CLEVE HILL SOLAR PARK

ENVIRONMENTAL STATEMENT
VOLUME 4 - TECHNICAL APPENDIx A10.2
GROUND INVESTIGATION

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CLEVE HILL
SOLAR PARK

A REPORT ON A GROUND INVESTIGATION FOR CLEVE HILL SOLAR FARM, GRAVENEY, KENT (FACTUAL)

CLIENT: WIRSOL Energy Limited

Date: 4 May 2018

Reference: DJM/18.103

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1. INTRODUCTION

A F Howland Associates Limited (AFHA) was instructed by WIRSOL Energy Limited to carry out a ground investigation for a proposed solar farm, focusing on the proposed compound area, at Cleve Hill, Graveney, Kent (drawing 18.103/01), to provide information on the subsoil conditions and relevant geotechnical parameters.

This report provides the factual details of the fieldwork and laboratory testing undertaken during the investigation.

The report was prepared for the use of the Client and its advisors. Other parties using the contained information do so at their own risk and any duty of care to those parties is specifically excluded as covered by copyright.

2. FIELDWORK

Fieldwork was carried out from 19 to 23 March 2018 and comprised three cable percussive boreholes, twenty two trial pits and seven dynamic cone penetrometer tests. Soakage testing was subsequently undertaken in two of the trial pits.

The exploratory hole positions were set out in general accordance with the requirements of the proposals, as shown on drawing 18.103/02. The National Grid references and, the elevations of the positions relative to Ordnance Datum, were measured using a Hemisphere S320 VRS GPS (RTK) system. The RTK system was also used to determine the profile of the existing sea defence embankment as shown on drawing 18.103/03.

The **cable percussive boreholes**, referenced BH01 to BH03, were each taken to a depth of 15.5 m. They were advanced using conventional cable percussive techniques ('shell and auger'), initially in 200 mm diameter casing and then reducing to 150 mm diameter casing. A starter pit was excavated by hand to a depth of 1.2 m at the borehole locations prior to the commencement of drilling to inspect for services. A cable avoidance tool (CAT) was also used to sweep all the positions and the immediate surrounding area to locate any potential services and the location adjusted as necessary. During subsequent advance of the borehole sampling and *in situ* testing were carried out and subsequent soil descriptions made in general accordance with the recommendations of BS EN1997-2:2007 Eurocode 7 (BSI, 2007) and its UK National Annex supported by BS 5930:2015 (BSI, 2015). In particular, open tube drive samples (U100) were taken in cohesive materials to allow laboratory testing of undisturbed material, while disturbed samples were taken for further laboratory testing and to allow later inspection of the materials encountered and facilitate accurate logging. Standard penetration tests (SPT) were carried out in cohesionless soils or materials where undisturbed samples could not be obtained, using a split barrel sampler or a solid cone as appropriate. The SPT N value was taken as the number of blows for 300 mm of penetration, following a seating drive of 150 mm or 25 blows. On completion, the boreholes were backfilled with arisings.

The boreholes were monitored for groundwater ingress during drilling. Upon encountering groundwater, drilling was temporarily stopped to allow the level to stabilise, recording the water level at five minute intervals for a period of twenty minutes. Water levels were also recorded at the start and end of each shift.

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The **trial pits**, referenced TP01 to TP22, were excavated utilising a mechanical 360 excavated equipped with a 1.2 m wide bucket and advanced to depths between 2.0 m and 3.2 m below ground level (bgl). The pits were logged *in situ* to about 1.0 m bgl, with soils below this depth described at surface from excavated material. Disturbed samples were taken for appropriate laboratory testing and to allow later inspection of the material encountered and facilitate accurately logging. Index strength tests utilising a hand shear vane, serial no. DR-2743 with a 19 mm vane, were performed in suitable cohesive material to provide an estimate of the undrained shear strength.

Soakage testing was anticipated to be undertaken at TP01 to TP03, but groundwater ingress in TP01 deemed it unsuitable for testing. To facilitate testing TP02 and TP03 were filled with 20 mm diameter gravel from 1.0 m to 2.0 m to provide a suitable test section. The tests were carried out in accordance with Building Research Establishment Report 365 (BRE, 2016) by filling the test sections with water and recording the time taken for it to drain away. In addition to manual dipping, data loggers were installed to record the level of the water. However, both tests failed due to insufficient drainage over a 24 hour monitoring period.

Seven **dynamic cone penetrometer (DCP)** tests were also undertaken, referenced DCP01 to DCP07. These were carried out utilising hand held equipment with an 8 kg hammer dropped through a height of 575 mm. The tests were taken to depths of between 1.24 m and 1.50 m. The dropped weight hammers a cone with an angle of 60 ^{o} and maximum diameter of 20 mm into the ground to determine the *in situ* California Bearing Ratio (CBR). The instrument is held vertically and the hammer raised to the specified height and left to drop freely. Readings were taken of the penetration rate per blow. After completing the tests, the DCP is removed by tapping the hammer upwards against the handle.

The CBR value was calculated based on the following:

TRL equation: log10 (CBR) = 2.48 – 1.057 x log10 (penetration rate)

Following completion of the tests, the soils were excavated to the base of the tests.

Details of the strata encountered, the sampling, *in situ* and laboratory testing are shown on records appended to this report.

3. LABORATORY TESTING

3.1 GENERAL

Subsequent to the fieldwork, a programme of laboratory testing was carried out to provide additional quantitative data on the materials encountered. The tests were completed in accordance with the procedures laid down in the pertinent British Standards unless stated otherwise and consisted of:

- Natural moisture content
- Atterberg limits
- Particle size distribution
- Undrained shear strength in triaxial compression without measurement of pore pressure
- One dimensional consolidation test
- Dry density/moisture content relationship
- California Bearing Ratio test
- Sulphate content and pH value
- Total sulphur
- Chloride
- Nitrate
- Ammonia

3.2 TEST PROCEDURES

3.2.1 NATURAL MOISTURE CONTENT

The natural moisture content is determined according to BS EN ISO 17892: Part 1: 2014: clause 5.2 (BSI, 2014). This represents the mass of moisture content retained by the soil in its natural state as a percentage of its dry mass. For organic soils and peats care should be taken to avoid heating the sample above 50°C to prevent irreversible physical changes to the material.

3.2.2 ATTERBERG LIMITS

The Atterberg limits are determined in the laboratory by the procedures given in BS 1377: Part 2: 1990 (BSI, 1990). The liquid limit (LL) is the moisture content of the soil at the point that its behaviour passes from that of a plastic solid to that of a liquid. The test procedure given as clause 4.4 was used based on the cone penetrometer in which the

penetration of a free-fall cone into moistened and cured samples of the soil is measured. The plastic limit (PL) is the moisture content of the soil at the point that its behaviour passes from a plastic solid to a brittle solid. This point is measured according to clause 5.3 and is the point at which a thread of the soil rolled to 3 mm diameter begins to crumble.

Together the Atterberg limits can be used to define the plastic range of the soil. The plasticity index (PI) is the difference between the liquid and plastic limit and is broadly correlated to the engineering behaviour of the soil. When used with the natural moisture content of the soil they can also give an indication of its in situ condition.

3.2.3 PARTICLE SIZE DISTRIBUTION

A quantitative assessment of the particle size distribution of the soil down to the fine grained sand size is made according to BS EN ISO 17892: Part 4: 2016: clause 5.2 (BSI, 2016). In this the percentage of certain sized fractions of the soil are found by determining the weight retained on a variety of sieve sizes through which the material is allowed to pass. The combined silt and clay fraction is determined by the difference between the sum of the retained weights and the original sample weight. Variations of the test procedure allow the silt and clay fraction to be removed from the coarser fraction by wet sieving during which the fine material is washed from the surface of the coarser material.

The quantitative determination of the particle size distribution for fine soils, from coarse silt to clay size, is made according to BS EN ISO 17892: Part 4: 2016: clause 5.3 or 5.4, using either the sedimentation by hydrometer method or pipette method. These tests are generally carried out if greater than 10% of the material passes the BS test sieve size of 63 μm. The percentages of the constituents of the fine soil can be linked to the curve obtained by sieving to provide a single curve for the whole material.

3.2.4 DETERMINATION OF THE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

The undrained shear strength of the soil was measured, as stated in BS 1377: Part 7: 1990: clause 8 (BSI, 1990), by axial compression of 100 mm diameter cylindrical specimens cut from the U100 undisturbed samples. The nature of the test is such that no change in moisture content of the specimen is allowed during shear.

The theory of behaviour of saturated clay materials in undrained shear failure gives that the strength will not be influenced by the confining pressure such that the measured angle of internal friction for the material will apparently be equal to zero. Experience has shown that this is true only for samples of unweathered heavily overconsolidated pure clays. Where the material is weathered or it contains a significant granular content a plastic rather than a brittle failure develops which produces a strain hardening during shear. In this situation measurable apparent undrained angle of internal friction is produced. A similar situation develops in partially saturated materials. The test results are also influenced by sample variation, and in particular the presence of natural fissures or inclusions within the sample.

The use of large diameter specimens is preferred as this compensates for the scale effects of random features in smaller specimens. One of two tests are carried out according to the soil characteristic. Unweathered specimens of heavily overconsolidated clays which have a brittle failure in shear are tested in a single stage. The confining pressure is taken as the total overburden pressure of the sample in situ. It is then failed by axial compression and the measured deviator stress reported as the apparent undrained cohesion. Specimens of weathered clay or the clays with granular contents are tested in a multistage manner according to BS 1377: Part 7: 1990: clause 9.

The test procedure is similar to the single stage but at the point that failure begins the confining pressure is increased and the specimen compressed for a further 2% of vertical strain at which point the confining pressure is again increased and held for a further 2% strain. The deviator stresses at each of the confining pressures are used to plot the Mohr envelope and the apparent undrained cohesion and if appropriate the undrained angle of internal friction.

3.2.5 ONE DIMENSIONAL CONSOLIDATION TEST

This determines the rate and magnitude of the consolidation of a saturated specimen of the soil in the form of a disc, confined laterally and subjected to a vertical axial pressure and which is allowed to drain freely from the top and bottom surfaces. The procedure is carried out according to BS EN ISO 17892: Part 5: 2017: clause 6.5 (BSI, 2017) in which the total load is applied incrementally.

3.2.6 DRY DENSITY/MOISTURE CONTENT RELATIONSHIP

The determination of the dry density of a sample of soil when compacted in a closely defined and specified manner over a range of moisture contents enables the maximum dry density of the soil to be determined for any one level of compaction effort. Three methods of compaction are described in BS 1377: Part 4: 1990: clause 3 (BSI, 1990), using a 2.5 kg hand plunger (clauses 3.3 3.4), a 4.5 kg hand plunger (clauses 3.5 3.6) and a vibrating hammer (clause 3.7).

3.2.7 CALIFORNIA BEARING RATIO TEST

A measure of the strength of a soil can be made by determination of its California bearing ratio (CBR). This is determined according to the procedure set out in BS 1377: Part 4: 1990: clause 7 (BSI, 1990) in which a relationship is determined between the force required to drive a cylindrical plunger a given distance into the prepared sample of the soil and the force required to drive a similar plunger into a standard sample of prepared crushed rock. The ratio is determined at penetrations of 2.5 and 5 mm and the higher value used.

The test cannot be directly related to other shear strength parameters and is most suitable for the empirical determination of the strength of a material for pavement design by the use of standard design charts. The test is best carried out on a sample which reproduces the worst conditions likely to occur in the field situation and can be carried out on *in situ* material in the field or on undisturbed or recompacted samples in the laboratory.

3.2.8 SULPHATE CONTENT AND pH VALUE

In order to evaluate any aggressive tendency of the subsoil or groundwater to buried concrete the pH and soluble sulphate of a number of samples were determined. The pH of either a groundwater sample or a soil suspension was determined electrometrically according to BS 1377: Part 3: 1990: clause 9.5 (BSI, 1990). The sulphate content was found by the gravimetric test procedure (BS 1377: Part 3: 1990: clause 5.5) in which the sulphate is precipitated as barium sulphate from either a water extract taken from the soil or a groundwater sample.

3.2.9 TOTAL SULPHUR CONTENT

To aid the evaluation of aggressive tendency of the subsoil to buried concrete as a result of its pyritic potential, the total potential sulphate content can be determined from the relationship between the total (acid soluble) sulphate content and the amount of total sulphur present. The total sulphur content is determined by a laboratory in-house method based on the Methods for the Examination of Waters and Associated Materials (MEWAM Environment Agency, 2006).

A dried portion of the soil is extracted at 115 °C for 75 minutes using 100% aqua regia and potassium bromate/bromide oxidizing mixture. The principle of this digest is to oxidize all sulphur to sulphate, and use the aqua regia acid mixture to digest the sample. The resultant digest solution is then filtered and analysed by ICP-OES. The results are expressed as % S, and include water soluble and acid soluble sulphates and total reduced sulphur, as well as insoluble sulphates and organic sulphur.

3.2.10 CHLORIDE

The chloride content was determined by an in-house procedure based on colorimetric methods using a spectrophotometric discrete analyser. The sample preparation is in generally accordance to those outlined in BR 279 (BRE, 1995) and BS 1377-3 Section 7 (BSI, 1990), but the analysis differs as these suggest using ion chromatography. Both methods give comparable results. A soil sample is dried at < 40°C and then a 2:1 water: soil extract is prepared by shaking 20 g soil plus 40 ml water. The chloride ions react with mercury (II) thiocyanate to form a soluble non-ionic compound. The thiocyanate ions released react in acid solution with iron (III) nitrate to form a red / brown iron (III) thiocyanate complex which is measured spectrophotometrically at 450 nm.

3.2.11 NITRATE

The nitrate content was determined by an in-house procedure based on colorimetric methods using a spectrophotometric discrete analyser, whereby it is calculated from the total oxidised nitrogen (TON) by subtraction of the nitrite content, in general accordance with methods outlined in BR 279 (BRE, 1995). A soil sample is dried at < 40°C and then a 2:1 water: soil extract is prepared by shaking 20 g soil plus 40 ml water. The nitrite ions reacts with sulphanilamide and N-1-napthylethylenediamine dihydrochloride under acidic

conditions to form a pink azo-dye which is measured spectrophotometrically at 540 nm. To determine TON all the nitrate in the sample is reduced to nitrite by hydrazine under alkaline conditions. The total nitrite ions are then reacted with sulphanilamide and N-1-napthylethylenediamine dihydrochloride under acidic conditions to form a pink azo-dye which is measured spectrophotometrically at 540 nm.

3.2.12 AMMONIA

The ammonia content was determined by an in-house procedure based on the colorimetric salicylate/nitroprusside method using a spectrophotometric discrete analyser, in general accordance to methods outlined in BR 279 (BRE, 1995). A 2:1 water: soil extract is prepared by shaking 20 g soil, as received, plus 40 ml water. The ammonia ions react with salicylate in the presence of hypochlorite and nitroprusside to form a coloured solution which is analysed by spectrophotometric measurement at a wavelength of 660 nm. The results are expressed as mg/l NH4+.

3.2.13 LOSS ON IGINITION

The organic content of peats or organic clays containing more than about 10% organic matter or sandy soils containing only limited quantities of clay or chalk can be related to the loss in the mass of the soil on ignition. This is carried out according to BS 1377: Part 3: 1990: Clause 4 (BSI, 1990). The test involves a previously dried and weighed sample being burned at a temperature of 440°C, the result is then reported as the ratio of mass before and after burning.

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4 May 2018

APPENDIX A: COPYRIGHT

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APPENDIX B: REFERENCES

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APPENDIX C: EXPLORATORY HOLE RECORDS

U	Nominal 100 mm diameter undisturbed open tube sample
X blows	The associated figure 'X' is the number of blows to drive the sample tube over the given depth range
XF	Undisturbed sample not recovered after 'X' number of blows to drive the sample tube
HV	Hand vane test
B	Bulk disturbed sample
D	Small disturbed sample (suffix 'P' denotes inspection pit sample)
W	Water sample
SPT	Standard penetration test using a split spoon sampler
SPT (C)	Standard penetration test using 60 degree solid cone
X,X/X,X,X,X	Blows per increment during the standard penetration test. The initial value relates to the seating drive (150 mm) and the remaining four to the 75 mm increments of the test length
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300 mm)
X*/Y	Incomplete standard penetration test where the seating drive could not be completed. The blows 'X' represent the total blows for the given length of seating drive 'Y' (mm)
X/Z	Incomplete standard penetration test where the seating drive was achieved but the full test length was not. The blows 'X' represent the total blows for the given test length 'Z' (mm)
dd/mm/yy: 1.0 **dd/mm/yy: dry**	Date, water level at the borehole depth at the end of shift and the start of the following shift

Each sample type is numbered sequentially with depth and relates to the depth range quoted

All depths and measurements are given in metres, except as noted

Strata descriptions complied by visual examination of samples obtained during boring, after BS 5930:1999+A2:2010 and modified in accordance with laboratory test results where applicable

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Site	Borehole Number
Cleve Hill Solar Farm, Graveney, Kent	BH01

Machine : Dando 2500 Method : Cable Percussion	Casing Diameter 200mm cased to 10.00m 150mm cased to 15.20m	Ground Level (mOD) 1.56	Client WIRSOL Energy Limited	Job Number 18.103
	Location 604841 E 164105 N	Dates 19/03/2018- 20/03/2018	Engineer	Sheet 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.30)	TOPSOIL (Dark brown mottled orange brown silty slightly gravelly clay. Gravel is subangular to subrounded fine to coarse flint and chalk)		
0.20	D1				1.26	0.30			
0.50	HV 63.82kPa			72,64,46/Av. 60.67		(0.40)	Brown silty slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint and chalk		
0.50	D2				0.86	0.70			
0.80	HV 67.33kPa			54,66,72/Av. 64.00			Firm grey mottled orange brown silty CLAY		
0.80	D3						...becoming soft to firm in places		
1.10	D4					(1.10)			
1.20-1.65	U1			4 blows					
							...becoming soft		
1.70	D5				-0.24	1.80			
2.00-2.45	SPT N=9		DRY	1,1/2,2,2,3			Firm grey silty slightly sandy CLAY		
2.00-2.45	S6								
2.50	D7								▽1
2.50	W1								
2.80	D8						...becoming firm to stiff, slightly blocky and fissured		
3.00-3.45	U2	2.50	DRY	55 blows			...becoming stiff		
3.50	D9						...becoming very stiff		
3.80	D10								
4.00-4.45	U3	2.50	DRY	55 blows			...becoming firm to stiff in places		
4.50	D11								
4.80	D12								
5.00-5.45	U4	2.50	DRY	62 blows			...becoming very stiff		
5.50	D13								
5.80	D14								
6.00-6.45	U5	2.50	DRY	75 blows		(8.20)			
6.50	D15								
7.00-7.45	SPT N=25	2.50	DRY	2,4/5,6,6,8					
7.50-7.95	S17								
8.50	D18								
9.00-9.45	U6	2.50	DRY	80 blows			...becoming blocky		
9.50	D19			19/03/2018:2.50m					
				20/03/2018:1.30m					
9.90	D20						...becoming very sandy		

Remarks
1. Location CAT scanned prior to excavation.
2. Hand dug inspection pit to 1.20 m.
3. Groundwater struck at 10.00 m and rose to 5.20 m in 5 mins., 2.70 m in 10 mins., 2.50 m in 15 mins. and 20 mins.
4. SPT Hammer Energy Ratio = 64%
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By
1:50	DJM

Figure No. 18.103.BH01

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Site	Borehole Number
Cleve Hill Solar Farm, Graveney, Kent	BH01

Machine : Dando 2500 Method : Cable Percussion	Casing Diameter 200mm cased to 10.00m 150mm cased to 15.20m	Ground Level (mOD) 1.56	Client WIRSOL Energy Limited	Job Number 18.103
	Location 604841 E 164105 N	Dates 19/03/2018- 20/03/2018	Engineer	Sheet 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00-10.50	B1			Fast(1) at 10.00m, rose to 2.50m in 20 mins, not sealed.	-8.44	10.00	Very dense dark greenish grey slightly clayey silty fine to medium SAND		▽1
10.50-10.89	SPT 55/235	10.90	2.60	8,11/12,16,18,9					
10.50-10.95	S21								
11.00-11.50	B2								
12.00-12.37	SPT 50/215	11.90	2.60	2,5/11,14,25					
12.00-12.45	S22					(4.60)			
13.00-13.50	B3								
13.50-13.84	SPT 50/185	13.40	2.60	7,12/14,16,20			...becoming shelly		
13.50-13.95	S23								
14.50-15.00	B4				-13.04	14.60	Very dense dark grey silty very sandy subrounded to rounded fine flint GRAVEL		
15.00-15.40	SPT(C) 50/245	14.90	2.60	5,8/14,12,16,8		(0.90)			
15.00-15.50	B5								
				20/03/2018:14.90m	-13.94	15.50	Complete at 15.50m		

