										
General R	lemarks										

TRIAL PIT RECORD 18312 Instance TRIAL PIT NECORD TRIAL PIT NO. DATE STARTEED 3004/2016 DATE STARTEED 3004/2016 GOOUND LEVEL (m) 544.05 TRIAL PIT NO. TRIAL PIT NO. <th <="" colspan="2" no.<="" pit="" th="" trial=""><th>And</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>REPORT N</th><th>UMBER</th><th></th></th>	<th>And</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>REPORT N</th> <th>UMBER</th> <th></th>		And									REPORT N	UMBER	
DNTRACT Grousemount Wind Farm TP165 Sede By F.C. CO-ORDINATES 506,600.02 598,647.15 IN GROUND LEVEL (m) 506,600.02 598,647.15 IN GROUND LEVEL (m) 3004/2015 LENT ESBI GROUND LEVEL (m) 544.95 EXCAVATION 13 Tonne Excavator METHOD Contestnuction - Possible weathered rock End of Trial Pit at 1.10m Image: Set	JGSL	I	FRIAL PIT I	RECO	RD					18	312			
Decision of the second secon	CONTRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	65			
LENT ESBI GROUND LEVEL (m) 544.95 EXCAVATION ISTORIC Excavator IGNEER ESBI Geotechnical Description ISTORIC Excavator ISTORIC Excavator Geotechnical Description ISTORIC Excavator ISTORIC Excavator ISTORIC Excavator Soft black florous PEAT (H4-H7) ISTORIC Excavator ISTORIC Excavator ISTORIC Excavator Code sitly sandy angular GRAVEL (Possible weathered ISTORIC Excavator ISTORIC Excavator Incode sitly sandy angular GRAVEL (Possible weathered ISTORIC Excavator ISTORIC Excavator Incode sitly sandy angular GRAVEL (Possible weathered ISTORIC Excavator ISTORIC Excavator Incode sitly sandy angular GRAVEL (Possible weathered rock ISTORIC Excavator ISTORIC Excavator Incode sitly sandy angular GRAVEL (Possible weathered rock ISTORIC Excessible weathered rock ISTORIC Excessible weathered rock Incode sitly sandy angular GRAVEL (Possible weathered rock ISTORIC Excessible weathered rock ISTORIC Excessible weathered rock Incode sitly Sander Conditions ISTORIC Excessible weathered rock ISTORIC Excessible weathered rock ISTORIC Excessible weathered rock Incode sitly Sander Conditions ISTORIC Excessible weathered rock ISTORIC Excessible weathered rock ISTORIC Excessible weathered rock Incode sitly Sander Excessible weathered rock ISTORIC Excessible we	.OGGED BY	F.C	CO-ORDINAT	ES	506,66 569,64	60.52 E 47.15 N		DATE S		30/04	4/2015 4/2015			
HONERE ES81 ES81 END Geotechnical Description 0 <td></td> <td>ESBI</td> <td>GROUND LEV</td> <td>/EL (m)</td> <td>544.9</td> <td>5</td> <td></td> <td>EXCAVA</td> <td></td> <td>13 To</td> <td colspan="2">onne Excavator</td>		ESBI	GROUND LEV	/EL (m)	544.9	5		EXCAVA		13 To	onne Excavator			
Geotechnical Description B Geotechnical Description Geotechnical Description <th< td=""><td>NGINEER</td><td>ESBI</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	NGINEER	ESBI												
Geotechnical Description B Geotechnical Description Geotechnical Descripition Geotechnical Descripi									Samples	6	a)	meter		
Soft black fibrous PEAT (H4-H7) Soft black fibrous PEAT (H4-H7) Soft black fibrous of PAT (H4-H7) <td></td> <td>Geotechnical Description</td> <td></td> <td>jend</td> <td>pth</td> <td>vation</td> <td>tter Strike</td> <td>mple</td> <td>Эс</td> <td>pth</td> <td>ne Test (KF</td> <td>nd Penetro</td>		Geotechnical Description		jend	pth	vation	tter Strike	mple	Эс	pth	ne Test (KF	nd Penetro		
Obstruction - Possible weathered rock Ind of Trial Pit at 1.10 Obstruction - Possible weathered rock Ind of Trial Pit at 1.10 Obstruction - Possible weathered rock Ind of Trial Pit at 1.10 O Obstruction - Possible weathered rock Ind of Trial Pit at 1.10 O O Obstruction - Possible weathered rock Ind of Trial Pit at 1.10 O				L, Le	(n) De	Ш Ш	Ma	Sai Re	Typ	De	Vai	Ha		
0 Destruction - Possible weathered rock End of Trial Pit at 1.10m 0	Loose s rock)	ck fibrous PEAT (H4-H7) silty sandy angular GRAVEL (Possible	weathered		0.10	544.85								
0 I	.0 Obstruc End of	ction - Possible weathered rock Trial Pit at 1.10m			1.10	543.85		AA34727	В	1.00-1.00				
a bility Observed	.0													
ability o Groundwater Conditions o Groundwater Observed	.0													
0 I														
roundwater Conditions o Groundwater Observed	.0													
ability p instability Observed	roundwater	Conditions												
ability o instability Observed	lo Groundwat	ter Observed												
	tability lo instability C	Dbserved												
eneral Remarks	ieneral Rem	arks												

										REPORT N	JMBER	
	3SL	Т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	66	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,64 569,73	15.12 E 39.25 N		DATE S	TARTED	30/04 30/04	/2015 /2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	532.32	2		EXCAVA METHO	ATION D	13 Tc	onne Exc	avator
									Samples	;	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)										
-	Soft light fine. Gra	brown sandy gravelly SILT with rootle vel is angular.	ets. Sand is	<u>\\/</u> *o.`X` X`X' X	0.40	531.92		AA34728	В	0.40-0.40	14 2[R]	
- - - 1.0	Loose sil	ty angular GRAVEL (Possible weathe	red rock)	× · × · × · × · × · × · × · × · × · × ·	0.80	531.52		AA34729	В	0.80-0.80		
-	Obstruct End of T	on - Possible weathered rock rial Pit at 1.20m		×0 ~×0 ^ × ^ ×	1.20	531.12						
-												
- 2.0												
-												
-												
3.0												
-												
-												
4.0 -												
-												
-												
Grou No G	indwater (roundwate	Conditions r Observed		<u> </u>								
Stab No in	ility stability Ol	oserved										
Gene	eral Rema	rks										



										REPORT N	UMBER	
102	J- BL	т	RIAL PIT F	RECO	RD					18	312	
CONTR	RACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	68	
LOGGE	ED BY	F.C	CO-ORDINAT	ES	506,73 569,89	32.06 E 96.99 N		DATE S	TARTE	Shee D 30/04 TED 30/04	t 1 of 1 4/2015 4/2015	
CLIENT	т	ESBI	GROUND LEV	/EL (m)	503.89	9		EXCAVA		13 To	onne Exc	cavator
ENGINE	EER	ESBI		1		1	1		D			
									Sample	s	(Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (ŀ	Hand Penet (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> </u>								
- /	Angular (COBBLES and BOULDERS (Presume	ed weathered	C C	0.20	503.69	1	AA34732	В	0.20-0.20	18 21R1	
	Obstructi	on - Possible rock			0.50	503.39	(Seepage)				2[13]	
[E	End of T	rial Pit at 0.50m										
-												
-												
-												
2.0												
-												
-												
-												
3.0												
-												
-												
-												
F												
E												
Ground	dwater (Conditions										
Water ly	lying on t	op of rock										
Stabilit No insta	ty ability Ot	oserved										
Genera	al Rema	rks										
	ariveilid	ING										
- - -												
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	ISL	т	RIAL PIT F	RECO	RD					18	312	
CONT	RACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	69	
			CO-ORDINATI	FS	506 74	47 75 F		- SHEET		Shee	t 1 of 1	
LOGO	GED BY	F.C			569,98	85.73 N		DATE S	OMPLE	ED 01/05	5/2015	
CLIEN	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	491.73	3		EXCAVA METHO	ATION D	13 Tc	nne Exc	avator
									Samples	3)a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetrc (KPa)
0.0	Soft brow	vn fibrous PEAT (H4-H7)										
-											20 8[R]	
											14 2[R]	
-								AA34733	В	1.50-1.50	10 0[R]	
- 2.0 - -	Loose sil Gravel a	ty sandy GRAVEL with cobbles. Sand nd cobbles are angular.	l is coarse.		1.90	489.83					10 0[R]	
-	Obstruct	on Despikle weathered reak		\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	2.80	488.93		AA34734	В	2.50-2.50		
- - - -	End of T	rial Pit at 2.80m										
-												
- 4.0 -												
-												
Grou	ndwater (Conditions										
INO GI	oundwate	i Ubservea										
Stabi No ins	lity stability Ol	oserved										
Gene	ral Rema	rks										

R										REPORT NUMBER		
IGSL		TRIAL PIT F	RECO	RD					18	312		
CONTRACT	Grousemount Wind Farm						TRIAL P	PIT NO.	TP1	70		
LOGGED BY	F.C	CO-ORDINAT	CO-ORDINATES 506,852.11 E 570,103.52 N				DATE S	TARTE	Sheet 1 of 1 ED 01/05/2015 ETED 01/05/2015			
CLIENT	ESBI	GROUND LEV	/EL (m)	493.6	7		EXCAVA METHO	ATION D	13 To	3 Tonne Excavator		
ENGINEER	ESBI										5	
							Samples		s	(Pa)	romete	
	Geotechnical Description		egend	Jepth m)	Elevation	Vater Strike	sample Ref	ype	Jepth	Vane Test (ŀ	Hand Penetr KPa)	
2.0 3.0 3.0 Costruction 1.0 3.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5	r COBBLES and BOULDERS (Possib tion - Possible weathered rock Trial Pit at 0.40m	le weathered		0.10 0.40	493.57 493.27	M.	AA34737	Б	0.30-0.30	<a>	Ξ. Σ	
- - - - - - -												
-										1		
Groundwater No Groundwa	r Conditions ter Observed		<u>ı</u>	I	1	I		1				
Stability No instability of	bserved											
General Rem	arks											

									REPORT NUMBER			
IGSL				RD					18	312		
CONTRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1 Shee	71 t 1 of 1		
LOGGED BY	F.C	CO-ORDINATES	CO-ORDINATES 506,942.83 E 570,243.05 N					DATE STARTED 05			5/05/2015 5/05/2015	
	ESBI	GROUND LEVE	L (m)	473.20)		EXCAVA METHO		13 To	onne Exc	cavator	
	E3DI	I						Sample	5		ter	
	Geotechnical Description					ke				t (KPa)	letrome	
			Legend	Depth (m)	Elevation	Water Stri	Sample Ref	Type	Depth	Vane Tes	Hand Pen (KPa)	
^{0.0} Soft br	rown fibrous PEAT (H4-H7)		<u>, , , ,</u>									
-		<u>_\</u> /,										
-										14 0[R]		
_ Obstru	iction - Possible rock	<u> </u>	<u> </u>	0.90	472.30		AA34740	В	0.90-0.90			
- -												
-												
-												
2.0												
-												
- -												
-												
- 3.0												
-												
-												
4.0												
-												
-												
-												
Groundwate Rapid water i	r Conditions ngress from G.L		I				1					
Stability No instability	Observed											
General Ren	narks											

										REPORT NUMBER		
IGSL	I	RIAL PIT RE	CORD					18	312			
CONTRACT Grousemo	unt Wind Farm					TRIAL P SHEET	PIT NO.	TP1 Shee	72 et 1 of 1			
LOGGED BY F.C		CO-ORDINATES	507,0 570,2	26.41 E 292.72 N		DATE S DATE C	TARTE	D 05/09	5/2015 5/2015			
CLIENT ESBI ENGINEER ESBI	CLIENT ESBI			73		EXCAV/ METHO	ATION D	13 Te	13 Tonne Excavator			
							Sample	s		eter		
Ge	otechnical Description				rike				st (KPa	netrom		
			epth n)	levation	ater St	ample ef	ype	epth	ane Te	and Pe (Pa)		
^{0.0} Soft black/brown fibr	ous PEAT (H4-H7)		<u>30</u>		(Rapid)	ο œ	É.		>	ΞŠ		
- - -												
Obstruction - Possib	le rock	<u> </u>	0.60	461.13		AA34741	В	0.50-0.50	48 12[R]			
	JOIN											
-												
2.0												
-												
-												
3.0												
-												
-												
- 4.0 												
Groundwater Conditions Rapid water ingress from G	i.L			1	<u> </u>				<u> </u>			
Stability No instability Observed												
General Remarks												
1651												

							F	REPORT NUMBER					
IGSL TRIA				RIAL PIT RECORD							18312		
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	73		
LOGGED BY F.C			CO-ORDINATES 507,130.93 E 570,323.38 N					SHEET Sheet 1 of DATE STARTED 05/05/201 DATE COMPLETED 05/05/201				5 5	
	NT	ESBI ESBI	GROUND LEV	/EL (m)	443.08	8		EXCAVA METHO	ATION D	13 To	onne Excavator		
			1					Samples			Pa)	ometer	
		Geotechnical Description		Legend	Depth (m)	Elevation	₩ ater Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetrc (KPa)	
- 0.0 - -	Soft blac	k fibrous PEAT (H4-H7)					(Rapid)						
-	Angular rock)	COBBLES and BOULDERS (Possible	e weathered		0.40	442.68		AA34742	В	0.40-0.40	24 10[R]		
- - - 1.0	Obstruct	ion - Possible rock			1.00	442.08							
- - -	End of T	nai Pitat 1.00m											
-													
2.0													
-													
-													
- - -													
- 4.0 -													
- - -													
-													
Groι Rapi	Groundwater Conditions Rapid water ingress from G.L												
Stab No ir	ility Istability Ol	oserved											
Gene	eral Rema	rks											

R											REPORT NUMBER			
	JJJ BSL	Т	RIAL PIT I	RECO	RD					18	312			
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	74			
LOG	GED BY F.C CO-ORDINATES 507,211.27 E DATE STARTED 570,373.66 N DATE COMPLE								Shee 0 05/05 TED 05/05					
CLIE	NT	ESBI	GROUND LEV	/EL (m)	425.22	2		EXCAVA		13 To	Tonne Excavator			
ENG	INEER	ESBI		1				METHO	D					
								Samp		s	(Pa)	ometer		
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (k	Hand Penetr (KPa)		
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> \\/ \\/</u>										
- - - - -	Soft brow Sand is o	wn sandy gravelly SILT with rootlets th coarse. Gravel is angular to subangula	aroughout. ar.	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0.40	424.82		AA34743	В	0.40-0.40	28 10[R]			
- - - -	Obstruct	ion - Possible rock rial Pit at 1 30m		× · × × × × × × × × × × × × × × × × × ×	1.30	423.92		AA34744	В	1.10-1.10				
- - - -														
- - 3.0 - -														
- - - 4.0														
-														
No C	Groundwate	or Observed												
No ir	ility nstability Ol	bserved												
Gen Gen	eral Rema	rks												

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	BSL	Т								18312			
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	<b>75</b>		
LOGGED BY F.C		CO-ORDINATE	S	507,29 570,42	94.25 E 25.18 N		DATE ST		D 05/05/2015				
CLIENT ESBI			GROUND LEVI	EL (m)	404.81	1		EXCAVA METHO		13 Tc	Fonne Excavator		
								Sample		5	(	eter	
		Geotechnical Description		-egend	Depth (m)	Elevation	₩ater Strike	Sample Ref	Type	Depth	∕ane Test (KPa	Hand Penetrom (KPa)	
0.0	Soft blac	k/brown fibrous PEAT (H4-H7)					(Seepage)	U.E.				<u> </u>	
- - - - - - - - - - - - - - - - - - -	Obstruct	ion - Possible rock		7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7 <th7< th=""> <th7< th=""> <th7< th=""> <th7< th=""></th7<></th7<></th7<></th7<>	1.60	403.21		AA34745	В	1.00-1.00	24 8[R] 16 8[R] 10 2[R]		
- - - 2.0	End of I	riai Pit at 1.60m											
3.0													
-													
Grou	Indwater (	Conditions											
Wate	er seepage	from G.L											
Stab No in	<b>ility</b> istability Ol	oserved											
Gene	eral Rema	rks											
	An									REPORT N	JMBER		
---------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------	-----------------------------------------------------------------------------------------------------------	-------------	---------	------------------	--------------------	--------------	-----------------	--------	--------------------	--------------------------	------------------------	
CONTRACT       Grousemount Wind Farm       TRIAL PIT RECORD       TRIAL PIT NO.       TRIAL PIT NO.         SHEET       S											312		
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	<b>76</b>		
LOG	GED BY	F.C	CO-ORDINAT	ES	507,39 570,45	90.93 E 51.61 N		DATE ST	TARTE	05/05 TED 05/05	5/2015 5/2015		
	NT	ESBI ESBI	GROUND LEV	/EL (m)	395.46	6		EXCAVA METHO		13 To	onne Exc	avator	
LIVO									Sample	s	(	eter	
		Geotechnical Description		Legend	Depth (m)	Elevation	₩ater Strike	Sample Ref	Type	Depth	Vane Test (KPa	Hand Penetrom (KPa)	
- 0.0 	Soft blac Angular rock) Obstruct End of T	Wbrown fibrous PEAT (H4-H7) COBBLES and BOULDERS (Possible ion - Possible rock rial Pit at 2.00m	e weathered		1.40	394.06	(Rapid)	AA34746	В	1.00-1.00	18 4[R] 10 0[R]		
<b>Grou</b> Rapio	indwater d water ing	Conditions gress from G.L				. 1							
Stab No in	<b>ility</b> istability O	bserved											
Gene	eral Rema	ırks											

									REPORT N	UMBER	
	J. BSL	т	RIAL PIT REC	ORD					18	312	
CON	TRACT	Grousemount Wind Farm						IT NO.	TP1	<b>77</b>	
LOG	GED BY	F.C	CO-ORDINATES	507,4 570,4	88.69 E 75.05 N		DATE ST	TARTED	) 11/05 TED 11/05	5/2015 5/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEVEL (m	) 394.6	6		EXCAVA METHO	TION	13 To	onne Exc	avator
								Sample	S	(a)	meter
		Geotechnical Description	Legend	Depth (m)	Elevation	<ul> <li>₩ater Strike</li> </ul>	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)
2.0	Soft brow brown cl	vn/black fibrous PEAT (H4-H7) vn sandy gravelly SILT with pockets o ay and blue/grey silt	34     34       4     44       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34     34       34	キューキューキューキューキューキョン 1.90 3.00	392.76	(Seepage)	AA12662 AA12663	В	1.00-1.00	24 10[R] 20 8[R] 10 0[R]	
<b>Grou</b> Wate	ndwater ( r seepage	Conditions from G.L									
Stab Side	<b>ility</b> walls unst	able due to water ingress									
Gene	eral Rema	rks									

	And									REPORT N	UMBER	
	3SL	-	TRIAL PIT	RECO	RD					18312		
CON	TRACT	Grousemount Wind Farm							IT NO.	TP1	78	
LOG	GED BY	F.C	CO-ORDINA	TES	507,58 570,49	88.31 E 95.39 N		DATE S	TARTE	D 11/05	5/2015 5/2015	
CLIE	NT	ESBI	GROUND LE	VEL (m)	392.4	0		EXCAVA		13 To	onne Exc	cavator
ENGI	NEER	ESBI										<u>ب</u>
									Sample	es	(Pa)	omete
		Geotechnical Description		pc	_	tion	r Strike	e		_	Test (K	Penetro
				Leger	Depth (m)	Eleva	₩ate	Samp Ref	Type	Depth	Vane	Hand
0.0	Soft blac	ck/brown fibrous PEAT (H4-H7)					(Seepage)					
				<u><u> </u></u>								
				$\frac{l_{\prime}}{\sqrt{l_{\prime}}} \frac{\sqrt{l_{\prime}}}{\sqrt{l_{\prime}}} \frac{\sqrt{l_{\prime}}}{\sqrt{l_{\prime}}}$							20 10[R]	
				<u>1/ N// N</u>							10[11]	
1.0	Coft brow	un condu aroughu CII T with coholog	and nackata of		1.10	391.30		AA12660	В	1.00-1.00	14 6(D)	
	reddish l	brown clay. Sand is fine to coarse. G are angular to subangular.	ravel and	() * · × - ·× · ×							סנאן	
				× × ×								
				$\times$								
2.0				$\times$	2 10	200.20		AA12661	в	2.00-2.00		
	End of T	rial Pit at 2.10m			2.10	390.30			2			
3.0												
3.0												
4.0												
Grou Wate	indwater	Conditions			<u> </u>	<u>I</u>	<u> </u>	<u>                                     </u>				1
vvale	1 seepaye	, nom O.E										
Stabi	ilitv											
No in	stability O	bserved										
Gene	eral Rema	ırks										

1	And									REPORT NU	JMBER	
	SSL	Т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL PI	T NO.	TP1	79	
100		EC	CO-ORDINATI	ES	507,66	64.71 E		DATE S1	TARTE	Snee 11/05	5/2015	
200		500	GROUND LEV	/EL (m)	388.67	7		DATE CO		TED 11/05	0/2015	avator
ENG	INEER	ESBI ESBI		1				METHOD	)			avalor
									Sample	s	Pa)	ometer
		Geotechnical Description				L.	Strike				est (K	enetro
				Legend	Depth (m)	Elevatio	Water S	Sample Ref	Type	Depth	Vane T	Hand P (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)										
				<u> </u>							22 8[R]	
	Soft to fi	rm brown sandy gravelly SILT with co	bbles. Sand is	( ) ( ) (0, × ) × )	0.80	387.87		AA12658	В	0.80-0.80		
1.0	Loose bi	rown silty sandy GRAVEL with cobble:	s. Sand is		1.00	387.67						
	000100.											
				0.00								
	Coff blue		a Oravalia	× × × × · · · · ·	1.90	386.77		AA12659	В	1.70-1.70		
2.0	angular.	/grey sandy gravelly SIL I. Sand is fin	e. Gravel Is	× · × · × · × · ×	2.10	386.57						
	End of T	rial Pit at 2.10m										
3.0												
4.0												
Grou	undwater (	Conditions or Observed				1						
<b>Stab</b> No in	<b>ility</b> nstability O	oserved										
Gene	eral Rema	rks										

	A								REPORT N	UMBER	
	T BSL	RIAL PIT F	RECO	RD					18	312	
CON	TRACT Grousemount Wind Farm						TRIAL P	IT NO.	TP1	<b>80</b>	
LOG	GED BY F.C	CO-ORDINATI	ES	507,73 570,59	36.07 E 94.37 N		DATE S	TARTE	) 11/05 TED 11/05	5/2015 5/2015	
CLIE	ENT ESBI	GROUND LEV	′EL (m)	385.4	5		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
ENG	INEER ESBI										<u> </u>
								Sample	s	Pa)	omete
	Geotechnical Description				E E	Strike				est (K	enetro
			gend	epth (I	evatic	ater S	ample ef	be	epth	ane To	and P Pa)
0.0	Soft black fibrous PEAT (H4-H7)			٥Ŀ	Ē	8	ů ř.	Т	ă	>	Ξ£
-			<u>, ,, ,</u> ,								
-	Soft brown sandy gravelly SILT with rootlets. S	and is coarse.	× · · · · · · · · · · · · · · · · · · ·	0.40	385.05		AA12656	В	0.40-0.40	26	
-	Gravel is angular to subangular.		× <u></u>							10[R]	
	Obstruction - Possible rock		<u>*</u>	0.90	384.55		AA12657	В	0.90-0.90		
- 1.0	End of Trial Pit at 0.90m										
-											
-											
-											
2.0											
-											
-											
-											
3.0											
-											
-											
-											
- 4.0											
-											
-											
-											
-											
Grou	Groundwater Observed										
10. 10.											
Stat	ility										
Gen	eral Remarks		_	_		_		_	_	_	_
16.51											

