

Ground Investigation Report

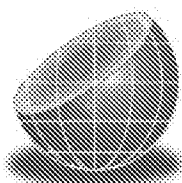
Brookbarn Farm, Wick, Littlehampton, West Sussex



Anesco Ltd.

Report No. 6716

**Version 1
January 2015**



SOUTH WEST GEOTECHNICAL

SOUTH WEST GEOTECHNICAL LTD
Unit 3 Brooklands Howden Road Tiverton Devon EX16 5HW



Ground Investigation Report

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1	Jan 2015	Final	Anesco



1 INTRODUCTION

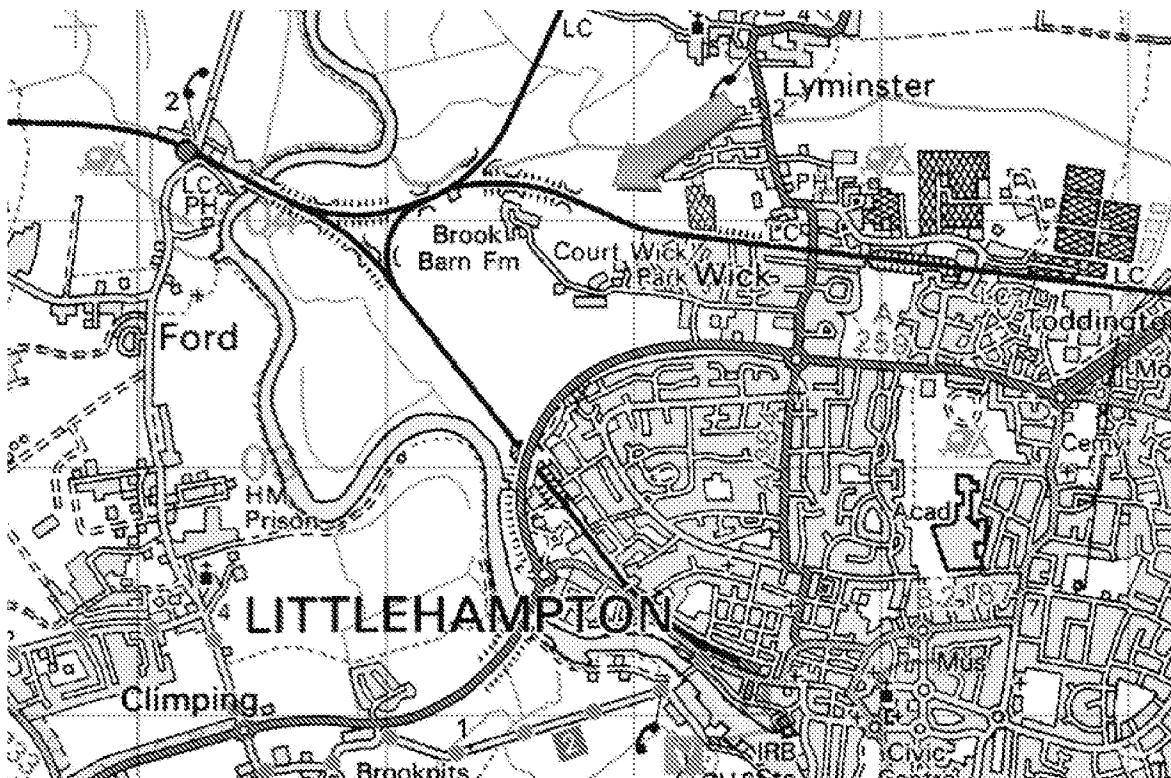
1.1 General

It is proposed to construct a new photovoltaic (PV) energy park at a site known as Land at Brookbarn Farm, Wick, Littlehampton, West Sussex.

South West Geotechnical Ltd (SWG) was instructed by Anesco Ltd (the Client), to undertake a ground investigation to provide information for foundation design purposes.

1.2 Site Location and Description

The site is located approximately 3km to the north of Littlehampton, as shown on the site location plan, presented as Figure 1 and the OS extract below. The British National Grid Reference of the site is 501934, 104145.