Remarks

Scale (approx)	Logged By
1:50	DJM

Figure No. 18.103.BH01

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Site	Borehole Number
Cleve Hill Solar Farm, Graveney, Kent	BH02

Machine : Dando 2500 Method : Cable Percussion	Casing Diameter 200mm cased to 3.20m 150mm cased to 15.50m	Ground Level (mOD) 1.61	Client WIRSOL Energy Limited	Job Number 18.103
	Location 604694 E 164276 N	Dates 19/03/2018- 20/03/2018	Engineer	Sheet 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.40)	TOPSOIL (Brown silty clay)		
0.20	D1				1.21	0.40			
0.50	D2						Firm brown mottled grey silty CLAY		
0.80	D3					(0.70)			
1.10	D4				0.51	1.10			
1.20-1.65	U1		DRY	5 blows			Firm brown mottled grey silty slightly sandy CLAY		
						(0.80)			
1.70	D5						...becoming soft		
1.90	D6				-0.29	1.90			
2.00-2.45	U2		DRY	7 blows			Very soft grey mottled dark grey silty sandy slightly shelly CLAY		
2.40	W1								▽1
2.50	D7					(1.30)			
2.80	D8								
3.00-3.45	U3	2.50	DRY	18 blows	-1.59	3.20	Very stiff slightly blocky grey slightly sandy CLAY		
3.50	D9								
3.80	D10								
4.00-4.45	U4	3.00	DRY	30 blows					
4.50	D11								
4.80	D12								
5.00-5.45	U5	3.00	DRY	60 blows					
5.50	D13								
5.80	D14								
6.00-6.45	U6	3.00	DRY	63 blows					
6.50	D15					(6.80)			
7.00	D16								
7.50-7.95	U7	3.00	DRY	65 blows					
8.00	D17								
8.50	D18								
9.00-9.45	U8	3.00	DRY	70 blows					
9.50	D19								
9.90	D20						...becoming firm, soft to firm in places and very sandy		

Remarks
1. Location CAT scanned prior to excavation.
2. Hand dug inspection pit to 1.20 m.
3. Groundwater struck at 10.00 m and rose to 4.80 m in 5 mins., 3.00 m in 10 mins., 2.60 m in 15 mins. and 2.40 m in 20 mins.
4. SPT Hammer Energy Ratio = 64%

Scale (approx)	Logged By
1:50	DJM

Figure No. 18.103.BH02

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Geotechnical Engineers

Site	Borehole Number
Cleve Hill Solar Farm, Graveney, Kent	BH02

Machine : Dando 2500 Method : Cable Percussion	Casing Diameter 200mm cased to 3.20m 150mm cased to 15.50m	Ground Level (mOD) 1.61	Client WIRSOL Energy Limited	Job Number 18.103
	Location 604694 E 164276 N	Dates 19/03/2018- 20/03/2018	Engineer	Sheet 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00-10.50	B1			Fast(1) at 10.00m, rose to 2.40m in 20 mins, not sealed.	-8.39	10.00	Very dense dark greenish grey slightly clayey silty fine to medium SAND		▽1
10.50-10.80	SPT 50/150	10.40	2.80	3,12/17,33					
10.50-10.95	S21								
11.00-11.50	B2								
12.00-12.24	SPT 50/85	11.90	2.80	2,12/45,5		(4.40)			
12.00-12.45	S22								
12.50-13.00	B3						...becoming slightly shelly		
13.50-13.82	SPT 50/170	13.40	2.80	4,5/11,24,15					
13.50-13.95	S23								
14.50-15.00	B4				-12.79	14.40	Very dense dark greenish grey silty very sandy subrounded to rounded flint and shell GRAVEL		
15.00-15.34	SPT 50/185	14.90	2.80	5,6/12,26,12		(1.10)			
				21/03/2018:2.80m	-13.89	15.50	Complete at 15.50m		

Remarks

Scale (approx)	Logged By
1:50	DJM

Figure No. 18.103.BH02

A F Howland Associates
Geotechnical Engineers

Site Cleve Hill Solar Farm, Graveney, Kent			**Borehole Number** BH03
Machine : Dando 2500 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 9.50m 150mm cased to 15.00m	**Ground Level (mOD)** 1.47	**Client** WIRSOL Energy Limited	**Job Number** 18.103
	Location 604551 E 164034 N	**Dates** 22/03/2018-23/03/2018	**Engineer**	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.30)	TOPSOIL (Brown silty clay)		
0.20	D1				1.17	0.30	Firm brown mottled grey silty CLAY		
0.50	D2					(0.60)			
0.80	D3				0.57	0.90	Firm grey silty slightly sandy CLAY		
1.10	D4								
1.20-1.65	U1		DRY	5 blows		(0.90)			
							...becoming soft		
1.70	D5				-0.33	1.80	Very soft grey mottled dark grey silty slightly sandy CLAY. Occasional peaty pockets. Slight organic odour		
1.80	D6								
2.00-2.45	U2		DRY	6 blows					
						(1.20)			
2.50	D7								
2.80	D8								▼1
2.80	W1								
3.00-3.45	U3	2.80	DRY	6 blows	-1.53	3.00	Very soft grey silty slightly sandy slightly shelly CLAY. Slightly organic in places		
3.50	D9								
3.80	D10								
4.00-4.45	U4	3.50	DRY	7 blows					
4.50	D11								
4.80	D12								
5.00-5.45	U5	4.80	DRY	11 blows		(4.50)			
5.50	D13								
5.80	D14								
6.00-6.45	U6	5.90	DRY	13 blows					
6.50	D15								
7.00	D16								
					-6.03	7.50	Very dense greyish brown slightly clayey silty fine to medium SAND		▽1
7.50-8.00	B1			Fast(1) at 7.50m, rose to 2.80m in 20 mins. not sealed.					
7.50-7.95	U7	7.40	7.50	11 blows					
8.00-8.50	B2								
9.00-9.40	SPT 50/245	8.90	3.20	3.5/8,11,24,7					
9.00-9.45	S17								
				22/03/2018:3.20m					
				23/03/2018:1.50m					

Remarks
1. Location CAT scanned prior to excavation.
2. Hand dug inspection pit to 1.20 m.
3. Groundwater struck at 7.50 m and rose to 3.40 m in 5 mins., 3.10 m in 10 mins., 2.80 m in 15 mins. and 20 mins.
4. Chiselling required from 10.80 m to 11.00 m for 0.25 hr
5. SPT Hammer Energy Ratio = 64%

Scale (approx)	Logged By
1:50	DJM

Figure No. 18.103.BH03

A F Howland Associates
Geotechnical Engineers

Site Cleve Hill Solar Farm, Graveney, Kent			**Borehole Number** BH03
Machine : Dando 2500 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 9.50m 150mm cased to 15.00m	**Ground Level (mOD)** 1.47	**Client** WIRSOL Energy Limited	**Job Number** 18.103
	Location 604551 E 164034 N	**Dates** 22/03/2018-23/03/2018	**Engineer**	**Sheet** 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00-10.50	B3						...becoming dark greenish grey		
10.50-10.84	SPT 50/185	10.40	3.20	3.4/6,10,34					
10.50-10.95	S18								
10.80	D20						10.8 to 11.0 m - siltstone band		
							...becoming silty slightly shelly SAND		
11.50-12.00	B4					(8.00)			
12.00-12.31	SPT 50/160	11.90	3.20	6,10/20,25,5					
12.00-12.45	S19								
13.00-13.50	B5								
13.50-13.83	SPT 50/180	13.40	3.20	3,6/12,18,20			...becoming gravelly with clayey pockets. Gravel is subrounded to rounded fine to medium flint		
14.00-14.50	B6								
15.00-15.31	SPT 50/160	14.90	3.20	4,7/17,23,10					
				23/03/2018:3.20m	-14.03	15.50	Complete at 15.50m		

Remarks
Chiselling from 10.80m to 11.00m for 0.25 hours.

Scale (approx)	Logged By
1:50	DJM

Figure No. 18.103.BH03

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 1.7 m x W 1.4 m x D 2.5 m	1.57	WIRSOL Energy Limited	18.103
	Location 604859 E 164222 N	**Dates** 20/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.35)	TOPSOIL (Brown silty slightly gravelly clay. Gravel is subangular to subrounded fine flint)		
0.20	D1							
				1.22	0.35	Firm brown mottled grey silty CLAY		
0.40	HV 57.86kPa		44,65,56/Av. 55.00					
0.40-0.90	B1				(0.40)			
				0.82	0.75	Firm grey mottled orange brown and brown silty slightly sandy CLAY. With rare shell fragments and occasional sand partings		
0.80	HV 76.80kPa		70,75,74/Av. 73.00					
0.80-1.20	B2							
1.20	D2		Fast(1) at 1.15m, fell to 1.50m in 20 mins.			...becoming soft to firm		1
1.30	HV 40.32kPa		50,40,25/Av. 38.33					
1.50	D3					...becoming soft		1
					(1.75)			
1.80	HV 23.14kPa		20,22,24/Av. 22.00					
2.00	D4					...becoming very soft		
2.20	HV 19.28kPa		25,18,12/Av. 18.33					
				-0.93	2.50			
2.50	D5					Complete at 2.50m		

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater struck at 1.15 m and rose to 1.60 m in 5 mins. and 1.50 m in 20 mins.
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. Trial pit intended to be used for soakage testing but deemed unsuitable due to groundwater ingress
6. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP01

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 1.3 m x W 1.4 m x D 2.0 m	1.46	WIRSOL Energy Limited	18.103
	Location 604689 E 164334 N	**Dates** 20/03/2018-23/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL (Brown silty clay)		
0.20	D1							
				1.16	0.30	Firm brown mottled grey silty shelly CLAY		
0.30-0.65	B1							
0.30-0.65	B2				(0.35)			
0.50	HV 75.04kPa		80,58,76/Av. 71.33					
				0.81	0.65	Firm grey mottled orange brown silty slightly sandy CLAY. With rare shell fragments		
0.65-1.20	B3					...becoming soft to firm		
					(1.05)			
1.20	HV 58.21kPa		50,56,60/Av. 55.33					
1.40	D2					...becoming soft, very sandy and with clayey silty sand pockets		
1.50	D3							
1.60	HV 31.56kPa		35,20,35/Av. 30.00			...becoming very soft, shelly and with silt pockets		
1.60	D4							
1.70-2.00	D5			-0.24	1.70	Grey mottled orange brown clayey sandy SILT. Tending to very soft silty sandy clay in places and clayey silty fine sand in places. With shell fragments		
					(0.30)			
				-0.54	2.00	Complete at 2.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. No groundwater encountered
3. Trial pit remained open and sidewalls stable during excavation
4. Pit backfilled with gravel to 1.0 m and then arisings to surface
5. Soakage test performed between 1.0 m and 2.0 m
6. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP02

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 1.7 m x W 1.3 m x D 2.13 m	1.46	WIRSOL Energy Limited	18.103
	Location 604706 E 164126 N	**Dates** 20/03/2018-23/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.60)	TOPSOIL (Brown silty clay. With rare subangular fine chalk gravel and shell fragments)		
0.30	D1							
0.50	HV 82.06kPa		68,68,98/Av. 78.00					
0.60-1.00	B1			0.86	0.60	Firm grey mottled orange brown silty slightly sandy CLAY		
0.75	HV 77.14kPa		68,74,78/Av. 73.33					
					(0.80)			
1.00	HV 69.43kPa		58,58,82/Av. 66.00					
1.00	D2							
1.25	HV 60.31kPa		68,48,56/Av. 57.33			...becoming firm to stiff in places		
1.25	D3							
				0.06	1.40	Soft, soft to firm in places, grey silty sandy CLAY. With occasional shell fragments		
1.50	HV 21.04kPa		20,20,20/Av. 20.00					
1.50	D4							
					(0.50)			
				-0.44	1.90	Grey clayey sandy shelly SILT. Tending to very soft silty sandy clay and clayey silty fine sand in places		
2.00	D5				(0.23)			
				-0.67	2.13	Complete at 2.13m		

Remarks

1. Location CAT scanned prior to excavation.
2. No groundwater encountered
3. Trial pit remained open and sidewalls stable during excavation
4. Pit backfilled with gravel to 1.13 m and then arisings to surface
5. Soakage test performed between 1.13 m and 2.13 m
6. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP03

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP04

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.1 m x W 2.2 m to 0.5 m depth then 1.3 m x D 3.0	1.64	WIRSOL Energy Limited	18.103
	Location 604713 E 164037 N	**Dates** 20/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						TOPSOIL (Brown silty slightly gravelly clay. Gravel is subangular to subrounded fine to coarse flint)		
0.30	D1				(0.80)			
0.50	HV 90.47kPa		78,90,90/Av. 86.00					
0.70	D2							
0.80-1.20	B1			0.84	0.80	Firm grey mottled orange brown silty slightly sandy CLAY		
1.00	HV 96.78kPa		78,110,88/Av. 92.00					
					(0.90)			
						...becoming soft to firm and with sandy and shelly pockets		
1.40	D3							
1.50	HV 53.30kPa		44,50,58/Av. 50.67					
				-0.06	1.70	Firm, firm to stiff in places, blocky grey mottled orange brown with ferrugineous staining silty CLAY		
1.75	HV 53.30kPa		60,55,55/Av. 56.67					
1.80	D4							
2.00	D5							
					(1.30)			
2.50	D6					...becoming very stiff		
				-1.36	3.00	Complete at 3.00m		
3.00	D7							

Remarks

1. Location CAT scanned prior to excavation.
2. No groundwater encountered
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052
6. Trial pit widened to avoid flint gravel trench at 0.5 m depth - possible land drain

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP04

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP05

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.0 m x W 1.3 m x D 3.0 m	1.65	WIRSOL Energy Limited	18.103
	Location 604788 E 164080 N	**Dates** 20/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D1				(0.30)	TOPSOIL (Dark brown silty clay)		
				1.35	0.30	Firm, soft to firm in places, brown mottled grey silty CLAY		
0.50	HV 75.04kPa		72,80,62/Av. 71.33		(0.40)			
0.50	D2							
				0.95	0.70	Firm grey mottled orange brown silty CLAY		
0.80	D3							
1.00	HV 58.91kPa		52,62,54/Av. 56.00					
1.00	D4				(1.05)			
						...becoming soft, very soft in places, sandy and shelly. With very sandy pockets and clayey sandy silt pockets		
1.50	HV 20.34kPa		20,18,20/Av. 19.33					
1.50	D5							
1.75-1.95	D6			-0.10	1.75	Brown clayey sandy shelly SILT		
					(0.20)			
				-0.30	1.95	Firm blocky grey silty CLAY. With occasional black carbonaceous pockets at top of stratum.		
2.00	D7							
					(1.05)			
2.50	D8					...becoming stiff		
				-1.35	3.00	Complete at 3.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. No groundwater encountered
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP05

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP06

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.1 m x W 1.3 m x D 3.0 m	1.60	WIRSOL Energy Limited	18.103
	Location 604885 E 164087 N	**Dates** 20/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D1				(0.35)	TOPSOIL (Brown silty clay. With rare subangular fine chalk gravel)		
				1.25	0.35	Firm brown mottled grey silty CLAY		
0.35-0.80	B1							
0.50	HV 72.94kPa		80,68,60/Av. 69.33		(0.45)			
				0.80	0.80	Firm grey mottled orange brown silty CLAY		
0.80-1.20	B2							
1.00	HV 62.42kPa		56,60,62/Av. 59.33					
					(1.05)			
1.50	HV 28.06kPa		24,26,30/Av. 26.67			...becoming soft, slight sandy and shelly		
1.50	D2							
1.85-2.00	B3			-0.25	1.85	Firm to stiff blocky grey with ferrugineous staining silty slightly sandy CLAY		
					(1.15)			
2.50	D3					...becoming very stiff		
3.00	D4		130+,130+,130+/Av. 130.00	-1.40	3.00	Complete at 3.00m		
3.00	HV >136kPa							

Remarks

1. Location CAT scanned prior to excavation.
2. No groundwater encountered
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP06

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP07

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.0 m x W 1.3 m x D 3.0 m	1.42	WIRSOL Energy Limited	18.103
	Location 604700 E 164207 N	**Dates** 21/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	TOPSOIL (Brown silty clay. With rare subangular fine chalk gravel)		
0.30	D1			0.92	0.50	Firm brown mottled grey silty CLAY		
0.50-0.70	B1				(0.20)			
0.50-0.70	B2							
0.60	HV 87.66kPa		86,82,82/Av. 83.33	0.72	0.70	Firm grey mottled orange brown silty CLAY		
0.70-1.00	B3							
0.70-1.00	B4							
1.20	HV 65.93kPa		52,58,78/Av. 62.67					
1.20	D2					...becoming soft to firm, slightly sandy and with occasional shell fragments		
1.50	HV 37.17kPa		30,46,30/Av. 35.33					
1.50	D3				(1.95)	...becoming soft, to very soft in places and with occasional sand partings		
1.80	HV 25.25kPa		20,20,32/Av. 24.00					
1.80	D4					...becoming very soft and sandy. Tending to a clayey sandy silt in places		
2.00	HV 18.59kPa		14,25,14/Av. 17.67					
2.00	D5					...becoming with very shelly pockets		
2.50	HV 13.33kPa		12,14,12/Av. 12.67					
2.50	D6			-1.23	2.65	Firm to stiff blocky grey silty slightly sandy CLAY		
2.70	D7				(0.35)	...becoming stiff to very stiff in places		
3.00	D8			-1.58	3.00	Complete at 3.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. No groundwater encountered
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052
6. Temporary standpipe installed to monitor groundwater level. Plumb was 2.94 m. 1 cm of groundwater in base of standpipe after 24 hours

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP07

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP08

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.0 m x W 1.2 m x D 3.0 m	1.48	WIRSOL Energy Limited	18.103
	Location 604759 E 164264 N	**Dates** 21/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D1			1.23	(0.25)	TOPSOIL (Brown silty clay)		
0.30	HV 56.81kPa		52,56,54/Av. 54.00		0.25	Firm brown mottled grey silty CLAY		
0.30-0.80	B1							
0.30-0.80	B2							
0.60	HV 62.42kPa		68,48,62/Av. 59.33		(0.65)			
0.90-1.20	B3			0.58	0.90	Firm, soft to firm in places, grey mottled orange brown silty slightly sandy CLAY		
0.90-1.20	B4							
1.00	HV 49.79kPa		48,42,52/Av. 47.33					
						...becoming soft to firm		
1.40	HV 31.56kPa		28,30,32/Av. 30.00		(1.10)			
1.40	D2					...becoming soft, to very soft in places		
1.80	D3		Seepage(1) at 1.80m.					▽1
1.80	HV 21.74kPa		20,20,22/Av. 20.67	-0.52	2.00	Very soft grey silty slightly sandy CLAY		
2.20	HV 14.02kPa		10,12,18/Av. 13.33					
2.20	D4				(0.80)			
2.60	HV 13.33kPa		10,12,16/Av. 12.67			...becoming shelly and with shell pockets. Tending to clayey sandy shelly silt in places		▽2
2.60	D5		Seepage(2) at 2.65m.	-1.32	2.80	Stiff to very stiff blocky grey silty slightly sandy CLAY		
2.90	D6				(0.20)			
				-1.52	3.00	Complete at 3.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater seepages at 1.80 m and 2.65 m
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP08