	A								REPORT N	UMBER	
		RIAL PIT F	RECO	RD					18	312	
CON	TRACT Grousemount Wind Farm						TRIAL P	IT NO.	TP1	81	
			s	507.8	84 40 F		- SHEET		Shee	t 1 of 1	
LOG	GED BY F.C			570,62	26.65 N		DATE S	OMPLE	TED 11/05	5/2015 5/2015	
CLIE	NT ESBI	GROUND LEV	EL (m)	377.90	)		EXCAVA		13 To	onne Exc	cavator
ENG	INEER ESBI										
								Sample	s	( <b>r</b>	neter
						é				(KPå	etron
	Geolechnical Description		р	_	tion	r Stril	e			Test	Pen
			eger	Depth m)	Eleva	Vate	samp Ref	ype	Depth	/ane	land KPa)
0.0	Soft black/brown fibrous PEAT (H4-H7)						0.11			-	
			<u>, ,,, ,</u>								
-	Soft to firm brown sandy gravelly SILT with roo	tlets. Sand is	×0	0.40	377.50		AA12654	В	0.40-0.40	20	
-	coarse. Gravel is angular.		× <u>\\</u>							8[R]	
-			<u>₩×√</u>	0.90	377.00		AA12655	В	0.80-0.80		
1.0	Obstruction - Possible rock End of Trial Pit at 0.90m										
-											
-											
-											
-											
2.0											
-											
-											
-											
-											
3.0											
Ē											
-											
_											
4.0											
-											
-											
F											
-	Inducator Conditions										
Grou	Groundwater Observed										
DI 16											
Stat	ility										
INO II	Istability Observed										
Gen	eral Remarks										
P LOG											
GSL -											



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	3SL		TRIAL PIT	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	83	
			CO-ORDINAT	FS	508.0	27.00 F		- SHEET	TADTE	Shee	t 1 of 1	
LOG	GED BY	F.C			570,69	97.88 N		DATE S	OMPLE	<b>TED</b> 11/08	5/2015 5/2015	
CLIE	NT	ESBI	GROUND LE	VEL (m)	363.8	8		EXCAVA METHO		13 To	onne Exc	cavator
ENG	NEER	ESBI		1								
									Sample	es	a)	neter
		Geotechnical Description					ike				t (KP	letror
				pu	£	ation	er Str	ple	-	Ę	e Tes	d Per
				Lege	(m)	Eleva	Mate	Sam Ref	Type	Dept	Vane	Hand (KPa
0.0	Soft blac	ck fibrous PEAT (H4-H7)		<u></u>			(Seepage)					
				<u>1, \1, \</u>				A A 10107	P	0 50 0 50	40	
	Soft brow	wn sandy gravelly SILT with rootlets.	Sand is coarse.	ו• × •	0.60	363.28		AA 10197	Б	0.50-0.50	40 14[R]	
	Soft to fi	rm blue/grev sandy gravelly SILT wit	h cobbles. Sand	<u>×</u> <u>×</u> v°. >	0.90	362.98						
1.0	is fine to	coarse. Gravel and cobbles are sub	angular.	× · · · · · · · · · · · · · · · · · · ·	*							
				8×.0;								
				× × ,	Ĩ							
				$(0 \times .)$	*			AA10198	В	1.70-1.70		
					1							
2.0	Obsructi	ion - Possible rock		<u>···×·O</u> >	2.10	361.78						
	End of T	rial Pit at 2.10m										
3.0												
0.0												
4.0												
Grou	Indwater	Conditions		1	I	I	I		<u> </u>			I
vvate	n seepage	; IIUIII G.L										
<b>Stab</b> Side	<b>ility</b> walls unst	able due to water ingress										
Gene * Rol	eral Rema	arks m. downbill										
Rel	ucated 201											

( stra									REPORT N	UMBER	
IGSL		TRIAL PIT R	RECO	RD					18	312	
CONTRACT	Grousemount Wind Farm							IT NO.	TP1	<b>84</b>	
LOGGED BY	F.C	CO-ORDINATE	S	508,08 570,68	30.03 E 51.66 N		DATE S		<b>)</b> 11/05	5/2015	
	ESBI	GROUND LEV	EL (m)	355.47	7		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
INGINEER	ESBI							Sample	s		ter
	Geotechnical Description					ke				t (KPa)	etrome
			gend	epth (I	evation	ater Stri	ample ef	,pe	epth	ane Tes	and Pen Pa)
0.0 Soft bla	ick fibrous PEAT (H4-H7)			۵Ľ	Ĕ	(Seepage)	S S S	Ţ	ă	>	ΞΞ
0-54		the ask blass Oscial	<u>// /// //</u> <u>/// //// **</u>	0.40	355.07			5	0 40 0 40	00	
is fine to	tirm blue/grey sandy gravelly SILT with coarse. Gravel and cobbles are sub	angular.	X X X X X X X X X X X X X X X X X X X	:			AA10195	В	0.40-0.40	20 8[R]	
1.0											
1.0			×0^ × ×								
			×°. 6 0 ^{×.} %								
			₩.×. ₩.×. ₩.×. ₩. ₩. ₩. ₩. ₩. ₩. ₩. ₩. ₩. ₩. ₩. ₩. ₩.								
2.0			Ô× ~~ * ~~ ~~ * ~~ ~~	2.20	252.07		AA10196	В	2.00-2.00		
Obstruc End of	ction - Possible rock Trial Pit at 2.20m			2.20	353.27						
3.0											
4.0											
Groundwater	Conditions										
Water seepag	e from G.L										
Stability											
No instability C	Dbserved										
General Rem	arks										

	BSL	т								18312			
CON	TRACT	Grousemount Wind Farm						TRIAL PI	T NO.	TP1	<b>85</b> t 1 of 1		
LOG	GED BY	F.C		ES /FL (m)	508,04 570,55	44.89 E 58.35 N 7		DATE ST		D 11/05 TED 11/05	5/2015 5/2015		
CLIE ENG	INEER	ESBI ESBI			010.0			METHOD	TION )	13 Tc	onne Exc	avator	
								:	Sample	s	a)	meter	
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)	
- 0.0 	Soft blac Soft to fi is fine to End of T	k/brown fibrous PEAT (H4-H7) rm blue/grey sandy gravelly SILT with coarse. Gravel and cobbles are subar	cobbles. Sand ngular.	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	0.50	348.37		AA10193 AA10194	В	0.50-0.50	8 0[R]		
Grou No G	undwater Groundwate	Conditions er Observed											
Stab No ir	<b>ility</b> nstability O	bserved											
Gen	eral Rema	rks											

TRIAL PIT RECORD     18312       ONTRACT Grousemount Wind Farm     TRIAL PIT RECORD     18312       ONTRACT Grousemount Wind Farm     TRIAL PIT RECORD     TRIAL PIT NO.     TP186       ONTRACT Grousemount Wind Farm     TRIAL PIT NO.     TP186       OGGED BY F.C     DATE STARTED OT/05/2015       LIENT ESBI       Geotechnical Description       OF GEOTECHNIC OF COLSPAN (H4-H7)
ONTRACT       Grousemount Wind Farm       TRIAL PIT NO.       TP186         OGGED BY       F.C       CO-ORDINATES       507,906.48 E       SheEt 1 of 1         ILIENT       ESBI       GROUND LEVEL (m)       348.32       DATE STARTED       07/05/2015         ILIENT       ESBI       Geotechnical Description       348.32       Excavation       13 Tonne Excavato         Image: Contract of the subargular.       Geotechnical Description       Image: Contract of the subargular to subrounded. Cobbles are subargular.       Samples       Image: Contract of the subargular to subrounded. Cobbles are subargular.       Antone Start subargular to subrounded. Cobbles are subargular.       Samples       Image: Contract of the subargular to subrounded. Cobbles are subargular.
OGGED BY     F.C       LIENT NGINEER     ESBI       Geotechnical Description     Geotechnical Description       Understand     Soft black fibrous PEAT (H4-H7)       Understand     Soft black fibrous pear (H4-H7)       Soft to firm grey sandy gravelly CLAY. Sand is fine. Gravel is subangular.     Soft to firm grey sandy gravelly SLT with cobbles. Sand is coarse. Gravel is subangular to subrounded. Cobbles are subangular.
LIENT NGINEER       ESBI ESBI       GROUND LEVEL (m)       348.32       EXCAVATION METHOD       13 Tonne Excavato METHOD         Image: Construction of the construc
NGINER       ESBI         Geotechnical Description       Image: Samples
Geotechnical Description     Image: Samples     Samples     Image: Sam
Geotechnical Description       Image: Soft black fibrous PEAT (H4-H7)       Image: Soft black fibrous PEAT
Image: Note of the subangular.       Soft black fibrous PEAT (H4-H7)       Image: Note of the subangular.
No     Soft black fibrous PEAT (H4-H7)     No     No <thn< td=""></thn<>
Soft reddish brown sandy gravelly CLAY. Sand is fine.     0.60     347.72     AA10189     B     0.50-0.50     20       Soft to firm grey sandy gravelly SILT with cobbles. Sand is coarse. Gravel is subangular.     0.80     347.52     0.80     347.52
Soft reddish brown sandy gravelly CLAY. Sand is fine.       0.60       347.72       0.80       347.52         Soft to firm grey sandy gravelly SILT with cobbles. Sand is coarse. Gravel is subangular.       0.60       347.52       0.80       347.52
Gravel is subangular. Soft to firm grey sandy gravelly SILT with cobbles. Sand is coarse. Gravel is subangular to subrounded. Cobbles are subangular.
.0     coarse. Gravel is subangular to subrounded. Cobbles are subangular.       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0       .0     .0 <tr< td=""></tr<>
.0 AA10190 B 2.00-2.00
Obstruction - Possible rock End of Trial Pit at 2.20m
.0
.0
roundwater Conditions
roundwater Conditions /ater seepage from G.L
ater seepage from G.L
iroundwater Conditions /ater seepage from G.L
iroundwater Conditions /ater seepage from G.L tability ide walls unstable due to water ingress eneral Remarks
iroundwater Conditions /ater seepage from G.L tability ide walls unstable due to water ingress eneral Remarks

	BSL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1 Shee	<b>87</b> t 1 of 1	
LOG	GED BY	F.C	CO-ORDINATI	ES	507,80 570,38	01.18 E 34.41 N		DATE ST	TARTED	07/05 TED 07/05	5/2015 5/2015	
CLIE ENG	NT INEER	ESBI ESBI	GROUND LEV	/EL (m)	358.20	6		EXCAVA METHO	TION	13 To	onne Exc	avator
									Sample	6	(a)	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	₩ater Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetror (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> \                                   </u>			(Seepage)					
-	Soft redo Gravel is	dish brown sandy gravelly CLAY. Sand s subangular.	d is fine.		0.40	357.86		AA10186	В	0.40-0.40	30 10[R]	
- - - - - -	Loose si angular.	Ity sandy GRAVEL. Sand is coarse. G (Possible weathered rock)	ravel is		0.90	357.36		AA10187	В	0.80-0.80		
- - - - - - - - - - - - - - - - - -	Obstruct End of T	ion - Possible rock irial Pit at 2.50m		0 0 5 0 1 0 0 5 0 1 0 5 0 1 0 5 0 1 0 5 0 1 0 5 0 0	2.50	355.76		AA10188	В	2.00-2.00		
3.0 												
- - - - - - - -	4.0											
Grou Wate	undwater er seepage	Conditions from G.L										
Stab Side	<b>ility</b> walls unst	able due to water ingress										
Gene	eral Rema	rks										

									REPORT N	UMBER	
IGSL	Т	RIAL PIT I	RECO	RD					18	312	
CONTRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	88	
LOGGED BY	F.C	CO-ORDINAT	ES	507,72 570,33	20.84 E 34.95 N		DATE S	TARTEI	Shee 0 07/05 TFD 07/05	et 1 of 1 5/2015 5/2015	
CLIENT	ESBI	GROUND LE	/EL (m)	361.5	5		EXCAVA		13 To	onne Exc	avator
ENGINEER	ESBI		1				METHO	0			
								Sample	s	(Pa)	ometer
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (ŀ	Hand Penet (KPa)
^{0.0} Soft blac	ck fibrous PEAT (H4-H7)		<u>\\/</u> \//								
Soft brov red clay	wn gravelly sandy SILT with pockets o and rootlets. Sand is coarse. Gravel is	f blue silt and s subangular.	× ··× · × ·× ·× · × ·× ·× ·	0.20	361.35			_		38 16[R]	
Loose si	Ity angular GRAVEL (Possibly weathe	ered rock)	$ \begin{array}{c} \times \\ \circ \\$	0.60	360.95		AA10184	В	0.50-0.50		
1.0 2.0 3.0 4.0	tion - Possible rock Trial Pit at 2.40m		$\begin{array}{c} x & x \\ x & y \\ x \\ y \\$	2.40	359.15		AA10185	В	2.00-2.00		
No Groundwater	er Observed										
Stability No instability O	bserved										
General Roma	irks										
General Kema	II NO										

									F		JMBER	
	3SL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	89	
LOG	GED BY	F.C	CO-ORDINATE	S	507,60 570,63	)1.65 E 33.60 N		DATE S	TARTED OMPLET	12/05 ED 12/05	5/2015 5/2015	
CLIE ENGI	NT	ESBI ESBI	GROUND LEV	EL (m)	397.45	5		EXCAVA METHO	ATION D	13 To	onne Exc	avator
									Samples		Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
- 0.0 	Soft blac	k fibrous PEAT (H4-H7)										
-											20 8[R]	
- 								AA12664	В	1.00-1.00	14 2[R]	
- - -	Medium Obstruct	dense silty angular GRAVEL		 ®O _X ∞®O _X ⊗X	1.30 1.50	396.15 395.95						
- -												
2.0												
-												
-												
3.0 												
-												
-												
4.0												
-												
-												
<b>Grou</b> No G	indwater ( Groundwate	Conditions or Observed				<u> </u>		<u> </u>				
Stab No in	<b>ility</b> istability Ol	oserved										
Gene	eral Rema	rks										

Г

s Aran	Anna									
T IGSL	RIAL PIT REC	ORD					18	312		
CONTRACT Grousemount Wind Farm					TRIAL P	IT NO.	TP1	<b>90</b>		
LOGGED BY F.C	CO-ORDINATES	507,4 570,6	21.82 E 42.97 N		DATE S	TARTEI	D 12/05	5/2015 5/2015		
CLIENT ESBI	GROUND LEVEL (m	) 393.7	7		EXCAVA		13 To	onne Exc	cavator	
ENGINEER ESBI										
						Sample	s	Pa)	meter	
Geotechnical Description	egend	Depth m)	Elevation	Vater Strike	Sample Ref	Type	Jepth	/ane Test (K	Hand Penetro KPa)	
^{0.0} Soft black fibrous PEAT (H4-H7)				>	0,12	-		/	<u> </u>	
Firm brown sandy gravelly SILT	×		393.47		AA12671	В	0.30-0.30	24 10[R]		
Obstruction - Possible rock	× · × · × × · × × · ×	× → 0.80	392.97		AA12672	В	0.60-0.60			
End of Trial Pit at 0.80m										
2.0										
3.0										
4.0										
Groundwater Conditions										
No Groundwater Observed										
Stability										
No instability Observed										
General Remarks										

6	Am									REPORT N	UMBER	
	JSL		TRIAL PIT	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	<b>91</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,3 570,6	17.67 E 54.66 N		DATE S		) 12/05 TED 12/05	5/2015 5/2015	
CLIE	NT	ESBI	GROUND LE	VEL (m)	385.4	9		EXCAVA		13 To	onne Exc	cavator
ENGI	NEER	ESBI										
									Samples	3	Pa)	omete
		Geotechnical Description	I	egend	)epth m)	elevation	¥ater Strike	sample Ref	_ype	Jepth	/ane Test (K	Hand Penetro KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)					(Seepage		-		>	
				1, <u>\\</u> , <u>\</u>	0.60	384 80		AA12673	В	0.50-0.50	24	
	Soft blue Sand is f	e/grey sandy gravelly SILT with cot fine to coarse. Gravel and cobbles	bles throughout. are subangular to	×0× ×	0.00	504.05					10[R]	
1.0	subround	ded.		×××××								
				× ~~ × × · · · × × · · · ×	Ì							
					*				P	4 50 4 50		
					*			AA12674	В	1.50-1.50		
				10. × 0								
2.0	Obstruct	ion - Possible rock		Y O	2.10	383.39						
	End of 1	nai Pit at 2.10m										
3.0												
4.0												
Grou	ndwater (	Conditions										
Wate	r seepage	from G.L										
<b>Stab</b> No in	<b>ility</b> stability Ol	bserved										
Gene	eral Rema	ırks										

										REPORT N	UMBER	
	BSL	т	RIAL PIT RE	CORD						18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	92	
LOG	GED BY	F.C	CO-ORDINATES	507 570	7,225 ),695	.38 E .73 N		DATE S	TARTE	Shee D 12/09	et 1 of 1 5/2015 5/2015	
CLIE	NT	ESBI	GROUND LEVEL	(m) 37	5.92			EXCAV	ATION	13 Te	onne Exc	avator
ENG	INEER	ESBI							D			
									Sample	es	(Pa)	ometer
		Geotechnical Description		Legend	(m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (ŀ	Hand Peneti (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)										
-	Obstruct End of T	ion - Possible rock irial Pit at 0.30m		0.3	03	376.62		AA12675	В	0.30-0.30	38 22[R]	
- - 1.0 -												
- - -												
- 2.0 -												
- - -												
3.0 												
-												
- 4.0 												
- - -												
Grou No C	undwater ( Groundwate	Conditions er Observed	I	1	1			<u> </u>	<u> </u>		1	L
Stab No ir	<b>ility</b> istability O	bserved										
Gen	eral Rema	rks										

										REPORT N	UMBER	
	55L	т	RIAL PIT RE	COF	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	93	
					507.03	29 62 E		SHEET		Shee	t 1 of 1	
LOG	GED BY	F.C	CO-ORDINATES		570,66	63.89 N		DATE S	OMPLE	TED 12/08	5/2015 5/2015	
CLIE	NT	ESBI	GROUND LEVEL	. (m)	396.54	1		EXCAVA METHO		13 To	onne Exc	cavator
ENG	INEER	ESBI										
									Sample	s	a)	neter
		Geotechnical Description					ike				t (KP	letror
		p		pu	Ļ	ation	er Str	ple		Ę	e Tes	d Per
				Lege	Dept (m)	Eleva	Wate	Sam Ref	Type	Dept	Vane	Hano (KPa
0.0	Soft blac	k fibrous PEAT (H4-H7)	<u>\\</u>	<u>, ,,,</u>								
-												
-	Obstruct	ion - Possible rock		<u>, , , ,</u>	0.50	396.04		AA12677	в	0.50-0.50	12	
F	End of T	rial Pit at 0.50m						7712011	D	0.00-0.00	2[R]	
-												
1.0												
-												
-20												
- 2.0												
ŀ												
-												
-												
3.0												
Ē												
E												
4.0												
-												
-												
-												
F												
	undwater	Conditions er Observed		I								
No ir	nstability O	bserved										
Gen	eral Rema	irks										

-	An									REPORT N	UMBER	
	BSL	1	FRIAL PIT I	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	PIT NO.	TP1	94	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,93 570,66	38.53 E 57.42 N		DATE S	TARTE	D 12/05	5/2015 5/2015	
CLIE	NT	ESBI	GROUND LEV	/EL (m)	399.52	2		EXCAVA METHO		13 To	onne Exc	cavator
ENG	INEER	ESBI							_			L
									Sample	es	(Pa)	omete
		Geotechnical Description		egend	)epth m)	Elevation	¥ater Strike	sample Ref	ype	Jepth	/ane Test (ŀ	Hand Peneti KPa)
0.0	Soft blac	ck fibrous PEAT (H4-H7)					(Rapid)	01			>	ТС
				<u> 1, 1, 1</u>								
				$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$				AA12678	В	0.50-0.50	10	
	Soft to fi	rm brown sandy gravelly SILT. Sand	is coarse.	× · ×	0.70	398.82					0[R]	
1.0	Obstruct	ion - Possible rock		.×°. >	1.00	398.52		AA12679	В	1.00-1.00		
	End of T	rial Pit at 1.00m										
2.0												
3.0												
-40												
4.0												
<b>Grou</b> Rapio	undwater ( d water ing	Conditions gress from G.L										
<b>Stab</b> No in	<b>ility</b> nstability Ol	bserved										
Gene	eral Rema	irks										

	An									REPORT N	UMBER	
	3SL	1	RIAL PIT I	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	95	
LOG	GED BY	F.C	CO-ORDINAT	ES				DATE S	TARTE	Shee 0 12/05 TED 12/05	5/2015 5/2015	
CLIE	NT	ESBI		/EL (m)				EXCAVA		13 To	onne Exc	cavator
ENG	NEER	ESBI										L
									Sample	s	Pa)	omete
		Geotechnical Description				Ę	strike				est (K	enetro
				Legend	Depth (m)	Elevatio	Water S	Sample Ref	Type	Depth	Vane Te	Hand Po (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)										
-				<u><u> </u></u>								
-	Soft brov Gravel is	wn sandy gravelly SILT with rootlets.	Sand is coarse.	× × ×	0.50			AA12680	В	0.50-0.50	28 12[R]	
_	Soft brow	vn sandy very gravelly SILT with cobl	oles and	$\sqrt{2}$	0.80						. =[. ,]	
1.0	boulders boulders	. Sand is fine to coarse. Gravel, cobb are angular to subangular.	les and	$ \begin{array}{c} \ast & (\cdot) \times \\ \cdot \times & \cdot \\ \times & \cdot \times \\ \times & (\cdot \times $								
-				× ×								
-								AA12681	В	1.50-1.50		
-	Obstruct	ion - Possible rock		. x.< *0 *	1.80							
2.0	End of T	rial Pit at 1.80m										
-												
-												
-												
- - 3.0												
-												
-												
-												
-												
-												
-												
-												
Grou No G	indwater ( iroundwate	Conditions er Observed										
No in	<b>ility</b> Istability Ol	bserved										
Gene	eral Rema	rks										

	173 BSL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1 Shee	<b>96</b> t 1 of 1	
LOG	GED BY	F.C	CO-ORDINATI	ES	507,66 570,66	69.43 E 68.74 N		DATE S	TARTED	12/05	5/2015 5/2015	
CLIE ENG	NT INEER	ESBI ESBI	GROUND LEV	/EL (m)	393.87	7		EXCAVA METHO	ATION D	13 To	onne Exc	avator
									Samples	5	a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetrol (KPa)
0.0	Soft bla	ck fibrous PEAT (H4-H7)		<u>v vi v</u> <u>vi vi</u>	0.00	000.57						
- - -	Soft to f rootlets. Cobbles	irm brown sandy gravelly SILT with col Sand is coarse. Gravel is angular to s s are angular.	bbles and ubangular.	X X X X X X X X X X X X X X X X X X X	0.30	393.57		AA12667	В	0.30-0.30	14 4[R]	
	Obstruc End of	tion - Possible rock Frial Pit at 0.70m		<u>Ax ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;</u>	0.70	393.17		AA12668	В	0.60-0.60		
1.0												
•												
2.0												
3.0												
•												
4.0												
•												
Grou	undwater	Conditions										
No G	Groundwat	er Observed										
<b>Stab</b> No ir	<b>ility</b> istability C	bserved										
Gene	eral Rema	arks										

	TRIAL PIT RECORD											
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	<b>97</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,58 570,70	30.49 E 05.76 N		DATE ST	TARTED	12/05	5/2015 5/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LE	/EL (m)	394.7 <i>°</i>	1		EXCAVA METHO	TION D	13 To	onne Exc	avator
									Samples	5	a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)
- 0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> </u>								
-	Soft to fi	rm brown sandy gravelly SILT with co	bbles annd	× × × × × × × × × × × × × × × × × × ×	0.80	393.91		AA12669	В	0.50-0.50	10 2[R]	
- 1.0 	rootlets. Cobbles	Sand is coarse. Gravel is angular to s are angular.	ubangular.	× × × × × × × × × × × × × × × × × × ×	1.60	303 11		AA12670	В	1.50-1.50		
-	Obstruct End of T	ion - Possible rock rial Pit at 1.60m			1.00	393.11						
2.0												
-												
-												
3.0 												
-												
-												
- 4.0 -												
-												
-												
<b>Grou</b> No G	indwater iroundwate	Conditions er Observed										
<b>Stab</b> No in	<b>ility</b> stability O	bserved										
Gene	eral Rema	rks										

6	An									REPORT N	JMBER	
	3SL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP1	98	
LOG	GED BY	F.C	CO-ORDINATI	ES	507,48 570,72	81.12 E 29.30 N		DATE ST	TARTED	) 13/05 TED 13/05	5/2015 5/2015	
	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	382.57	7		EXCAVA METHO		13 To	onne Exc	avator
									Sample	6	a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetro (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)									14 4[R]	
- 1.0 - - - - -	Soft brow fine to co are suba	vn/grey sandy gravelly SILT with cobb arse. Gravel is subangular to subrour ngular.	les. Sand is ided. Cobbles	× × × × ×	1.20	381.37		AA12684 AA12685	B	1.00-1.00	14 2[R]	
- - 2.0 - - - -	Obstruct End of T	ion - Possible rock rial Pit at 1.90m		* <u>·</u> ···································	1.90	380.67						
- - - - - - - -												
- - - - - - - - - - -												
Grou No G	indwater ( roundwate	Conditions r Observed		<u> </u>								
Stab No in	stability Ol	oserved										
Gene	eral Rema	rks										