The site comprises a level arable field. Access is gained via gates off Old Mead Road to the east. It is bordered by further arable land to the north, south and west and residential properties to the east. The River Arun, with associated tributaries and drainage ditches is located to the west. The sites boundaries are defined by mature hedgerows, and



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drainage ditches. A railway line forms the southern boundary. The site is essentially level and the ground conditions underfoot were noted to be soft and saturated.

It is understood that site has been used as a landfill in the recent past, however, no active filling was noted at the time of the investigation.

Photographs of the site are presented in Appendix B.

1.3 Geological Desk Study

A GroundSure Geology Report was obtained to provide detailed information on the underlying ground conditions. The report is based on the BGS 1:50,000 mapping, BGS Geosure, BRITPITS database, Shallow Mining data and Borehole Records, Coal Authority database, PBA non-coal mining and natural cavity database, JPB mining data, and GroundSure's database on surface and sub-surface workings.

The GroundSure report indicates that the site has been used as a landfill site, reporting artificial ground. However, no ground workings are noted on site.

The report also states that the underlying geology is the New Pit Chalk Formation and the undifferentiated Lewes Nodular, Seaford, Newhaven, Culver and Portsdown C Chalk Formation / Member.

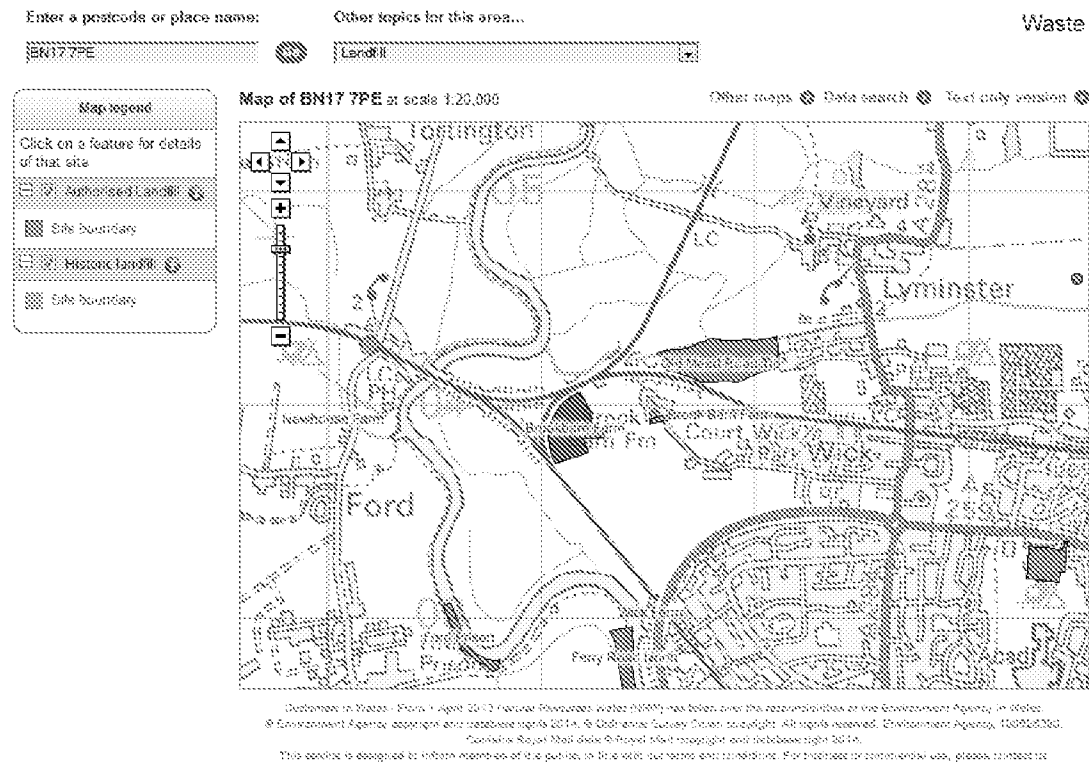
Superficial raised beach and raised marine deposits are also recorded on site.