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP09

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.1 m x W 1.3 m x D 3.1 m	1.55	WIRSOL Energy Limited	18.103
	Location 604833 E 164289 N	**Dates** 21/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL (Brown silty clay)		
0.20	D1			1.15	0.40			
0.40-0.80	B1					Firm brown mottled grey silty CLAY		
0.40-0.80	B2							
0.50	HV 74.34kPa		64,74,74/Av. 70.67		(0.45)			
				0.70	0.85			
0.90-1.20	B3					Firm, soft to firm in places, grey mottled orange brown silty slightly sandy CLAY. With occasional very sandy pockets		
0.90-1.20	B4							
1.00	HV 48.39kPa		48,46,44/Av. 46.00					
					(0.85)	...becoming soft to firm		
1.50	HV 25.25kPa		26,26,20/Av. 24.00			...becoming soft		
1.50	D2							
				-0.15	1.70	Very soft grey mottled dark grey silty slightly sandy CLAY. Slight organic odour		
1.80	HV 17.54kPa		14,18,18/Av. 16.67					
1.80	D3							
2.00	HV 14.02kPa		14,10,16/Av. 13.33					
2.00	D4				(1.10)			
						...becoming sandy and with very shelly pockets. Tending to clayey sandy silt in places		
2.50	HV 12.62kPa		10,12,14/Av. 12.00					
2.50	D5							
			Seepage(1) at 2.65m.					▽1
			Seepage(2) at 2.80m.	-1.25	2.80	Stiff blocky grey silty slightly sandy CLAY		▽2
2.90	D6				(0.30)			
				-1.55	3.10	Complete at 3.10m		

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater seepages at 2.65 m and 2.80 m
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP09

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP10

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.0 m x W 1.3 m x D 3.2 m	1.60	WIRSOL Energy Limited	18.103
	Location 604825 E 164359 N	**Dates** 21/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						TOPSOIL (Brown silty slightly gravelly clay. Gravel is subangular to subrounded fine chalk)		
0.20	D1				(0.50)			
				1.10	0.50	Firm brown mottled grey silty CLAY		
0.60	HV 67.39kPa		64,68,60/Av. 64.00					
0.60	D2				(0.40)			
				0.70	0.90	Firm grey mottled orange brown silty sandy CLAY. With occasional sand partings		
1.00	HV 51.20kPa		46,48,52/Av. 48.67					
1.00	D3					...becoming soft to firm		
					(0.90)			
1.50	HV 16.13kPa		14,16,16/Av. 15.33			...becoming soft		
1.50	D4							
				-0.20	1.80	Very soft grey mottled dark grey silty sandy CLAY. Slight organic odour		
2.00	HV 11.92kPa		10,12,12/Av. 11.33					
2.00	D5							▽1
			Seepage(1) at 2.10m.					
					(1.30)			
2.50	D6							
						...becoming with shelly pockets. Tending to clayey sandy silt in places		
3.00	D7							
3.10	D8			-1.50	3.10			
					(0.10)	Stiff blocky grey silty slightly sandy CLAY		
				-1.60	3.20			

No image available

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater seepage at 2.10 m
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP10

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP11

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 1.8 m x W 1.3 m x D 3.1 m	1.53	WIRSOL Energy Limited	18.103
	Location 604751 E 164330 N	**Dates** 21/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						TOPSOIL (Brown silty clay)		
0.20	D1				(0.50)			
				1.03	0.50	Firm brown mottled grey silty CLAY		
0.60	HV 85.56kPa		86,82,76/Av. 81.33					
0.60	D2				(0.40)			
				0.63	0.90	Firm grey mottled orange brown silty sandy CLAY. With occasional sand partings		
1.00	D3		Seepage(1) at 1.00m.					▽1
1.00	HV 54.00kPa		42,56,56/Av. 51.33					
					(0.85)	...becoming soft to firm		
1.50	HV 21.04kPa		22,18,20/Av. 20.00					
1.50	D4					...becoming soft		
				-0.22	1.75	Very soft grey mottled dark grey silty very sandy CLAY		
1.80	D5							
2.00	HV 11.22kPa		10,10,12/Av. 10.67					
2.00	D6							
					(1.30)			
2.50	D7					...tending to clayey sandy silt in places		
			Seepage(2) at 2.80m.			...becoming shelly and with very sandy pockets		▽2
3.00	D8			-1.52	3.05	Stiff to very stiff blocky grey silty slightly sandy CLAY		
3.10	D9			-1.57	3.10	Complete at 3.10m		

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater seepages at 1.00 m and 2.80 m
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP11

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP12

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.1 m x W 1.9 m to 0.5 m depth then 1.2 m x D 3.0 m	1.47	WIRSOL Energy Limited	18.103
	Location 604775 E 164140 N	**Dates** 21/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						TOPSOIL (Brown silty clay. With rare subangular fine flint gravel)		
0.20	D1				(0.40)			▽1
			Seepage(1) at 0.30m.	1.07	0.40	Firm brown mottled grey silty CLAY		
0.40-0.80	B1							
0.40-0.80	B2							
0.50	HV 74.34kPa		72,70,70/Av. 70.67		(0.40)			
				0.67	0.80	Firm grey mottled orange brown silty slightly sandy CLAY. Slightly friable to 1.0 m depth		▽2
0.80-1.10	B3							
0.80-1.10	B4		Seepage(2) at 0,95m.			...becoming soft to firm		
1.00	HV 44.89kPa		38,38,52/Av. 42.67					
1.40-1.60	B5				(1.30)			
1.50	HV 18.23kPa		18,20,14/Av. 17.33			...becoming soft		
						...tending to a clayey very sandy shelly SILT		
2.00	D2			-0.63	2.10	Stiff blocky grey silty slightly sandy CLAY		
2.20	D3							
					(0.90)			
2.80	D4							
				-1.53	3.00	Complete at 3.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater seepages at 0.30 m and 0.95 m
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052
6. Trial pit widened to avoid flint gravel trench at 0.5 m depth - possible land drain

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP12

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP13

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.0 m x W 1.2 m x D 3.0 m	1.60	WIRSOL Energy Limited	18.103
	Location 604855 E 164154 N	**Dates** 21/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D1				(0.50)	TOPSOIL (Brown silty clay)		
				1.10	0.50	Firm brown mottled grey silty CLAY		
0.60	HV 68.73kPa		58,78,60/Av. 65.33		(0.30)			
0.60	D2							
				0.80	0.80	Firm grey mottled orange brown silty slightly sandy CLAY		
0.90	HV 56.81kPa		56,48,58/Av. 54.00					▽1
0.90	D3		Seepage(1) at 1.00m.					
					(1.00)	...becoming soft to firm and with occasional sand partings and rare shell fragments		
1.40	HV 31.56kPa		30,28,32/Av. 30.00					
1.40	D4					...becoming soft		
				-0.20	1.80	Very soft grey mottled dark grey silty slightly sandy slightly shelly CLAY		
2.00	HV 15.43kPa		16,14,14/Av. 14.67		(0.50)			
2.00	D5							
				-0.70	2.30	Stiff blocky grey silty slightly sandy CLAY		
2.40	D6					...becoming very stiff		
					(0.70)			
2.80	D7							
				-1.40	3.00	Complete at 3.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater seepage at 1.00 m
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP13

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP14

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 1.9 m x W 2.4 m to 0.4 m depth then 1.2 m x D 3.0 m	1.48	WIRSOL Energy Limited	18.103
	Location 604530 E 164012 N	**Dates** 22/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D1				(0.45)	TOPSOIL (Brown silty clay. With rare subrounded fine chalk gravel)		
				1.03	0.45	Firm brown mottled grey silty CLAY		
0.50	HV 83.46kPa		80,80,78/Av. 79.33					
0.50	D2				(0.40)			
				0.63	0.85	Firm grey mottled orange brown silty slightly sandy CLAY		
1.00	HV 68.73kPa		58,68,70/Av. 65.33					
1.00	D3							▽1
			Seepage(1) at 1.30m.			...becoming soft to firm and with sandy shell pockets		
					(1.25)			
1.50	HV 30.86kPa		38,30,20/Av. 29.33					
1.50	D4							
2.00	D5		Seepage(2) at 2.00m.					▽2
2.00	HV 21.04kPa		20,20,20/Av. 20.00	-0.62	2.10	Very soft grey mottled dark grey silty sandy CLAY. With sandy shell pockets		
2.30	HV 14.73kPa		14,18,10/Av. 14.00					
2.30	D6							
					(0.90)			
2.80	D7							
			Slow(3) at 2.90m.					▽3
				-1.52	3.00	Complete at 3.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater seepages at 1.30 m and 2.00 m
3. Groundwater struck at 2.90 m
4. Trial pit remained open and sidewalls stable during excavation
5. Trial pit backfilled with arisings upon completion
6. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052
6. Temporary standpipe installed to monitor groundwater level. Plumb was 2.93 m. Groundwater level was 2.36 m after approximately 24 hours

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP14

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP15

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.1 m x W 1.3 m x D 3.2 m	1.54	WIRSOL Energy Limited	18.103
	Location 604529 E 164082 N	**Dates** 22/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.35)	TOPSOIL (Brown silty clay)		
0.20	D1		Seepage(1) at 0.20m.					▽1
				1.19	0.35	Firm brown mottled grey silty CLAY		
0.50	HV 67.33kPa		58,58,76/Av. 64.00		(0.45)			
0.50	D2							
				0.74	0.80	Firm grey mottled orange brown silty slightly sandy CLAY. With occasional sand partings		
1.00	HV 64.52kPa		66,60,58/Av. 61.33					
1.00	D3				(0.80)			
						...becoming soft to firm, soft in places		
1.50	HV 14.73kPa		12,10,20/Av. 14.00					
1.50	D4			-0.06	1.60	Very soft bluish grey mottled brown and dark grey silty slightly sandy organic CLAY. With occasional organic fragments, peaty pockets and strong sulphurous odour. With occasional mottled orange brown shelly slightly gravelly fine to medium sand partings/bands. Gravel is subangular to subrounded fine to medium flint.		
1.70	D5					...becoming very soft		
2.00	HV 11.92kPa		16,10,8/Av. 11.33					
2.00	D6							
2.20	D7							
					(1.60)			
2.50	HV 11.22kPa		10,10,12/Av. 10.67					
2.50	D8							
3.00	D9							
				-1.66	3.20			

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater seepage at 0.20 m
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP15

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP16

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.1 m x W 1.3 m x D 3.2 m	1.57	WIRSOL Energy Limited	18.103
	Location 604507 E 164154 N	**Dates** 22/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL (Brown silty clay)		
0.20	D1							
				1.27	0.30	Firm brown mottled grey silty CLAY		
0.30-0.80	B1							
0.30-0.80	B2							
0.50	HV 69.432kPa		58,70,70/Av. 66.00		(0.50)			
				0.77	0.80	Firm grey mottled orange brown silty slightly sandy CLAY. With occasional fine silty sand partings		
0.80-1.20	B3							
0.80-1.20	B4							
1.00	HV 56.81kPa		56,56,50/Av. 54.00					
					(0.90)			
						...becoming soft to firm		
1.50	D2							
				-0.13	1.70	Very soft grey mottled dark grey silty sandy CLAY		
1.80	HV 10.52kPa		10,12,8/Av. 10.00		(0.30)			
1.80	D3							
				-0.43	2.00	Dark grey slightly slightly silty sandy shelly subrounded to rounded fine to medium flint GRAVEL		▽1
2.00-2.40	B5		Slow to moderate(1) at 2.00m.		(0.40)			
				-0.83	2.40	Very soft grey mottled dark grey silty sandy CLAY		
					(0.20)			
				-1.03	2.60	Plastic dark bluish grey mottled brown clayey slightly sandy amorphous PEAT. With rare shell fragments. Organic odour		
2.70	D4				(0.25)			
				-1.28	2.85	Soft dark grey clayey slightly sandy slightly peaty SILT		
2.90	D5				(0.25)			
				-1.53	3.10			
3.20	D6			-1.63	(0.10) 3.20	Soft to firm, firm in places, light brown silty slightly sandy CLAY		

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater struck at 2.00 m
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP16

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP17

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.1 m x W 1.3 m x D 2.25	1.55	WIRSOL Energy Limited	18.103
	Location 604489 E 164210 N	**Dates** 22/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D1				(0.35)	TOPSOIL (Brown silty clay. With rare subangular fine flint gravel)		
				1.20	0.35	Firm brown mottled grey silty CLAY		
0.50	HV 67.33kPa		58,62,72/Av. 64.00					
0.50	D2				(0.45)			
				0.75	0.80	Firm grey mottled orange brown silty CLAY		
0.90	D3							
1.00	HV 45.58kPa		46,42,42/Av. 43.33					
					(1.00)	...becoming soft to firm		
1.40	D4							
1.50	HV 21.04kPa		20,20,20/Av. 20.00			...becoming slightly sandy and with frequent fine sand partings		
						...becoming soft		
				-0.25	1.80			▽1
1.80	D5				(0.20)	Very soft grey mottled dark grey silty sandy CLAY		
				-0.45	2.00			
2.00	HV 12.62kPa		8,12,16/Av. 12.00			Grey clayey silty very gravelly shelly fine to coarse SAND. With occasional flint cobbles. Gravel is subrounded to rounded fine to coarse flint		▽1
2.00-2.20	B1		Moderate to fast(1) at 2.10m, rose to 1.80m in 20 mins.		(0.25)			
				-0.70	2.25			
						Complete at 2.25m		

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater struck at 2.10 m and rose to 1.80 m in 20 mins.
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052
6. Temporary standpipe installed to monitor groundwater level. Plumb was 2.23 m. Groundwater level immediately after backfilling was 1.2 m. Groundwater level was 0.92 m after approximately 24 hours

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP17

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP18

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.1 m x W 1.3 m x D 3.1 m	1.49	WIRSOL Energy Limited	18.103
	Location 604481 E 164284 N	**Dates** 22/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D1				(0.45)	TOPSOIL (Brown silty clay)		
				1.04	0.45	Firm brown mottled grey silty CLAY		
0.50	HV 72.59kPa		74,65,68/Av. 69.00					
0.50	D2				(0.35)			
				0.69	0.80	Firm grey mottled orange brown silty slightly sandy CLAY. With occasional fine sand partings		
1.00	HV 47.00kPa		44,44,46/Av. 44.67					
1.00	D3				(0.80)			
						...becoming soft to firm		
1.40	D4							
1.50	HV 19.64kPa		20,20,16/Av. 18.67			...becoming soft		
				-0.11	1.60	Very soft grey mottled dark grey silty slightly sandy slightly shelly CLAY		▽1
1.70	D5		Seepage(1) at 1.70m.					
						...tending to clayey slightly sandy slightly shelly SILT		
2.10	D6				(1.00)			
2.60-2.90	B1		Slow(2) at 2.60m.	-1.11	2.60	Dark grey clayey silty sandy fine to medium shell and occasional flint GRAVEL		▽2
					(0.30)			
				-1.41	2.90	Very soft grey mottled dark grey clayey slightly sandy slightly shelly SILT		
3.00	D7				(0.20)			
				-1.61	3.10	Complete at 3.10m		

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater seepage at 1.70 m
3. Groundwater struck at 2.60 m
4. Trial pit remained open and sidewalls stable during excavation
5. Trial pit backfilled with arisings upon completion
6. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP18

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP19

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.1 m x W 1.3 m x D 3.0 m	1.52	WIRSOL Energy Limited	18.103
	Location 604558 E 164290 N	**Dates** 22/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D1				(0.30)	TOPSOIL (Brown silty slightly gravelly clay. Gravel is subangular to subrounded fine to medium flint and chalk)		
				1.22	0.30	Firm brown mottled grey silty CLAY		
0.50 0.50	HV 79.95kPa D2		68,80,80/Av. 76.00		(0.50)			
				0.72	0.80	Firm grey mottled orange brown silty CLAY		
1.00 1.00	HV 35.06kPa D3		30,32,38/Av. 33.33		(0.80)	...becoming soft to firm		
						...becoming soft		
1.50 1.50	HV 14.73kPa D4		18,12,12/Av. 14.00					
				-0.08	1.60	Very soft bluish grey mottled dark grey silty slightly sandy CLAY		
2.00 2.00	HV 10.52kPa D5		10,10,10/Av. 10.00			...tending to dark grey clayey sandy slightly shelly SILT		
2.20	D6				(1.30)			
2.70	D7							
				-1.38	2.90			
2.95	D8			-1.48	(0.10) 3.00	Stiff to very stiff blocky grey, with occasional ferrugineous staining, silty slightly sandy CLAY		
						Complete at 3.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. No groundwater encountered
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP19

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP20

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.2 m x W 1.3 m x D 3.0 m	1.52	WIRSOL Energy Limited	18.103
	Location 604583 E 164215 N	**Dates** 22/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D1				(0.30)	TOPSOIL (Brown silty CLAY. With rare subrounded fine chalk gravel)		
				1.22	0.30	Firm brown mottled grey silty CLAY		
0.30-0.80 0.30-0.80	B1 B2							
0.50 0.50	HV 77.14kPa D2		70,72,78/Av. 73.33		(0.50)			
				0.72	0.80	Firm grey mottled orange brown silty slightly sandy CLAY. With frequent sand partings		
0.80-1.30 0.80-1.30	B3 B4							
1.00 1.00	HV 51.20kPa D3		52,46,48/Av. 48.67		(0.70)			
						...becoming soft to firm		
						...becoming soft		
				0.02	1.50			
1.60 1.60	HV 14.02kPa D4		10,12,18/Av. 13.33			Very soft grey clayey sandy shelly SILT. With sand and shell pockets		
2.20	D5				(1.25)			
				-1.23	2.75	Firm to very stiff blocky silty slightly sandy CLAY		
2.80	D6				(0.25)			
				-1.48	3.00	Complete at 3.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. No groundwater encountered
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP20

A F Howland Associates
Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP21

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.0 m x W 1.3 m x D 3.0 m	1.56	WIRSOL Energy Limited	18.103
	Location 604623 E 164038 N	**Dates** 23/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL (Brown silty slightly gravelly clay. Gravel is subangular to subrounded fine to coarse flint and fine to medium chalk)		
0.20	D1			1.16	0.40	Firm grey mottled orange brown silty slightly sandy CLAY		
0.50	HV 79.60kPa		72,82,73/Av. 75.67					
0.60	D2							
1.00	HV 71.54kPa		72,70,62/Av. 68.00		(1.25)			
1.20	D3					...becoming soft to firm		
1.40	D4					...becoming soft and sandy		
1.50	HV 17.54kPa		16,12,22/Av. 16.67			...tending to very soft clayey very sandy slightly shelly SILT. With occasional silty sand partings		
1.60	D5			-0.09	1.65			
					(0.20)	Soft bluish grey mottled dark grey silty CLAY. Slightly organic in places		
1.80	HV 26.65kPa		22,26,28/Av. 25.33	-0.29	1.85			
1.80	D6					Plastic grey mottled dark grey and brown clayey silty slightly sandy amorphous PEAT. Strong sulphurous odour		
2.00	D7							
					(0.60)			
				-0.89	2.45	Soft dark grey very silty organic CLAY. Organic odour		
2.50	D8							
					(0.55)			
			Slow(1) at 2.90m.			...becoming mottled grey and with very soft pockets	▽1	
3.00	D9			-1.44	3.00	Complete at 3.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater struck at 2.90 m
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP21

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Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	TP22

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	L 2.5 m x W 1.3 m x D 3.0 m	1.68	WIRSOL Energy Limited	18.103
	Location 604610 E 164101 N	**Dates** 23/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D1				(0.30)	TOPSOIL (Brown silty clay. With rare subangular fine chalk gravel)		
0.30-0.75	B1			1.38	0.30	Firm brown mottled grey silty CLAY		
0.30-0.75	B2							
0.50	HV 58.56kPa		50,55,62/Av. 55.67		(0.45)			
0.75-1.25	B3			0.93	0.75	Firm grey mottled orange brown silty slightly sandy CLAY		
0.75-1.25	B4							
1.00	HV 51.90kPa		42,64,42/Av. 49.33					
					(0.85)	...becoming soft to firm		
1.50	HV 24.54kPa		20,22,28/Av. 23.33					
				0.08	1.60	Soft, soft to firm in places, grey mottled brown silty slightly sandy slightly shelly CLAY	▽1	
1.70	D2		Seepage(1) at 1.70m.		(0.35)	...tending to dark grey clayey sandy slightly shelly SILT. With sandy shell pockets		
1.80	D3			-0.27	1.95			
2.00	D4					Very soft brown mottled orange brown silty sandy slightly shelly CLAY. With rare rounded medium flint gravel. Tending to silt in places		
					(0.45)			
				-0.72	2.40	Soft, soft to firm in places, light brown mottled light grey silty sandy CLAY		
2.50	D5							
2.60	HV 56.10kPa		48,50,62/Av. 53.33			...becoming firm and slightly friable		
2.60	D6				(0.60)			
						...becoming soft to firm and friable		
2.90	D7			-1.32	3.00	Complete at 3.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. Groundwater seepage at 1.70 m
3. Trial pit remained open and sidewalls stable during excavation
4. Trial pit backfilled with arisings upon completion
5. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.TP22