**REPORT NUMBER** 

18387.GPJ IGSL.GDT 16/7/15

TP LOG . Igsl

										REPORT N	JMBER	
	3SL	Т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2	00	
			CO-ORDINATI	ES	507,27	77.77 E		- SHEET		Shee	t 1 of 1	
LOG	GED BY	F.C			570,72	22.57 N		DATE C	OMPLE	TED 13/05	/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	'EL (m)	372.3	/ 		EXCAVA METHOI	ATION D	13 To	onne Exc	avator
									Sample	6	(Pa)	ometer
		Geotechnical Description		-		ы	Strike	0			est (K	enetr
				Legenc	Depth (m)	Elevati	Water	Sample Ref	Type	Depth	Vane T	Hand F (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)										
-	Soft brow Gravel is	vn sandy gravelly SILT with rootlets. S subangular to subrounded.	Sand is coarse.	×o. · × · ·× · · × × <u>· ·</u> × · × ·× · × ·	0.30	372.07		AA12689	В	0.30-0.30	18 6[R]	
- - 				× · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · · × · · × · · × · · × · · × · · × · · × · · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · · × · · × · · × · · · × · · × · · × · · × · · × · · × · · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · · · · · · · · · · · · · · · · · · ·				AA12690	в	1 00-1 00		
-				× <u>\'1</u> ,0x × ×	1.30	371.07		A12030	D	1.00-1.00		
-	Obstruct End of T	ion - Possible rock rial Pit at 1.30m			1.00	01 1101						
-												
- 2.0												
-												
-												
-												
- 3.0												
-												
-												
-												
4.0												
-												
-												
-												
<b>Grou</b> No G	indwater ( roundwate	Conditions Pr Observed		I	I	I	I	<u> </u>				
Stab No in	<b>ility</b> stability Ol	oserved										
Gene	eral Rema	rks										

E		т	RIAL PIT R	RECO	RD					REPORT N	JMBER 312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2	01	
LOG	GED BY	F.C	CO-ORDINATE	S	507,17 570,73	75.59 E 33.90 N		DATE S	TARTE	Shee           0         13/05           TED         13/05	5/2015 5/2015	
CLIE ENG	INT INEER	ESBI ESBI	GROUND LEV	EL (m)	371.07	7		EXCAVA METHO	ATION D	13 Tc	onne Exc	avator
									Sample	s	(Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
	Obstruct End of T	ion - Possible rock rial Pit at 1.40m			1.40	369.67	₹ (Rāpid)	AA12691	В	1.00-1.00	14 2[R] 10 0[R]	
<b>Groı</b> Rapi	undwater ( d water ing	Conditions gress from 1.10m										
Stab No ir	<b>ility</b> istability O	bserved										
Gen	eral Rema	rks										

	/										REPORT N	UMBER	
	ی او	J. BSL	т	RIAL PIT F	RECO	RD					18312		
C	CON	TRACT	Grousemount Wind Farm						TRIAL P	PIT NO.	TP2	202	
L	.OG	GED BY	F.C	CO-ORDINATI	ES	507,07 570,73	77.22 E 32.17 N		DATE S	TARTE	D 13/09 TED 13/09	et 1 of 1 5/2015 5/2015	
C	CLIE	NT	ESBI	GROUND LEV	/EL (m)	376.2	7		EXCAV/	ATION	13 To	onne Exc	cavator
E	INGI	NEER	ESBI							Sample	S	<u> </u>	eter
			Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa	Hand Penetrom (KPa)
	0.0 1.0 2.0 3.0	Soft blac Obstruct End of T	k fibrous PEAT (H4-H7) ion - Possible rock rial Pit at 0.10m			0.10	376.17		AA12692	В	0.10-0.10		
<u> </u>	Grou	ndwater (	Conditions er Observed		1		1	1	1	1	I		1
10///.	νυ G	roundwate											
.6PJ 165L	Stabi No in	<b>ility</b> stability Ol	bserved										
	Gene	eral Rema	rks										

									REPORT N	UMBER	
	SSL	Т	RIAL PIT RE		18312						
CON	ITRACT	Grousemount Wind Farm					TRIAL P	PIT NO.	TP2	203	
LOG	GED BY	F.C	CO-ORDINATES	506,9 570,7	979.61 E 753.92 N		DATE S		Shee D 13/09	et 1 of 1 5/2015 5/2015	
CLIE	NT	ESBI	GROUND LEVEL	( <b>m)</b> 377.4	43		EXCAV	ATION	13 To	onne Exc	cavator
ENG	INEER	ESBI				1	METHO	D			1
								Sample	es	(Pa)	ometer
		Geotechnical Description		Legend Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (ŀ	Hand Penet (KPa)
0.0	Soft blac	ck fibrous PEAT (H4-H7)									
-	Obstruct End of T	tion - Possible rock Trial Pit at 0.30m	<u> </u>	0.30	377.13		AA12693	В	0.30-0.30	20 10[R]	
- - 1.0 -											
- - -											
- 2.0 -											
-											
3.0 											
-											
4.0 - -											
- - - -											
Grou No C	undwater Groundwate	Conditions er Observed	I			<u> </u>	1	<u> </u>		<u> </u>	<u> </u>
Stab	<b>bility</b> hstability O	bserved									
Gen	eral Rema	ırks									

		т	RIAL PIT F	RECO	RD					REPORT NI	JMBER 312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP2	<b>04</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,87 570,76	75.06 E 33.37 N		DATE S	TARTED	13/05 13/05	5/2015 5/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	379.19	9		EXCAVA METHO	ATION D	13 Tc	onne Exc	avator
									Samples	5	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
0.0	Soft blac Soft brow reddish b subangu	k fibrous PEAT (H4-H7) vn sandy gravelly SILT with cobbles a prown clay. Sand is coarse. Gravel and lar to subrounded.	nd pockets of d cobbles are		0.40	378.79		AA12694	В	0.40-0.40	22 8[R]	
- - - - - - -	Obstruct	ion - Possible rock			1.60	377.59		AA12695	В	1.40-1.40		
- - 2.0	End of T	rial Pit at 1.60m										
-												
3.0   												
- - - - - - -												
Grou	Indwater (	Conditions										
NO G	roundwate	r Ubservea										
<b>Stab</b> No in	<b>ility</b> Istability Ol	oserved										
Gene	eral Rema	rks										

									REPORT N	UMBER		
	T SSL	RIAL PIT F	RECO	RD					18312			
CON	ITRACT Grousemount Wind Farm							PIT NO.	TP2	205		
LOG	GED BY F.C	CO-ORDINAT	ES	506,7 570,7	69.76 E 66.56 N		DATE S	TARTE	D 13/03 TED 13/03	5/2015 5/2015		
CLIE	ENT ESBI	GROUND LEV	/EL (m)	362.5	8		EXCAVA	ATION D	13 T	onne Exc	cavator	
ENG	INEER ESBI										<u> </u>	
								Sample	s	Pa)	omete	
	Geotechnical Description				L.	Strike				est (K	enetr	
			egend	epth n)	levatio	ater S	ample ef	ype	epth	ane T	and P (Pa)	
0.0	Very soft black fibrous PEAT with occasional a	angular		05 05	ш	\$	S R	É.		>	ΞŠ	
-	boulders	0	$\left( \bigcirc  \\ \\ \bigcirc  \\ \odot \\ \hline \\ \bigcirc  \\ \odot \\ $									
-				-			AA12696	B	0 50-0 50	8		
E			N. 4			1	10112000		0.00 0.00	0[R]		
-	Obstruction - Possible rock			0.90	361.68	(Rapid)						
-	End of That Pit at 0.90m											
-												
-												
2.0												
-												
E												
-												
3.0												
-												
-												
4.0												
-												
-												
Ē												
Gree	undwater Conditions											
Rapi	d water ingress from 0.90m											
- 												
Stat	<b>bility</b> Instability Observed											
Gen	eral Remarks											
] * Re	located 10m due to steepness of slope											
- L												

strange and the second s								REPORT NUMBER					
	3SL	т	RIAL PIT F	RECO	RD					18312			
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2	<b>06</b> t 1 of 1		
LOG	GED BY	F.C	CO-ORDINATI	ES	506,67 570,76	72.19 E 53.63 N		DATE S		) 13/05 TED 13/05	/2015 /2015		
	NT	ESBI	GROUND LEV	′EL (m)	355.12	2		EXCAVA METHO	ATION D	13 To	nne Exc	avator	
2.10									Sample	5		eter	
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa	Hand Penetrom (KPa)	
0.0	Soft blac	k fibrous PEAT (H4-H7)			0.10	355.02	-	07 E	F		-	±0	
	Soft brov boulders boulders Doubstruct End of T	vn very sandy very gravelly SILT with o and rootlets. Sand is coarse. Gravel, are angular to subangular.	cobbles, cobbles and		1.80	353.32		AA12697	В	1.00-1.00			
-													
Grou No G Stab	indwater froundwate	Conditions er Observed at 1.80m		I		·		I					
Gond	aral Domo	rke											
Gene	FI AI REIII	והס											

( stars)								REPORT N	UMBER	
IGSL	TRIAL PIT	RECO		18312						
CONTRACT Grousemount Wind Farm							IT NO.	TP2	<b>07</b>	
.OGGED BY F.C	CO-ORDINA	TES	506,5 570,7	79.32 E 65.34 N		DATE SI	TARTEI OMPLE	D 13/08	5/2015 5/2015	
LIENT ESBI	GROUND LE	EVEL (m)	350.7	0		EXCAVA METHOD		13 To	onne Exc	cavat
							Sample	es	_	eter
Geotechnical Descri	ption			c	trike				est (KPa)	enetrome
		Legend	Depth (m)	Elevatio	Water S	Sample Ref	Type	Depth	Vane Te	Hand Pe
⁰ Soft black fibrous PEAT (H4-H7)		<u></u>								
		$\frac{\sqrt{1}}{\sqrt{1}} \frac{\sqrt{1}}{\sqrt{1}}$	0.50	250.20						
Soft brown/light brown sandy gravelly Sand is coarse. Gravel and cobbles an	SILT with cobbles. e subangular.	× × ×	0.00	330.20		AA12698	В	0.50-0.50		
		× × ×								
0		×0, ×,	Ì						30 14[R]	
		× · · ~								
			*			AA12699	В	1.50-1.50		
		× 0; × × 0;	2.00	348 70						
⁰ Soft grey sandy gravelly SILT with cob Sand is fine to coarse. Gravel is subar Solution of the second secon	bles and boulders. Igular to subrounded.	* 0× 5	2.00	540.70						
Cobbles and boulders are subangular.		* <u>,</u> 								
		× · · · · · · · · · · · · · · · · · · ·				AA12700	В	2.50-2.50		
		×1. ×1 ××.	3.00	347 70						
^{.0} End of Trial Pit at 3.00m			0.00	547.70						
0										
o Groundwater Conditions										
tability o instability Observed										
eneral Remarks										

_ 5ª	Anz									REPORT N	JMBER	
	BSL	Т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2 Shee	<b>08</b> t 1 of 1	
LOG	GED BY	F.C	CO-ORDINATI	ES	506,46 570,75	65.34 E 58.26 N		DATE S	TARTEI OMPLE	D 13/05 TED 13/05	5/2015 5/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	339.98	3		EXCAVA METHO	ATION D	13 Tc	onne Exc	avator
									Sample	s	a)	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetror (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u>\\/</u> <u>\\/</u>	0.10	339.88						
-	Soft blue fine. Gra subangu	/grey sandy gravelly SILT with cobble vel is subangular to subrounded. Cob lar.	s. Sand is bles are	( ⁽⁰ ×) × · · · · · · · · · · · · · · · · · · ·	0.60	339.38		AA20460	В	0.50-0.50		
-	End of T	rial Pit at 0.60m										
1.0												
-												
-												
-												
2.0												
-												
-												
-												
3.0												
-												
-												
-												
4.0												
-												
-												
-												
Grou	indwater (	Conditions										
NO G	nounuwate											
Stab	ility											
No in	stability O	oserved										
Gene	eral Rema	rks										

6	An									REPORT N	JMBER		
	J.J. BSL	т	RIAL PIT F	RECO	RD					18312			
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2	<b>09</b>		
LOG	GED BY	F.C	CO-ORDINATI	ES	506,30 570,70	68.57 E 63.68 N		DATE S DATE C	TARTE	D 13/05 TED 13/05	5/2015 5/2015		
	INT	ESBI ESBI	GROUND LEV	′EL (m)	337.84	4		EXCAVA METHO	ATION D	13 To	onne Exc	avator	
									Sample	s	a)	neter	
		Geotechnical Description		Legend	Depth (m)	Elevation	<ul> <li>₩ater Strike</li> </ul>	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetrol (KPa)	
_ 0.0 _ _ _	Soft blac Soft brov coarse. (	k fibrous PEAT (H4-H7) vn sandy gravelly SILT with cobbles. S Gravel is angular to subangular. Cobb	Sand is	× × × × × × × × × × × × × × × × × × ×	0.30	337.54	(Rapid)				20 8[R]		
- - - - - - 1.0 -	subangu	lar.		× × × × × × × × × × × × × × × × × × ×				AA20461	В	1.00-1.00			
- - - -	Obstruct End of T	ion - Possible rock rial Pit at 1.50m		×°. 8 , , , , , , , , , , , , , , , , , , ,	1.50	336.34							
2.0    													
- - - - - - - -													
- - - - - - - - -													
<b>Grou</b> Rapio	undwater ( d water ing	Conditions gress from G.L											
<b>Stab</b> No in	<b>ility</b> nstability Ol	oserved											
Gene	eral Rema	rks											

-	And									REPORT NU	JMBER		
	BSL	Т	RIAL PIT F	RECO	RD					18312			
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2	<b>10</b>		
LOG	GED BY	F.C	CO-ORDINATI	ES	506,27 570,77	74.61 E 75.40 N		DATE S	TARTED OMPLE	) 14/05 TED 14/05	/2015 /2015		
	NT	ESBI ESBI	GROUND LEV	/EL (m)	333.46	6		EXCAVA METHO	TION	13 To	nne Exc	avator	
			1						Sample	S	a)	neter	
		Geotechnical Description		Legend	Depth (m)	Elevation	<ul> <li>₩ater Strike</li> </ul>	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetroi (KPa)	
0.0 	Soft blac Soft blue to coarse subangu	ck fibrous PEAT (H4-H7) e/grey sandy gravelly SILT with cobble e. Gravel is angular to subangular. Co lar.	s. Sand is fine bbles are	、	1.20	332.26	(Seepage)	AA20462	В	1.00-1.00	16 4[R] 10 0[R]		
- - - - - - - - - - - - - - - - - - -	End of T	rial Pit at 3.00m		ઌ૽ૼૼૼૼૼૼૼૡૼૢૢૢૢૢૢૢઌૢૢૢૢૢૢૢૢૢઌૢૢૢૢૢૢૢૢૢઌૢૢૢૢૢૢૢૢ	3.00	330.46		AA20463	В	2.50-2.50			
- - - - - - - - - - - - - - - - - - -													
Grou Wate	indwater ( er seepage	Conditions from G.L		·						<u> </u>			
Side	walls colla	psing from 1.20m											
Gene	eral Rema	rks											

a Array										REPORT NU	JMBER	
	BSL	Т	RIAL PIT I	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2 Shee	<b>11</b> t 1 of 1	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,16 570,76	68.23 E 62.29 N		DATE ST	TARTEI OMPLE	0 14/05 TED 14/05	/2015 /2015	
CLIE ENG	INEER	ESBI ESBI	GROUND LEV	/EL (m)	334.39	9		EXCAVA METHO	TION	13 To	nne Exc	avator
			1						Sample	s	a)	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetrol (KPa)
     	Soft blac Soft to fi pockets subangu	rm blue/grey sandy gravelly SILT with of silt. Sand is coarse. Gravel is angu lar. Cobbles are subangular.	cobbles and lar to	Dx*Q* ax       Dx*Q*       Dx*Q*	1.40	332.99	(Seepage)	AA20464 AA20465	В	1.00-1.00	20 8[R] 14 4[R]	
Grou Wate	undwater ( er seepage	Conditions from G.L				<u> </u>						
<b>Stab</b> No ir	<b>ility</b> nstability Ol	bserved										
Gene	eral Rema	rks										
						REPORT N	JMBER					
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	JJ- BSL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2	<b>12</b>	
LOG	GED BY	F.C	CO-ORDINATE	ES	506,06 570,76	68.21 E 60.71 N		DATE S	TARTED	14/05 14/05	5/2015 5/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	′EL (m)	336.46	3		EXCAVA METHO	ATION D	13 To	onne Exc	avator
									Samples	3	)a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetrc (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)										
-	Soft brov boulders	vn sandy gravelly SILT with occasiona and rootlets	l large	× · · · · · · · · · · · · · · · · · · ·	0.30	336.16		AA20466	В	0.30-0.30	10 0[R]	
- - - - -	Obstruct	ion - Possible rock		· · · · · · · · · · · · · · · · · · ·	1.40	335.06		AA20467	В	1.30-1.30		
-	End of T	rial Pit at 1.40m										
- 2.0												
-												
-												
3.0												
-												
- 4.0 -												
-												
-												
<b>Grou</b> No G	indwater ( roundwate	Conditions r Observed		· I		·				·		
<b>Stab</b> No in	<b>ility</b> stability Ot	oserved										
Gene	eral Rema	rks										

									REPORT N	UMBER	
IGSL	) T	RIAL PIT I	RECO	RD					18	312	
CONTRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2	13	
LOGGED B	Y F.C	CO-ORDINAT	ES	505,98 570,77	31.51 E 70.83 N		DATE S	TARTED	Shee 14/05 ED 14/05	t 1 of 1 5/2015 5/2015	
CLIENT	ESBI	GROUND LEV	/EL (m)	339.50	)		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
ENGINEER	ESBI							Samples	5		eter
	Geotechnical Description		p		tion	Strike	<u></u>			Test (KPa)	Penetrome
			Legen	Depth (m)	Elevat	Water	Samp Ref	Type	Depth	Vane	Hand (KPa)
- 0.0 Soft I - Soft I 	olack fibrous PEAT (H4-H7) olue/grey sandy gravelly SILT with cobble	es and rootlets		0.10	339.40						
- 1.0 Obsti - End (	ruction - Possible rock of Trial Pit at 1.40m			1.40	338.10		AA20468	В	1.00-1.00		
- 2.0											
- - - - - - - - - -											
- - - - - - - - -											
Groundwat No Groundv	er Conditions vater Observed										
Stability											
No instability	/ Observed										
General Re	marks										

									I	REPORT N	JMBER	
	JJ JSL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL PI	T NO.	TP2	14	
LOG	GED BY	F.C	CO-ORDINATI	ES	505,89 570,82	90.03 E 20.30 N		DATE SI	ARTED	14/05 ED 14/05	5/2015 5/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	342.15	5		EXCAVA METHOE	TION	13 To	onne Exc	avator
									Samples	;	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
_ 0.0 	Soft blac Soft grey coarse. 0	k fibrous PEAT (H4-H7) //blue sandy gravelly SILT with cobble: Gravel is subangular to subrounded. C	s. Sand is cobbles are	×∞×∞×××××××××××××××××××××××××××××××××	1.40	340.75	ب (Rapid)	AA20469	В	1.00-1.00	34 12[R] 14 6[R]	
- - - - - - - - - - - - - - -	Subangu	IGI .		>         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >         >	2.00	220.45		AA20470	В	2.00-2.00		
3.0	End of T	rial Pit at 3.00m			3.00	339.13						
Rapio Rapio Stab Side	d water ingress from 1.40m											
Gene	eral Rema	rks										

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										REPORT NU	JMBER	
	3SL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP2	15	
LOG	GED BY	F.C	CO-ORDINATI	ES	505,85 570,90	56.52 E 03.56 N		DATE S		14/05 14/05	5/2015 5/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	345.60	D		EXCAVA METHO	TION D	13 Tc	onne Exc	avator
									Samples	5	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetro (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7) vn sandy gravelly SILT with rootlets. S	and is coarse.	×o	0.30	345.30		AA20471	В	0.30-0.30	30	
-	Gravel is Soft to fin is fine to	subangular. m blue/grey sandy gravelly SILT with coarse. Gravel is angular to subangul	cobbles. Sand ar. Cobbles	× <u>v</u> v× · · · · · · · · · · · · · · · · · · ·	0.70	344.90		AA20472	В	0.60-0.60	10[R]	
1.0 	are suba	ft to firm blue/grey sandy gravelly SILT with cobbles. San ine to coarse. Gravel is angular to subangular. Cobbles e subangular.			2.30	343.30		AA20473	В	1.60-1.60		
-	Obstruct End of T	ion - Possible rock rial Pit at 2.30m										
3.0 												
- - - - - -												
Grou No G	indwater ( iroundwate	Conditions er Observed		<u> </u>								
<b>Stab</b> No in	<b>ility</b> Istability Ol	oserved										
Gene	eral Rema	rks										

									F	REPORT NU	JMBER	
	JSL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP2	<b>16</b>	
LOG	GED BY	F.C	CO-ORDINATE	ES	505,85 570,99	57.66 E 91.74 N		DATE ST	TARTED OMPLET	14/05 ED 14/05	5/2015 5/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	′EL (m)	348.53	3		EXCAVA METHOD	TION D	13 Tc	onne Exc	avator
									Samples		Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	<ul> <li>▲ water Strike</li> </ul>	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
0.0 	Very soft	black fibrous PEAT (H4-H7)		<u>, ,, ,</u>			(Rapid)					
-				<u> </u>							14 4[R]	
- - - -											12 0[R]	
-								AA20474	В	1.50-1.50	8 0[R]	
2.0 					2 40	346 13					4 0[R]	
-	Loose sil are angu	ty sandy GRAVEL with cobbles. Grav lar.	el and cobbles		2.40	040.10		AA20475	В	2.70-2.70		
3.0	End of T	rial Pit at 3.00m		<u>(y</u> o. y	3.00	345.53						
-												
- - - 4.0												
-												
-												
<b>Grou</b> Rapio	ndwater ( d water ind	Conditions ress from G.L										
•												
<b>Stab</b> Pit co	<b>ility</b> ollapsing du	ue to water ingress										
Gene	eral Rema	rks										

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										REPORT N	JMBER	
	3SL	Т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP2	<b>17</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES	505,93 571,04	37.72 E 12.68 N		DATE ST	TARTED	) 14/05 TED 14/05	5/2015 5/2015	
CLIE ENG	INT	ESBI ESBI	GROUND LEV	/EL (m)	348.01	1		EXCAVA METHO		13 To	onne Exc	avator
			1						Sample	6	a)	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetron (KPa)
	Medium boulders angular. Obstruct End of T	k fibrous PEAT (H4-H7) dense silty sandy GRAVEL with cobb . Sand is coarse. Gravel, cobbles and ion - possible rock rial Pit at 1.80m	les and boulders are		1.50	346.51 346.21	(Rāpid)	AA20476	В	1.00-1.00	14 2[R] 0[R] 8 0[R]	
<b>Grou</b> Rapi	undwater ( d water ing	Conditions ress from 1.50m										
04 7	1114.											
Stab No ir	nstability Of	oserved										
Gen	eral Rema	rks										

	An									REPORT N	JMBER	
	BSL	Т	RIAL PIT I	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP2	<b>18</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,02 571,09	25.24 E 96.90 N		DATE S	TARTEI OMPLE	D 14/05	5/2015 5/2015	
		ESBI	GROUND LEV	/EL (m)	346.3	7		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
ENG		ESDI							Sample	es	(	eter
		Geotechnical Description		pue	ţ	ation	er Strike	ple	0	-F	e Test (KPa	d Penetrom a)
				Lege	Dep (m)	Elev	₩at	Sam Ref	Type	Dep	Van	Han (KPå
0.0	Soft blac	k fibrous PEAT (H4-H7)					(Seepage)					
-	Soft blue Sand is subangu	e/grey sandy gravelly SILT with cobble coarse. Gravel is angular to subangula lar.	es and rootlets. ar. Cobbles are		0.40	345.97		AA20477	В	0.40-0.40	28 0[R]	
_ 1.0 _				(0, 0, 0)	1 30	345.07		AA20478	в	1.20-1.20		
2.0 2.0 3.0 4.0 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	.0     Obstruction - Possible rock End of Trial Pit at 1.30m       .0     .0       .0     .0       .0     .0					343.07						
Wate	er seepage	from G.L										
<b>Stab</b> Pit si	<b>ility</b> des collap	sing										
Gene	eral Rema	ırks										