The landfill operations are recorded on the environment agency's website and in the environmental report provided by GroundSure. A screen shot of the environmental report reference and EA's web page is shown below for reference:

2	0-0	On Site	561800 104200	Site Address: Old Mead Road Tip, Littlehampton, Sussex Waste Licence: Yes Site Reference: 27-329, WD27/151, WD13/12, WD13/79 Waste Type: Inert, Industrial, Commercial, Household, Special, Liquid sludge, Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 19-Jun-1977 Licence Surrendered: 13-Oct-1984 Licence Hold Address: - Operator: -
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The licence details indicate that the site was operational between 30th Nov 1975 and 12 Oct 1984, receiving inert, industrial, commercial, household, special waste including liquids and sludge's. It should be noted that the lease area is not shown to affect the entire site, with the south eastern corner of the site showing as unworked ground.

Historical mapping was also obtained for the site to provide information on the location of the areas that have been subjected to landfill. The mapping provides little detail for the subject site with no evidence that the site has been worked or landfilled.

The full GeolInsight report is attached as Appendix D.

1.4 Scope of Works

The scope of the site and laboratory works was as follows:

- ⇒ Five window sample boreholes
- ⇒ Eight dynamic probes (DPSH)
- ⇒ TRL DCP probes
- ⇒ Geotechnical Laboratory testing
- ⇒ pH testing
- ⇒ Soluble sulphate testing



1.5 Limitations

This investigation gives an account of the ground conditions encountered in the various exploratory holes. No responsibility can be accepted for ground conditions that, through natural variability or anthropogenic activity, were not encountered in these holes.

Groundwater levels can vary both seasonally and with antecedent weather conditions. Therefore observations made during the site works are subject to change with time.



2 SITE WORKS

2.1 Background

A combination of window sample boreholes and dynamic probes were considered to be the most suitable method of investigation as they would allow the inspection of the ground without excessively disrupting the site. They also simulate the preferred method of foundation construction (driven posts), enabling a direct comparison.

All fieldwork was undertaken in general accordance with BS EN 1997-2 (2007) Part 2 – Ground investigation and testing, and BS5930 (1999): British Standard Code of Practice for Site Investigation. The engineering logs of the exploratory holes are presented as Appendix A.

The exploratory hole locations were set out by the SWG Engineer to provide adequate site coverage and are shown on the exploratory hole location plan presented as Figure 2. Prior to breaking the ground each exploratory position was scanned with a calibrated cable avoidance instrument.

2.2 Window Sampling

Window sampling was carried out using a Competitor percussive rig, which used a 63.5kg weight dropping a vertical distance of 750mm (BS 5930 Section 4, Clause 22.9). The boring produces a continuous sample in diameters ranging from 100mm down to 36mm, in clear rigid plastic liners. Three of the five window sample boreholes were advanced to the scheduled depth of 3.0m, the exceptions being except WS1 which refused at 1.7m bgl and WS2 which refused at 1.0m bgl, most likely due to obstructions.

2.3 Dynamic Probing

The eight dynamic probes were formed immediately adjacent to the window sample holes and at other locations using the same Competitor 130 tracked rig utilising a 63.5kg weight falling 750mm. The dynamic probes used 32mm rods attached to a 50mm 90 degree cone (BS 5930 Section 4, Clause 26.2 – DPSH method). The cone diameter, driving weight and fall distance are all identical to that used in the Standard Penetration Test (BS 5930 Section 4, Clause 25.2), which enables an approximate correlation between the two. The test records the number of blows required to drive the test cone 100mm, and is referred to as the N_{100} value. All but one of the eight probes reached the scheduled depth of 5.0m



3 LABORATORY TESTING

3.1 Geotechnical Testing

Geotechnical testing was carried at the SWG Tiverton laboratory as scheduled by the Engineer. The following tests were carried out in general accordance with BS 1377 "Methods of Tests for Soils for Civil Engineering Purposes" 1990, the results for which are presented as Appendix C:

Test	No.
BS1377: Part 2: 1990: 3.2, Moisture Content	4
BS1377: 1990: Part 2: 3.2, 4.3, 5.3 and 5.4, Plasticity Index	4
BS1377: Part 3: 1990: 9, pH	6
Soluble Sulphate	3