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Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	DCP01

DCP Details	Excavation Method	Ground Level (mOD)	Client	Job Number
Hammer weight - 8 kg Hammer drop - 575 mm Cone diameter - 20 mm Cone angle - 60 degrees Zero error - 0 mm Initial Penetration - 5 mm	Machine excavated trial pit	1.61	WIRSOL Energy Limited	18.103
	Location 604884 E 164086 N	**Dates** 19/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Layer CBR % Value	CBR Value Per Blow (1 – 10 – 100)	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.35)	TOPSOIL (Brown silty clay. With rare subangular to subrounded fine chalk gravel)		
		3.5		1.26	0.35	Firm brown mottled grey silty CLAY		
		4.5			(0.45)			
				0.81	0.80	Firm grey mottled orange brown silty CLAY		
		4.1			(0.44)			
				0.37	1.24	Complete at 1.24m		

Remarks
1. CBR % value equated from TRL method : (log (CBR) = 2.48 - 1.057 x log (penetration rate))
2. Location CAT scanned prior to excavation.
3. No groundwater encountered
4. Trial pit remained open and sidewalls stable during excavation
5. Trial pit backfilled with arisings upon completion
6. Undertaken at same location as TP06 - see associated record

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.DCP01

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Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	DCP02

DCP Details	Excavation Method	Ground Level (mOD)	Client	Job Number
Hammer weight - 8 kg Hammer drop - 575 mm Cone diameter - 20 mm Cone angle - 60 degrees Zero error - 0 mm Initial Penetration - 5 mm	Hand dug trial pit	1.47	WIRSOL Energy Limited	18.103
	Location 604874 E 164155 N	**Dates** 19/03/2018	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Layer CBR % Value	CBR Value Per Blow (1 – 10 – 100)	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.65)	TOPSOIL (Brown silty slightly gravelly clay. Gravel is subangular fine to medium shell)		
0.30	HV 62.42kPa 76,44,58 Av. 59.33	4.8		0.82	0.65	Soft to firm grey mottled light brown silty slightly sandy CLAY	V1	
0.30	D1							
0.65-1.15	B1							
0.80	HV 72.24kPa 88,50,68 Av. 68.67	6.0			(0.61)			
				0.21	1.26	Complete at 1.26m		

Plan

Remarks
1. CBR % value equated from TRL method : (log (CBR) = 2.48 - 1.057 x log (penetration rate))
2. Location CAT scanned prior to excavation.
3. Hand dug inspection pit to 1.26 m.
4. Groundwater seepage at 0.65 m
5. Trial pit remained open and sidewalls stable during excavation
6. Trial pit backfilled with arisings upon completion
7. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.DCP02

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Geotechnical Engineers

Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	DCP03

DCP Details
Hammer weight - 8 kg
Hammer drop - 575 mm
Cone diameter - 20 mm
Cone angle - 60 degrees
Zero error - 0 mm
Initial Penetration - 5 mm

Excavation Method	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	1.59	WIRSOL Energy Limited	18.103

Location	Dates	Engineer	Sheet
604859 E 164222 N	19/03/2018-20/03/2018		1/1

Depth (m)	Sample / Tests	Layer CBR % Value	CBR Value Per Blow (1 – 10 – 100)	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.35)	TOPSOIL (Brown silty slightly gravelly clay. Gravel is subangular fine flint)		
		5.2		1.24	0.35			
					(0.40)	Firm brown mottled grey silty CLAY		
		6.3		0.84	0.75			
					(0.51)	Firm grey mottled orange brown and brown silty slightly sandy CLAY. With rare shell fragments		▽1
		7.0		0.33	1.26			
						Complete at 1.26m		

Remarks
1. CBR % value equated from TRL method : (log (CBR) = 2.48 - 1.057 x log (penetration rate))
2. Location CAT scanned prior to excavation.
3. Groundwater struck at 1.15 m
4. Trial pit remained open and sidewalls stable during excavation
5. Trial pit backfilled with arisings upon completion
6. Undertaken at same location as TP01 - see associated record

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.DCP03

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Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	DCP04

DCP Details
Hammer weight - 8 kg
Hammer drop - 575 mm
Cone diameter - 20 mm
Cone angle - 60 degrees
Zero error - 0 mm
Initial Penetration - 5 mm

Excavation Method	Ground Level (mOD)	Client	Job Number
Hand dug trial pit	1.58	WIRSOL Energy Limited	18.103

Location	Dates	Engineer	Sheet
604848 E 164291 N	19/03/2018		1/1

Depth (m)	Sample / Tests	Layer CBR % Value	CBR Value Per Blow (1 – 10 – 100)	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						TOPSOIL (Brown silty clay)		
0.30	HV 72.24kPa 30,54,60 Av. 48.00	4.7		0.88	(0.70)			
0.30	D1				0.70	Soft to firm light brown mottled grey silty CLAY		
0.70-1.20	B1	3.7			(0.55)			
0.80	HV 50.5kPa 70,72,66 Av. 69.33			0.33	1.25			
						Complete at 1.25m		

Plan

Remarks
1. CBR % value equated from TRL method : (log (CBR) = 2.48 - 1.057 x log (penetration rate))
2. Location CAT scanned prior to excavation.
3. Hand dug inspection pit to 1.25 m.
4. No groundwater encountered
5. Trial pit remained open and sidewalls stable during excavation
6. Trial pit backfilled with arisings upon completion
7. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.DCP04

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Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	DCP05

DCP Details
Hammer weight - 8 kg
Hammer drop - 575 mm
Cone diameter - 20 mm
Cone angle - 60 degrees
Zero error - 0 mm
Initial Penetration - 5 mm

Excavation Method	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	1.71	WIRSOL Energy Limited	18.103

Location	Dates	Engineer	Sheet
604674 E 164016 N	23/03/2018		1/1

Depth (m)	Sample / Tests	Layer CBR % Value	Level (mOD)	Depth (m) (Thickness)	Description	Legend
0.10	D1			(0.35)	TOPSOIL (Brown silty slightly gravelly clay. Gravel is subangular to subrounded fine to medium chalk)	
0.35-0.85	B1	2.8	1.36	0.35	Firm light brown mottled grey silty CLAY	
0.50	HV 78.55kPa 67.73.84 Av. 74.67	4.5		(0.50)		
0.85-1.30	B2		0.86	0.85	Firm grey mottled orange brown silty slightly sandy CLAY	
1.00	HV 77.85kPa 82.68.72 Av. 74.00	6.9		(0.45)		
			0.41	1.30	Complete at 1.30m	

CBR Value Per Blow: 1 10 100

Remarks
1. CBR % value equated from TRL method : (log (CBR) = 2.48 - 1.057 x log (penetration rate))
2. Location CAT scanned prior to excavation.
3. No groundwater encountered
4. Trial pit remained open and sidewalls stable during excavation
5. Trial pit backfilled with arisings upon completion
6. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.DCP05

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Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	DCP06

DCP Details
Hammer weight - 8 kg
Hammer drop - 575 mm
Cone diameter - 20 mm
Cone angle - 60 degrees
Zero error - 0 mm
Initial Penetration - 5 mm

Excavation Method	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit	1.49	WIRSOL Energy Limited	18.103

Location	Dates	Engineer	Sheet
604586 E 164007 N	23/03/2018		1/1

Depth (m)	Sample / Tests	Layer CBR % Value	Level (mOD)	Depth (m) (Thickness)	Description	Legend
0.10	D1			(0.35)	TOPSOIL (Brown silty clay. With subangular to subrounded fine chalk gravel)	
0.35-0.70	B1	4.4	1.14	0.35	Firm brown mottled grey silty CLAY	
0.50	HV 56.81kPa 50.52.60 Av. 54.00			(0.35)		
0.70-1.40	B2		0.79	0.70	Firm grey mottled orange brown silty slightly sandy CLAY	
1.00	HV 58.91kPa 58.64.46 Av. 56.00	6.9		(0.71)	...becoming soft to firm	
			0.08	1.41	Complete at 1.41m	

CBR Value Per Blow: 1 10 100

Remarks
1. CBR % value equated from TRL method : (log (CBR) = 2.48 - 1.057 x log (penetration rate))
2. Location CAT scanned prior to excavation.
3. Groundwater seepage at 1.10 m
4. Trial pit remained open and sidewalls stable during excavation
5. Trial pit backfilled with arisings upon completion
6. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.DCP06

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Site	Trial Pit Number
Cleve Hill Solar Farm, Graveney, Kent	DCP07

DCP Details	Excavation Method	Ground Level (mOD)	Client	Job Number
Hammer weight - 8 kg Hammer drop - 575 mm Cone diameter - 20 mm Cone angle - 60 degrees Zero error - 0 mm Initial Penetration - 5 mm	Machine excavated trial pit	1.52	WIRSOL Energy Limited	18.103
	Location	**Dates**	**Engineer**	**Sheet**
	604508 E 164004 N	23/03/2018		1/1

Depth (m)	Sample / Tests	Layer CBR % Value	CBR Value Per Blow (1 – 10 – 100)	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL (Brown silty clay)		
0.20	D1			1.12	0.40			
0.40-0.85	B1					Firm brown mottled grey silty CLAY		
0.50	HV 73.64kPa 78.60,72 Av. 70.00	4.9			(0.45)			
				0.67	0.85			
0.90-1.40	B2					Firm grey silty slightly sandy CLAY		
1.00	HV 65.93kPa 54.74,60 Av. 62.67	6.1			(0.65)	...becoming soft to firm		▽1
				0.02	1.50			
						Complete at 1.50m		

Remarks

1. CBR % value equated from TRL method : (log (CBR) = 2.48 - 1.057 x log (penetration rate))
2. Location CAT scanned prior to excavation.
3. Groundwater seepage at 1.10 m
4. Trial pit remained open and sidewalls stable during excavation
5. Trial pit backfilled with arisings upon completion
6. 19 mm hand vane - serial no. DR-2743. Correction factor 1.052

Scale (approx)	Logged By	Figure No.
1:20	DJM	18.103.DCP07

APPENDIX D: LABORATORY TESTING

Natural moisture content

Atterberg limits

Particle size distribution

One-dimensional consolidation test

Dry density moisture content

Undrained shear strength in triaxial compression without measurement of pore pressure

California bearing ratio test

Sulphate content and pH value

Total sulphur

Chloride, nitrate and ammonia

Loss on ignition

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Laboratory Test Results

Site : Cleve Hill Solar Farm, Graveney, Kent

Client : WIRSOL Energy Limited

Engineer:

Job Number 18.103

Sheet 1 / 2

DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425µm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Modified Plasticity Index %	Liquidity Index	Group Symbol	Laboratory Description
				Percentage %	Moisture Content %							
BH01	1.20	U1	53.7	100	53.7	65	22	43	43	0.74	CH	Soft fissured brown silty CLAY.
BH01	2.50	D7	37.6	100	37.6	91	27	64	64	0.17	CE	Dark grey silty CLAY.
BH01	3.00	U2	35.6	100	35.6	92	28	64	64	0.13	CE	Stiff fissured dark grey CLAY.
BH01	5.00	U4	31.8	100	31.8	87	24	63	63	0.13	CV	Stiff fissured dark grey silty CLAY.
BH01	8.50	D18	27.7	100	27.7	83	21	62	62	0.11	CV	Dark grey silty CLAY.
BH02	0.50	D2	42.1	100	42.1	90	34	56	56	0.14	CV/CE	Mottled brown and brownish grey silty CLAY.
BH02	2.00	U2	42.8	99	43.2	41	23	18	18	1.11	CI	Soft dark grey silty CLAY with rare fine gravel sized gypsum and medium sized shell fragments.
BH02	3.50	D9	33.9	100	33.9	89	31	58	58	0.05	CV	Dark grey silty CLAY.
BH02	4.00	U4	31.7	100	31.7	85	25	60	60	0.12	CV	Stiff dark grey silty CLAY.
BH02	7.00	D16	32.5	100	32.5	94	29	65	65	0.06	CE	Dark grey silty CLAY.
BH02	8.50	D18	29.8	100	29.8	82	25	57	57	0.09	CV	Dark grey silty CLAY.
BH02	9.00	U8	29.1	100	29.1	73	24	49	49	0.10	CV	Stiff fissured dark grey silty CLAY.
BH03	1.20	U1	39.5	100	39.5	57	18	39	39	0.56	CH	Soft brown CLAY with a pocket containing yellowish brown silt.
BH03	3.00	U3	73.1	100	73.1	86	24	62	62	0.79	CV	Soft grey CLAY.
BH03	5.00	U5	50.9	99	51.4	66	18	48	48	0.69	CH	Soft grey CLAY with fine to medium shell fragments.
DCP06	0.35	B1	40.5	100	40.5	82	30	52	52	0.21	CV	Brown CLAY
DCP06	0.70	B2	47.4	100	47.4	82	29	53	53	0.34	CV	Brown CLAY
TP01	0.40	B1	35.5	100	35.5	87	31	56	56	0.09	CV	Brown CLAY with silt pockets.
TP01	0.80	B2	36.0	100	36.0	72	25	47	47	0.23	CV	Brown CLAY with silt pockets.
TP03	1.00	D2	45.2	100	45.2	83	32	51	51	0.25	CV	Brownish grey mottled brown silty CLAY.
TP04	1.80	D	39.7									Grey CLAY with fine to coarse gravel (weak mudstone & fine chalk)
TP05	2.00	D7	36.3									Grey CLAY with fine to coarse gravel (weak mudstone) & pockets of silt & organic matter
TP07	0.50	B1+B2	39.5	100	39.5	78	32	46	46	0.17	CV	Greyish brown CLAY
TP07	0.70	B3+B4	40.1	100	40.1	75	28	47	47	0.26	CV	Greyish brown CLAY
TP07	2.00	D5	38.4	99	38.8	43	20	23	23	0.83	CI	Grey sandy silty CLAY with rare shell fragments.
TP08	0.30	B1+B2	43.5	100	43.5	79	31	48	48	0.27	CV	Greyish brown CLAY
TP08	0.90	B3+B4	42.7	100	42.7	72	22	50	50	0.42	CV	Brown CLAY mixed with greyish brown SILT (mainly on the surface)
TP12	0.40	B1+B2	43.4	100	43.4	87	31	56	56	0.21	CV	Greyish brown CLAY
TP12	0.80	B3+B4	50.5	100	50.5	82	27	55	55	0.44	CV	Greyish brown CLAY
TP12	2.20	D3	36.4	100	36.4	84	31	53	53	0.09	CV	Dark grey mottled brownish grey silty CLAY.
TP20	0.30	B1+B2	40.4	100	40.4	82	24	58	58	0.28	CV	Brown CLAY
TP20	0.80	B3+B4	49.4	100	49.4	69	22	47	47	0.57	CH	Mottled grey and brown CLAY.
TP20	1.60	D4	48.3	97	49.8	57	19	38	37	0.82	CH	Grey and greyish brown sandy silty CLAY with occasional shells and shell fragments.

Method of Preparation :

Method of Test : BS EN ISO 17892:PART 1:2014:5.2 Test execution (moisture content) BS 1377:PART 2:1990:3 Determination of moisture content 1990:4 Determination of the liquid limit BS 1377:PART 2:1990:5 Determination of the plastic limit and plasticity index. Modified plasticity index BRE Digest 240 (1993)

Remarks :

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Laboratory Test Results

Site : Cleve Hill Solar Farm, Graveney, Kent

Client : WIRSOL Energy Limited

Engineer:

Job Number 18.103

Sheet 2 / 2

DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425µm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Modified Plasticity Index %	Liquidity Index	Group Symbol	Laboratory Description
				Percentage %	Moisture Content %							
TP22	0.30	B1+B2	53.8	100	53.8	81	30	51	51	0.47	CV	Greyish brown CLAY
TP22	0.75	B3+B4	56.8	100	56.8	82	31	51	51	0.51	CV	Greyish brown CLAY
TP22	2.00	D4	30.9	100	30.9	42	16	26	26	0.58	CI	Brown mottled grey slightly sandy silty CLAY.
TP22	2.60	D6	27.6	100	27.6	44	19	25	25	0.36	CI	Mottled brown and brownish grey silty CLAY.

Method of Preparation :

Method of Test : BS EN ISO 17892:PART 1:2014:5.2 Test execution (moisture content) BS 1377:PART 2:1990:3 Determination of moisture content 1990:4 Determination of the liquid limit BS 1377:PART 2:1990:5 Determination of the plastic limit and plasticity index. Modified plasticity index BRE Digest 240 (1993)

Remarks :

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Laboratory Test Results

Site : Cleve Hill Solar Farm, Graveney, Kent

Client : WIRSOL Energy Limited

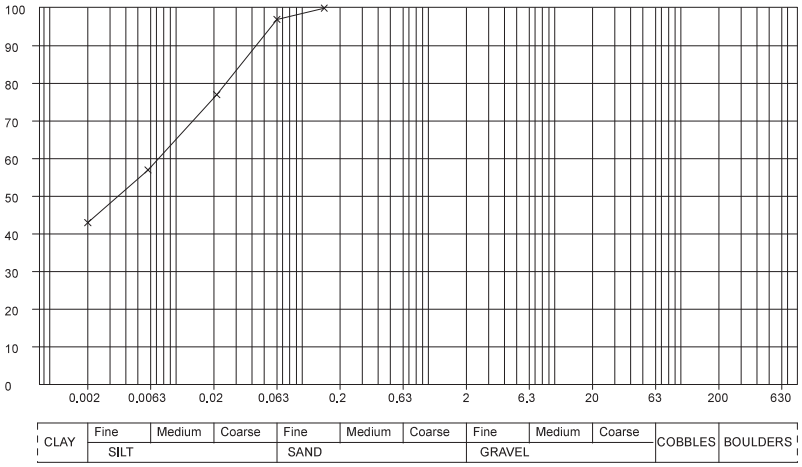
Engineer:

Job Number 18.103

Sheet 1/8

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH02	1.70	D5	Brown SILT and CLAY.



Sieve / Particle Size	% Passing
150 µm	100.0
63 µm	97.0
21 µm	77.0
6 µm	57.0
2 µm	43.0

Grading Analysis	
D85	37.8 µm
D60	8.3 µm
D10	<2.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	-
Sand	3.0%
Silt	54.0%
Clay	43.0%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

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Laboratory Test Results

Site : Cleve Hill Solar Farm, Graveney, Kent

Client : WIRSOL Energy Limited

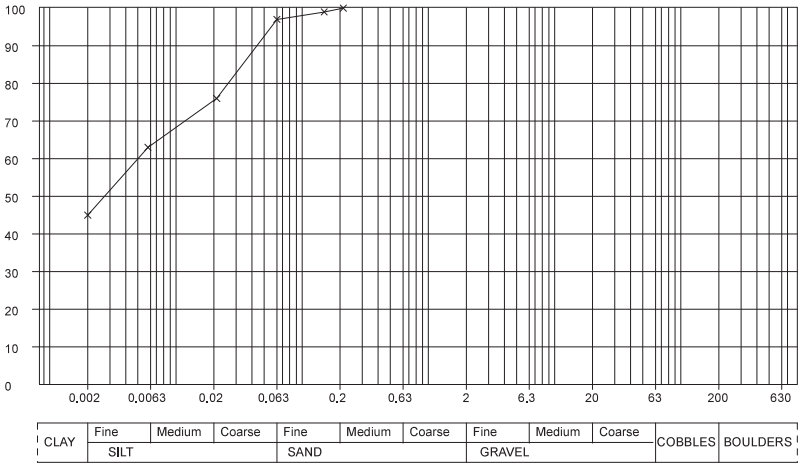
Engineer:

Job Number 18.103

Sheet 2/8

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH03	1.80	D6	Brownish grey SILT and CLAY.