									F	REPORT NU	JMBER	
	J- BSL	Т	RIAL PIT I	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP2	<b>19</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES				DATE ST	TARTED	22/05	/2015	
				/EL (m)				DATE CO		ED 22/05	i/2015	avator
ENG	NEER	ESBI		1				METHO	)			
									Samples		(ac	meter
		Geotechnical Description				u	Strike				est (KI	enetro
				Legend	Depth (m)	Elevatio	Water S	Sample Ref	Type	Depth	Vane T	Hand P (KPa)
0.0	Soft blac	:k/brown fibrous PEAT (H4-H7)										
-	Soft brow Gravel is	wn sandy gravelly SILT with rootlets. S s subangular to subrounded.	Sand is coarse.	× <u>· ×</u> · × · × · × · × · × · × · × · × · ×	0.30			AA19341	В	0.30-0.30	30 12[R]	
-	Soft to fi is fine. G	rm blue/grey sandy gravelly SILT with Gravel and cobbles are subangular to s	cobbles. Sand subrounded.		0.60							
1.0				× × × × × ×								
				×.				AA19342	В	1.30-1.30		
				×. v v ×. v								
	Obstruct	ion Doosible rook		10. × × × × × × × × × × × × × × × × × × ×	2.00							
-	End of T	rial Pit at 2.00m										
-												
-												
3.0												
4.0												
-												
<b>Grou</b> No G	indwater	Conditions er Observed										
<b>Stab</b> No in	<b>ility</b> stability O	bserved										
Gene	eral Rema	irks										

	Am									REPORT N	JMBER	
	BSL		TRIAL PIT	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP2	<b>20</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES				DATE S	TARTED	<b>)</b> 22/05	5/2015	
			GROUND LE	VEL (m)				DATE C		13 Tc	0/2015	avator
ENG	INEER	ESBI		1	I	-	1	METHO	)			
									Sample	s	Pa)	ometer
		Geotechnical Descrip	tion	egend	lepth n)	levation	Vater Strike	ample tef	ype	lepth	'ane Test (K	land Penetro ≺Pa)
0.0	Soft blac	ck fibrous PEAT (H4-H7)				ш	5	S R	-		>	Ξ÷
-												
											26	
-								4 4 4 0 2 4 2	P	0 00 0 00	12[R]	
1.0	Soft brov Gravel is	wn sandy gravelly SILT with roos subrounded.	otlets. Sand is coarse.	×o × ×	0.90			AA 19343	В	0.80-0.80		
-	Soft blue	e/grey sandy gravelly SILT with	cobbles. Sand is		1.20							
-	fine. Gra	ivel and cobbles are subangula	r to subrounded.									
-												
-					* *			A A 10244	D	2 00 2 00		
_								AA 19344	Б	2.00-2.00		
-				₩ ₩ ₩ ₩ ₩ ₩ ₩								
-												
					3.00							
- 3.0	End of T	rial Pit at 3.00m										
-												
-												
-												
4.0												
-												
-												
Grou No G	indwater ( Groundwate	Conditions er Observed		1	1	I	1	1				I
Stab No ir	<b>ility</b> istability O	bserved										
Gene	eral Rema	ırks										

Z			TRIAL PIT	RECO	RD					REPORT NI 1 Q	JMBER 31つ	
	BSL		~~~~							10,	21	
CON	TRACT	Grousemount wind Fa	rm					- SHEET	II NO.	Shee	<b>2</b> 1 t 1 of 1	
LOG	GED BY	F.C	CO-ORDINA	TES				DATE S	TARTED OMPLE	22/05 TED 22/05	5/2015 5/2015	
	NT	ESBI FSBI	GROUND LE	EVEL (m)				EXCAVA METHO	ATION D	13 To	onne Exc	cavator
									Sample	S	(	eter
		Geotechnical D	escription			_	rike				st (KPa	netrom
				Legend	Depth (m)	Elevatior	Water St	Sample Ref	Type	Depth	Vane Te	Hand Pe (KPa)
0.0	Soft blac	ck fibrous PEAT (H4-H7)										
Ę												
_					-						24 10[R]	
					-							
1.0								AA19345	В	1.00-1.00	16 4[R]	
	0.611	· · · · · · · · · · · · · · · · · · ·			1.40							
-	to coarse subroun	e/grey sandy gravelly SIL e. Gravel and cobbles are ded.	subangular to	X X X X X X X X X X X X	*							
-				Å×	*							
2.0				× × × ×	2 20			AA19346	В	2.00-2.00		
-	Obstruct End of T	tion - Possible rock Frial Pit at 2.20m			2.20							
-												
-												
3.0												
-												
-												
-												
4.0												
-												
-												
-												
<b>Grou</b> No G	indwater Groundwate	Conditions er Observed										
<b>Stab</b> No ir	<b>ility</b> istability O	bserved										
Gene	eral Rema	arks										

	A	т	RIAL PIT	RECO	RD					REPORT NU	JMBER	
	gsl	-								18	312	
CON	ITRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2 Shee	<b>22</b> t 1 of 1	
LOG	GED BY	F.C	CO-ORDINAT	ES				DATE ST	TARTED	22/05	5/2015 5/2015	
		ESBI FSBI	GROUND LE	VEL (m)				EXCAVA METHO		13 Tc	onne Exc	avator
			1						Sample	6	(	eter
		Geotechnical Description				Ē	rike				st (KPa	netrom
				Legend	Depth (m)	Elevatior	Water St	Sample Ref	Type	Depth	Vane Te	Hand Pe (KPa)
0.0	Soft blac	ck fibrous PEAT (H4-H7)							•		-	
-												
-											24 8[R]	
-	Soft brov	wn sandy gravelly SILT with rootlets.	Sand is coarse.	× · · · · · · · · · · · · · · · · · · ·	0.90		(Seepage)	AA19367	В	0.80-0.80		
1.0 -	Gravel is	s subangular to subrounded.		× <u></u> , × . × × . × × .								
-	Soft grov	coordy grouply SILT with popular Si	and is find to	× × ×	1.50							
-	coarse.	Gravel is subangular to subrounded. ( ded.	Cobbles are						-			
2.0								AA19368	В	1.80-1.80		
-				×~·~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	:							
-												
-												
3.0	End of T	rial Pit at 3.00m		<u>`````````````````````````````````````</u>	3.00							
-												
-												
-												
- 4.0												
-												
-												
Grou	undwater	Conditions										
wate	er seepage	at 0.90m										
Stat	oility											
Pit si	ides collap	sing due to water ingress										
Gen	eral Rema	ırks										

	BSL	т	RIAL PIT	RECO	RD					REPORT N	JMBER 312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2	23	
								SHEET		Shee	t 1 of 1	
LOG	GED BY	F.C	CO-ORDINAT	ES				DATE S		22/05	5/2015 5/2015	
CLIE	NT	ESBI	GROUND LE	VEL (m)				EXCAVA		13 To	nne Exc	cavator
ENG	INEER	ESBI		1		1	1	METHO	0			1
									Sample	s	Pa)	ometer
		Geotechnical Description		p	_	tion	r Strike	e			Test (K	Penetro
				Leger	Depth (m)	Eleva	Watei	Samp Ref	Type	Depth	Vane	Hand (KPa)
0.0	Soft bro fine to c	wn/grey sandy gravelly SILT with rooth oarse. Gravel is subangular to subrour wn/grey sandy gravelly SILT with cobb	ets. Sand is nded.		1.00							
2.0	Obstruc End of T	tion rial Pit at 2.20m		× × × × × × × × × × × × × × × × × × ×	2.20			AA19349	В	1.20-1.20		
-3.0												
-4.0												
<b>Grou</b> No G	<b>Indwater</b> Groundwate	Conditions er Observed		·	·	·		·				·
Stab No in	<b>ility</b> istability O	bserved										
Gene	eral Rema	arks										

- Star	Am									REPORT N	JMBER	
	BSL	I	RIAL PIT I	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm	1					TRIAL P	IT NO.	TP2 Shee	<b>24</b> t 1 of 1	
LOG	GED BY	F.C	CO-ORDINAT	ES				DATE S		25/05	/2015 /2015	
CLIE ENGI	NT	ESBI	GROUND LEV	/EL (m)				EXCAVA		13 To	nne Exc	avator
			I						Samples	6	(E	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetrom (KPa)
0.0	Soft blac Soft brov Gravel is	k fibrous PEAT (H4-H7) wn sandy gravelly SILT with rootlets. S subangular to subrounded.	Sand is coarse.	× · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · · × · · · × · · · × · · · × · · · × · · · · × · · · · × · · · · · · · · · · · · · · · · · · · ·	0.30			AA19350	В	0.30-0.30	28 10[R]	
- 1.0	Soft blue to coars subangu	e/grey sandy gravelly SILT with cobble . Gravel is subangular to subrounded lar.	s. Sand is fine . Cobbles are		0.90			AA24303	В	1.00-1.00		
	Obstruct	ion - Possible rock rial Pit at 1.70m		**************************************	1.70							
2.0												
-												
3.0												
4.0												
Grou	Indwater	Conditions										
No G	iroundwate	er Observed										
<b>Stab</b> No in	<b>ility</b> Istability O	bserved										
Gene	eral Rema	rks										

	- BSL	1	RIAL PIT	RECO	RD					REPORT NU 18	jmber 312	
CON	ITRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2	25	
								SHEET		Shee	t 1 of 1	
LOG	GED BY	F.C	CO-ORDINAT	Eð				DATE S	TARTED	25/05 FED 25/05	5/2015 5/2015	
CLIE	INT	ESBI	GROUND LEV	VEL (m)				EXCAVA		13 To	nne Exc	cavator
ENG	INEER	ESBI		1				METHO	0			1
							Ð		Samples	5	(KPa)	trometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strik	Sample Ref	Type	Depth	Vane Test	Hand Pene (KPa)
0.0	Soft bla	ck fibrous PEAT with pockets of silt (F	H4-H7)	×1/ ×1/								
- - -	Soft bro Gravel i	wn sandy gravelly SILT with rootlets. S s subangular to subrounded.	Sand is coarse.		0.20			AA24304	В	0.20-0.20		
- - - - - - - - - - - - - - - - - - -	Soft blue/grey sandy gravelly SILT with cobbles. Sand is coarse. Gravel is subrounded. Cobbles are subangular.			ૻ૱×ઌૼ૾ૡ૿૾૾૾ઌૻૹૺૡૼૢૡૻ૾ૢઌ૾ૡ૽૾ૺ૾૾૾૾ૡ૽ ઌ૽ૼ૾૾ઌ૾૾૾ઌ૽૾ૢૢૢૢૢૢૢૢ૾ઌ૽ૢૢૢૢૢૢૢૢૢૢૢ૾ઌ૾ઌ૽૽ૡ૽૾ઌ૾૾૾૾૾૾ૡ૽ૻૣ૾ૣ	0.90			AA24305	В	1.90-1.90		
- - - - - - - - - - - - - - -	Obstruction - Possible rock End of Trial Pit at 2.80m				2.80							
- 4.0 												
GIVIOL INO C	<b>undwater</b> Groundwate	Conditions er Observed		·						. 1		
Stab No ir	<b>bility</b> hstability C	bserved										
Gen IP LUG 1838/	eral Rema	arks										

	GSL	I	RIAL PIT F	RECO	RD					REPORT N	umber 312	
со	NTRACT	Grousemount Wind Farm						TRIAL P	PIT NO.	TP2	26	
LO	GGED BY	F.C	CO-ORDINAT	ES				DATE S DATE C	TARTEI	Shee 25/09 TED 25/09	et 1 of 1 5/2015 5/2015	
CL EN	IENT GINEER	ESBI ESBI	GROUND LEV	/EL (m)				EXCAVA METHO	ATION D	13 To	onne Exc	cavator
	_		1						Sample	s	(B	leter
		Geotechnical Description		egend	Jepth m)	Elevation	Vater Strike	Sample Ref	Type	Depth	/ane Test (KPa	Hand Penetrom KPa)
_ 0.0	Soft blac	ck fibrous PEAT (H4-H7)					>	0 E			/	
- - -	Medium boulders angular.	dense silty sandy GRAVEL with cobb and rootlets. Gravel, cobbles and bo	oles and ulders are		0.20			AA24306	В	0.40-0.40	30 12[R]	
	Obstruct End of T	ion - Large angular boulders rial Pit at 0.70m			0.70							
- - - - - - - - -												
Gro No	oundwater Groundwate	Conditions er Observed		1	<u> </u>	1	<u> </u>	1	<u> </u>		<u> </u>	<u> </u>
	1.1114											
Sta No	instability O	bserved										
Ger IT LUG	neral Rema	ırks										

									F	EPORT NU	JMBER	
	J.J. BSL	т	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP2	<b>27</b>	
LOG	GED BY	F.C	CO-ORDINATI	ES				DATE ST		25/05	/2015	
CLIE	NT	ESBI	GROUND LEV	/EL (m)				EXCAVA		13 Tc	nne Exc	avator
ENGI	NEER	ESBI										Ŀ
							٥		Samples		(KPa)	tromet
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strik	Sample Ref	Type	Depth	Vane Test (	Hand Pene (KPa)
0.0 - - - - - - - - - - - - - - - - - -	<ul> <li>Soft black fibrous PEAT (H4-H7)         Soft light grey sandy gravelly SILT with rootlets and cobble Sand is fine to coarse. Gravel is subrounded to rounded. Cobbles are subangular.     </li> <li>Soft light grey gravelly silty SAND with cobbles and boulde Sand is fine to coarse. Gravel is subrounded to rounded. Cobbles and boulders are subangular.</li> </ul>				0.10			AA24307	В	1.00-1.00		
- - - - - - - -	Soft light Sand is Cobbles	grey gravelly silty SAND with cobbles ine to coarse. Gravel is subrounded to and boulders are subangular.	and boulders. o rounded.	x     0x     0x     0x     0x       Dx     0x     0x     0x     0x	2.30							
- - - - - - - - - - - - - - - - - -	End of T	rial Pit at 2.30m										
4.0 	4.0											
<b>Grou</b> No G	ndwater roundwate	Conditions r Observed										
Stabi No in	<b>ility</b> stability O	oserved										
Gene	eral Rema	rks										

								F	EPORT NU	JMBER		
	J. BSL	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP2	28	
LOG	GED BY	FC	CO-ORDINAT	ES				DATE ST	TARTED	25/05	i/2015	
			GROUND LEV	/EL (m)				DATE CO		ED 25/05	/2015 Inne Exc	avator
ENGI	NEER	ESBI		1			1	METHO	)			
									Samples		Pa)	ometer
		Geotechnical Description				uo	Strike	a			est (K	Penetro
				Legen	Depth (m)	Elevati	Water	Sampl Ref	Type	Depth	Vane 1	Hand F (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)			0.20							
-	Soft brov Gravel is	wn sandy gravelly SILT with rootlets. S s subangular to subrounded.	and is coarse.	× · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · ·	0.20						24 8[R]	
	Soft to fi	rm grey/blue sandy gravelly SILT with a. Gravel and cobbles are subrounded	cobbles. Sand	*0 × · · · · · · · · · · · · · · · · · ·	0.60							
-  1.0			× × × ×									
-			***** ***** **************************									
-				\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$				AA24308	В	1.50-1.50		
-				10.× 0, 10.× 0, 10.× 0,								
- 2.0				× . 0								
-				* • • • • • * • * • • * • • • • • • • •								
-				× · · *								
3.0	End of T	rial Pit at 3.00m		<u>~`~~`0</u> ,	3.00							
-												
-												
- - 4.0												
-												
-												
-												
<b>Grou</b> No G	ndwater roundwate	Conditions er Observed		1			1	<u> </u>		<u> </u>		
Stabi No in	<b>ility</b> stability O	bserved										
Gene	eral Rema	rks										

									R	EPORT NU	JMBER	
	BSL	т	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TP2	<b>29</b>	
LOG	GED BY	FC	CO-ORDINATI	ES				DATE ST	TARTED	25/05	5/2015	
0.15		- 10 FODI	GROUND LEV	/EL (m)				DATE CO		ED 25/05	0/2015	avator
ENG	NEER	ESBI						METHO	5			
									Samples		Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetro (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u>\\/</u> <u>\\/</u>	0.15							
- - - - - - - - - - -	Soft brov Gravel is	vn sandy gravelly SILT with rootlets. S subangular to subrounded.	and is coarse.					AA24309	В	1.00-1.00		
-	Soft blue coarse.	/grey sandy gravelly SILT with cobble Gravel is subrounded. Cobbles are sul	s. Sand is bangular.	× × × ×	1.20							
-	Obsttruc End of T	tion - Possible rock rial Pit at 1.60m		×	1.60							
_ 2.0 - - - - - -												
3.0 												
- - - - - - - -												
<b>Grou</b> No G	indwater ( roundwate	Conditions er Observed		_	_		_				_	
Stab No in	<b>ility</b> stability Ol	oserved										
Gene	eral Rema	rks										

										REPORT N	UMBER	
	3SL	т	RIAL PIT F	RECO	RD					18	312	
CON	ITRACT	Grousemount Wind Farm						TRIAL P	NO.	TP2	30	
				=0				SHEET		Shee	t 1 of 1	
LOG	GED BY	F.C	CO-ORDINAT					DATE S DATE C	OMPLE	25/08	5/2015 5/2015	
		ESBI	GROUND LEV	/EL (m)				EXCAV/ METHO	ATION D	13 To	onne Exc	cavator
			1						Samples	6	(e	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetron (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> </u>							-	
-	Stiff blac	k CLAY			0.20							
-	Obstruct	ion - possible rock			0.40			AA24310	В	0.30-0.30		
-	End of T	rial Pit at 0.40m										
-												
1.0												
-												
-												
-												
-												
2.0												
-												
-												
-												
-												
3.0												
-												
-												
-												
-												
4.0												
-												
-												
-												
-												
Gro		Conditions		1	I	1	1	1	1	1	I	I
Stat	<b>bility</b> hstability Ol	bserved										
Gen	eral Rema	rks										
200												
ۆ												

	1								F	REPORT NU	JMBER	
	BSL	т	RIAL PIT I	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TP2	<b>31</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES				DATE S		25/05	/2015	
CLIE	NT	ESBI	GROUND LEV	/EL (m)				EXCAVA		25/05 13 To	nne Exc	avator
ENG	NEER	ESBI										
									Samples		(Pa)	omete
		Geotechnical Description		р		ion	Strike	٩			Test (k	Penetr
				Legen	Depth (m)	Elevat	Water	Sampl Ref	Type	Depth	Vane ⁻	Hand (KPa)
0.0	Soft blac	ck fibrous PEAT (H4-H7)		$\frac{\langle 1_{1} \rangle \langle 1_{2} \rangle}{\langle 1_{2} \rangle \langle 1_{2} \rangle}$	0.20							
-	Soft bro subroun	wn sandy gravelly SILT with rootlets. G ded.	Gravel is	×0×	0.20							
-				*0× · × × * · × \/ * · × 0								
-				(x, y, y, y)								
- 1.0	Loose a	rev silty gravelly SAND with occasional	cobbles.	ו × * ו ×	1.20			AA24311	В	1.00-1.00		
-	Sand is subroun	fine. Gravel is rounded to subrounded. ded.	Cobbles are	×0. ×0.	;							
-				0. X. .0. .0.								
2.0				×.0:×0: .0:×.0: .0:×.0:								
-				. O								
-								AA24312	В	2.50-2.50		
-				×								
3.0	End of T	rial Pit at 3.00m		<u>, × .</u>	3.00							
-												
-												
-												
4.0												
-												
-												
		Oondikiona										
No G	Froundwater	er Observed										
<b>Stab</b> No in	<b>ility</b> Istability O	ty ability Observed										
Gene	eral Rema	ırks										

2									REPORT N	JMBER	
		IAL PIT F	RECO	RD					18	312	
CON	ITRACT Grousemount Wind Farm						TRIAL P	IT NO.	TP2 Shee	<b>32</b> t 1 of 1	
LOG	GED BY F.C	O-ORDINAT	ES				DATE S	TARTE	D 25/05	5/2015 5/2015	
CLIE	ENT ESBI	ROUND LE	/EL (m)				EXCAVA METHO		13 To	onne Exc	cavator
ENG								Sample	s		ter
	Geotechnical Description					ex ex		•		: (KPa)	etrome
			Legend	Depth (m)	Elevation	Water Stri	Sample Ref	Type	Depth	Vane Test	Hand Pen (KPa)
0.0	Soft black fibrous PEAT (H4-H7)		<u>\\</u> <u>\</u> <u>\</u>								
-										1	
-	Soft brown sandy gravelly SILT with rootlets. San	nd is coarse.	<u>\\ /, \\ /,</u> X_0 . X .	0.70			AA24313	В	0.50-0.50	20 8[R]	
-	Gravel is subrounded.		× <u>\\x</u> ox , x							I	
	Soft blue/grey SILT			1.20						I	
-				e: e:						I	
-										I	
2.0				e e						I	
-										I	
-							AA24314	В	2.60-2.60	I	
	End of Trial Dit at 2.00m		× × × × × ×	3.00						I	
-										l	
-										I	
-										I	
4.0										l	
-										I	
-										l	
-											
No G	undwater Conditions Groundwater Observed										
Stat Pit w	<b>vility</b> as unstable at 1.20m										
Gen	eral Remarks										
-											
2											

and									REPORT NU	JMBER	
IGSL		TRIAL PIT	RECO	RD					183	312	
CONTRACT	Grousemount Wind Farm							IT NO.	TPT	<b>001</b>	
LOGGED BY	F.C	CO-ORDINA	TES	509,1 571,5	74.96 E 70.92 N		DATE SI		<ul> <li>Sheet</li> <li>16/04</li> <li>TED 16/04</li> </ul>	/2015 /2015	
CLIENT	ESBI	GROUND LE	VEL (m)	314.1	3		EXCAVA		13 To	nne Exc	cavato
ENGINEER	ESBI										<u> </u>
								Sample	s	Pa)	omete
	Geotechnical Description				E.	Strike				est (K	enetro
			Legend	Depth (m)	Elevatio	Water S	Sample Ref	Type	Depth	Vane T	Hand P
D.0 Soft da	rk brown fibrous PEAT (H4-H7)										
Light br	own gravelly SILT with cobbles		10 × ×	0.30	313.83					50 54	
	0			*			AA32071	В	0.50-0.50	56	
Dark br	rown very gravelly SILT with frequer	t cobbles and		0.70	313.43		AA32071	D	0.50-0.50		
.0	nai angular boulders (up to boomin	)	× ×	ł							
			× × ×	ĺ			4 4 9 9 9 7 9	P	1 50 4 50		
				*			AA32072 AA32072	D	1.50-1.50		
			× × ×								
0				Ì							
				*							
			××××	Ì							
			× × ×	ř							
.0 End of	Trial Pit at 3.00m			3.00	311.13						
0											
iroundwater	Conditions ter Observed			1							1
tability											
lo instability o	bserved										
eneral Rem	arks										

	JJ JSL	т	RIAL PIT	RECO	RD					REPORT N	^{имвек} 312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	PIT NO.	TPT	<b>'002</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES	509,2 571,30	77.14 E 09.48 N		DATE S DATE C	TARTED	16/04 16/04	4/2015 4/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LE	VEL (m)	339.2	3		EXCAVA METHO	ATION D	13 To	onne Exc	avator
									Samples	3	a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetro (KPa)
0.0	Soft dar	k black fibrous PEAT (H4-H7)		<u>,</u> <u></u>	0.00			AA32066	в	0 20-0 20	40	
	Reddish some bo	grey very gravelly SILT with frequent ulders. Cobbles and boulders are ang	cobbles and ular.	*0 × × ; × × ° × ;	0.30	338.63		AA32066	DB	0.20-0.20	42 50	
	Obstruct End of T	ion - Possible boulder/bedrock irial Pit at 0.60m			0.00	550.05		AA32067	D	0.50-0.50		
1.0												
2.0												
- 3.0												
4.0												
Grou	Indwater	Conditions										
No G	roundwate	er Observed										
<b>Stab</b> No in	<b>ility</b> stability ot	oserved										
Gene	eral Rema	rks										