4 GROUND CONDITIONS

In summary, four window sample boreholes (WS1, 2, 3 and 5) encountered a thin mantle of placed topsoil to depths of between 0.10m and 0.15m underlain by a soft clay capping layer (made ground) to depths of between 0.6 and 1.3m underlain by made ground comprising waste within a clay matrix. The fill materials generally consisting of clay, silt, sand and gravel but with fibreglass, plastic, timber, organic material, household refuse, polythene sheet bales, brick etc. Frequent heavily hydrocarbon stained pockets were noted, alongside both hydrocarbon and organic odours. All of these window sample boreholes progressed to the scheduled depth of 3.0m with the exceptions of WS1 and WS2 the met refusal at 1.0m and 1.7m respectively, most likely due to an obstruction within the made ground. It should be noted that the made ground varied in both consistency (grading) and strength.

WS4 was specifically targeted to the south of the main development area, where desk study information suggested there to be natural formation soils. This borehole encountered a thin mantle of topsoil over a firm silty sandy clay to the scheduled depth of 3.0m. This deposit is considered to represent the natural superficial deposits.

The laboratory testing reports plasticity index values for the more cohesive formation soils of between 9 and 24%. The modified plasticity results indicate that the formation soils are of negligible to medium volume change potential.

To conclude, the investigation confirmed that the site is a former landfill site, with significant depths of inert made ground. Natural ground was encountered by one of the five boreholes and this is to the south the development area.

The ground conditions have been summarised in the following table:

Strata	Depth to base of strata (m)				
	WS1	WS2	WS3	WS4	WS5
Topsoil	0.15	0.10	0.10	0.10	0.10
MG: brown gravelly clay	1.3	0.60	0.58	-	1.00
MG: clay matrix with waste	>1.4	>1.0	>3.0	-	>3.0
Superficial silty clay	-	-	-	>3.0	-



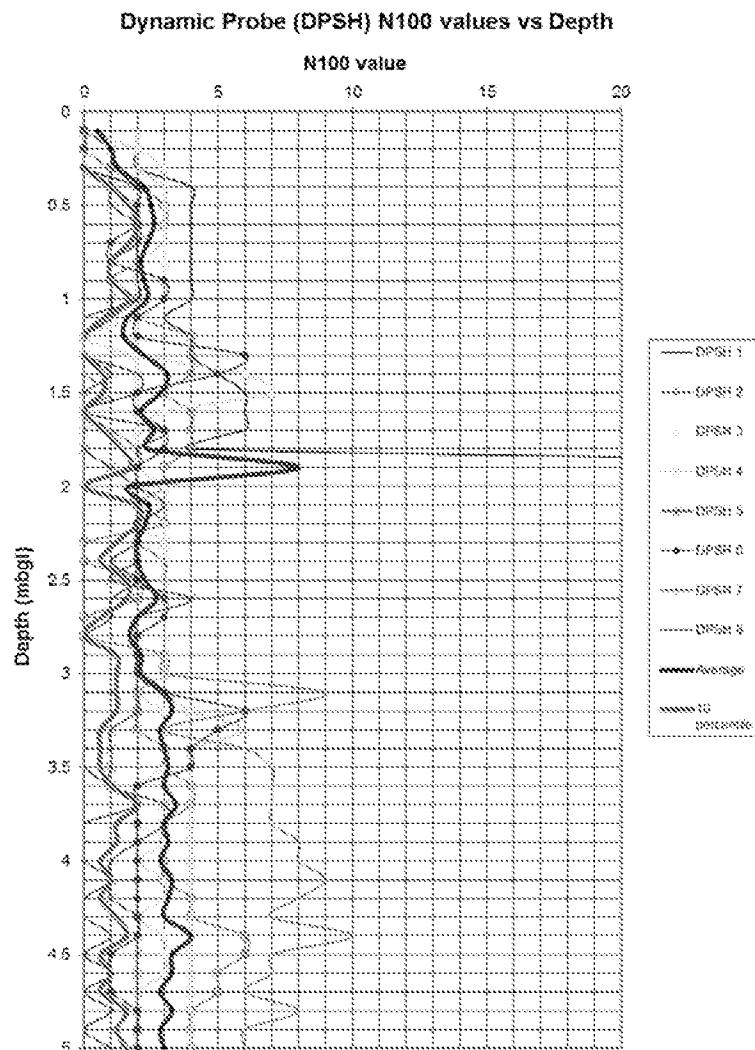
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4.1 In-situ Testing

A series of dynamic probes were undertaken alongside each window sample borehole to further assess the density / strength of the underlying soils. The dynamic probes showed the ground conditions and strength profile of the ground to vary spatially and with depth. However, they also show that the made ground has some appreciable strength.