Sieve / Particle Size	% Passing
212 µm	100.0
150 µm	99.0
63 µm	97.0
21 µm	76.0
6 µm	63.0
2 µm	45.0

Grading Analysis	
D85	39.0 µm
D60	5.3 µm
D10	<2.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	-
Sand	3.0%
Silt	52.0%
Clay	45.0%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

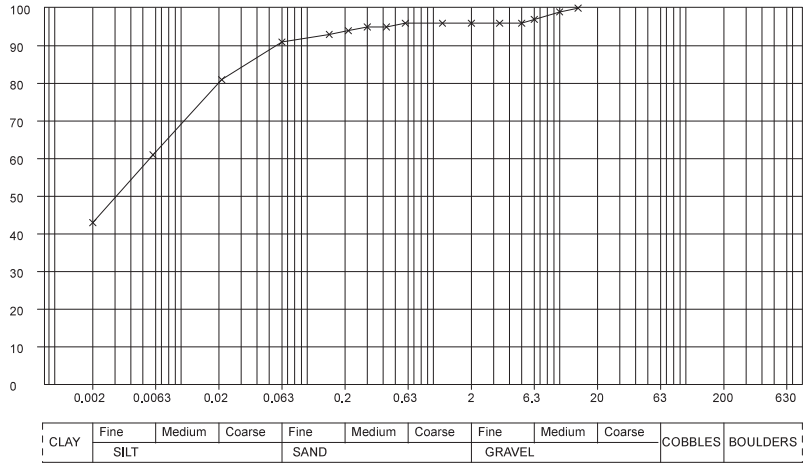
A F Howland Associates
Geotechnical Engineers

Laboratory Test Results

Site : Cleve Hill Solar Farm, Graveney, Kent	**Job Number** 18.103
Client : WIRSOL Energy Limited	**Sheet** 3/8
Engineer:	

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH03	3.80	D10	Grey SILT and CLAY with shells.



Sieve / Particle Size	% Passing
14 mm	100.0
10 mm	99.0
6.3 mm	97.0
5 mm	96.0
3.35 mm	96.0
2 mm	96.0
1.18 mm	96.0
600 µm	96.0
425 µm	95.0
300 µm	95.0
212 µm	94.0
150 µm	93.0
63 µm	91.0
21 µm	81.0
6 µm	61.0
2 µm	43.0

Grading Analysis	
D85	37.8 µm
D60	5.8 µm
D10	<2.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	4.0%
Sand	5.0%
Silt	48.0%
Clay	43.0%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

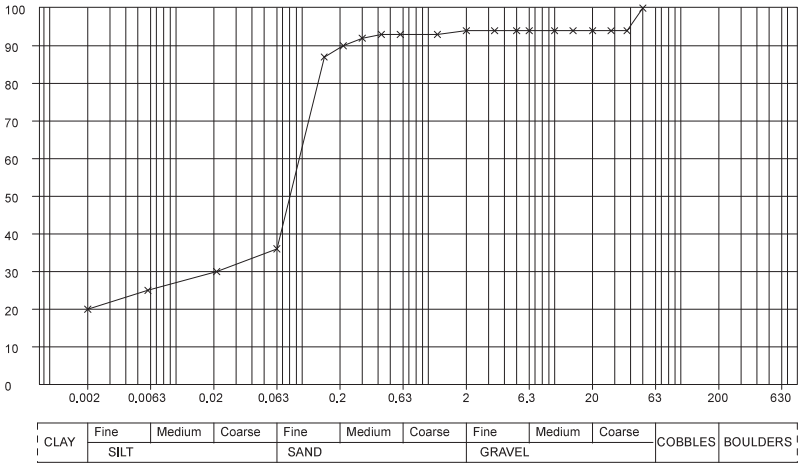
A F Howland Associates
Geotechnical Engineers

Laboratory Test Results

Site : Cleve Hill Solar Farm, Graveney, Kent	**Job Number** 18.103
Client : WIRSOL Energy Limited	**Sheet** 4/8
Engineer:	

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH03	7.50	B1	Greyish brown sandy silty CLAY (wet) with rare flint gravel.



Sieve / Particle Size	% Passing
50 mm	100.0
37.5 mm	94.0
28 mm	94.0
20 mm	94.0
14 mm	94.0
10 mm	94.0
6.3 mm	94.0
5 mm	94.0
3.35 mm	94.0
2 mm	94.0
1.18 mm	93.0
600 µm	93.0
425 µm	93.0
300 µm	92.0
212 µm	90.0
150 µm	87.0
63 µm	36.0
21 µm	30.0
6 µm	25.0
2 µm	20.0

Grading Analysis	
D85	146.6 µm
D60	103.9 µm
D10	<2.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	6.0%
Sand	58.0%
Silt	16.0%
Clay	20.0%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

A F Howland Associates
Geotechnical Engineers

Laboratory Test Results

Site : Cleve Hill Solar Farm, Graveney, Kent

Client : WIRSOL Energy Limited

Engineer:

Job Number 18.103

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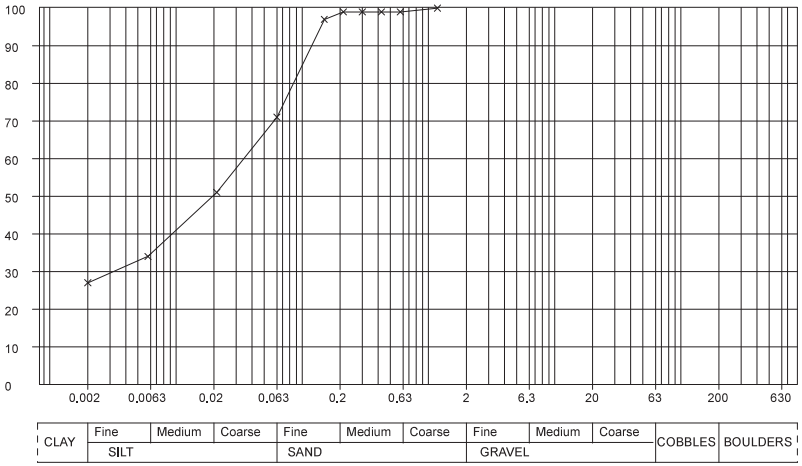
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
TP07	2.00	D5	Grey sandy silty CLAY with rare shell fragments.



Sieve / Particle Size	% Passing
1.18 mm	100.0
600 µm	99.0
425 µm	99.0
300 µm	99.0
212 µm	99.0
150 µm	97.0
63 µm	71.0
21 µm	51.0
6 µm	34.0
2 µm	27.0

Grading Analysis	
D85	109.8 µm
D60	39.9 µm
D10	<2.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	-
Sand	29.0%
Silt	44.0%
Clay	27.0%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

A F Howland Associates
Geotechnical Engineers

Laboratory Test Results

Site : Cleve Hill Solar Farm, Graveney, Kent

Client : WIRSOL Energy Limited

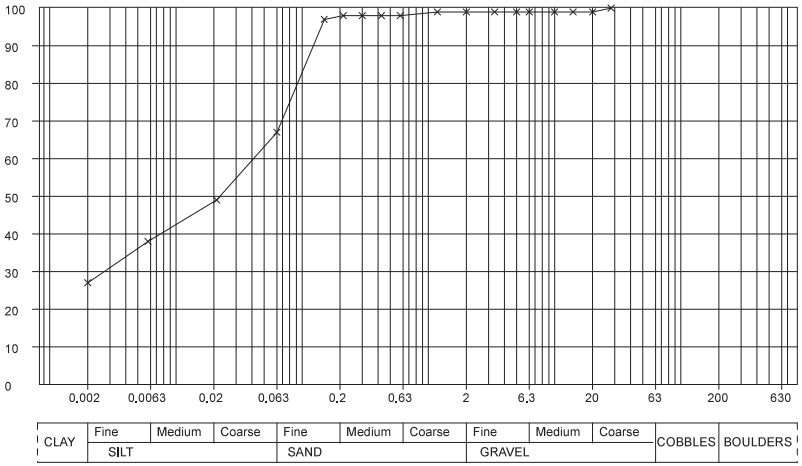
Engineer:

Job Number 18.103

Sheet 6/8

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
TP12	2.00	D2	Greyish brown sandy silty CLAY with rare shells.



Sieve / Particle Size	% Passing
28 mm	100.0
20 mm	99.0
14 mm	99.0
10 mm	99.0
6.3 mm	99.0
5 mm	99.0
3.35 mm	99.0
2 mm	99.0
1.18 mm	99.0
600 µm	98.0
425 µm	98.0
300 µm	98.0
212 µm	98.0
150 µm	97.0
63 µm	67.0
21 µm	49.0
6 µm	38.0
2 µm	27.0

Grading Analysis	
D85	115.2 µm
D60	46.7 µm
D10	<2.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	1.0%
Sand	32.0%
Silt	40.0%
Clay	27.0%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

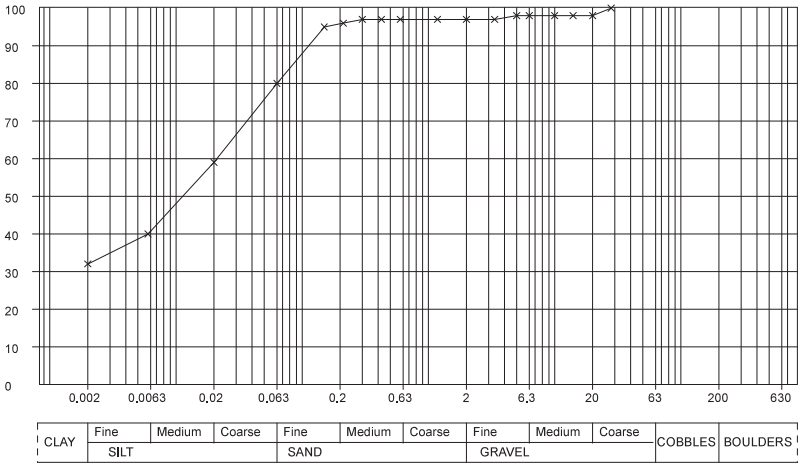
A F Howland Associates
Geotechnical Engineers

Laboratory Test Results

Site : Cleve Hill Solar Farm, Graveney, Kent	**Job Number** 18.103
Client : WIRSOL Energy Limited	**Sheet** 7/8
Engineer:	

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
TP20	1.60	D4	Grey and greyish brown sandy silty CLAY with occasional shells and shell fragments.



Sieve / Particle Size	% Passing
28 mm	100.0
20 mm	98.0
14 mm	98.0
10 mm	98.0
6.3 mm	98.0
5 mm	98.0
3.35 mm	97.0
2 mm	97.0
1.18 mm	97.0
600 µm	97.0
425 µm	97.0
300 µm	97.0
212 µm	96.0
150 µm	95.0
63 µm	80.0
20 µm	59.0
6 µm	40.0
2 µm	32.0

Grading Analysis	
D85	92.0 µm
D60	22.0 µm
D10	<2.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	3.0%
Sand	17.0%
Silt	48.0%
Clay	32.0%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

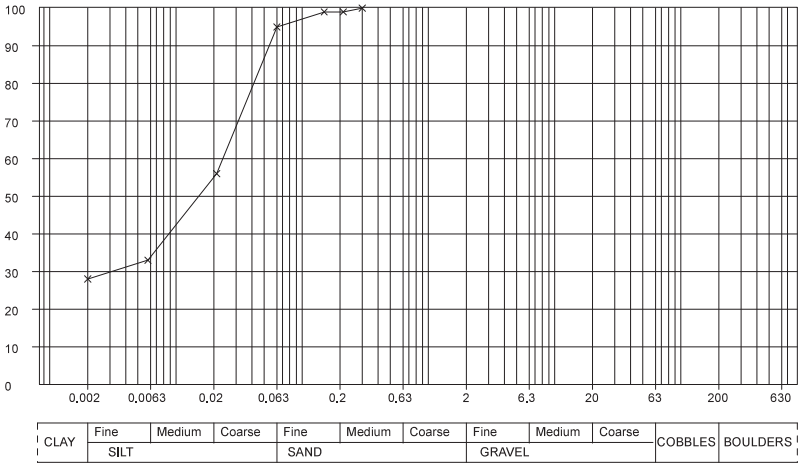
A F Howland Associates
Geotechnical Engineers

Laboratory Test Results

Site : Cleve Hill Solar Farm, Graveney, Kent	**Job Number** 18.103
Client : WIRSOL Energy Limited	**Sheet** 8/8
Engineer:	

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
TP22	2.00	D4	Brown mottled grey slightly sandy silty CLAY.



Sieve / Particle Size	% Passing
300 µm	100.0
212 µm	99.0
150 µm	99.0
63 µm	95.0
21 µm	56.0
6 µm	33.0
2 µm	28.0

Grading Analysis	
D85	52.2 µm
D60	25.3 µm
D10	<2.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	-
Sand	5.0%
Silt	67.0%
Clay	28.0%

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

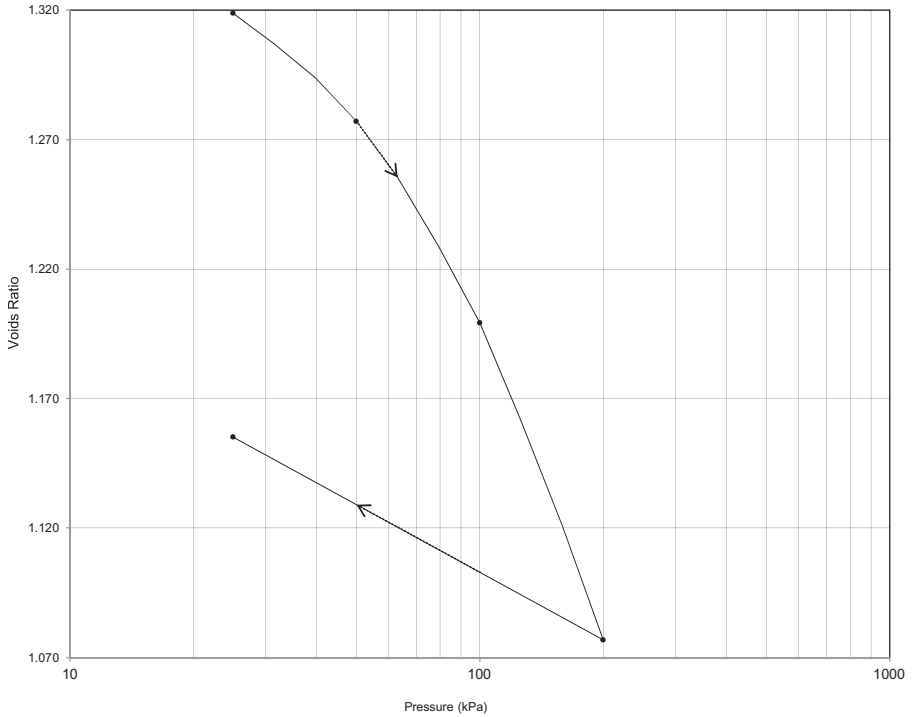
BS EN ISO 17892-5 : 2017

INCREMENTAL LOADING OEDOMETER TEST

BH / TP	BH01
Sample Ref.	U1
Depth (m)	1.20
Sample Type	U
Depth within original (mm)	30
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Soft brown CLAY.



Initial Conditions:

Height	(mm)	18.21	Water Content	(%)	48.6	(from trimmings)
Diameter	(mm)	76.23	Voids Ratio		1.353	
Area	(mm²)	4564	Bulk Density	(Mg/m³)	1.72	
Volume	(cm³)	83.11	Dry Density	(Mg/m³)	1.16	
Laboratory Temperature	(ºC)	20.4	Particle density	(Mg/m³)	2.72 (Assumed)	
			Degree of Saturation	(%)	97.8	

Results have been corrected for equipment deformation

Checked and Approved by

[redacted]

J Sturges - Operations Manager
20/04/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

GEOLABS

UKAS TESTING 1982

BS EN ISO 17892-5 : 2017

INCREMENTAL LOADING OEDOMETER TEST

BH / TP BH01
Sample Ref. U1
Depth (m) 1.20
Sample Type U
Depth within original (mm) 30
Orientation within original Vertical
Specimen preparation Undisturbed

Description:

Soft brown CLAY.

Pressure Range (kPa)	m_v (m²/MN)	c_v (m²/year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 25	0.57	0.90	t50	9.44	1.319
25 - 50	0.72	0.69	t50	11.9	1.277
50 - 100	0.68	0.67	t50	11.7	1.199
100 - 200	0.56	0.47	t50	15.0	1.077
200 - 25	0.22	0.41 (Sv)	t50	16.9	1.155

Checked and Approved by

[redacted]

J Sturges - Operations Manager
20/04/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

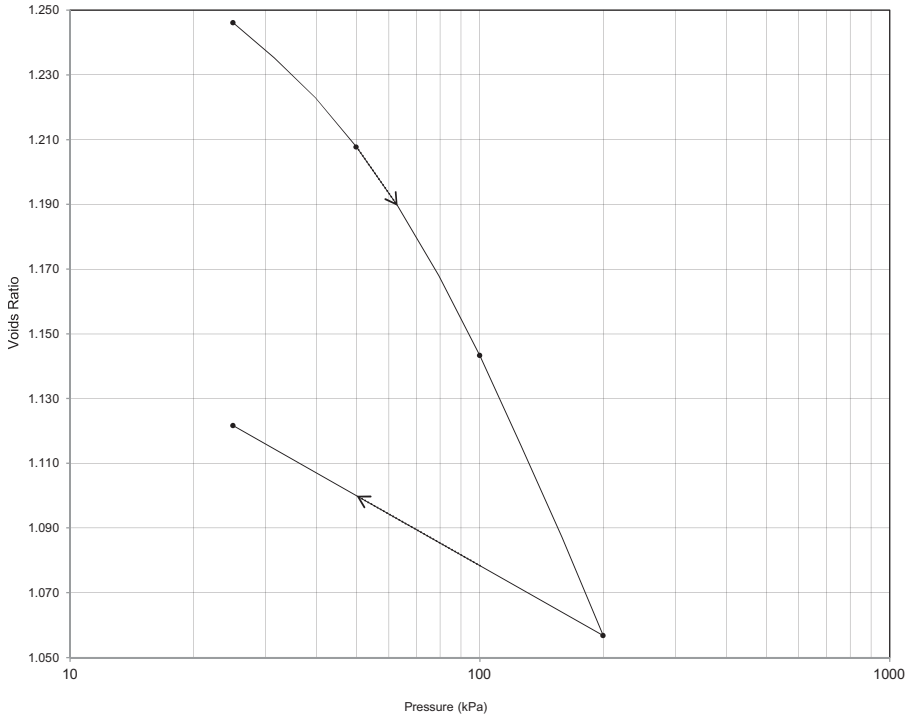
BS EN ISO 17892-5 : 2017

INCREMENTAL LOADING OEDOMETER TEST

BH / TP	BH02
Sample Ref.	U1
Depth (m)	1.20
Sample Type	U
Depth within original (mm)	50
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Soft brown CLAY.



Initial Conditions:

Height	(mm)	18.34	Water Content	(%)	46.8	(from trimmings)
Diameter	(mm)	76.10	Voids Ratio		1.287	
Area	(mm²)	4548	Bulk Density	(Mg/m³)	1.75	
Volume	(cm³)	83.42	Dry Density	(Mg/m³)	1.19	
Laboratory Temperature	(ºC)	21.1	Particle density	(Mg/m³)	2.72 (Assumed)	
			Degree of Saturation	(%)	98.9	

Results have been corrected for equipment deformation

Checked and Approved by

[redacted]

J Sturges - Operations Manager
20/04/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT

18.103

BS EN ISO 17892-5 : 2017

INCREMENTAL LOADING OEDOMETER TEST

BH / TP BH02
Sample Ref. U1
Depth (m) 1.20
Sample Type U
Depth within original (mm) 50
Orientation within original Vertical
Specimen preparation Undisturbed

Description:

Soft brown CLAY.