									I	REPORT N	JMBER	
	35L	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TPT	003	
LOG	GED BY	F.C	CO-ORDINATE	ES	509,36 571,10	69.02 E 00.02 N		DATE S		15/04 15/04	t 1 of 1 1/2015 1/2015	
CLIE	NT	ESBI	GROUND LEV	EL (m)	324.96	6		EXCAVA		13 To	onne Exc	avator
ENG	NEER	ESBI							Samples			ter
							e				(KPa)	trome
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strik	Sample Ref	Type	Depth	Vane Test	Hand Pene (KPa)
0.0	Soft dark	brown fibrous PEAT (H4-H7)		<u>\\</u> \\\\\\\								
-				<u> \\/</u> \\//				AA32062	В	0.30-0.30	30 20	
	Soft dark	grey silty PEAT (H4-H7)			0.50 0.60	324.46 324.36		AA32063	В	0.60-0.60	30	
	End of T	rial Pit at 0.60m						AA32063	D	0.60-0.60		
1.0												
-												
-												
- 2.0												
-												
-												
3.0												
-												
-												
-												
4.0												
-												
-												
-												
<b>Gro</b> u No G	Indwater ( Groundwate	Conditions r Observed										
Stab No ir	<b>ility</b> istability Ob	bserved										
Gene	eral Rema	rks										
2.5.1												

											REPORT NUMBER		
	35L	Т	RIAL PIT F	RECO		18312							
CON	TRACT	Grousemount Wind Farm						TRIAL P	it no.	TPT	004		
LOG	GED BY	F.C	CO-ORDINAT	ES				DATE S	TARTEI OMPI F	D 13/04/2015			
CLIE	NT	ESBI	GROUND LEV	/EL (m)	EXCAVAT					<b>N</b> 13 Tonne Excavator			
ENG	INEER	ESBI							D				
									Sample	es	(Pa)	ometer	
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (k	Hand Penetr (KPa)	
0.0	Soft blac	k/brown fibrous PEAT (H4-H7)		$\frac{\langle 1_{i} \rangle \langle 1_{i}}{\langle 1_{i} \rangle \langle 1_{i} \rangle}$									
	Soft brow	vn gravelly SILT with rootlets. Gravel	is subangular.	×o_ × ×o_ ×	0.30			AA27909	В	0.30-0.30	30		
-	BOULDE	ERS (Possible bedrock)			0.50			AA279091 AA27910 AA279101	B D	0.30-0.30	10[R]		
	Obstruct End of T	ion - Possible bedrock rial Pit at 0.70m			0.70				D	0.00 0.00			
1.0													
-													
2.0													
-													
F													
-													
3.0													
-													
-													
4.0													
-													
-													
F													
Grai	undwater (	Conditions											
No G	Groundwater	or Observed											
Stab No ir	<b>ility</b> Istability Ol	oserved											
Gene	eral Rema	rks											



18387.GPJ IGSL.GDT 16/7/15

TP LOG . Igsl

	TRIAL PIT RECORD										18312		
CON	TRACT	Grousemount Wind Farm							IT NO.	TPT	<b>006</b>		
LOG	GED BY	F.C	CO-ORDINAT	ES	510,13 570,25	39.87 E 55.88 N		DATE S	TARTED OMPLET	D 14/01/2015 TED 14/11/2016			
CLIE ENG	NT INEER	ESBI ESBI	GROUND LEV	/EL (m)	405.1	1		EXCAVATION 13 T METHOD			onne Excavator		
									Samples		Pa)	ometer	
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetrc (KPa)	
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> </u>									
-	Soft brov rootlets.	wn sandy gravelly SILT with occasiona Sand is coarse. Gravel is angular to s	I cobbles and ubangular.	$\frac{\langle 1/2}{2} \frac{\langle 1/2}{2}$	0.40	404.71		AA27928 AA27928T	B D	0.30-0.30 0.30-0.30	26 6[R]		
-	Cobbles Obstruct End of T	are angular. ion - Possible boulders/bedrock rial Pit at 0.70m			0.70	404.41		AA27929 AA27929T	B D	0.60-0.60 0.60-0.60			
1.0 													
-													
-													
2.0													
-													
-													
- 3.0													
-													
-													
- 4.0													
-													
-													
Grou	undwater	Conditions											
No G	Groundwate	er Observed											
Stab No ir	<b>iility</b> nstability O	bserved											
Gen	eral Rema	rks											

/												REPORT NUMBER		
	27 IG	J. BL	т	RIAL PIT F	RECO	RD					18312			
С	ONT	RACT	Grousemount Wind Farm						TRIAL P	IT NO.	TPT	007		
					=9	510.0	54 65 5		SHEET		Sheet 1 of 1			
L	OGG	ED BY	F.C		<b></b>	569,9	17.87 N		DATE STARTED         14/12/2014           DATE COMPLETED         14/09/2017					
C	LIEN [.] NGIN	T EER	ESBI ESBI	GROUND LEV	'EL (m)	308.3	5		EXCAVATION 13 METHOD			Fonne Excavator		
				I						Sample	s	a)	meter	
			Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetro (KPa)	
-	0.0	Soft blac	k/brown fibrous PEAT (H4-H7)											
-					<u>1/ 1/ 1/ 1/</u> <u>1/ 1// 1// 1/ 1// 1/</u>				AA27930 AA27930T	B D	0.50-0.50 0.50-0.50	22 4[R]		
- 1 - -	.0	Obstructi End of T	on - Possible boulders/bedrock rial Pit at 1.00m			1.00	367.33		AA27931 AA27931T	B D	1.00-1.00 1.00-1.00	20 0[R]		
-														
2	2.0													
-														
	8.0													
-														
-	.0													
-														
-														
G	roun	dwater (	Conditions											
GUI 16///1	ater	iying at 1	.uum											
1651 1651	tabili o inst	i <b>ty</b> tability Ot	bserved											
183 IP LUG 183	General Remarks													

	F											REPORT NUMBER		
	35L	Т	RIAL PIT F	RECO	RD					18312				
CON	TRACT	Grousemount Wind Farm							IT NO.	TPT008 Sheet 1 of 1				
LOG	GED BY	F.C	CO-ORDINATI	ES	508,88 569,92	34.46 E 21.56 N		DATE ST	TARTED OMPLET	15/04 ED 15/04	/2015 /2015			
	NT	ESBI ESBI	GROUND LEV	/EL (m)	395.84	1		EXCAVATION 13 T METHOD			onne Excavator			
			L						Samples		a)	meter		
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetro (KPa)		
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u>, , , ,</u> ,										
-	Soft light to coarse	brown/red sandy gravelly silty CLAY. e. Gravel is subangular to subrounded	Sand is fine		0.30	395.54		AA17702 AA17702T	B D	0.50-0.50 0.50-0.50	20 6[R]			
- - 1.0	1.0 Obstruction - Possible boulders/bedrock				1.00	394.84		AA17703 AA17703T	B D	0.90-1.00 0.90-1.00				
-	End of I	rial Pit at 1.00m												
-														
2.0														
-														
- - - 30														
-														
- 4.0 -														
-														
-														
<b>Grou</b> No G	indwater ( Groundwate	Conditions r Observed												
Stab No in	<b>ility</b> Istability Ot	oserved												
Gene	eral Rema	rks												

										REPORT NUMBER		
JC	SL	т	RIAL PIT RE	CO	RD					18312		
CONT	RACT	Grousemount Wind Farm						TRIAL P	IT NO.	TPT	009	
LOGG	ED BY	F.C	CO-ORDINATES		508,63 569,56	84.72 E 64.61 N		DATE STARTED 16/04/			1 of 1 /2015	
	IT	ESBI	GROUND LEVEL	_ (m)	380.94	Ļ		EXCAVATION 13 T			onne Excavator	
ENGIN	IEER	ESBI						METHO	0			
									Sample	6	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)	<u></u>	<u> </u>			-		•		-	
- - - - - - - - - - - - - - - - - - -								AA17713 AA17713T	B D	1.00-1.00 1.00-1.00	22 8[R] 14 2[R]	
2.0	Obstructi End of T	on - Possible boulders/bedrock rial Pit at 1.40m	,	<u>, , , , , , , , , , , , , , , , , , , </u>	1.40	379.54					8 0[R]	
- 3.0 		Sanditiona										
Rapid	water ing	ress at 1.40m										
No ins	tability Ot	oserved										
Gener	ral Rema	rks										

											REPORT NUMBER		
IGSL	TRIAL PIT RECORD												
CONTRACT Grousemoun	t Wind Farm						TRIAL P	IT NO.	TPT	010			
LOGGED BY F.C		CO-ORDINATE	S	509,09 569,73	93.51 E 30.69 N		DATE S	TARTE	TED 15/04/2015				
CLIENT ESBI		GROUND LEV	EL (m)	389.91	1		EXCAVA		13 Tonne Excavato				
ENGINEER ESBI								,					
								Samples		Pa)	meter		
Geote	echnical Description		egend	epth n)	levation	/ater Strike	ample ef	ype	epth	ane Test (K	and Penetro <pa)< td=""></pa)<>		
0.0 Soft black/brown fibrous	S PFAT (H4-H7)			05	ш	8	ഗ്ഷ	F		>	Ц		
	EL and COBBLES	, , , , , , , , , , , , , , , , , , ,	× × × × × × × × × × × × × × × × × × ×	1.00	388.91		AA27947	В	1.00-1.00	26 10[R] 18 2[R]			
Obstruction - Possible t End of Trial Pit at 1.80r	ooulders/bedrock n		> :×0 ;	1.80	388.11		- V- L I J - I I		1.00-1.00	2[13]			
3.0													
- - - - - - - - - - - - - - - - - - -													
-													
Groundwater Conditions No Groundwater Observed													
Stability No instability Observed													
General Remarks													

6	R											REPORT NUMBER			
	SSL	Т	RIAL PIT I	RECO	RD					18312					
CON	TRACT	Grousemount Wind Farm						TRIAL PI	T NO.	TPT	<b>011</b>				
LOG	GED BY	F.C	CO-ORDINAT	ËS	508,80 569,25	00.94 E 50.93 N		DATE ST	ARTED	D 22/04/2015 TED 22/04/2015					
	NT	ESBI ESBI	GROUND LEV	VEL (m)	403.58	3		EXCAVATION 13 Tonne Exca METHOD							
									Sample	5	a)	neter			
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetrol (KPa)			
- 0.0 - - - - -	Soft blac	k/brown fibrous PEAT (H4-H7)			0.00	100 70					24 14[R]				
- - - - - - - -	Soft blue fine. Gra subangu	/grey sandy gravelly SILT with cobble vel is angular to subrounded. Cobble lar.	es. Sand is s are	ઌૢ૾૾ૢૢૢૢૢૢૢૢૢૢઌૢૢૢૢૢૢૢૢૢૢૢૢઌૢૢૢૢૢૢૢૢૢૢ	0.80	402.78		AA22718 AA22718	B D	0.80-0.80 0.80-0.80					
2.0	Obstruct End of T		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	2.40	401.18		AA22719 AA22719	B D	2.20-2.20 2.20-2.20						
- - - - - - - - -															
- - - - - - - - -	-4.0														
<b>Grou</b> No G	indwater ( iroundwate	Conditions er Observed		<u> </u>		<u>                                     </u>									
Stab No in	<b>ility</b> istability O	bserved													
Gene	eral Rema	rks													

	F									REPORT NUMBER		
	3SL	Т	RIAL PIT R	ECO	RD					18312		
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TPT	012	
LOG	GED BY	F.C	CO-ORDINATE	S	509,20 569,32	06.76 E 26.24 N		DATE STARTED         17/04/2015           DATE COMPLETED         17/04/2015				
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	EL (m)	453.92	2		EXCAVA METHO	ATION D	13 To	onne Exc	avator
									Samples	3	Pa)	ometer
		Geotechnical Description		Depth (m)		Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetro (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)		$\frac{\langle 1 \rangle}{\langle 1 \rangle} \frac{\langle 1 \rangle}{\langle 1 \rangle}$	0.20	452 72						
-	Obstructi End of T	on - Possible boulders/bedrock rial Pit at 0.20m		· · · · · ·	0.20	453.72		AA17724 AA17724T	B D	0.20-0.20 0.20-0.20	30 12[R]	
- 1.0 												
2.0 												
3.0												
- 4.0 												
<b>Grou</b> No G	indwater ( Groundwate	Conditions r Observed										
Stab No in	<b>ility</b> Istability Of	oserved										
Gene	eral Rema	rks										





. Igsl



18387.GPJ IGSL.GDT 16/7/15

TP LOG . Igsl
Le contraction de la contracti		т			REPORT N	JMBER 312						
	TRACT	Grousemount Wind Farm						TRIAL P	T NO.	TPT	016	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,39 568,68	97.05 E 31.06 N		DATE ST	TARTED OMPLE	Shee 28/03 TED 28/03	t 1 of 1 8/2015 8/2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	397.6	1		EXCAVA METHOE	TION )	13 Tc	onne Exc	avator
									Sample	s	(a)	meter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KI	Hand Penetro (KPa)
0.0 - - - - - - - - - - - - - - - - - -	Soft blac Soft to fin boulders fine to co	k fibrous PEAT (H4-H7) m brown/grey sandy gravelly SILT wit and occasional pockets of blue/grey s parse. Gravel, cobbles and boulders a	h cobbles and silt. Sand is re subangular.		0.50	397.11		AA32227	В	0.50-0.50	46 14[R]	
- - - - - - 2.0				0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 20	395 41		AA32228	В	1.90-1.90		
- - - - - - - - - - - -	Obstruct End of T	ion - Possible rock rial Pit at 2.20m										
<b>Grou</b> No G	indwater ( iroundwate	Conditions or Observed						I				
<b>Stab</b> No in	<b>ility</b> Istability Ol	bserved										
Gene	eral Rema	rks										

6	TRIAL PIT RECORD											
	3SL	Т	RIAL PIT	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TPT	<b>017</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,1 568,9	10.25 E 74.05 N		DATE ST	TARTED	29/04 TED 29/04	l/2015	
	NT	ESBI ESBI	GROUND LE	VEL (m)	459.9	0		EXCAVA METHOD		13 Tc	onne Exc	avator
			<u> </u>						Samples	6		eter
		Geotechnical Description				_	rike				st (KPa	netrom
				Legend	Depth (m)	Elevation	<b>♦</b> ₩ater St	Sample Ref	Type	Depth	Vane Te	Hand Pe (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)			0.00	450.00	(Seepage)					
-	Soft brov light brov	vn sandy gravelly SILT with rootlets a vn clay. Sand is coarse. Gravel is sub led	nd pockets of angular to	× · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · · × · ·	0.30	459.60		AA34703	В	0.30-0.30	42 14[R]	
-	Gabroand											
1.0 	Soft grey boulders	/brown sandy gravelly SILT with cobb . Sand is fine to coarse. Gravel, cobbl	les and es and	×. , , , , , , , , , , , , , , , , , , ,	1.00	458.90						
-	boulders	are angular to subangular.		× × × × × × × × × × × × × × × × × × ×								
-				× · · × ?	8 - -							
2.0				$\mathbf{x} = \mathbf{x} + $				AA34704	В	2.00-2.00		
-				× × ×								
-	Obstruct	ion - Possible rock		*.x [×] .₹	2.60	457.30						
- - 		nai Fil al 2.00m										
-												
-												
-												
4.0												
-												
-												
<b>Grou</b> Wate	Indwater ( er ingress f	Conditions rom G.L		1								
Stab Side	<b>ility</b> walls unsta	able due to water ingress										
Gene	eral Rema	rks										

	JJ- BSL	т	RIAL PIT F	RECO	RD					18	з 312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	<b>TPT</b> Shee	<b>018</b> t 1 of 1	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,51 569,02	13.20 E 26.91 N		DATE S	TARTED	29/04 ED 29/04	/2015 /2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	414.24	4		EXCAVA METHO	ATION D	13 To	onne Exc	avator
									Samples	;	a)	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KF	Hand Penetroi (KPa)
0.0 - - - - - -	Soft blac Soft brow rootlets. Cobbles	k fibrous PEAT (H4-H7) vn very sandy gravelly SILT with cobb Sand is coarse. Gravel is angular to s are subangular.	les and ubrounded.	× × × × × × × × × × × × × × × × × × ×	0.40	413.84		AA32244	В	0.40-0.40	18 6[R]	
- - - - - - -	Obstruct End of T	ion rial Pit at 1.40m		× 0 × 0 × 0 × 0 × 0 × 0 × 0 × 0 × 0 × 0	1.40	412.84		AA32245	В	1.10-1.10		
- - 2.0 - - - -												
- - - - - - - -												
-												
Grou No G	indwater ( iroundwate	Conditions Pr Observed		<u> </u>		<u>                                     </u>		<u>                                     </u>		<u> </u>		
No in	stability O	oserved										
Gene	eral Rema	rks										

	A										JMBER	
	J J J J J J J J J J J J J J J J J J J	т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TPT	019	
LOG	GED BY	F.C	CO-ORDINATE	S	507,32 569.28	20.71 E 35.30 N		DATE S	TARTE	<b>)</b> 29/04	/2015	
CLIE	NT	ESBI	GROUND LEV	EL (m)	464.00	3		DATE C	OMPLE ATION	<b>TED</b> 29/04 13 Tc	/2015 Inne Exc	avator
ENG	INEER	ESBI						METHO	כ			
									Sample	s	(a ^c	meter
		Geotechnical Description		jend	pth	vation	tter Strike	mple f	Эс	pth	ne Test (KI	nd Penetro Pa)
0.0	Soft blac	k fibrous PEAT (H4 H7)			D D D	Ele	Ma	Sa Re	Т _{УІ}	De	Va	н Ц Х
-	Solt blac							AA34708	В	0.30-0.30	18 4[R]	
-	Angular rock)	COBBLES and BOULDERS (Possible	weathered		0.60	463.46						
1.0 	Obstruct	ion - possible rock			1.20	462.86						
-	End of T	rial Pit at 1.20m										
-												
2.0												
-												
-												
- 												
-												
-												
-												
4.0												
-												
-												
-												
<b>Grou</b> No G	undwater Groundwate	Conditions er Observed										
<b>Stab</b> No ir	<b>iility</b> hstability O	bserved										
Gen	eral Rema	ırks										

Т	RIAL PIT F	RECO	RD					18	312	
CONTRACT Grousemount Wind Farm							T NO.	TPT	<b>020</b>	
OGGED BY F.C	CO-ORDINATE	ES	507,62 570,30	20.74 E 06.97 N		DATE ST	ARTED	0 07/05 TED 07/05	5/2015 5/2015	
LIENT ESBI NGINEER ESBI	GROUND LEV	EL (m)	370.44	1		EXCAVA METHOE	TION	13 Tc	onne Exc	cavato
							Sample	s	(Pa)	ometer
Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (k	Hand Penetr
⁰ Soft black fibrous PEAT (H4-H7)			0.50	369.94						
Soft brown sandy gravelly SILT with pockets o red clay. Sand is coarse. Gravel is subangular subrounded.	f blue silt and to	× q × × × × × × × × × × × × × × × × × ×				AA10182	В	0.50-0.50	20 8[R]	
0 Soft blue/grey sandy gravelly SILT. Sand is fin subangular.	e. Gravel is	× × × × × × × × × × × × × × × × × × ×	2.70	367.74		AA10183	В	2.00-2.00		
.0 End of Trial Pit at 3.20m		*•× · * * · × · *	3.20	367.24						
.0										
o Groundwater Conditions				·				· · · ·		
tability lo instability Observed										
eneral Remarks										

										REPORT N	JMBER	
	35L	Т	RIAL PIT F	RECO	RD					18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	PIT NO.	TPT	021	
LOG	GED BY	F.C	CO-ORDINAT	ES	507,97 570,47	72.35 E 71.17 N		DATE S	TARTEI OMPI F	Shee D 07/08	<u>t 1 of 1</u> 5/2015 5/2015	
CLIE	NT	ESBI	GROUND LEV	/EL (m)	349.28	В		EXCAVA		13 To	onne Exc	cavator
ENG	NEER	ESBI		1					D			
									Sample	es	(Pa)	ometer
		Geotechnical Description		-egend	Depth (m)	Elevation	Nater Strike	Sample Ref	Lype	Jepth	/ane Test (k	Hand Penetr (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)						0, 8				
-				<u>1/ \\/ \</u>								
-	Soft brov Gravel is	vn sandy gravelly SILT with rootlets. S subangular.	Sand is coarse.	× · · · · · · · · · · · · · · · · · · ·	0.40	348.88		AA10191	В	0.40-0.40	30 12[R]	
- 	Obstruct	ion - Possible rock		× · × / · _o ×· /	1.10	348.18		AA10192	В	1.00-1.00		
2.0												
- - -												
<b>Grou</b> No G	indwater ( Groundwate	Conditions er Observed										
<b>Stab</b> No in	<b>ility</b> istability Ol	oserved										
Gene	eral Rema	rks										



18387.GPJ IGSL.GDT 16/7/15 . Igsl

TP LOG



18387.GPJ IGSL.GDT 16/7/15 . Igsl

TP LOG

	J- BSL	т	RIAL PIT F	RECO	RD					REPORT NU	з 312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	<b>TPT</b>	<b>024</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,73 570,56	34.06 E 56.16 N		DATE ST		) 12/05	2015 2015	
CLIE ENGI	NT NEER	ESBI ESBI	GROUND LEV	/EL (m)	401.08	3		EXCAVA METHOD	TION	13 To	nne Exc	avator
									Sample	6	(E	neter
		Geotechnical Description		Legend	Depth (m)	Elevation	<ul> <li>₩ater Strike</li> </ul>	Sample Ref	Type	Depth	Vane Test (KP	Hand Penetrom (KPa)
2.0	Soft blac Medium rock) Obstruct End of T	k fibrous PEAT (H4-H7) dense silty angular GRAVEL (Possible ion - Possible rock rial Pit at 1.70m	e weathered		1.70	399.38 398.88	(Seepage)	AA12682 AA12683	В	1.00-1.00	20 8[R] 14 2[R]	
	illity walls unst	Conditions from G.L able due to water ingress rks										



18387.GPJ IGSL.GDT 16/7/15

TP LOG . Igsl

										REPORT NU	JMBER	
	J.J. BSL	Т	RIAL PIT F	RECO	RD					183	312	
CON	TRACT	Grousemount Wind Farm							IT NO.	TPB	<b>004</b>	
LOG	GED BY	F.C	CO-ORDINATI	ES	508,34 568,63	49.85 E 36.49 N		DATE ST	TARTED	23/04	/2015	
CLIE	NT	ESBI	GROUND LEV	/EL (m)	334.38	3		EXCAVA		13 To	nne Exc	avator
ENGI	NEER	ESBI						METHOL	)			
									Sample	5	Pa)	ometer
		Geotechnical Description		5		uo	Strike	a			「est (K	Penetr
				Legen	Depth (m)	Elevati	Water	Sampl Ref	Type	Depth	Vane 1	Hand F (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)										
-												
-					0.70	333.68		AA32201 AA32201	B D	0.50-0.50 0.50-0.50	28 10[R]	
-	Soft bro Gravel is	wn sandy gravelly SILT with rootlets. S subangular to subrounded.	Sand is coarse.	× · × · ×								
- ^{1.0}	Soft blue	and a rayely SII T with co	obbles Sand is	°× ·× × * ·× ·\ * ·× ·	1.20	333.18		AA32202 AA32202	B D	1.00-1.00 1.00-1.00		
-	fine to co are suba	parse. Gravel is subangular to subrour ingular.	nded. Cobbles	× × · Q								
-				× × × ×	:							
- 2.0				×0 ×0 ×0 ×				AA32203	в	2.00-2.00		
-	Obstruct	ion Bossible boulders/bodrack		x, v,	2.30	332.08		AA32203	D	2.00-2.00		
-	End of T	rial Pit at 2.30m										
-												
3.0												
-												
-												
-												
4.0 -												
-												
Grou	Indwater	Conditions										
No G	roundwate	er Observed										
Stab	ility											
No in	stability O	bserved										
Gene	eral Rema	rks										

	GSL TRIAL PIT RECORD										312	
CON	TRACT	Grousemount Wind Farm							PIT NO.	TPE	<b>3005</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,76 570,06	62.77 E 62.50 N		DATE S	TARTE	D 01/08	5/2015 5/2015	
CLIE	INT	ESBI	GROUND LEV	/EL (m)	494.70	C		EXCAVA METHO	ATION D	13 To	onne Exc	cavator
ENG		ESBI							Sample	es		eter
		Geotechnical Description					ike				t (KPa	netrom
				Legend	Depth (m)	Elevation	Water Str	Sample Ref	Type	Depth	Vane Tea	Hand Per (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7) Ity sandy GRAVEL with cobbles. Sand	d is coarse	N/ N/	0.10	494.60						
-	Gravel a	nd cobbles are angular. ( Possible we	athered rock)		: :			AA34735	В	0.40-0.40		
-	Obstruct End of T	ion - Possible rock rial Pit at 0.70m			0.70	494.00						
1.0												
-												
-												
-												
2.0												
-												
-												
- - 3.0												
-												
-												
-												
4.0												
-												
-												
-												
<b>Grou</b> No G	undwater ( Groundwate	Conditions er Observed										
Stab	ility											
No in	stability O	bserved										
Gene	eral Rema	rks										

	BSL	т	RIAL PIT F	RECO	RD					REPORT N	umber 312	
CON	TRACT	Grousemount Wind Farm						TRIAL P	IT NO.	TPE	<b>6006</b>	
LOG	GED BY	F.C	CO-ORDINATE	ES	506,82 570,04	26.25 E 13.22 N		DATE S	TARTED	01/04 01/05	1/2015 5/2015	
CLIE ENG	NT	ESBI ESBI	GROUND LEV	EL (m)	492.40	)		EXCAVA METHO	ATION D	13 To	onne Exc	avator
									Samples	3	Pa)	ometer
		Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (K	Hand Penetr (KPa)
0.0	Soft blac	k fibrous PEAT (H4-H7)		<u> </u>	0.30	402.10						
-	Loose si Obstruct End of T	Ity angular GRAVEL ( Possible weath ion - Possible rock irial Pit at 0.50m	ered rock)	®0x∞®0x ≫1 x x x	0.50	491.90		AA34736	В	0.30-0.30	20 8[R]	
- 												
-												
-												
- 2.0												
-												
-												
- 												
-												
-												
- 4.0												
-												
-												
Grou	Indwater	Conditions er Observed										
Stab No in	<b>ility</b> istability ob	oserved										
Gene	eral Rema	rks										

TRIAL PIT RECORD											JMBER	
	BSL									18	312	
CON	TRACT	Grousemount Wind Farm						TRIAL PI	T NO.	TPB Shee	<b>007</b>	
LOG	GED BY	F.C	CO-ORDINAT	ES	506,85 570,18	57.19 E 32.65 N		DATE ST		0 01/05 TED 01/05	/2015	
		ESBI	GROUND LEV	/EL (m)	483.50	0		EXCAVA METHOD		13 To	nne Exc	avator
LING	NEEK	ESDI							Sample	s		ter
		Costophical Description					é				(KPa)	etrome
		Geolechnical Description		Legend	Depth (m)	Elevation	Water Stril	Sample Ref	Type	Depth	Vane Test	Hand Pen (KPa)
0.0	Soft bro	wn fibrous PEAT (H4-H7)		<u> \ / \ /</u>								
-				<u> \\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\\</u> <u>\</u> <u></u>				AA34739	В	0.50-0.50	8 0[R]	
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4.0 - -												
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Groundwater Conditions No Groundwater Observed									
Stability No instability observed									
General Remarks									

## Appendix 2

## **APEX Geophysical Report**

## AGL15080_01

**REPORT ON THE** 

**GEOPHYSICAL SURVEY** 

AT

**GROUSEMOUNT WIND FARM** 

FOR

**IGSL/ESB**I

8TH JUNE 2015



APEX Geoservices Limited Unit 6 Knockmullen Business Pk., Gorey, Co. Wexford, Ireland

T: 0402 21842 F: 0402 21843 E: info@apexgeoservices.ie W: www.apexgeoservices.com



# 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 GEOSERVICES 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	AGL15080		
AUTHOR	CHECKED	REPORT STATUS	Date
EURGEOL SHANE O'ROURKE P.GEO., M.SC (GEOPHYSICS)		V.01	8 [™] JUNE 2015



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#### 1. EXECUTIVE SUMMARY

APEX Geoservices Limited was requested by IGSL & ESBi to carry out a geophysical investigation as part of the ground investigation prior to the development of the Grousemount Wind Farm, 18km east of Kenmare.

Grousemount Wind Farm involves the design and construction of twenty-four wind turbines (T01-T24) and associated infrastructure on the site.

The geophysical investigation consisted of Electrical Resistivity Tomography, Seismic Refraction, and MASW at the turbine bases to provide geotechnical parameters on the sub-peat soils and bedrock.

Peat probing has been carried out upon each of the ERT Profiles and this shows a thin covering of peat which has been plotted on each of the sections.

The centre of Turbine T01 has been interpreted as medium dense-very dense clayey gravel/gravel from 0.2-3.7m followed by slightly weathered-fresh sandstone.

The centre of Turbine T02 has been interpreted as loose-very dense clayey gravel/gravel from 0.7-2.2m followed by slightly weathered-fresh sandstone.

The centre of Turbine T03 has been interpreted as medium dense-very dense clayey gravel/gravel from 0.5-3.3m followed by slightly weathered-fresh sandstone.

The centre of Turbine T04 has been interpreted as loose dense clayey gravel/gravel from 0.4-2.2m followed by highly-moderately weathered sandstone to 4.5m followed by slightly weathered-fresh sandstone.

The centre of Turbine T05 has been interpreted as very dense clayey gravel/gravel from 1.3-5.3m followed by highly-moderately weathered sandstone to 8.0m followed by slightly weathered-fresh sandstone.

The centre of Turbine T06 has been interpreted as very loose-very dense clayey gravel/gravel from 0.5-3.1m followed by slightly weathered-fresh sandstone.

The centre of Turbine T07 has been interpreted as very dense clayey gravel/gravel from 0.9-3.1m followed by slightly weathered-fresh sandstone.

The centre of Turbine T08 has been interpreted as very loose-very dense clayey gravel/gravel from 0.9-4.4m followed by slightly weathered-fresh sandstone.

The centre of Turbine T09 has been interpreted as very loose-very dense clayey gravel/gravel from 0.5-3.5m followed by highly-moderately weathered sandstone to 6.4m followed by slightly weathered-fresh sandstone.



The centre of Turbine T10 has been interpreted as very loose-very dense clayey gravel/gravel from 0.7-4.3m followed by slightly weathered-fresh sandstone.

The centre of Turbine T11 has been interpreted as loose-very dense clayey gravel/gravel from 0.6-4.5m followed by slightly weathered-fresh sandstone.

The centre of Turbine T12 has been interpreted as very dense clayey gravel/gravel from 0.7-1.3m followed by slightly weathered-fresh sandstone.

The centre of Turbine T13 has been interpreted as very dense clayey gravel/gravel from 0.4-2.1m followed by slightly weathered-fresh sandstone.

The centre of Turbine T14 has been interpreted as loose-very dense clayey gravel/gravel from 0.7-4.0m followed by highly-moderately weathered sandstone to 5.7m followed by slightly weathered-fresh sandstone.

The centre of Turbine T15 has been interpreted as loose-very dense clayey gravel/gravel from 0.2-6.4m followed by highly-moderately weathered sandstone to 11.0m followed by slightly weatheredfresh sandstone.

The centre of Turbine T16 has been interpreted as loose-very dense clayey gravel/gravel from 0.3-5.5m followed by slightly weathered-fresh sandstone.

The centre of Turbine T17 has been interpreted as very loose-very dense clayey gravel/gravel from 0.2-5.2m followed by slightly weathered-fresh sandstone.

The centre of Turbine T18 has been interpreted as very loose-very dense clayey gravel/gravel from 0.2-4.8m followed by slightly weathered-fresh sandstone.

The centre of Turbine T19 has been interpreted as very dense clayey gravel/gravel from 0.3-2.3m followed by slightly weathered-fresh sandstone.

The centre of Turbine T20 has been interpreted as medium dense-very dense clayey gravel/gravel from 0.3-6.4m followed by slightly weathered-fresh sandstone.

The centre of Turbine T21 has been interpreted as dense-very dense clayey gravel/gravel from 0.1-2.2m followed by slightly weathered-fresh sandstone.

The centre of Turbine T22 has been interpreted as very dense clayey gravel/gravel from 2.0-4.0m followed by slightly weathered-fresh sandstone.

The centre of Turbine T23 has been interpreted as very dense clayey gravel/gravel from 0.8-2.1m followed by slightly weathered-fresh sandstone.

The centre of Turbine T24 has been interpreted as very dense clayey gravel/gravel from 0.8-2.2m followed by slightly weathered-fresh sandstone.



Sharp lithological contacts and/or faults may result in zones of lower quality bedrock (increased weathering/fracturing) being present that could increase the risk to excavation.

Changes in bedrock lithology with depth may represent a perpendicular change in bedrock properties. These lithological boundaries would pose a possible risk to the excavation of the turbine foundation due to lateral variations in the bedrock quality.

The findings of the geophysical investigation should be reviewed following the completion of the intrusive investigations.

One set of soil resistivity measurements have been carried out at T2, T14, T17 & T22, with two sets at the substation location.



## 2. INTRODUCTION

APEX Geoservices Limited was requested by IGSL & ESBi to carry out a geophysical investigation as part of the ground investigation prior to the development of the Grousemount Wind Farm, 18km east of Kenmare.

Grousemount Wind Farm involves the design and construction of twenty-four wind turbines and associated infrastructure on the site. The turbines bases to be investigated were T01-T24.

The geophysical investigation consisted of Electrical Resistivity Tomography, Seismic Refraction and MASW at the turbine bases to provide geotechnical parameters on the sub-peat soils and bedrock. Soil Resistivity measurements were carried out at bases T2, T14, T17 & T22, with two sets of measurements at the substation location.

This report details the findings from the turbine bases investigation utilising ERT, seismic refraction and MASW.

#### 2.1 Survey Objectives

The objective of the investigation was:

- Provide information on the type and thickness of the overburden
- Estimate the overburden stiffness
- Assess the depth to and quality of the bedrock
- Identify the type of bedrock
- Measure the soil resistivity values at five locations

#### 2.2 Site Background

The site is set in steeply undulating boggy mountainous area with topography ranging from c. 320-460 mOD. The surrounding land is used both for agriculture and for forestry. The Roughty River flows through the centre of the survey area from south to north. The turbine bases are approximately 400m apart.





Fig 2.1: Location map.

## 2.2.1 Geology

Bedrock geology for the site comprises the Bird Hill Formation (Fig.2.2) which is made up of purple siltstone and fine sandstone and strikes approximately east-west, and dips steeply to the north and south. It is offset by several sinistral faults that trend north-south.





Fig 2.2: The GSI bedrock map showing the geology as the Bird Hill Formation.

## 2.2.2 Soils

The soil for the predominant part of the site is a layer of blanket peat on rock, with some Devonian sandstone till to the east of the site (Fig.2.3).





Fig. 2.3: The Teagasc soil map with blanket peat (brown), rock at surface (grey), and Devonian sandstone till (magenta).

## 2.2.3 Aquifers

The site of the Grousemount Wind Farm is described as a "Poor Aquifer – Bedrock which is Generally Unproductive except in Local Zones" (Fig.2.4).





Fig. 2.4: Aquifers map for the site. Green = Poor Aquifer – Bedrock which is Generally Unproductive except in Local Zones. Cyan = Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones.

## 2.2.4 Vulnerability

The vulnerability for the site is either high or extreme, and also contains sections where there is rock near to the surface (Fig.2.5).





Fig. 2.5: Vulnerability map for the site. Green = High. Pink = Extreme. Grey = Rock at or near the surface.



#### 2.3 Survey Rationale

The following techniques have been employed to achieve the objectives of the survey:

**Electrical Resistivity Tomography** (ERT) soundings will outline variations in overburden/bedrock type and depth to the top of the bedrock along profiles which were 62/93m in length. ERT profiles will also map any sharp lateral changes in bedrock topography, and changes in bedrock lithology.

**Seismic Refraction Profiling** will confirm the depth to the top of the bedrock based upon an increase in seismic velocity for the more competent rock, compared to less competent overburden. When combined with the resistivity method, it is possible to interpret variations in seismic velocity as variations in overburden / bedrock type.

The **MASW** method is used to estimate shear-wave (S-wave) velocities in the ground material to indicate possible soft zones. Overburden material with an S-wave velocity of <175 m/s is generally classified as soft. The depth of investigation for this method will depend on the source type and geophone spacing.

The **Soil Resistivity Measurements**, using the Wenner Array, as described in IEEE Std 81-1983 (Guide for measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Ground System) is a standard method used for measuring vertical variations in subsurface resistivity. These measurements are used in the design of earthing systems. For ESBI, the "A" spacings are used are 0.3, 0.5, 0.7, 1, 2, 3, 4, 5, 7, 10, 15, 20, 30, 40, 50, 60, 80 and 100m.



## 3. RESULTS

The findings from the investigation have been presented in ACAD Drawing No's AGL15080_T01_01 to AGL15080_T24_01 and corresponding A4 report tables.

## 3.1 ERT

Two orthogonal Electrical Resistivity Tomography (ERT) profiles were acquired at each turbine base. Each of the profiles were 62/93m in length, with a 2-3m electrode spacing, which image to a depth of 12-15m.

The resistivity values are in the range 100 - 2400 Ohm.m and the results and interpretation are shown in the Drawings AGL15080_T01_01 to AGL15080_T24_01.

Resistivity	Interpretation
100-314	Sandy Gravelly CLAY
314-985	GRAVEL
459-1700	SANDSTONE
214-673	SILTSTONE
100-214	SHALE

The resistivity data has been generally interpreted on the following basis:

## 3.2 Seismic Refraction Profiling

Two P-wave seismic refraction profiles were recorded at each of the turbine bases. These were each 23/46m in length with a 1-2m geophone spacing.

The locations are indicated on Drawings AGL15080_T01_01 to AGL15080_T24_01.

The tomographically processed seismic data indicates p-wave velocities in the range 250–4500 m/s for the twenty-four turbine bases over a depth range of 0-25m (Appendix B).



## 3.3 MASW

Two 1D MASW profiles were acquired with a 1m geophone spacing, and centered at each proposed turbine location.

Data was recorded to 1 second and 1D end shots for each profile were selected for office based data analysis.

The data describes the estimated stiffness of the overburden layers and velocity of the top of the top of rock.

The data shows S-wave velocities in the range 150-1200 m/s over a depth range of 1.5m – 11m bgl.

The results and interpretation are shown in detail in Appendix A (Turbine Summaries). For T02-T03, T06-T07, T10, T12-T14, T16, T19 and T22-T24 an insufficient surface wave was generated to allow MASS processing, which is sometimes the case in areas of very shallow bedrock. For these profiles the shear wave velocities were calculated from the seismic refraction results (all of excellent quality) using a Poissons Ratio of 0.46.

The following table summarises shear wave velocity, soil cohesion and bedrock type.



Fig.3.1. Shear-wave velocity and corresponding soil cohesion.



## 3.4 Soil Resistivity Testing

Soil resistivity measurements were taken at T02, T14, T17, T22 and R1 & R2 at the substation as follows:

T02 "A"	Resistance	Resistivity (Ohm-
Spacing	(ohms)	m)
0.3	105.6	198.95
0.5	100.5	315.57
0.7	95.75	420.92
1	101.5	637.42
2	93.03	1168.46
3	68.75	1295.25
4	52.6	1321.31
5	45.26	1421.16
7	39.6	1740.82
10	33.89	2128.29
15	25.34	2387.03
20	19.31	2425.34
30	14.38	2709.19
40	12.57	3157.58
50	12.06	3786.84
60	10.56	3979.01
80	9.142	4592.94
100		

T14 "A" Spacing	Resistance (ohms)	Resistivity (Ohm- m)
0.3	106.4	200.46
0.5	75.42	236.82
0.7	61.03	268.29
1	53.22	334.22
2	26.95	338.49
3	26.65	502.09
4	26.65	669.45
5	24.54	770.56
7	25.64	1127.13
10	21.32	1338.90
15	13.93	1312.21
20	10.66	1338.90
30	6.623	1247.77
40	5.431	1364.27
50	4.646	1458.84
60	4.063	1530.94
80	3.721	1869.43
100	3.51	2204.28



T17 "A"	Resistance	Resistivity (Ohm-
Spacing	(ohms)	m)
0.3	46.75	88.08
0.5	41.35	129.84
0.7	27.29	119.97
1	34.42	216.16
2	31.99	401.79
3	30.35	571.79
4	30.25	759.88
5	34.02	1068.23
7	28.72	1262.53
10	25.15	1579.42
15	22.22	2093.12
20	15.38	1931.73
30	10.85	2044.14
40	7.211	1811.40
50	4.858	1525.41
60	3.33	1254.74
80	2.841	1427.32
100	2.77	1739.56

T22 "A" Spacing	Resistance (ohms)	Resistivity (Ohm- m)
0.3	10.25	19.31
0.5	67.93	213.30
0.7	44.25	194.52
1	38.62	242.53
2	23.83	299.30
3	18.09	340.82
4	16.2	406.94
5	16.09	505.23
7	15.85	696.77
10	15.09	947.65
15	14.28	1345.18
20	10.5	1318.80
30	8.7	1639.08
40	8.5	2135.20
50	6.03	1893.42
60	6.01	2264.57
80	5.04	2532.10
100		



SUB-R1 "A"	Resistance	Resistivity (Ohm-
Spacing	(ohms)	m)
0.3	89.51	168.64
0.5	87.5	274.75
0.7	73.32	322.31
1	56.32	353.69
2	49.08	616.44
3	40.53	763.59
4	33.29	836.24
5	28.36	890.50
7	23.43	1029.98
10	18.7	1174.36
15	13.27	1250.03
20	12.16	1527.30
30	9.595	1807.70
40	8.68	2180.42
50	7.543	2368.50
60	6.366	2398.71
80	4.707	2364.80
100	3.61	2267.08

SUB-R2 "A" Spacing	Resistance (ohms)	Resistivity (Ohm- m)
0.3	117.6	221.56
0.5	102.5	321.85
0.7	90.72	398.81
1	67.18	421.89
2	54.51	684.65
3	42.54	801.45
4	35.5	891.76
5	31.68	994.75
7	27.76	1220.33
10	21.12	1326.34
15	15.38	1448.80
20	10.76	1351.46
30	10.04	1891.54
40	9.011	2263.56
50	7.503	2355.94
60	6.044	2277.38
80	4.626	2324.10
100	3.59	2254.52



#### 4. **REFERENCES**

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## 5. APPENDIX A: DRAWINGS & TURBINE SUMMARIES

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

T01			
AGL14327_T01_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 1:1250 1:750 1:750	@ A3 @ A3 @ A3 @ A3
AGL14327_T01_02	Geophysical Investigation Summary T01	A4 Sprea	adsheet
т02			
AGL14327_T002_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 1:2000 1:750 1:750	@ A3 @ A3 @ A3 @ A3
AGL14327_T02_02	Geophysical Investigation Summary T02	A4 Sprea	adsheet
Т03			
AGL14327_T03_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 1:1250 1:750 1:750	@ A3 @ A3 @ A3 @ A3
AGL14327_T03_02	Geophysical Investigation Summary T03	A4 Sprea	adsheet
Т04			
AGL14327_T04_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 1:1250 1:750 1:750	@ A3 @ A3 @ A3 @ A3
AGL14327_T04_02	Geophysical Investigation Summary T04	A4 Sprea	adsheet
T05			
AGL14327_T05_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 1:1250 1:750 1:750	@ A3 @ A3 @ A3 @ A3
AGL14327_T05_02	Geophysical Investigation Summary T05	A4 Sprea	adsheet


T06		
AGL14327_T06_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T06_02	Geophysical Investigation Summary T06	A4 Spreadsheet
<b>T07</b> AGL14327_T07_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T07_02	Geophysical Investigation Summary T07	A4 Spreadsheet
<b>T08</b> AGL14327_T08_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T08_02	Geophysical Investigation Summary T08	A4 Spreadsheet
<b>T09</b> AGL14327_T09_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:2000 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T09_02	Geophysical Investigation Summary T09	A4 Spreadsheet
<b>T10</b> AGL14327_T10_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T10_02	Geophysical Investigation Summary T10	A4 Spreadsheet
<b>T11</b> AGL14327_T11_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL1452/_111_02	Geophysical investigation Summary 111	A4 Spreausneet



T12		
AGL14327_T12_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:2000 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T12_02	Geophysical Investigation Summary T12	A4 Spreadsheet
<b>T13</b> AGL14327_T13_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T13_02	Geophysical Investigation Summary T13	A4 Spreadsheet
<b>T14</b> AGL14327_T14_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:20000 @ A3 1:2000 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T14_02	Geophysical Investigation Summary T14	A4 Spreadsheet
<b>T15</b> AGL14327_T15_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T15_02	Geophysical Investigation Summary T15	A4 Spreadsheet
<b>T16</b> AGL14327_T16_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T16_02	Geophysical Investigation Summary T16	A4 Spreadsheet
<b>T17</b> AGL14327_T17_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:2000 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T17_02	Geophysical Investigation Summary T17	A4 Spreadsheet

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T18		
AGL14327_T18_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T18_02	Geophysical Investigation Summary T18	A4 Spreadsheet
<b>T19</b> AGL14327_T19_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T19_02	Geophysical Investigation Summary T19	A4 Spreadsheet
<b>T20</b> AGL14327_T20_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T20_02	Geophysical Investigation Summary T20	A4 Spreadsheet
<b>T21</b> AGL14327_T21_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T21_02	Geophysical Investigation Summary T21	A4 Spreadsheet
<b>T22</b> AGL14327_T22_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:2000 @ A3 1:750 @ A3 1:750 @ A3
AGL14327_T22_02	Geophysical Investigation Summary T22	A4 Spreadsheet
<b>T23</b> AGL14327_T23_01	Fig.1 Grousemount Wind Farm Location Fig.2 Turbine Map Fig.3 ERT Profile R1 Fig.3 ERT Profile R2	1:40000 @ A3 1:1250 @ A3 1:750 @ A3 1:750 @ A3
AUL1452/_125_02	Geophysical investigation Summary 125	A4 Spreadsheet

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T24		
AGL14327_T24_01	Fig.1 Grousemount Wind Farm Location	1:40000 @ A3
	Fig.2 Turbine Map	1:1250 @ A3
	Fig.3 ERT Profile R1	1:750 @ A3
	Fig.3 ERT Profile R2	1:750 @ A3
AGL14327_T24_02	Geophysical Investigation Summary T24	A4 Spreadsheet
AGL14327 SUB 01	Fig.1 Grousemount Wind Farm Location	1:40000 @ A3
	Fig.2 Substation Map	1:2500 @ A3
	Fig.3 ERT Profile R1	1:750 @ A3
	Fig.3 ERT Profile R2	1:750 @ A3



# Geophysical Investigation Summary Drawing No. AGL15080_T01_01



Site	Grousemount Wind Farm
Turbine Base	T01

Location (ITM)	
Easting	509159
Northing	571592
Elevation (mOD)	314.5

Methodology	
Seismic Refraction	24 ch. @ 1m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*	incorpretation	Quality **	Excavatability
0.0	0.2	314	-	355	1200	-	-	-	-	PEAT		Diggable
0.2	1.7	1442	227	835	2000	0.46	103.39	0.30	5.54	Clayey GRAVEL/GRAVEL	MEDIUM DENSE	Diggable
1.7	2.6	1442	370	1470	2000	0.47	273.90	0.80	27.86	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.6	3.7	985	581	1993	2000	0.45	676.03	1.97	121.95	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.7	5.1	985	763	2540	2700	0.45	1573.92	4.57	490.00	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
5.1	6.8	673	867	3139	2700	0.46	2028.53	5.92	751.91	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
6.8	9.0	459	976	3638	2700	0.46	2570.41	7.51	1114.43	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
9.0	11.7	459	1184	3969	2700	0.45	3787.93	10.99	2088.96	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T02_01



Site	Grousemount Wind Farm
Turbine Base	т02

Location (ITM)	
Easting	509159
Northing	571592
Elevation (mOD)	338.5

Methodology	
Seismic Refraction	24 ch. @ 1m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated Excavatability
from	to	ohm M	S Wave	P Wave	kg/m ³		Dynamic	Dynamic	Static*		Quality **	
0.0	0.7	314	-	315	1200	-	-	-	-	PEAT		Diggable
0.7	1.3	1442	155	569	2000	0.46	48.02	0.14	1.56	Clayey GRAVEL/GRAVEL	LOOSE	Diggable
1.3	2.2	1442	391	1435	2000	0.46	305.05	0.89	33.05	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.2	3.1	1442	655	2405	2700	0.46	1156.75	3.38	298.05	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
3.1	3.9	1442	820	3011	2700	0.46	1813.88	5.30	626.10	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
3.9	4.8	1700	858	3153	2700	0.46	1988.60	5.81	728.70	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
4.8	7.5	1700	891	3272	2700	0.46	2141.79	6.25	823.61	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
7.5	9.3	1700	952	3496	2700	0.46	2444.57	7.14	1024.41	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T03_01