Pressure Range (kPa)	m_v (m²/MN)	c_v (m²/year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 25	0.71	0.71	t50	12.1	1.246
25 - 50	0.68	0.63	t50	13.1	1.208
50 - 100	0.58	0.75	t50	10.6	1.143
100 - 200	0.40	0.76	t50	9.66	1.057
200 - 25	0.18	0.71 (Sv)	t50	10.3	1.122

Checked and Approved by

[redacted]

J Sturges - Operations Manager
20/04/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT

18.103

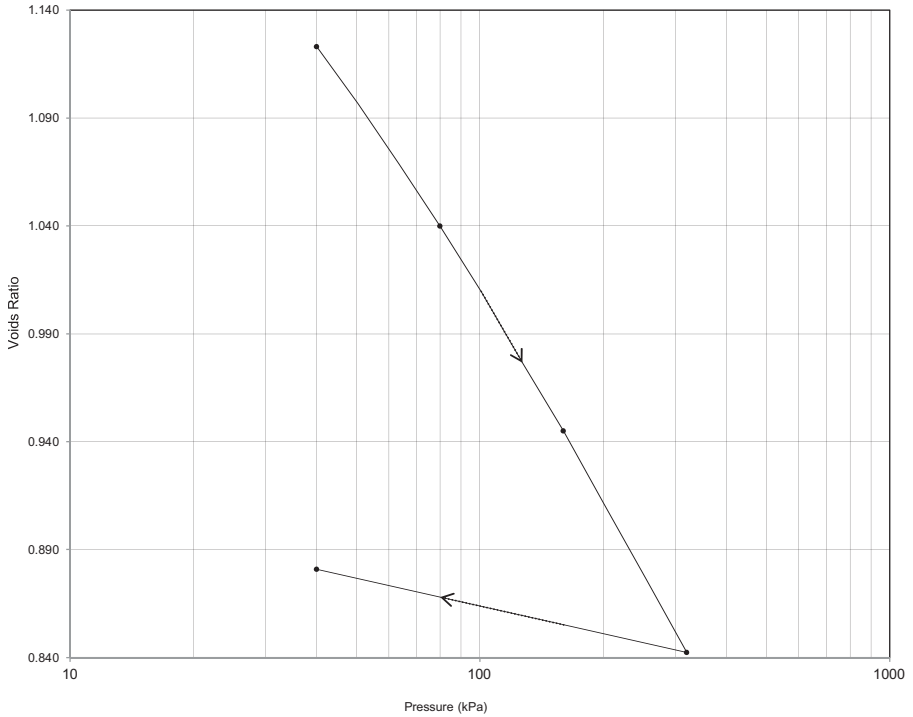
BS EN ISO 17892-5 : 2017

INCREMENTAL LOADING OEDOMETER TEST

BH / TP	BH02
Sample Ref.	U2
Depth (m)	2.00
Sample Type	U
Depth within original (mm)	60
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Soft grey silty CLAY with an organic odour.



Initial Conditions:

Height	(mm)	18.75	Water Content	(%)	47.4	(from trimmings)
Diameter	(mm)	76.07	Voids Ratio		1.274	
Area	(mm²)	4545	Bulk Density	(Mg/m³)	1.75	
Volume	(cm³)	85.22	Dry Density	(Mg/m³)	1.19	
Laboratory Temperature	(ºC)	20.3	Particle density	(Mg/m³)	2.70 (Assumed)	
			Degree of Saturation	(%)	100.4	

Results have been corrected for equipment deformation

Checked and Approved by

[redacted]

J Sturges - Operations Manager
20/04/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

BS EN ISO 17892-5 : 2017

INCREMENTAL LOADING OEDOMETER TEST

BH / TP BH02
Sample Ref. U2
Depth (m) 2.00
Sample Type U
Depth within original (mm) 60
Orientation within original Vertical
Specimen preparation Undisturbed

Description:

Soft grey silty CLAY with an organic odour.

Pressure Range (kPa)	m_v (m²/MN)	c_v (m²/year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 40	1.7	0.90	t50	9.52	1.123
40 - 80	0.98	0.69	t50	11.0	1.040
80 - 160	0.58	0.93	t50	7.54	0.945
160 - 320	0.33	1.1	t50	5.90	0.842
320 - 40	0.075	1.6 (Sv)	t50	3.75	0.881

Checked and Approved by

[redacted]

J Sturges - Operations Manager
20/04/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

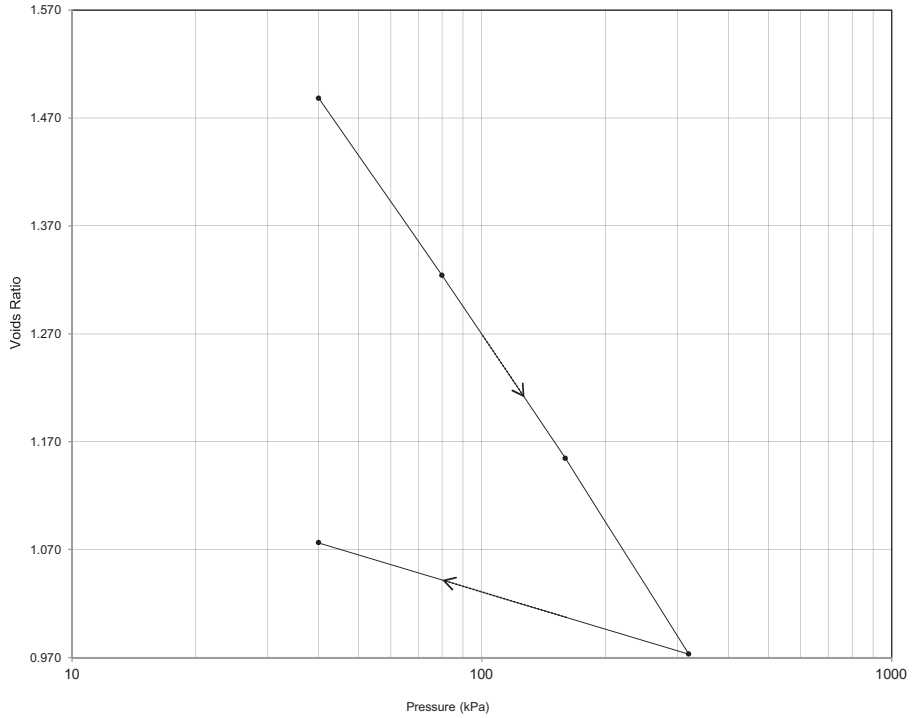
BS EN ISO 17892-5 : 2017

INCREMENTAL LOADING OEDOMETER TEST

BH / TP	BH03
Sample Ref.	U2
Depth (m)	2.00
Sample Type	U
Depth within original (mm)	60
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Soft slightly organic grey CLAY.



Initial Conditions:

Height	(mm)	18.56	Water Content	(%)	69.7	(from trimmings)
Diameter	(mm)	76.18	Voids Ratio		1.836	
Area	(mm²)	4558	Bulk Density	(Mg/m³)	1.62	
Volume	(cm³)	84.60	Dry Density	(Mg/m³)	0.95	
Laboratory Temperature	(ºC)	20.5	Particle density	(Mg/m³)	2.70 (Assumed)	
			Degree of Saturation	(%)	102.5	

Results have been corrected for equipment deformation

Checked and Approved by

[redacted]

J Sturges - Operations Manager
20/04/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

BS EN ISO 17892-5 : 2017

INCREMENTAL LOADING OEDOMETER TEST

BH / TP	BH03
Sample Ref.	U2
Depth (m)	2.00
Sample Type	U
Depth within original (mm)	60
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Soft slightly organic grey CLAY.

Pressure Range (kPa)	m_v (m²/MN)	c_v (m²/year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 40	3.1	0.24	t50	32.7	1.488
40 - 80	1.6	0.18	t50	36.8	1.324
80 - 160	0.91	0.20	t50	27.7	1.155
160 - 320	0.53	0.20	t50	24.0	0.973
320 - 40	0.19	0.23 (Sv)	t50	20.1	1.076

Checked and Approved by

[redacted]

J Sturges - Operations Manager
20/04/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

1410 - Comp TP04 01.80 D Test 01 - 27270-193308.XLSM

BS1377:Part 4:1990 Clause 3.5

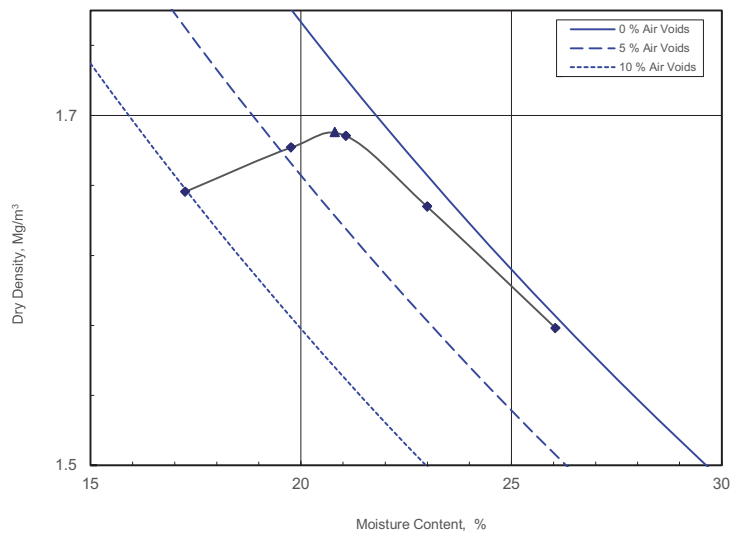
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH/TP	TP04
Depth (m)	1.80
Sample Type	D

Description:

Grey CLAY with rare gravel sized mudstone and fine chalk.

Preparation		Oven dried
Test Method		4.5kg Rammer for soils with particles up to medium-gravel size
Samples Used		Single / Multiple
Mass Retained on 37.5 mm Sieve	%	-
Mass Retained on 20.0 mm Sieve	%	-
Particle Density - Assumed	Mg/m³	2.70
Maximum Dry Density	Mg/m³	1.69
Optimum Moisture Content	%	20.8



Determination		1	2	3	4	5
Moisture Content	%	17.2	19.8	21.1	23.0	26.0
Dry Density	Mg/m³	1.66	1.68	1.69	1.65	1.58

GL:Version 1.33 - 23/02/2018

Checked and Approved by:

[redacted]

S Burke - Senior Technician
02/05/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

GEOLABS

1410 - Comp TP05 02.00 D7 D Test 01 - 27270-193303.XLSM

BS1377:Part 4:1990 Clause 3.5

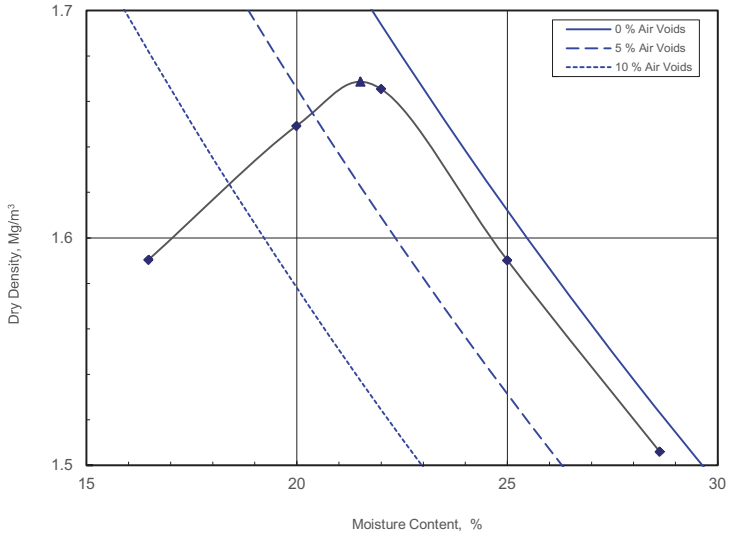
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH/TP	TP05
Sample Ref	D7
Depth (m)	2.00
Sample Type	D

Description:

Grey CLAY with rare gravel sized weak mudstone and pockets of silt and organic matter.

Preparation		Oven dried
Test Method		4.5kg Rammer for soils with particles up to medium-gravel size
Samples Used		Single / Multiple
Mass Retained on 37.5 mm Sieve	%	-
Mass Retained on 20.0 mm Sieve	%	-
Particle Density - Assumed	Mg/m³	2.70
Maximum Dry Density	Mg/m³	1.67
Optimum Moisture Content	%	21.5



Determination		1	2	3	4	5
Moisture Content	%	16.5	20.0	22.0	25.0	28.6
Dry Density	Mg/m³	1.59	1.65	1.67	1.59	1.51

GL:Version 1.33 - 23/02/2018

Checked and Approved by:

[redacted]

S Burke - Senior Technician
02/05/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

GEOLABS

1410 - Comp TP07 00.50 B1 + B2 B Test 01 - 27270-504381.XLSM

BS1377:Part 4:1990 Clause 3.5

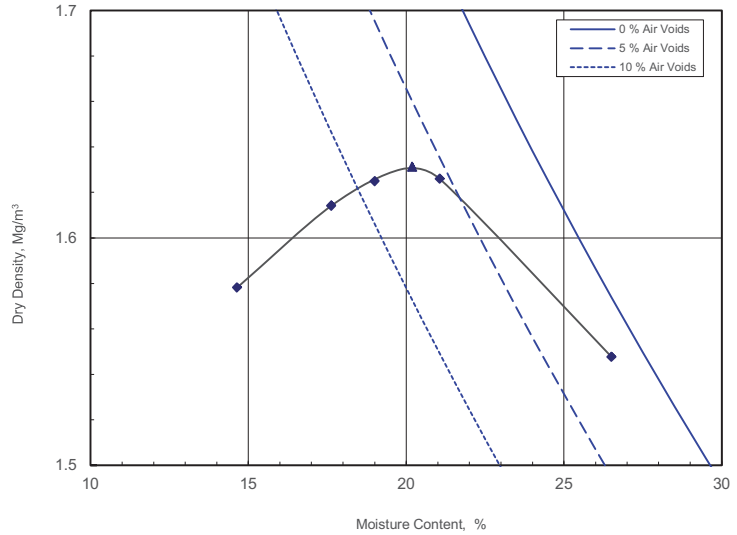
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH/TP	TP07
Sample Ref	B1 + B2
Depth (m)	0.50
Sample Type	B

Description:

Greyish brown CLAY

Preparation		Oven dried
Test Method		4.5kg Rammer for soils with particles up to medium-gravel size
Samples Used		Single / Multiple
Mass Retained on 37.5 mm Sieve	%	-
Mass Retained on 20.0 mm Sieve	%	-
Particle Density - Assumed	Mg/m³	2.70
Maximum Dry Density	Mg/m³	1.63
Optimum Moisture Content	%	20.2



Determination		1	2	3	4	5
Moisture Content	%	14.6	17.6	19.0	21.1	26.5
Dry Density	Mg/m³	1.58	1.61	1.62	1.63	1.55

GL:Version 1.33 - 23/02/2018

Checked and Approved by:

[redacted]

S Burke - Senior Technician
02/05/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

1410 - Comp TP07 00.70 B3 + B4 B Test 01 - 27270-504382.XLSM

BS1377:Part 4:1990 Clause 3.5

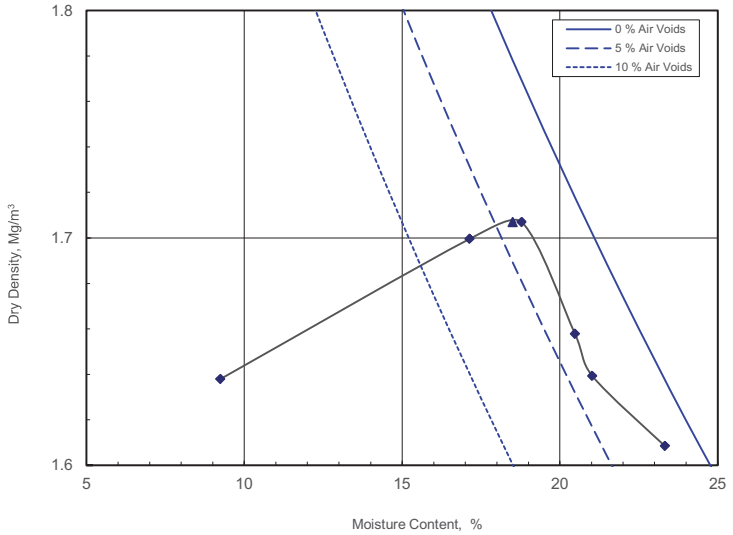
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH/TP	TP07
Sample Ref	B3 + B4
Depth (m)	0.70
Sample Type	B

Description:

Greyish brown CLAY

Preparation		Oven dried
Test Method		4.5kg Rammer for soils with particles up to medium-gravel size
Samples Used		Single / Multiple
Mass Retained on 37.5 mm Sieve	%	-
Mass Retained on 20.0 mm Sieve	%	-
Particle Density - Assumed	Mg/m³	2.65
Maximum Dry Density	Mg/m³	1.71
Optimum Moisture Content	%	18.5



Determination		1	2	3	4	5
Moisture Content	%	9.2	17.1	18.8	20.5	21.0
Dry Density	Mg/m³	1.64	1.70	1.71	1.66	1.64

GL:Version 1.33 - 23/02/2018

Checked and Approved by:

[redacted]

S Burke - Senior Technician
02/05/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

1410 - Comp TP08 00.30 B1 + B2 B Test 01 - 27270-504383.XLSM

BS1377:Part 4:1990 Clause 3.5

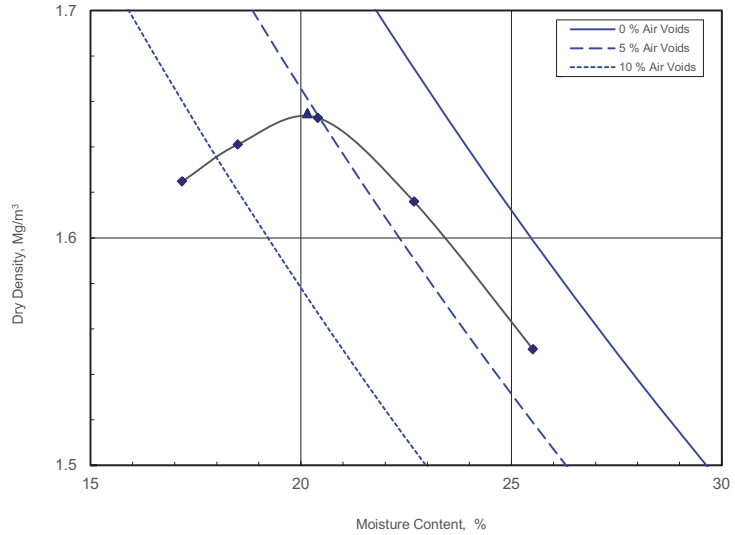
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH/TP	TP08
Sample Ref	B1 + B2
Depth (m)	0.30
Sample Type	B

Description:

Greyish brown CLAY

Preparation		Oven dried
Test Method		4.5kg Rammer for soils with particles up to medium-gravel size
Samples Used		Single / Multiple
Mass Retained on 37.5 mm Sieve	%	-
Mass Retained on 20.0 mm Sieve	%	-
Particle Density - Assumed	Mg/m³	2.70
Maximum Dry Density	Mg/m³	1.65
Optimum Moisture Content	%	20.2



Determination		1	2	3	4	5
Moisture Content	%	17.2	18.5	20.4	22.7	25.5
Dry Density	Mg/m³	1.62	1.64	1.65	1.62	1.55

Checked and Approved by:

[redacted]

S Burke - Senior Technician
02/05/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

GL:Version 1.33 - 23/02/2018

1410 - Comp TP08 00.90 B3 + B4 B Test 01 - 27270-504384.XLSM

BS1377:Part 4:1990 Clause 3.5

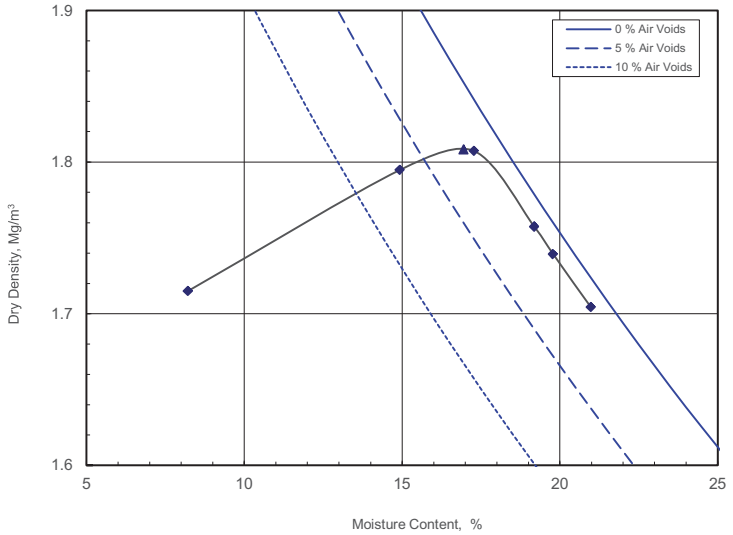
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH/TP	TP08
Sample Ref	B3 + B4
Depth (m)	0.90
Sample Type	B

Description:

Greyish brown CLAY

Preparation		Oven dried
Test Method		4.5kg Rammer for soils with particles up to medium-gravel size
Samples Used		Single / Multiple
Mass Retained on 37.5 mm Sieve	%	-
Mass Retained on 20.0 mm Sieve	%	-
Particle Density - Assumed	Mg/m³	2.70
Maximum Dry Density	Mg/m³	1.81
Optimum Moisture Content	%	17.0



Determination		1	2	3	4	5
Moisture Content	%	8.2	14.9	17.3	19.2	19.8
Dry Density	Mg/m³	1.71	1.79	1.81	1.76	1.74