Site	Grousemount Wind Farm				
Turbine Base	Т03				
Turbine base	105				

Location (ITM)	
Easting	509346
Northing	571122
Elevation (mOD)	325.4

Methodology	
Seismic Refraction	24 ch. @ 1m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod MPa	Youngs Mod GPa	Youngs Mod MPa	Interpretation	Estimated Stiffness / Rock Quality **	Estimated Excavatability
Irom	ιο	ONTH IVI	S Wave	P Wave	kg/m		Dynamic	Dynamic	Static*			
0.0	0.5	314	-	371	1200	-	-	-	-	PEAT		Diggable
0.5	1.4	1442	194	713	2000	0.46	75.33	0.22	3.29	Clayey GRAVEL/GRAVEL	MEDIUM DENSE	Diggable
1.4	2.4	1442	401	1473	2000	0.46	321.70	0.94	36.08	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.4	3.3	1442	568	2086	2000	0.46	644.79	1.88	113.63	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.3	4.2	1442	602	2212	2700	0.46	978.64	2.86	226.19	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
4.2	5.2	985	646	2372	2700	0.46	1125.82	3.29	285.01	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
5.2	8.0	673	829	3045	2700	0.46	1854.38	5.41	649.34	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
8.0	10.0	673	979	3595	2700	0.46	2585.25	7.55	1123.49	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T04_01



Site	Grousemount Wind Farm
Turbine Base	T04

Location (ITM)	
Easting	509549
Northing	570741
Elevation (mOD)	306.4

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m) from	Depth (m) to	Resistivity ohm M	Avg. Ve S Wave	elocity (m/s) P Wave	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
0.0	0.4	314	-	306	1200	-	-	-	-	PEAT		Diggable
0.4	0.9	459	142	523	2000	0.46	40.47	0.12	1.18	Clayey GRAVEL/GRAVEL	LOOSE	Diggable
0.9	1.5	673	271	969	2000	0.46	146.96	0.43	9.88	Clayey GRAVEL/GRAVEL	DENSE	Diggable
1.5	2.2	673	264	1413	2000	0.48	139.70	0.41	9.34	Clayey GRAVEL/GRAVEL	DENSE	Diggable
2.2	4.5	985	364	2315	2500	0.49	331.29	0.99	39.05	Highly-Moderately Weathered SANDSTONE	POOR	Break / Blast
4.5	6.0	1442	454	2676	2700	0.49	555.74	1.65	91.46	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
6.0	8.8	1442	569	2863	2700	0.48	875.45	2.59	192.35	Slightly Weathered -Fresh SANDSTONE	FAIR	Break / Blast
8.8	11.0	1442	885	2992	2700	0.45	2115.21	6.14	799.57	Slightly Weathered -Fresh SANDSTONE	FAIR	Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T05_01



Site	Grousemount Wind Farm
Turbine Base	T05

Location (ITM)	
Easting	509824
Northing	570475
Elevation (mOD)	385.1

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	1.3	530	-	533	1200	-	-	-	-	PEAT		Diggable
1.3	2.0	673	388	604	2000	0.15	300.85	0.69	21.74	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.0	3.0	985	398	692	2000	0.25	316.65	0.79	27.31	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.0	3.9	1442	418	816	2000	0.32	349.26	0.92	35.08	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.9	5.3	1700	399	1014	2000	0.41	317.99	0.90	33.36	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
5.3	8.0	1700	426	1184	2500	0.43	454.59	1.30	61.35	Highly-Moderately Weathered SANDSTONE	VERY POOR	Rippable
8.0	11.0	1700	681	1520	2500	0.37	1158.44	3.18	270.45	Highly-Moderately Weathered SANDSTONE	VERY POOR	Rippable
11.0	13.2	1700	568	2085	2700	0.46	869.74	2.54	186.18	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
13.2	15.3	1700	652	2395	2700	0.46	1147.85	3.35	294.27	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Depth information taken at centre of base (closest accessible point)

#### Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

Recommendations



# Geophysical Investigation Summary Drawing No. AGL15080_T06_01



Site	Grousemount Wind Farm
Turbine Base	т06

Location (ITM)	
Easting	510155
Northing	570248
Elevation (mOD)	406.0

Methodology	
Seismic Refraction	24 ch. @ 1m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*	incorpretation	Quality **	Excavatability
0.0	0.5	530	-	300	1200	-	-	-	-	PEAT		Diggable
0.5	1.3	673	122	448	2000	0.46	29.70	0.09	0.71	Clayey GRAVEL/GRAVEL	VERY LOOSE to LOOSE	Diggable
1.3	2.2	985	318	1169	2000	0.46	202.47	0.59	16.81	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.2	3.1	1442	542	1993	2000	0.46	588.56	1.72	97.74	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.1	4.0	1700	789	2899	2700	0.46	1681.11	4.91	552.29	Slightly Weathered -Fresh SANDSTONE	FAIR	Break / Blast
4.0	4.9	1700	918	3371	2700	0.46	2273.24	6.64	908.66	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
4.9	7.6	1700	1040	3821	2700	0.46	2920.49	8.53	1373.85	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
7.6	11.4	1700	1134	4168	2700	0.46	3474.97	10.15	1830.23	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T07_01



Site	Grousemount Wind Farm
Turbine Base	T07
Turbine Base	107

Location (ITM)	
Easting	510088
Northing	569922
Elevation (mOD)	371.9

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.9	459	-	747	1200	-	-	-	-	PEAT		Diggable
0.9	2.2	673	397	1457	2000	0.46	314.71	0.92	34.79	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.2	3.1	985	524	1924	2000	0.46	548.70	1.60	87.06	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.1	4.0	1442	692	2543	2700	0.46	1294.01	3.78	358.62	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
4.0	4.9	1442	872	3204	2700	0.46	2053.03	5.99	768.05	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
4.9	5.8	1442	982	3607	2700	0.46	2603.25	7.60	1136.42	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
5.8	7.6	985	1088	3998	2700	0.46	3198.22	9.34	1596.01	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
7.6	11.4	673	1137	4178	2700	0.46	3491.34	10.19	1844.48	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T08_01



Site	Grousemount Wind Farm
Turbine Base	т08

Location (ITM)	
Easting	508860
Northing	569948
Elevation (mOD)	393.2

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.9	314	-	320	1200	-	-	-	-	PEAT		Diggable
0.9	1.7	459	111	408	2000	0.46	24.68	0.07	0.52	Clayey GRAVEL/GRAVEL	VERY LOOSE	Diggable
1.7	2.4	673	259	648	2000	0.40	134.56	0.38	8.03	Clayey GRAVEL/GRAVEL	DENSE	Diggable
2.4	3.3	985	465	784	2000	0.23	431.84	1.06	44.12	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.3	4.4	1442	579	1055	2000	0.28	669.70	1.72	97.94	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
4.4	5.8	1442	687	1864	2000	0.42	945.06	2.69	204.26	Slightly Weathered -Fresh SANDSTONE	VERY POOR	Break / Blast
5.8	7.6	1442	829	2787	2700	0.45	1854.02	5.38	642.92	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
5.8	7.6	1442	847	3111	2700	0.46	1936.22	5.65	697.29	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
7.6	9.5	1442	948	3481	2700	0.46	2424.03	7.08	1010.24	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

#### Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T09_01



Site	Grousemount Wind Farm
Turbine Base	т09

Location (ITM)	
Easting	508625
Northing	569548
Elevation (mOD)	380.1

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m) from	Depth (m) to	Resistivity ohm M	Avg. Ve S Wave	elocity (m/s) P Wave	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
0.0	0.5	459	-	375	1200	-	-	-	-	PEAT		Diggable
0.5	1.2	673	135	495	2000	0.46	36.35	0.11	0.99	Clayey GRAVEL/GRAVEL	VERY LOOSE to LOOSE	Diggable
1.2	1.8	673	285	681	2000	0.39	162.44	0.45	10.82	Clayey GRAVEL/GRAVEL	DENSE	Diggable
1.8	2.6	985	326	709	2000	0.37	212.69	0.58	16.33	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.6	3.5	1442	383	1043	2000	0.42	294.12	0.84	29.79	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.5	6.4	1442	454	1688	2500	0.46	515.68	1.51	78.68	Highly-Moderately Weathered SANDSTONE	VERY POOR	Rippable
6.4	8.4	985	597	2306	2700	0.46	962.89	2.82	221.23	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
8.4	11.7	985	864	3173	2700	0.46	2013.95	5.88	744.07	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T10_01



Site	Grousemount Wind Farm
Turbine Base	T10

Location (ITM)	
Easting	509105
Northing	569709
Elevation (mOD)	389.6

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m) from	Depth (m) to	Resistivity ohm M	Avg. Ve S Wave	elocity (m/s) P Wave	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
0.0	0.7	673	-	407	1200	-	-	-	-	PEAT		Diggable
0.7	1.4	985	133	489	2000	0.46	35.49	0.10	0.95	Clayey GRAVEL/GRAVEL	VERY LOOSE to LOOSE	Diggable
1.4	2.4	1442	250	918	2000	0.46	125.02	0.37	7.58	Clayey GRAVEL/GRAVEL	MEDIUM DENSE to DENSE	Diggable
2.4	3.3	1442	343	1259	2000	0.46	234.80	0.69	21.46	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.3	4.3	1442	425	1563	2000	0.46	361.87	1.06	43.81	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
4.3	5.5	1700	619	2273	2700	0.46	1033.49	3.02	247.48	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
5.5	6.7	1700	737	2708	2700	0.46	1467.37	4.28	441.29	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
6.7	9.3	1700	1046	3844	2700	0.46	2956.31	8.63	1401.76	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T11_01



Site	Grousemount Wind Farm
Turbine Base	T11

Location (ITM)	
Easting	508796
Northing	569240
Elevation (mOD)	403.0

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m elect. spacing
GPS	dGPS (< 1m accuracy)

Depth (m) from	Depth (m) to	Resistivity ohm M	Avg. Ve S Wave	elocity (m/s) P Wave	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
0.0	0.6	459	-	493	1200	-	-	-	-	PEAT		Diggable
0.6	1.7	763	166	610	2000	0.46	55.18	0.16	1.97	Clayey GRAVEL/GRAVEL	LOOSE to MEDIUM DENSE	Diggable
1.7	2.5	985	266	785	2000	0.44	141.58	0.41	9.05	Clayey GRAVEL/GRAVEL	DENSE	Diggable
2.5	3.4	1442	451	1124	2000	0.40	406.05	1.14	49.68	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.4	4.5	1442	639	1871	2000	0.43	817.18	2.34	163.06	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
4.5	6.0	1442	706	2451	2700	0.45	1345.46	3.91	380.20	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
6.0	7.5	985	836	3355	2700	0.47	1889.23	5.54	674.79	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
7.5	9.5	985	1045	3839	2700	0.46	2948.67	8.61	1395.79	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T12_01



Site	Grousemount Wind Farm
Turbine Base	T12

Location (ITM)	
Easting	509230
Northing	569320
Elevation (mOD)	460.1

Methodology	
Seismic Refraction	24 ch. @ 1&2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 2m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.7	985	-	576	1200	-	-	-	-	PEAT		Diggable
0.7	1.3	1442	314	1153	2000	0.46	197.07	0.58	16.07	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
1.3	2.2	1442	609	2238	2700	0.46	1002.12	2.93	235.21	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
2.2	3.1	1442	818	3004	2700	0.46	1805.29	5.27	621.21	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
3.1	4.0	1700	979	3598	2700	0.46	2590.13	7.56	1126.98	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
4.0	5.8	1700	1262	4635	2700	0.46	4298.56	12.55	2599.68	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
5.8	7.7	1700	1325	4866	2700	0.46	4737.41	13.83	3051.96	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
7.7	9.6	1700	1353	4972	2700	0.46	4946.15	14.44	3277.01	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T13_01



Site	Grousemount Wind Farm
Turbine Base	T13

Location (ITM)	
Easting	509651
Northing	569402
Elevation (mOD)	494.7

Methodology	
Seismic Refraction	24 ch. @ 1m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 2m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.4	695	-	424	1200	-	-	-	-	PEAT		Diggable
0.4	2.1	985	544	1997	2000	0.46	591.04	1.73	98.42	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.1	3.1	1442	848	3117	2700	0.46	1943.63	5.68	701.69	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
3.1	4.3	1442	862	3167	2700	0.46	2007.00	5.86	739.84	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
4.3	5.7	1700	953	3500	2700	0.46	2450.56	7.16	1028.55	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
5.7	7.5	1700	1034	3798	2700	0.46	2884.97	8.42	1346.39	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
7.5	9.7	1700	1096	4026	2700	0.46	3242.94	9.47	1633.00	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

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# Geophysical Investigation Summary Drawing No. AGL15080_T14_01



Site	Grousemount Wind Farm
Turbine Base	T14

Location (ITM)	
Easting	509339
Northing	568932
Elevation (mOD)	464.9

Methodology	
Seismic Refraction	24 ch. @ 1m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 2m & 3m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.7	673	-	456	1200	-	-	-	-	PEAT		Diggable
0.7	1.3	985	180	661	2000	0.46	64.75	0.19	2.56	Clayey GRAVEL/GRAVEL	LOOSE to MEDIUM DENSE	Diggable
1.3	2.2	1442	233	857	2000	0.46	108.72	0.32	6.02	Clayey GRAVEL/GRAVEL	MEDIUM DENSE	Diggable
2.2	3.1	1700	275	1010	2000	0.46	151.09	0.44	10.37	Clayey GRAVEL/GRAVEL	DENSE	Diggable
3.1	4.0	1700	308	1133	2000	0.46	190.14	0.56	15.15	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
4.0	5.7	1700	366	1343	2500	0.46	333.99	0.98	38.38	Highly-Moderately Weathered SANDSTONE	VERY POOR	Rippable
5.7	7.6	1700	579	2126	2700	0.46	904.12	2.64	198.48	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
7.6	9.4	1700	854	3139	2700	0.46	1970.84	5.75	717.98	Slightly Weathered -Fresh SHALE	FAIR	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T15_01



Site	Grousemount Wind Farm
Turbine Base	T15

Location (ITM)	
Easting	509055
Northing	568536
Elevation (mOD)	452.8

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 2m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.2	673	-	228	1200	-	-	-	-	PEAT		Diggable
0.3	1.3	985	74	272	2000	0.46	10.94	0.03	0.14	Clayey GRAVEL/GRAVEL	VERY LOOSE	Diggable
1.3	2.4	1442	132	485	2000	0.46	34.79	0.10	0.92	Clayey GRAVEL/GRAVEL	VERY LOOSE to LOOSE	Diggable
2.4	3.5	1442	326	591	2000	0.28	212.06	0.54	14.63	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.5	4.8	1700	344	732	2000	0.36	236.54	0.64	19.28	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
4.8	6.4	1700	406	958	2000	0.39	329.79	0.92	34.68	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
6.4	8.6	1700	535	1292	2500	0.40	714.95	2.00	125.22	Highly-Moderately Weathered SANDSTONE	VERY POOR	Rippable
8.6	11.0	1700	675	1724	2500	0.41	1139.47	3.21	274.31	Highly-Moderately Weathered SANDSTONE	VERY POOR	Rippable
11.0	13.3	1700	587	2155	2700	0.46	929.18	2.71	207.63	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

#### Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.

T15
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# Geophysical Investigation Summary Drawing No. AGL15080_T16_01



Site	Grousemount Wind Farm
Turbine Base	T16

Location (ITM)	
Easting	507371
Northing	568711
Elevation (mOD)	403.7

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.3	673	-	365	1200	-	-	-	-	PEAT		Diggable
0.3	1.3	985	147	539	2000	0.46	43.04	0.13	1.31	Clayey GRAVEL/GRAVEL	LOOSE	Diggable
1.3	2.1	1442	204	750	2000	0.46	83.30	0.24	3.88	Clayey GRAVEL/GRAVEL	MEDIUM DENSE	Diggable
2.1	2.9	1442	265	972	2000	0.46	140.04	0.41	9.15	Clayey GRAVEL/GRAVEL	DENSE	Diggable
2.9	3.8	1700	314	1153	2000	0.46	196.89	0.57	16.05	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.8	4.7	1700	374	1373	2000	0.46	279.17	0.82	28.55	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
4.7	5.5	1700	458	1681	2000	0.46	418.79	1.22	55.75	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
4.7	7.2	1700	627	2303	2700	0.46	1061.11	3.10	258.49	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
5.5	9.1	1700	907	3332	2700	0.46	2220.61	6.48	874.21	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

#### Bedrock Geology - GSI 1:100k shapefile

	• T1
Û₪	T2 *
	Т3 Т4
т22	· · · · · · · · · · · · · · · · · · ·
T24 * T23 *	T21 . T5
•	
¹²⁰ Bird	Hill Formation V
<u>500m</u>	• • • • • • • • • • • • • • • • • • •
	T9 •
. T19	T11 T12 . T13
T18	2
T17 * *	° T14
• ^{T16}	
	T15
Discussion	
Discussion	115

According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.


# Geophysical Investigation Summary Drawing No. AGL15080_T17_01



Site	Grousemount Wind Farm
Turbine Base	T17

Location (ITM)	
Easting	507145
Northing	568973
Elevation (mOD)	455.2

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Bock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*	interpretation	Quality **	Excavatability
0.0	0.2	673	-	317	1200	-	-	-	-	PEAT		Diggable
0.2	2.0	985	99	363	2000	0.46	19.52	0.06	0.35	Clayey GRAVEL/GRAVEL	VERY LOOSE	Diggable
2.0	2.9	1442	217	674	2000	0.44	94.26	0.27	4.66	Clayey GRAVEL/GRAVEL	MEDIUM DENSE	Diggable
2.9	3.9	1442	218	985	2000	0.47	95.42	0.28	4.93	Clayey GRAVEL/GRAVEL	MEDIUM DENSE	Diggable
3.9	5.2	1700	332	1330	2000	0.47	220.64	0.65	19.51	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
5.2	6.9	1700	485	1855	2700	0.46	635.58	1.86	111.38	Slightly Weathered -Fresh SANDSTONE	VERY POOR	Break / Blast
6.9	8.9	1700	604	2568	2700	0.47	983.84	2.89	230.95	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
8.9	11.1	1700	916	3230	2700	0.46	2265.79	6.60	899.95	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T18_01



Site	Grousemount Wind Farm
Turbine Base	T18
	-

Location (ITM)	
Easting	507539
Northing	569063
Elevation (mOD)	408.8

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m) from	Depth (m) to	Resistivity ohm M	Avg. Ve S Wave	elocity (m/s) P Wave	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
0.0	0.2	673	-	211	1200	-	-	-	-	PEAT		Diggable
0.2	1.6	985	90	331	2000	0.46	16.26	0.05	0.26	Clayey GRAVEL/GRAVEL	VERY LOOSE	Diggable
1.6	2.6	1442	246	953	2000	0.46	120.93	0.35	7.21	Clayey GRAVEL/GRAVEL	MEDIUM DENSE to DENSE	Diggable
2.6	3.6	1442	267	1550	2000	0.48	142.72	0.42	9.70	Clayey GRAVEL/GRAVEL	DENSE	Diggable
3.6	4.8	1700	362	2072	2000	0.48	261.87	0.78	26.40	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
4.8	6.3	1700	477	2883	2700	0.49	614.81	1.83	108.14	Slightly Weathered -Fresh SANDSTONE	FAIR	Break / Blast
6.3	8.2	1700	599	3443	2700	0.48	969.54	2.88	228.90	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
8.2	10.1	1700	946	3500	2700	0.46	2416.54	7.06	1005.77	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T19_01



Site	Grousemount Wind Farm
Turbine Base	T19

Location (ITM)	
Easting	507329
Northing	569308
Elevation (mOD)	461.5

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 2m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.3	673	-	578	1200	-	-	-	-	PEAT		Diggable
0.3	1.4	985	361	1327	2000	0.46	260.79	0.76	25.52	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
1.4	2.3	1442	522	1916	2000	0.46	543.93	1.59	85.82	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.3	3.2	1442	755	2772	2700	0.46	1537.21	4.49	476.48	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
3.2	4.1	1700	849	3117	2700	0.46	1944.15	5.68	702.00	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
4.1	5.0	1700	882	3241	2700	0.46	2101.45	6.14	798.16	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
5.0	7.8	1700	1058	3889	2700	0.46	3024.86	8.83	1455.79	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
7.8	9.6	1700	1143	4200	2700	0.46	3528.90	10.30	1877.33	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T20_01



Site	Grousemount Wind Farm
Turbine Base	T20

Location (ITM)	
Easting	507610
Northing	570305
Elevation (mOD)	369.8

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m) from	Depth (m) to	Resistivity ohm M	Avg. Ve S Wave	elocity (m/s) P Wave	Assumed Density kg/m ³	Poissons Ratio	Shear Mod	Youngs Mod GPa	Youngs Mod MPa	Interpretation	Estimated Stiffness / Rock Quality **	Estimated Excavatability
		-					Dynamic	Dynamic	Static*			
0.0	0.3	673	-	419	1200	-	-	-	-	PEAT		Diggable
0.3	1.3	985	196	531	2000	0.42	76.89	0.22	3.25	Clayey GRAVEL/GRAVEL	MEDIUM DENSE	Diggable
1.3	2.5	1442	234	673	2000	0.43	109.83	0.31	5.93	Clayey GRAVEL/GRAVEL	MEDIUM DENSE	Diggable
2.5	3.5	1442	319	765	2000	0.39	203.76	0.57	15.74	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.5	4.8	1700	435	871	2000	0.33	378.14	1.01	40.58	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
4.8	6.4	1700	533	1218	2000	0.38	567.18	1.57	83.99	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
6.4	8.5	1700	628	1836	2700	0.43	1065.66	3.06	252.64	Slightly Weathered -Fresh SANDSTONE	VERY POOR	Break / Blast
8.5	11.0	1700	703	2582	2700	0.46	1334.19	3.90	377.18	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T21_01



Site	Grousemount Wind Farm
Turbine Base	T21
	-

Location (ITM)	
Easting	507993
Northing	570504
Elevation (mOD)	350.6

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated Excavatability
from	to	ohm M	S Wave	P Wave	kg/m ³		Dynamic	Dynamic	Static*		Quality **	
0.0	0.1	314	-	523	1200	-	-	-	-	PEAT		Diggable
0.1	0.9	673	257	946	2000	0.46	132.51	0.39	8.35	Clayey GRAVEL/GRAVEL	DENSE	Diggable
0.9	1.5	985	270	1327	2000	0.48	145.97	0.43	10.00	Clayey GRAVEL/GRAVEL	DENSE	Diggable
1.5	2.2	1442	337	1933	2000	0.48	226.90	0.67	20.84	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.2	3.2	1442	464	2502	2700	0.48	580.28	1.72	97.90	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
3.2	4.4	1442	544	3165	2700	0.48	799.66	2.37	166.64	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
4.4	7.8	985	723	3675	2700	0.48	1411.92	4.18	423.46	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
7.8	10.0	985	916	3799	2700	0.47	2266.69	6.66	913.69	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

S wave values in italics have been calculated from the P wave results, assuming a Poissons Ratio of 0.46

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

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T22_01



Site	Grousemount Wind Farm
Turbine Base	T22

Location (ITM)	
Easting	507484
Northing	570624
Elevation (mOD)	396.0

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	2.0	314	-	590	1200	-	-	-	-	PEAT		Diggable
2.0	3.1	459	390	1432	2000	0.46	303.89	0.89	32.84	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
3.1	4.0	673	422	1551	2000	0.46	356.42	1.04	42.72	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
4.0	4.8	985	549	2016	2700	0.46	812.74	2.37	166.48	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
4.8	5.7	1442	636	2335	2700	0.46	1090.62	3.18	270.46	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
5.7	7.5	1442	981	3602	2700	0.46	2595.77	7.58	1131.03	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
7.5	9.4	1442	1141	4193	2700	0.46	3516.41	10.27	1866.38	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T23_01



Site	Grousemount Wind Farm
Turbine Base	T23

Location (ITM)	
Easting	507110
Northing	570648
Elevation (mOD)	386.0

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.8	459	-	1184	1200	-	-	-	-	PEAT		Diggable
0.8	1.3	673	526	1933	2000	0.46	553.49	1.62	88.32	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
1.3	2.1	985	560	2056	2000	0.46	626.70	1.83	108.42	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.1	3.0	1442	643	2364	2700	0.46	1117.79	3.26	281.66	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
3.0	3.9	1442	781	2870	2700	0.46	1647.99	4.81	534.45	Slightly Weathered -Fresh SANDSTONE	FAIR	Break / Blast
3.9	4.7	1442	852	3131	2700	0.46	1960.77	5.73	711.93	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
4.7	7.4	1442	965	3547	2700	0.46	2516.83	7.35	1074.84	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
7.4	9.2	1442	1143	4200	2700	0.46	3529.74	10.31	1878.07	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.



# Geophysical Investigation Summary Drawing No. AGL15080_T24_01



Site	Grousemount Wind Farm
Turbine Base	T24

Location (ITM)	
Easting	507110
Northing	570648
Elevation (mOD)	386.0

Methodology	
Seismic Refraction	24 ch. @ 2m geophones
MASW	24 ch. @ 1m geophones
ERT	32 el. @ 3m electrodes
GPS	dGPS (< 1m accuracy)

Depth (m)	Depth (m)	Resistivity	Avg. Ve	elocity (m/s)	Assumed Density	Poissons Ratio	Shear Mod	Youngs Mod	Youngs Mod	Interpretation	Estimated Stiffness / Rock	Estimated
from	to	ohm M	S Wave	P Wave	kg/m ³		MPa Dynamic	GPa Dynamic	MPa Static*		Quality **	Excavatability
0.0	0.8	673	-	602	1200	-	-	-	-	PEAT		Diggable
0.8	2.2	985	333	1223	2000	0.46	221.70	0.65	19.52	Clayey GRAVEL/GRAVEL	VERY DENSE	Diggable
2.2	3.1	1442	615	2260	2700	0.46	1021.53	2.98	242.77	Slightly Weathered -Fresh SANDSTONE	POOR	Break / Blast
3.1	4.0	1442	908	3337	2700	0.46	2227.16	6.50	878.47	Slightly Weathered -Fresh SANDSTONE	FAIR	Heavy Break / Blast
4.0	4.9	1442	992	3644	2700	0.46	2656.32	7.76	1174.89	Slightly Weathered -Fresh SANDSTONE	GOOD	Heavy Break / Blast
4.9	5.7	1442	1100	4041	2700	0.46	3266.58	9.54	1652.69	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
5.7	7.6	1442	1132	4160	2700	0.46	3462.37	10.11	1819.29	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast
7.6	9.5	1442	1143	4200	2700	0.46	3528.90	10.30	1877.33	Slightly Weathered -Fresh SANDSTONE	EXCELLENT	Heavy Break / Blast

Due to the insufficent development of surface waves, the above S wave values have been calculated from the P wave results, assuming a Poissons Ratio of 0.46 * converted to static equivalent using empirical correlation from van Heerden, 1987.

** correlation from Imai et al, 1976

*** from Deere et al, 1967

Recommendations

Depth information taken at centre of base (closest accessible point)

Bedrock Geology - GSI 1:100k shapefile



According to the GSI 1:100k Bedrock Geology map the Grousemount Wind Farm site is underlain by the Bird Hill Formation. This is described as purple siltstone and fine sandstone.





#### 6. APPENDIX B: SEISMIC PLATES

The following figures show the seismic refraction data acquired at each of the fourteen proposed turbine bases:



Fig.6.1. Tomographic Inversion of Profile S1 at Turbine Base T01.



Fig.6.2. Tomographic Inversion of Profile S2 at Turbine Base T01.





Fig.6.3. Tomographic Inversion of Profile S1 at Turbine Base T02.



Fig.6.4. Tomographic Inversion of Profile S2 at Turbine Base T02.





Fig.6.5. Tomographic Inversion of Profile S1 at Turbine Base T03.



Fig.6.6. Tomographic Inversion of Profile S2 at Turbine Base T03.





Fig.6.7. Tomographic Inversion of Profile S1 at Turbine Base T04.



Fig.6.8. Tomographic Inversion of Profile S2 at Turbine Base T04.





Fig.6.9. Tomographic Inversion of Profile S1 at Turbine Base T05.



Fig.6.10. Tomographic Inversion of Profile S2 at Turbine Base T05.





Fig.6.11. Tomographic Inversion of Profile S1 at Turbine Base T06.



 Distance (m)

 Fig.6.12. Tomographic Inversion of Profile S2 at Turbine Base T06.





Fig.6.13. Tomographic Inversion of Profile S1 at Turbine Base T07.



Fig.6.14. Tomographic Inversion of Profile S2 at Turbine Base T07.





Fig.6.15. Tomographic Inversion of Profile S1 at Turbine Base T08.



Fig.6.16. Tomographic Inversion of Profile S2 at Turbine Base T08.





Fig.6.17. Tomographic Inversion of Profile S1 at Turbine Base T09.









Fig.6.19. Tomographic Inversion of Profile S1 at Turbine Base T10.



Fig.6.20. Tomographic Inversion of Profile S2 at Turbine Base T10.





Fig.6.21. Tomographic Inversion of Profile S1 at Turbine Base T11.



Fig.6.22. Tomographic Inversion of Profile S2 at Turbine Base T11.





Fig.6.23. Tomographic Inversion of Profile S1 at Turbine Base T12.



Fig.6.24. Tomographic Inversion of Profile S2 at Turbine Base T12.





Fig.6.25. Tomographic Inversion of Profile S1 at Turbine Base T13.



Fig.6.26. Tomographic Inversion of Profile S2 at Turbine Base T13.





Fig.6.27. Tomographic Inversion of Profile S1 at Turbine Base T14.



Fig.6.28. Tomographic Inversion of Profile S2 at Turbine Base T14.





Fig.6.29. Tomographic Inversion of Profile S1 at Turbine Base T15.



Fig.6.30. Tomographic Inversion of Profile S2 at Turbine Base T15.





Fig.6.31. Tomographic Inversion of Profile S1 at Turbine Base T16.



Fig.6.32. Tomographic Inversion of Profile S2 at Turbine Base T16.





Fig.6.33. Tomographic Inversion of Profile S1 at Turbine Base T17.



 Distance (m)

 Fig.6.34. Tomographic Inversion of Profile S2 at Turbine Base T17.





Fig.6.35. Tomographic Inversion of Profile S1 at Turbine Base T18.



Fig.6.36. Tomographic Inversion of Profile S2 at Turbine Base T18.





Fig.6.37. Tomographic Inversion of Profile S1 at Turbine Base T19.



Fig.6.38. Tomographic Inversion of Profile S2 at Turbine Base T19.




Fig.6.39. Tomographic Inversion of Profile S1 at Turbine Base T20.



Fig.6.40. Tomographic Inversion of Profile S2 at Turbine Base T20.





Fig.6.41. Tomographic Inversion of Profile S1 at Turbine Base T21.



Fig.6.42. Tomographic Inversion of Profile S2 at Turbine Base T21.





Fig.6.43. Tomographic Inversion of Profile S1 at Turbine Base T22.



Fig.6.44. Tomographic Inversion of Profile S2 at Turbine Base T22.





Fig.6.45. Tomographic Inversion of Profile S1 at Turbine Base T23.



Fig.6.46. Tomographic Inversion of Profile S2 at Turbine Base T23.





Fig.6.47. Tomographic Inversion of Profile S1 at Turbine Base T24.



Fig.6.48. Tomographic Inversion of Profile S2 at Turbine Base T24.



# 7. APPENDIX C: DETAILED METHODOLOGY

A combination of a number of geophysical techniques was used to provide the high quality interpretation and reduce any ambiguities, which may otherwise exist. The data was acquired from  $16^{rd}$  April to  $21^{st}$  May 2015.

# 7.1 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.

# 7.1.1 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. The 2D-resistivity profiling method involves the use of 32 electrodes connected to a resistivity meter, using computer software to control the process of data collection and storage.



# 7.1.2 Data Collection

Profiles were recorded using a Tigre resistivity meter, imaging software, one 32 takeout multicore cable and up to 32 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 survey. A 2-3m electrode spacing was used throughout, with each profile 62-93m in length which has a depth of penetration of 12-15m. Two orthogonal profiles were acquired at each of the turbine bases.

# 7.1.3 Data Processing

The field readings were stored in computer files and inverted using the RES2DINV package (Campus Geophysical Instruments, 1997) 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. Distance is indicated along the



horizontal axis of the profiles. Profiles have been contoured using the same contour intervals and colour codes.

# 7.2 Seismic refraction profiling

#### 7.2.1 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 (Vp) of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher Vp velocities while soft, loose or fractured materials have lower Vp velocities. Readings are taken using geophones connected via multicore cable to a seismograph.

# 7.2.2 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 (1-2m spacing). Equipment was carried was operated by a two-person crew. Two orthogonal profiles were acquired at each of the turbine bases.

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. 46m profile ~16m depth, 23m profile ~ 11m depth)

Shots from seven different positions were taken (2 x off-end, 2 x end, 3 x middle) to ensure optimum coverage of all refractors. All profiles were surveyed to Irish National Grid using a ProXR dGPS system.





# 7.2.3 Data Processing

The recorded data was interpreted using the ray-tracing and tomographic inversion methods, to acquire depths to layer boundaries and the P-wave velocities of these layers, using the SeisImager/2D programme from Geometrics.

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

The time-term method uses a least squares approach to calculate delay times to determine a discrete layer solution for the data.

In the reciprocal method delay times are calculated manually to also determine a discrete layer solution for the data.

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.

#### 7.3 Multichannel Analysis of Surface Waves (MASW)

MASW profiling was carried out to provide information on overburden material stiffness or density and on the bedrock quality.

# 7.3.1 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 the 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,

(v)the dispersion curve in inverted using a modeling and least squares minimization process to produce a subsurface profile of the variation of Surface wave and shear wave velocity with depth.

#### 7.3.2 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. Two orthogonal profiles were acquired at each of the turbine bases, with a 1m geophone spacing.



#### 7.3.3 Data Processing

MASW processing was carried out using the SURFSEIS processing package developed by Kansa 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.

#### 7.3.4 Relocation

All data were referenced using a ProXR dGPS system with sub 1m accuracy. All positions within this report are given in ITM coordinates.

#### 7.4 Soil Resistivity

#### 7.4.1 Principles

The method used is the four point method as described in IEEE Std 81-1983 (Guide for measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Ground System); with a modification in the "a" spacings as detailed below as specified by the client ESBi.

This method utilizes the equally spaced Wenner Array to determine the apparent resistivity of the ground material using four electrodes placed in a line in the ground and a current is passed through the two outer electrodes. The potential difference (V) is measured across the two inner electrodes. The measured potential is divided by the current value (I) to obtain the resistance (R) using the following formula: V/I=R.

The resistivity is determined from the measured resistance at each electrode spacing using the following standard formula for the Wenner array:

Resistivity (ohm-m) n = R * 2 * Pi * inter-electrode spacing.

Single measurements were taken with the four electrodes having inter-electrode separations ('a' spacing) of 0.3, 0.5, 0.7, 1, 2, 3, 4, 5, 7, 10, 15, 20, 30, 40, 50, 60, 80 and 100m.

(IEEE Std 81-1983 states that use of an electrode spacing of a m gives approximately the average resistivity of the soil to a m, although general geophysical experience indicates that the effective depth of penetration for the Wenner array is approximately a/2 m).

# 7.4.2 Data Collection

One set of Soil Resistivity Measurements were recorded at turbines T2, T14, T17 & T22, with two sets at the substation location.

#### 7.4.3 Data Processing

The field readings were converted to apparent resistivities using the formula Resistivity = R * 2 * Pi *a where :

- R = measured resistance (ohms)
- a = inter-electrode spacing



# 7.4.4 Relocation

All data were referenced using a Pro-XR GPS system with c.1m accuracy.

# Appendix 3

Site Plan / Drawings

	E	N	Elev.
TP064	509224	571490	318.441
TP065	509261.7	571415.7	327.62
TP066	509335	571196	337.35
TP067	509459	571056	319.319
TP068	509575.8	570995.7	328.692
TP069	509623.1	570943.1	325.644
TP070	509713.1	570894.9	327.201
TP071	509671	570803	325.751
TP073	509766	570774	342.099
TP074	509823	570692	357.382
TP075	509885.9	570614	377.361
TP076	509929	570524	390.083
TP077	509975	570435	401.729
TP078	510017.9	570345	402.77
TDU88	509762	5600/5	3/18 009
	509702	560020	353 611
	509052.3	569908 5	361 167
11090	505552.5	505508.5	501.107
TP094	509538	569776.1	350.007
TP095	509446	569714	366.967
TP096			
TP097	509260.9	569639	387.68
TP098	509158	569647	391.584
TP099	509057	569795	387.31
TP100	508972	569865	393.376
TP101	509065.9	569686	396.847
TP102	508983.1	569750	396.955
TP103	508885.9	569779	397.006
TP104	508793	569755	391.804
TP105	508726	569686.1	387.241
TP106	508954.8	569686	401.188
TP107	508913.2	569615.1	401.812
TP108	508882.6	569524.9	402.972
TP109	508947.9	569442.9	412.014
TP110	509034.9	569395.1	426.618
TP111	509112.8	569347.1	439.982
TP112	508963.2	569317.7	421.721
TP113	508991.1	569223	424.485
TP114	509058	569150.9	427.957
TP115	509118	569067.1	430.07
TP116	509174.1	568975.8	434.473
TP117	509229.5	568883.4	446.359
TP118	509255.6	568815.7	452.81
TP119	509261.7	568741	459.188
TP120	509193.6	568677.4	457.16
TP121	509126.1	568594	458.915
TP122	509385	568995	471.48
TP123	509438	569079.9	478.083
TP124	509474.5	569162.7	487.501
TP125	509527	569237	487.574
TP126	509566.1	569312.9	489.38
TP127	508839.2	569448	404.608

TP128	508816.2	569339	404.066
TP129	508750.6	569159.8	392.109
TP130	508751.7	569058.4	384.909
TP131	508687.3	568932.9	364.065
TP132	508718.1	568865.9	360.44
TP133	508635.9	568809.8	341.279
TP134	508549.9	568762	333.792
TP135	508450	568741	324.539
TP136	508359	568701	317.068
TP137	508271	568649	322.08
TP138	508182.1	568601	335.782
TP139	508091.1	568564.1	342.941
TP140	507991	568570	338.379
TP141	507898.1	568603.6	325.913
TP142	507797.8	568600.9	338.276
TP143	507700.9	568586	347.583
TP144	507598	568607	365.695
TP145	507488	568608.1	378.776
TP146	507312	568765	418.993
TP147	507206	568787.1	434.645
TP148	507259	568895.7	439.812
TP149	507368.1	568892.9	425.262
TP150	507388.2	568968.1	432.384
TP151	507106 9	568815	450 44
TP152	507024.6	568828.8	462,161
TP153	506997 7	568897.2	466 809
TP154	506955.5	568976 1	472.4
TP155	507185.1	569035.5	464.461
TP156	507253	569151	465 517
TP157	507174.8	569122.4	473.798
TP158	507084.2	569200	490 331
TP159	506997 5	569211 9	500 434
TP160	506904.4	569274 1	512 344
TP161	506817.5	569308.8	524.475
TP162	506752.7	569387.8	535 749
TP163	506715.9	569463.2	543,535
TP164	506695.5	569550.3	547,985
TP165	506660 5	569647 1	544 949
TP166	506645 1	569739.2	532 316
TP167	506710 5	569789	518 608
TP168	506732.1	569897	503 888
TP169	506747 7	569985 7	491 734
TP170	506852.1	570103 5	493 667
TP171	506942.8	570243	473.2
TP172	507026.4	570245	461 727
TP173	507020.4	570323 4	443 075
TP174	5072113	570373 7	425 216
TP175	507294.2	570425.2	404 809
TP176	507390.9	570451.6	395 457
TP177	507488 7	570475	394 659
TP178	507588 3	570495.4	392 396
TP179	507664 7	570553	388 672
TP180	507726 1	57059/ /	385 454
TP181	507821 /	570626.7	377 902
TP187	507914.4	570680 6	371 287
TD102	507914.1	570607 0	363 884
1F 100 TD10/	500027	570651 7	355 166
TP185	508000	570558 2	348 871
11 100	500044.3	2,0220.2	570.074

TP186	507906.5	570413.8	348.315
TP187	507801.2	570384.4	358.255
TP188	507720.8	570335	361.552
TP189	507601.6	570633.6	397.45
TP190	507421.8	570643	393.77
TP191	507317.7	570654.7	385,489
TP192	507225.4	570695.7	376.924
TP193	507038.6	570663.9	396.537
TP194	506938.5	570667.4	399.517
TP195	00000000	0,000,11	0001017
TP196	5076694	570668 7	393 872
TP197	507580 5	570705.8	394 705
TD108	507/81 1	570729.3	382 571
TD100	507382.7	570725.8	379 087
TD200	E07377 0	570725.0	272.007
TF 200	507277.0	570722.0	271 07
TP201	507175.0	570755.5	371.07
	50/0//.2	570752.2	3/0.2/1
TP205	500979.0 E0607E 1	570753.9	270 10E
TP204	500675.1	570705.4	379.103
TP205	500/09.0	570762.6	302.301 255 116
TP200	500072.2		353.110
TP207	506579.3	5/0/65.3	350.703
TP208	506465.3	5/0/58.3	339.98
TP209	506368.6	5/0/63./	337.84
TP210	506274.6	5/0//5.4	333.464
TP211	506168.2	570762.3	334.387
TP212	506068.2	570760.7	336.463
TP213	505981.5	570770.8	339.499
TP214	505890	570820.3	342.152
TP215	505856.5	570903.6	345.597
TP216	505857.7	570991.7	348.527
TP217	505937.7	571042.7	348.013
TP218	506025.2	571096.9	346.371
TP219			
TP220			
TP221			
TP222			
TP223			
TP224			
TP225			
TP226			
TP227			
TP228			
TP229			
TP230			
TP231			
TP232			

TPB001	509867	570495	387.423
TPB004	508349.8	568636.5	334.379
TPB005	506762.8	570062.5	494.695
TPB006	506826.3	570043.2	492.4
TPB007	506857.2	570182.7	483.498
TPB008	506911.1	570146.3	495.052
TPT001	509175	571570.9	314.129
TPT002	509277.1	571309.5	339.233
TPT003	509369	571100	324.96
TPT004			
TPT005	509833.9	570492	384.785
TPT006	510139.9	570255.9	405.105
TPT007	510054.6	569917.9	368.328
TPT008	508884.5	569921.6	395.835
TPT009	508634.7	569564.6	380.938
TPT010	509093.5	569730.7	389.909
TPT011	508800.9	569250.9	403.578
TPT012	509206.8	569326.2	453.921
TPT013	509637	569384.9	492.984
TPT014	509316	568913	459.138
TPT015	509071.9	568548.1	452.797
TPT016	507397.1	568681.1	397.608
TPT017	507110.3	568974.1	459.903
TPT018	507513.2	569026.9	414.238
TPT019	507320.7	569285.3	464.063
TPT020	507620.7	570307	370.437
TPT021	507972.4	570471.2	349.275
TPT022	507524.5	570619.4	398.216
TPT023	507134.5	570664.2	384.427
TPT024	506734.1	570566.2	401.084



# **APPENDIX D**

# **Correspondence from Byrne Looby**



19th August 2015

Ref: B1323/2_GEO_L01_01

# **BY E-MAIL**

Ms. Susan Stack, ESB International.

# Re: Grousemount Wind Farm – High Level Review

Dear Susan,

ESB International (ESBI) have requested that ByrneLooby carry out a high level review of their Peat Stability Risk Assessment (PSRA) for the proposed Grousemount Wind Farm in County Kerry.

ESBI have requested a high level review of their PSRA, with ByrneLooby to review a selection of the proposed roads and turbines in areas deemed most onerous in terms of peat stability. ESBI have not assessed any of the areas where peat was found to be less than 0.5m deep during the trial pit investigations. The following defines the scope of the review which is presented in this letter:

- The basis of the Peat Stability Risk Assessment.
- Adequacy of the mitigation measures in relation to peat storage
- Comment on the conclusions and recommendations
- Comment on the factual information in the PSRA worksheets

# Statement of Expertise:

ByrneLooby have over 15 years' experience of design and risk mitigation in upland peat environments on Wind Farms and other developments in Ireland and abroad. The site walkover survey for Grousemount Wind Farm was carried out by an engineer from ByrneLooby with more than 5 years similar experience of peat stability assessments for wind farms in Ireland. The project director for the works has over 20 years' experience of similar projects in both design and expert witness roles.

# Initial Comment:

Following the high level review, ByrneLooby can confirm that ESBI's overarching approach to the preliminary stage PSRA has used industry best practice in line with the recommendations of the Scottish Executive document titled 'Peat Landslide Hazard and Risk Assessment: Best Practice Guide for Proposed Electricity Generation Developments' (2006). This included targeted site investigations which considered all the proposed infrastructure, site drainage considerations and minimisation of risk.

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The preliminary work which has been carried will allow development of a geotechnical risk register and detailed design of the proposed wind farm while minimising risk of peat instability in line with industry best practice. This approach should be continued into the detailed design stage.

# Information Provided:

In terms of ground investigations, the majority of the planned trial pits and a number of peat probes have been carried out and made available to ByrneLooby for the purposes of the review. Rotary coring is currently being carried out, with results not yet available for review.

Byrne Looby have been provided with the following information by ESBI for the purposes of carrying out the PSRA review:

- ESBI drawings as follows;
  - Barnastooka Wind Farm Site Location Map W78035-F105-010-D-0002_0
  - Barnastooka Wind Farm Site Investigation Locations W78035-F105-010-D-0003_1
  - Grousemount Wind Farm Site Location Map W78035-F105-010-D-0004_0
  - Grousemount Wind Farm Site Investigation Locations W78035-F105-010-D-0005_1
  - Grousemount Wind Farm Main Works Contract Site Layout Drawings Sheets 1 to 7 – QR320171-MWC-P-1003 (July 2015)
- IGSL Trial Pit records for Grousemount Wind Farm Report No. 18312 (April 2015)
- ESBI Draft Peat Stability Risk Assessment Report W78035-F105-018-R-0001 (August 2015)

The initial work undertaken to carry out this review involved a walkover survey and review of the available site investigation information to allow the PSRA's carried out by ESBI to be reviewed.

Following this, the draft PSRA report has been reviewed with a view to assessing the risk methodology adopted and to confirm that acceptably low risk proposals for storage of peat are proposed.

ByrneLooby have reviewed 25 of the PSRA's carried out by ESBI in detail (6 No. turbine locations and 19 No. access tracks). The selection was based on the most onerous locations in terms of the initial risk ratings that were assigned by ESBI. Most of the locations reviewed were given a 'significant' risk rating prior to mitigation measures.

# Walkover Survey:

A site walkover survey was completed by two engineers from ByrneLooby on 22nd to 24th June 2015. During the survey all of the proposed turbine locations and access road routes were

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walked and assessed, excluding those where ESBI had indicated peat depths were less than 0.5m and thus had not carried out PSRA's.

At the time of the walkover, only trial pits located in accessible areas had been completed on site and no further intrusive works had been undertaken on site. Therefore, Byrne Looby used GPS co-ordinates of the completed and proposed site investigations as well as the ESBI site layout maps to estimate the location of the roads and turbines.

The assessments completed by ByrneLooby included peat probing in selective areas and general visual assessments along roads and at turbines. This included noting topographical features such as slope characteristics, gradients and existing drainage ditches etc. Other parameters relevant to the PSRA's were also noted where evident.

It should be noted that the Everwind Wind Farm site was not assessed as part of the walkover survey. This is a small additional site not connected to the main Grousemount Wind Farm. For the purposes of the high level review at this preliminary stage, it was not required to review the entire site.

# Existing Conditions:

No development has been undertaken on the proposed wind farm sites to date. The existing conditions on site are typically undisturbed upland peat and rock outcrops. The peat was typically underlain by a grey glacial till material which could be variously described as sandy gravelly Silt/Clay or very clayey/silty Sand and Gravel with occasional cobbles.

The peat was shallow and appeared to be relatively dry (moisture content <1000%) on most of the slopes, with deeper upland blanket bog on some of the flatter topographies. Terraces of peat which appeared to be held in place by the rock cleavage were also common on some slopes.

The bedrock on the site appeared to be Sandstone and Siltstone, based on inspection of outcrops.

Vegetation on the site was consistent throughout the proposed development areas of the site. Typically well-established grassland which was stocked with sheep was prevalent across the mountains in question. In some wetter areas, rushes and moss/spaghnum were more evident; however there was no significant change with grass dominant in all areas. Sparse heather was also found locally at higher elevations.

Drainage on the site consisted of man-made drainage ditches typically running downslope and small streams flowing towards the two main watercourses, both of which combined into the Roughty River before leaving the site.



# Summary:

Conceptually, the basis of the proposed mitigation measures is deemed to be adequate and in line with industry best practice. However, some of the finer points of implementing these mitigation measures will need to be teased out during detailed design to ensure that the proposed solutions can be practically implemented at Grousemount during the construction phase.

For the purposes of the planning stage high level review, ByrneLooby are satisfied that the PSRA carried out by ESBI is generally adequate.

It should be noted that this is a high level review with spot checking of the factual information in some of the PSRA's only. We are not verifying the accuracy of all factual data.

If you have any questions on the information outlined above do not hesitate to contact me.

Yours sincerely,

for Byrne Looby Partners

Paul Sof

Paul Stephenson BEng. CEng. MIEI. Senior Project Engineer