Checked and Approved by:

[redacted]

S Burke - Senior Technician
02/05/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

GL:Version 1.33 - 23/02/2018

1410 - Comp TP12 00.40 B1 + B2 B Test 01 - 27270-504385.XLSM

BS1377:Part 4:1990 Clause 3.5

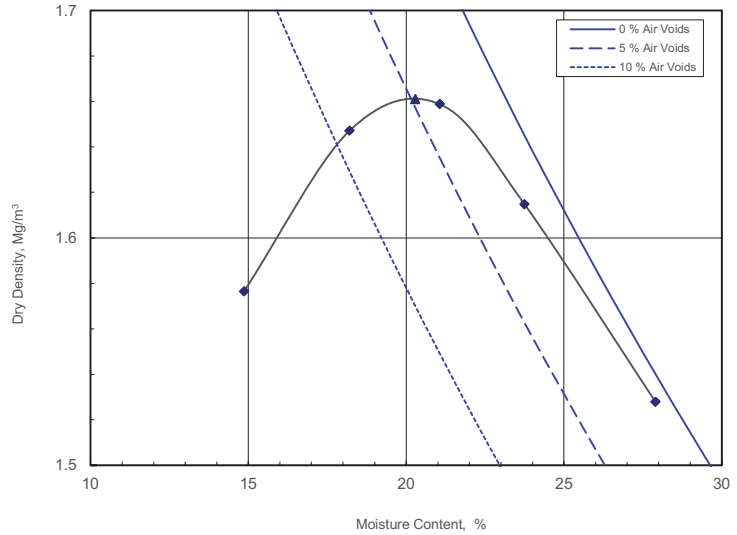
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH/TP	TP12
Sample Ref	B1 + B2
Depth (m)	0.40
Sample Type	B

Description:

Greyish brown CLAY

Preparation		Oven dried
Test Method		4.5kg Rammer for soils with particles up to medium-gravel size
Samples Used		Single / Multiple
Mass Retained on 37.5 mm Sieve	%	-
Mass Retained on 20.0 mm Sieve	%	-
Particle Density - Assumed	Mg/m³	2.70
Maximum Dry Density	Mg/m³	1.66
Optimum Moisture Content	%	20.3



Determination		1	2	3	4	5
Moisture Content	%	14.9	18.2	21.1	23.7	27.9
Dry Density	Mg/m³	1.58	1.65	1.66	1.61	1.53

GL:Version 1.33 - 23/02/2018

Checked and Approved by:

[redacted]

S Burke - Senior Technician
02/05/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

1410 - Comp TP12 00.80 B3 + B4 B Test 01 - 27270-504386.XLSM

BS1377:Part 4:1990 Clause 3.5

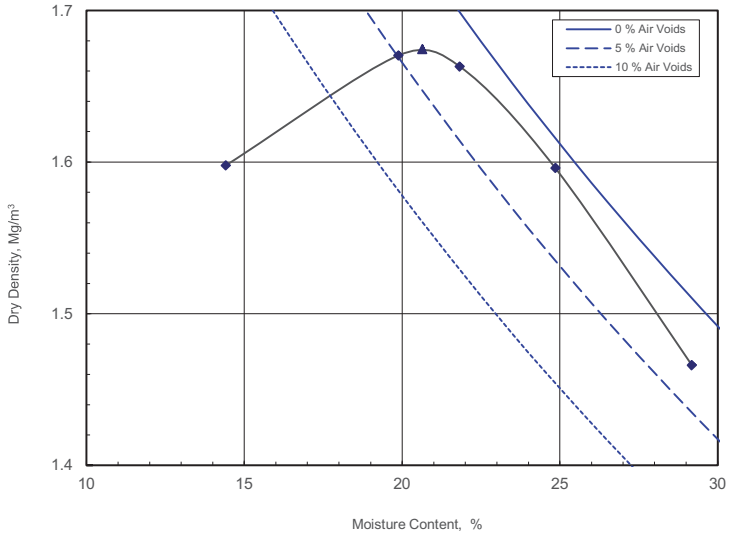
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH/TP	TP12
Sample Ref	B3 + B4
Depth (m)	0.80
Sample Type	B

Description:

Greyish brown CLAY

Preparation		Oven dried
Test Method		4.5kg Rammer for soils with particles up to medium-gravel size
Samples Used		Single / Multiple
Mass Retained on 37.5 mm Sieve	%	-
Mass Retained on 20.0 mm Sieve	%	-
Particle Density - Assumed	Mg/m³	2.70
Maximum Dry Density	Mg/m³	1.67
Optimum Moisture Content	%	20.6



Determination		1	2	3	4	5
Moisture Content	%	14.4	19.9	21.8	24.9	29.2
Dry Density	Mg/m³	1.60	1.67	1.66	1.60	1.47

GL:Version 1.33 - 23/02/2018

Checked and Approved by:

[redacted]

S Burke - Senior Technician
02/05/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

1410 - Comp TP20 00.30 B1 + B2 B Test 01 - 27270-504387.XLSM

BS1377:Part 4:1990 Clause 3.5

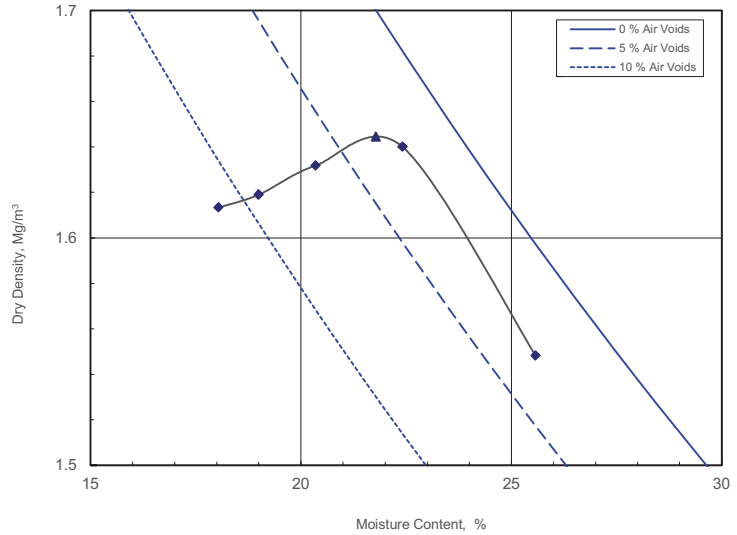
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH/TP	TP20
Sample Ref	B1 + B2
Depth (m)	0.30
Sample Type	B

Description:

Brown CLAY

Preparation		Oven dried
Test Method		4.5kg Rammer for soils with particles up to medium-gravel size
Samples Used		Single / Multiple
Mass Retained on 37.5 mm Sieve	%	-
Mass Retained on 20.0 mm Sieve	%	-
Particle Density - Assumed	Mg/m³	2.70
Maximum Dry Density	Mg/m³	1.64
Optimum Moisture Content	%	21.8



Determination		1	2	3	4	5
Moisture Content	%	18.0	19.0	20.3	22.4	25.6
Dry Density	Mg/m³	1.61	1.62	1.63	1.64	1.55

GL-Version 1.33 - 23/02/2018

Checked and Approved by:

[redacted]

S Burke - Senior Technician
02/05/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

GEOLABS

1410 - Comp TP20 00.80 B3 + B4 B Test 01 - 27270-504388.XLSM

BS1377:Part 4:1990 Clause 3.5

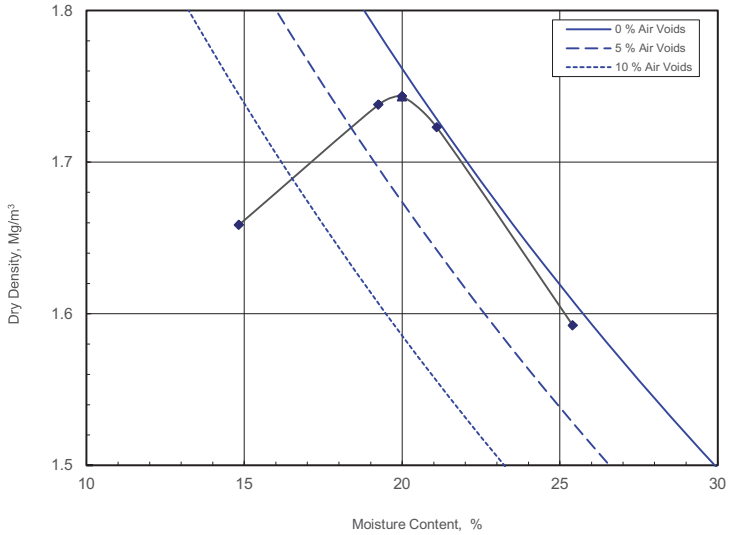
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH/TP	TP20
Sample Ref	B3 + B4
Depth (m)	0.80
Sample Type	B

Description:

Mottled grey and brown CLAY.

Preparation		Oven dried
Test Method		4.5kg Rammer for soils with particles up to medium-gravel size
Samples Used		Single / Multiple
Mass Retained on 37.5 mm Sieve	%	-
Mass Retained on 20.0 mm Sieve	%	-
Particle Density - Assumed	Mg/m³	2.72
Maximum Dry Density	Mg/m³	1.74
Optimum Moisture Content	%	20.0



Determination		1	2	3	4	5
Moisture Content	%	14.8	19.2	20.0	21.1	25.4
Dry Density	Mg/m³	1.66	1.74	1.74	1.72	1.59

GL-Version 1.33 - 23/02/2018

Checked and Approved by:

[redacted]

S Burke - Senior Technician
02/05/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

GEOLABS

1410 - Comp TP22 00.30 B1 + B2 B Test 01 - 27270-504389.XLSM

BS1377:Part 4:1990 Clause 3.5

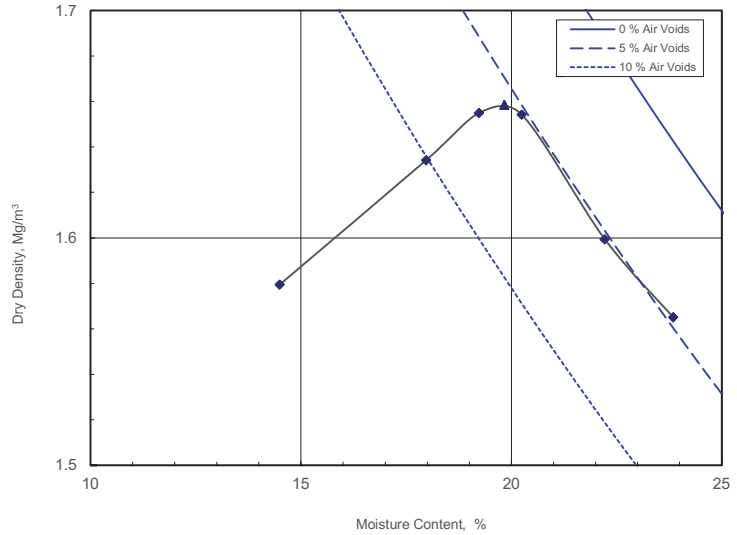
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH/TP	TP22
Sample Ref	B1 + B2
Depth (m)	0.30
Sample Type	B

Description:

Greyish brown CLAY

Preparation		Oven dried
Test Method		4.5kg Rammer for soils with particles up to medium-gravel size
Samples Used		Single / Multiple
Mass Retained on 37.5 mm Sieve	%	-
Mass Retained on 20.0 mm Sieve	%	-
Particle Density - Assumed	Mg/m³	2.70
Maximum Dry Density	Mg/m³	1.66
Optimum Moisture Content	%	19.8



Determination		1	2	3	4	5
Moisture Content	%	14.5	18.0	19.2	20.2	22.2
Dry Density	Mg/m³	1.58	1.63	1.65	1.65	1.60

GL:Version 1.33 - 23/02/2018

Checked and Approved by:

[redacted]

S Burke - Senior Technician
02/05/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

GEOLABS

1410 - Comp TP22 00.75 B3 + B4 B Test 01 - 27270-504390.XLSM

BS1377:Part 4:1990 Clause 3.5

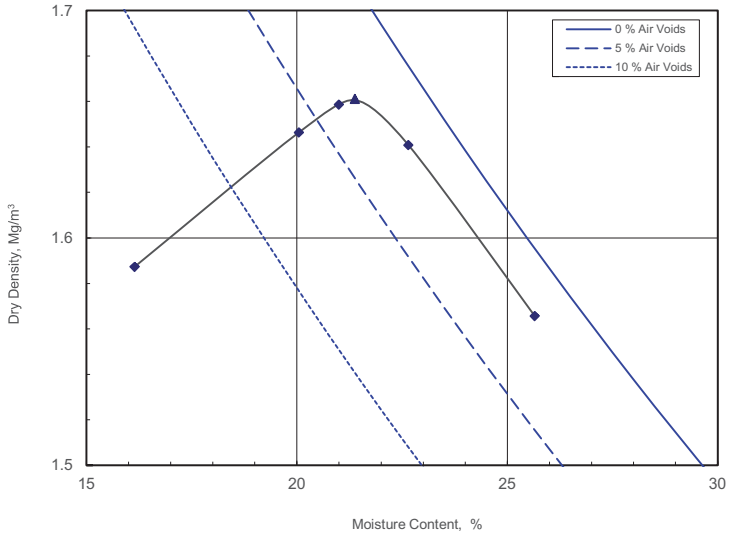
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH/TP	TP22
Sample Ref	B3 + B4
Depth (m)	0.75
Sample Type	B

Description:

Greyish brown CLAY

Preparation		Air dried
Test Method		4.5kg Rammer for soils with particles up to medium-gravel size
Samples Used		Single / Multiple
Mass Retained on 37.5 mm Sieve	%	-
Mass Retained on 20.0 mm Sieve	%	-
Particle Density - Assumed	Mg/m³	2.70
Maximum Dry Density	Mg/m³	1.66
Optimum Moisture Content	%	21.4



Determination		1	2	3	4	5
Moisture Content	%	16.1	20.0	21.0	22.6	25.7
Dry Density	Mg/m³	1.59	1.65	1.66	1.64	1.57

GL:Version 1.33 - 23/02/2018

Checked and Approved by:

[redacted]

S Burke - Senior Technician
02/05/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

GEOLABS

A F Howland Associates
Geotechnical Engineers

Laboratory Test Results

Site : Cleve Hill Solar Farm, Graveney, Kent

Client : WIRSOL Energy Limited

Engineer :

Job Number 18.103

Sheet 1 / 1

DETERMINATION OF DENSITY, MOISTURE CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole/ Trial Pit	Depth (m)	Sample	Moisture Content %	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Cell Pressure (kN/m²)	Deviator Stress (kN/m²)	Apparent Cohesion (kN/m²)	Angle of Shearing Resistance (degrees)	Laboratory Description
BH01	1.20	U1	54	1.72	1.12	24	29	14		Soft fissured brown silty CLAY.
BH01	3.00	U2	36	1.91	1.41	60	172	86		Stiff fissured dark grey CLAY.
BH01	4.00	U3	33	1.92	1.45	80	183	91		Stiff fissured dark grey CLAY with rare fine gravel sized gypsum.
BH01	5.00	U4	32	1.90	1.45	100	119	59		Stiff fissured dark grey silty CLAY.
BH01	9.00	U6	24	2.01	1.62	180	248	124		Very stiff fissured dark grey silty CLAY.
BH02	1.20	U1	48	1.72	1.16	24	34	17		Soft brown CLAY.
BH02	2.00	U2	43	1.81	1.27	40	26	13		Soft dark grey silty CLAY with rare fine gravel sized gypsum and medium sized shell fragments.
BH02	4.00	U4	32	1.90	1.44	80	174	87		Stiff dark grey silty CLAY.
BH02	5.00	U5	32	1.91	1.44	100	144	72		Stiff fissured dark grey CLAY with rare shell fragments.
BH02	6.00	U6	32	1.90	1.44	120	124	62		Stiff fissured dark grey silty CLAY with rare fine gravel sized gypsum.
BH02	7.50	U7	31	1.91	1.46	150	152	76		Stiff fissured dark grey silty CLAY.
BH02	9.00	U8	29	1.99	1.54	180	214	107		Stiff fissured dark grey silty CLAY.
BH03	1.20	U1	40	1.76	1.26	24	28	14		Soft brown CLAY with a pocket containing yellowish brown silt.
BH03	2.00	U2	68	1.60	0.96	40	14	7		Soft grey mottled light brown CLAY.
BH03	3.00	U3	73	1.59	0.92	60	13	6		Soft grey CLAY.
BH03	4.00	U4	73	1.60	0.93	80	15	7		Soft grey CLAY.
BH03	5.00	U5	51	1.77	1.17	100	23	11		Soft grey CLAY with fine to medium shell fragments.
BH03	6.00	U6	28	2.02	1.57	120	33	16		Soft dark brown silty CLAY.

Method of Preparation : BS 1377:PART 1:1990:7.4.2 Moisture content 1990: Preparation of undisturbed samples for testing BS 1377:PART 2:1990:7.2

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:7 Determination of density BS 1377:PART 7:1990:8 Undrained shear strength 1990:9 Multistage loading

Remarks :

1441 - CBR DCP06 00.35 B1 B Test 01 - 27270-193264.XLSM

BS1377 : Part 4 : Clause 7 : 1990

CALIFORNIA BEARING RATIO

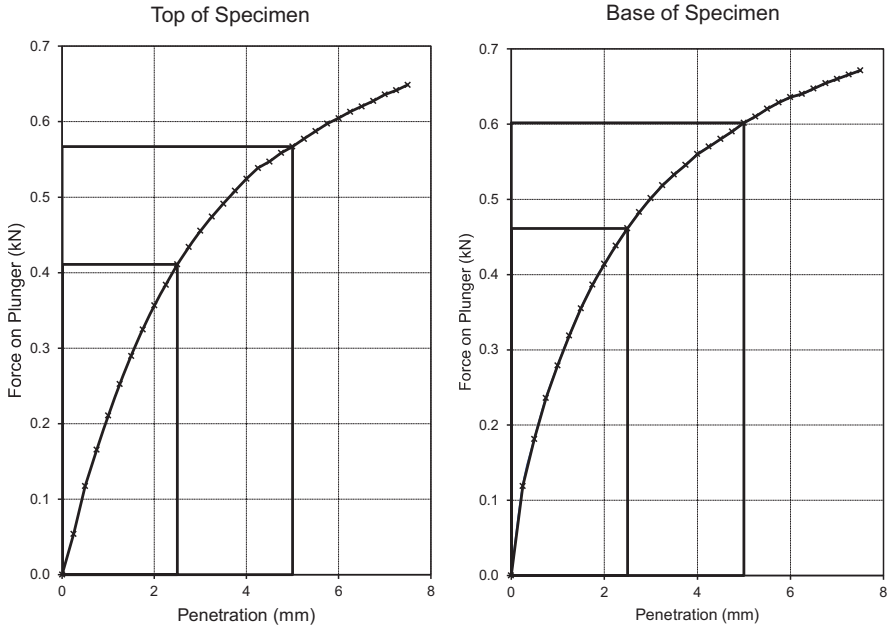
BH/TP No.:	DCP06
Sample No.:	B1
Depth (m):	0.35
Sample Type:	B

Description: Brown CLAY

PREPARATION DETAILS

The specimen was tested in an unsoaked condition.
The specimen was tested at its existing moisture content
The specimen was prepared by dynamic compaction using a 2.5 kg rammer
Prepared bulk density 1.77 Mg/m³
Prepared dry density 1.26 Mg/m³

Test Details	Top	Base
Surcharge	12.0 kg	12.0 kg
Seating load	10 N	10 N
Moisture content	40 %	41 %
CBR Value	3.1 %	3.5 %



GL:Version 1.28 - 16/02/2017

Checked and Approved by:

[redacted]

S Burke - Senior Technician
30/04/2018

Project Number: **GEO / 27270**

Project Name: **CLEVE HILL SOLAR FARM, GRAVENEY, KENT**
18.103

GEOLABS

UKAS TESTING 1982

1441 - CBR DCP06 00.70 B2 B Test 01 - 27270-193260.XLSM

BS1377 : Part 4 : Clause 7 : 1990

CALIFORNIA BEARING RATIO

BH/TP No.:	DCP06
Sample No.:	B2
Depth (m):	0.70
Sample Type:	B

Description:

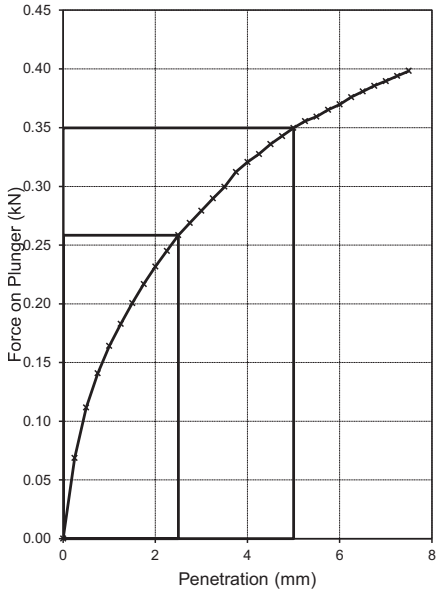
Brown CLAY

PREPARATION DETAILS

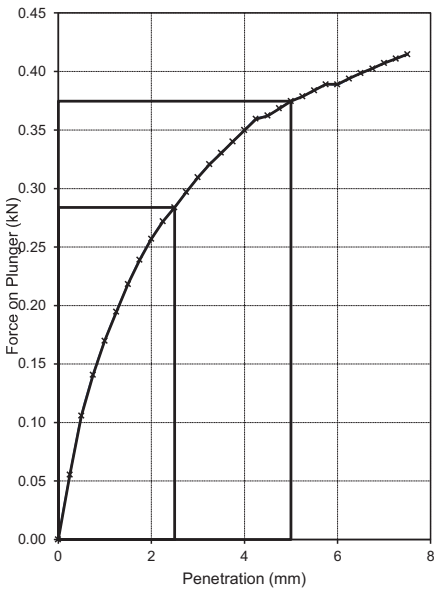
The specimen was tested in an unsoaked condition.
The specimen was tested at its existing moisture content
The specimen was prepared by dynamic compaction using a 2.5 kg rammer
Prepared bulk density 1.68 Mg/m³
Prepared dry density 1.14 Mg/m³

Test Details	Top	Base
Surcharge	12.0 kg	12.0 kg
Seating load	10 N	10 N
Moisture content	44 %	51 %
CBR Value	2.0 %	2.2 %

Top of Specimen



Base of Specimen



GL:Version 1.28 - 16/02/2017

Checked and Approved by:

[redacted]

S Burke - Senior Technician
30/04/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

1441 - CBR TP01 00.40 B1 B Test 01 - 27270-193269.XLSM

BS1377 : Part 4 : Clause 7 : 1990

CALIFORNIA BEARING RATIO

BH/TP No.:	TP01
Sample No.:	B1
Depth (m):	0.40
Sample Type:	B

Description:

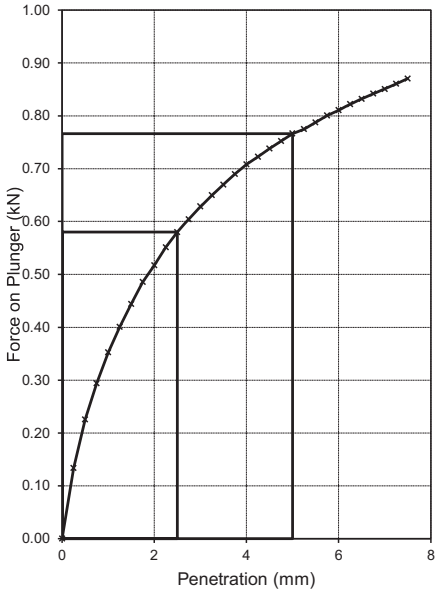
Brown CLAY with pockets of silt.

PREPARATION DETAILS

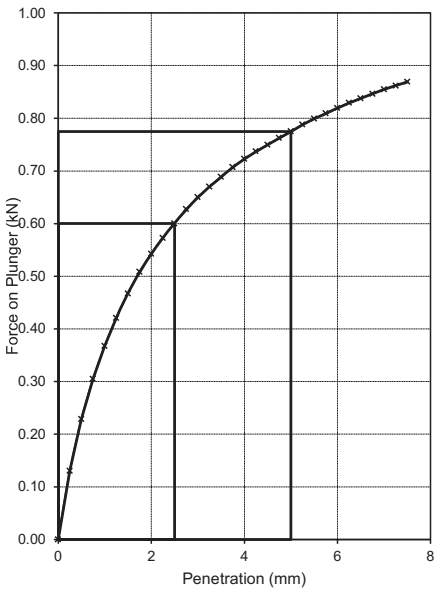
The specimen was tested in an unsoaked condition.
The specimen was tested at its existing moisture content
The specimen was prepared by dynamic compaction using a 2.5 kg rammer
Prepared bulk density 1.77 Mg/m³
Prepared dry density 1.31 Mg/m³

Test Details	Top	Base
Surcharge	12.0 kg	12.0 kg
Seating load	10 N	10 N
Moisture content	35 %	35 %
CBR Value	4.4 %	4.5 %

Top of Specimen



Base of Specimen



GL:Version 1.28 - 16/02/2017

Checked and Approved by:

[redacted]

S Burke - Senior Technician
30/04/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

1441 - CBR TP01 00.80 B2 B Test 01 - 27270-193279.XLSM

BS1377 : Part 4 : Clause 7 : 1990

CALIFORNIA BEARING RATIO

BH/TP No.:	TP01
Sample No.:	B2
Depth (m):	0.80
Sample Type:	B

Description:

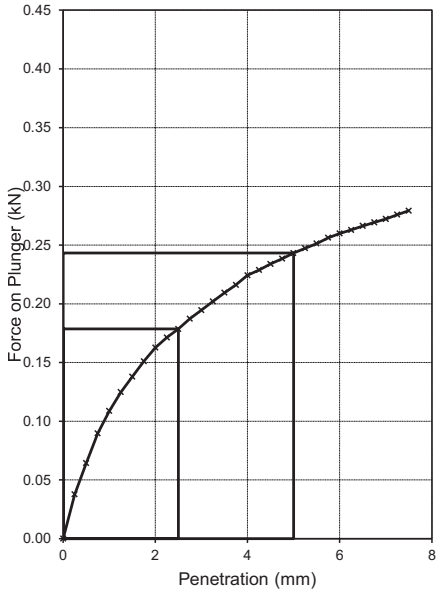
Brown CLAY with pockets of silt.

PREPARATION DETAILS

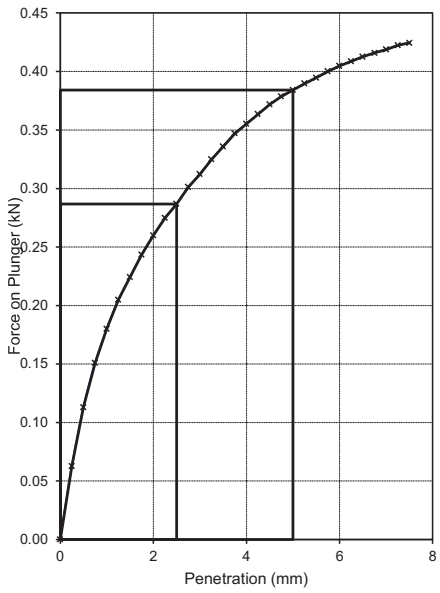
The specimen was tested in an unsoaked condition.
The specimen was tested at its existing moisture content
The specimen was prepared by dynamic compaction using a 2.5 kg rammer
Prepared bulk density 1.71 Mg/m³
Prepared dry density 1.26 Mg/m³

Test Details	Top	Base
Surcharge	12.0 kg	12.0 kg
Seating load	10 N	10 N
Moisture content	35 %	37 %
CBR Value	1.4 %	2.2 %

Top of Specimen



Base of Specimen



Checked and Approved by:

[redacted]

S Burke - Senior Technician
30/04/2018

Project Number:

GEO / 27270

Project Name:

CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

GEOLABS

UKAS TESTING 1902

GL:Version 1.28 - 16/02/2017

A F Howland Associates
Geotechnical Engineers

Laboratory Test Results

Site : Cleve Hill Solar Farm, Graveney, Kent

Client : WIRSOL Energy Limited

Engineer :

Job Number 18.103

Sheet 1 / 1

DETERMINATION OF pH, SULPHATE, TOTAL SULPHUR, MAGNESIUM, CHLORIDE, NITRATE AND AMMONIUM CONTENT

Borehole/ Trial Pit	Depth (m)	Sample	Concentration of Sulphate		Total Sulphur %	Ammonium NH4 mg/l	Water Soluble Magnesium mg/l	Water Soluble Chloride mg/l	Water Soluble Nitrate mg/l	pH	Laboratory Description
			Total S04 %	S03 in 2:1 water:soil g /l							
BH01	1.10	D4	0.19	0.64	0.07	< 10		440	<10	8.1	Clay
BH01	2.00	S6	0.31	0.88	0.79					8.7	Clay
BH01	3.80	D10	0.20	0.56	0.51					8.6	Clay
BH01	6.50	D15	0.25	0.51	1.30					8.2	Clay
BH01	7.50	S17	0.20	0.39	1.00					8.3	Clay
BH01	10.50	S21	0.05	0.19	0.17	< 10		300	<10	8.1	Sandy Soil
BH02	0.80	D3	0.08	0.20	0.03	< 10		140	<10	8.5	Clay
BH02	1.10	D4	0.11	0.41	0.04	< 10		300	<10	8.4	Clay
BH02	2.80	D8	0.23	0.76	0.46	< 10		850	<10	8.4	Clay
BH02	3.80	D10	0.28	0.76	1.70					8.4	Clay
BH02	5.80	D14	0.18	0.54	0.63					8.4	Clay
BH02	9.50	D19	0.20	0.47	0.68					8.1	Clay
BH02	10.50	S21	0.03	0.12	0.26	< 10		410	<10	8.1	Sandy Soil
BH03	0.50	D2	0.06	0.12	0.26	< 10		20	20.00	8.3	Clay
BH03	2.50	D7	0.38	1.50	1.70	< 10		2800	<10	8.7	Clay
BH03	3.50	D9	0.20	0.58	1.10	< 10		4000	<10	8.9	Clay
BH03	6.50	D15	0.05	0.19	0.05	< 10		1100	<10	9.1	Clay
BH03	9.00	S17	0.02	0.07	0.01	< 10		750	<10	9.5	Sandy Soil
BH03	10.50	S18	0.05	0.15	0.38	< 10		820	<10	9.1	Sandy Soil
TP08	1.40	D2	0.36	1.30	0.16	< 10		770	<10	7.9	Clay
TP16	2.70	D4	0.48	1.40	1.80	< 10		1400	<10	7.3	Clay
TP20	0.50	D2	0.09	0.29	0.05	< 10		180	<10	8.4	Clay

Method of Preparation : BS 1377:PART 1:1990:7.5 Preparation of soil for chemical tests BS 1377:PART 3:1990:5.2, 5.3, 5.4 & 9.4

Method of Test : Lab in-house methods based on BS1377: Part 3 for sulphate, pH and chloride, Lab in-house method based on BRE 279 2005 for Nitrate and Ammonium NH4. Lab in-house method based on MEWAM (EA, 2006) for total sulphur and TRL 447 (2005) for magnesium

Remarks :

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Geotechnical Engineers

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Sheet 1 / 1

DETERMINATION OF pH, SULPHATE, TOTAL SULPHUR, MAGNESIUM, CHLORIDE, NITRATE AND AMMONIUM CONTENT

Borehole/ Trial Pit	Depth (m)	Sample	Sulphate S03 mg/l	Water Soluble Chloride mg/l	Water Soluble Nitrate,N mg/l	Water Soluble Magnesium mg/l	Total Sulphur %	Ammonium NH4 mg/l	pH	Laboratory Description
BH01	2.50	W1	535						6.9	Water sample
BH02	2.40	W1	417						7.0	Water sample

Method of Preparation : BS 1377:PART 1:1990:7.5 Preparation of soil for chemical tests BS 1377:PART 3:1990:5.2, 5.3, 5.4 & 9.4

Method of Test : Lab in-house methods based on BS1377: Part 3 for pH and chloride. Lab in-house method based on BRE 279 2005 for Nitrate and Ammonium NH4. Lab in-house method based on MEWAM (EA, 2006) for total sulphur, sulphate and magnesium

Remarks :

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Laboratory Test Results

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DETERMINATION OF CHLORIDE CONTENT, ORGANIC MATTER CONTENT, LOSS ON IGNITION AND PH

Borehole/ Trial Pit	Depth (m)	Sample	Concentration of Chloride			Percentage of sample passing 2mm Sieve %	Organic Matter Content %	Mass Loss on Ignition %	pH	Laboratory Description
			Soil		Groundwater mg/l					
			Acid Soluble %	Water Soluble mg/l						
BH01	2.50	W1			2700				6.86	Water sample
BH02	2.40	W1			3600				7.02	Water sample
BH03	2.50	D7.						5.00		Clay
BH03	3.50	D9.						5.90		Clay
TP15	1.70	D5						7.70		Clay
TP16	2.70	D4.						7.70		Clay
TP21	2.00	D1						17.00		Clay

Method of Preparation : BS 1377:PART 1:1990:7.5 Preparation of soil for chemical tests BS 1377:PART 3:1990:7.2.3.2 Water-soluble, 7.3.3.3 Acid-soluble

Method of Test : Lab in-house method based on BS 1377:PART 3:1990:7 for Determination of chloride content, 1990:3 for Determination of organic matter content, BS 1377:PART 3:1990:4 for Determination of loss on ignition and an in-house method for BS 1377:PART 3:1990:9 Determination of the pH value.

Remarks :

APPENDIX E: DRAWINGS

Drawing 18.103/01	Site Location Plan
Drawing 18.103/02	Exploratory Hole Location Plan
Drawing 18.103/03	Sea Defence Embankment Section and Plan

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Key:

- Borehole location and reference
- Trial pit location and reference
- Soak away test location and reference
- DCP location and reference
- DCP and trial pit location and reference

Rev	Date	Revision Description	Drwn	Chkd

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Client: WIRSOL Energy Limited

Site:
Cleve Hill Solar Farm, Kent ME13 9EE

Job No.: 18.103

Drawing Title:

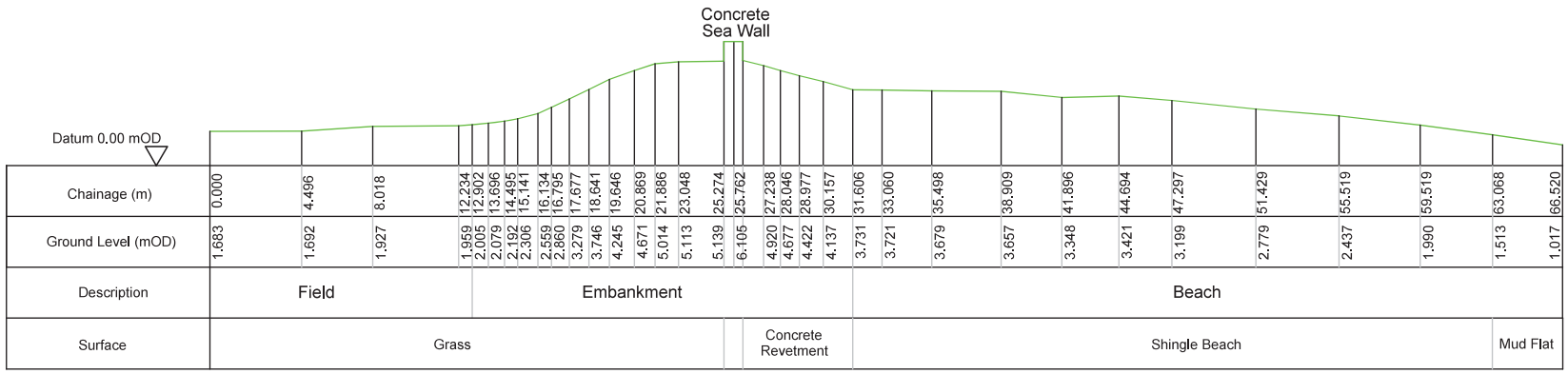
EXPLORATORY HOLE LOCATION PLAN

Date: May 2018

Drawing No: 18.103/02

Scale: 1:2000 @ A3

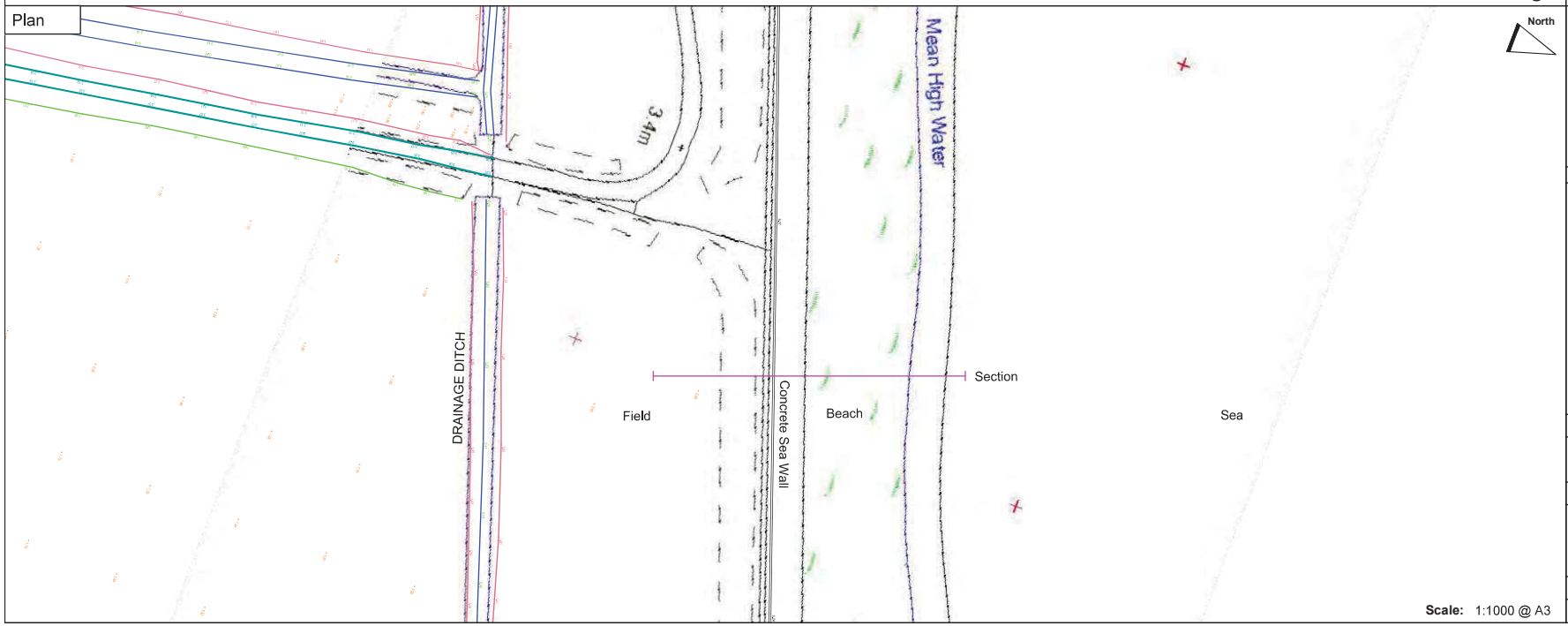
Section



Chainage (m)	0.000	4.496	8.018	12.234	12.902	13.696	14.495	15.141	16.134	16.795	17.677	18.641	19.646	20.869	21.886	23.048	25.274	25.762	27.238	28.046	28.977	30.157	31.606	33.060	35.498	38.909	41.896	44.694	47.297	51.429	55.519	59.519	63.068	66.520
Ground Level (mOD)	1.683	1.692	1.927	1.959	2.005	2.079	2.192	2.306	2.559	2.860	3.279	3.746	4.245	4.671	5.014	5.113	5.139	6.105	4.920	4.677	4.422	4.137	3.731	3.721	3.679	3.657	3.348	3.421	3.199	2.779	2.437	1.990	1.513	1.017
Description	Field			Embankment															Beach																
Surface	Grass																	Concrete Revetment	Shingle Beach															Mud Flat	

Scale: 1:250 @ A3

Plan



Scale: 1:1000 @ A3

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Rev	Date	Revision Description	Drwn	Chkd

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Site:
Cleve Hill Solar Farm, Kent ME13 9EE

Job No.: 18.103

Drawing Title:
SEA DEFENCE EMBANKMENT
SECTION AND PLAN

Date: May 2018

Drawing No: 18.103/03

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