All of the probes reached the scheduled depth of 5.0m apart from WS1 which refused at 1.9m bgl.

The probes are summarised in the following chart, with corresponding average and 10th percentile lines being shown.





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4.2 Groundwater

Groundwater was encountered in WS1, 2, 3 and 5 at 1.3, 1.0, 1.0 and 1.0m Groundwater was not encountered in WS4.



5 GEOTECHNICAL CONSIDERATIONS

5.1 Proposals

It is understood that the site is to be developed with the construction of photovoltaic plant and associated infrastructure including transformers and trackways.

5.2 PV Panel Foundations

Generally, the results of this investigation indicate that the ground may be suitable for the adoption for a percussively driven post / pile type foundation solution. However, when taking into account the nature of the fill soils (i.e. variable end tipped waste), and the potential for significant medium to long term settlements (as the waste degrades and self-weight settlement occurs) a conventional piled system may encounter long term deformation across the panel tables bring the serviceability of this option into doubt. Therefore, alternative foundation solutions such as a ballasted system or tethered tables using ground anchors should be considered.

If a piled solution is the preferred option then pile testing (i.e. compressive, tension and lateral or inclined) is strongly recommended to ensure the design solution performs as expected.

In addition, the possibility of obstructions within the made ground cannot be completely discounted due to the inherent variability of the fill material. This is highlighted by the relatively shallow refusals of WS1, DP1 and WS2. Therefore, pile drivability trials are also recommended, preferably with the specific piles to be used during construction and the selected contractor / rigs.

Consideration could also be given for undertaking further investigative work to delineate the areas of fill and natural ground and relocating the park to the south, placing it on the more favourable superficial deposits as encountered in WS4 where a more conventional piled solution could be adopted. The further investigative work could comprise of a series of trial trenches and further dynamic probing.

5.3 Associated Structures

It is recommended that the more conventional structures are placed on the natural formation soils to the south and east of the main site as the made ground is considered unsuitable as a founding stratum. Therefore, based on the above, structures that require



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more traditional foundations (e.g. substations etc.) reinforced concrete raft foundations are recommended, built on a compacted granular blanket, constructed at a depth of 0.50m within natural formation soils using a maximum allowable bearing pressure of 50 kN/m².

Allowable bearing pressures have been estimated from site observations and the correlation between N_{100} value and undrained shear strength of clays given in Huntley S L (1990) and Warren G (2007).

The bases of excavations for such foundations should be checked by a competent Engineer to ensure the design allowable bearing capacities are not exceeded.

Laboratory testing classified natural formation soils as non-shrinkable. Therefore, foundations will not need to be deepened where building near trees / hedgerows.

5.4 Groundwater and Excavations

Groundwater was encountered in the fill soils at depths of between 1.0 and 1.3m during the investigating. Therefore, dewatering of deep excavations will be required.

5.5 Roads

The eight TRL DCPs indicate a low CBR value of around 2% to be appropriate for track foundation design. This equates to 150mm of sub-base and 450mm of capping. A permeable separating geotextile should be laid between the capping and subgrade soils.

5.6 Chemical Conditions

Nine samples were tested for pH, giving a range of values between 7.0 and 7.4. The average pH value is 7.2. It is considered that this average value is representative for the site for design purposes.

Three soluble sulphate tests have been completed by an MCERTS accredited specialist sub-contract laboratory to check for aggressivity to buried concrete. All of the soluble sulphate concentration results fell below 0.05 g/l. pH values of between 7.0 and 7.4 have also been measured. Therefore, as groundwater can be considered to be generally static, concrete should be designed to Sulphate Class DS-1 and ACEC Class AC-1s (BRE SD1, 2005).



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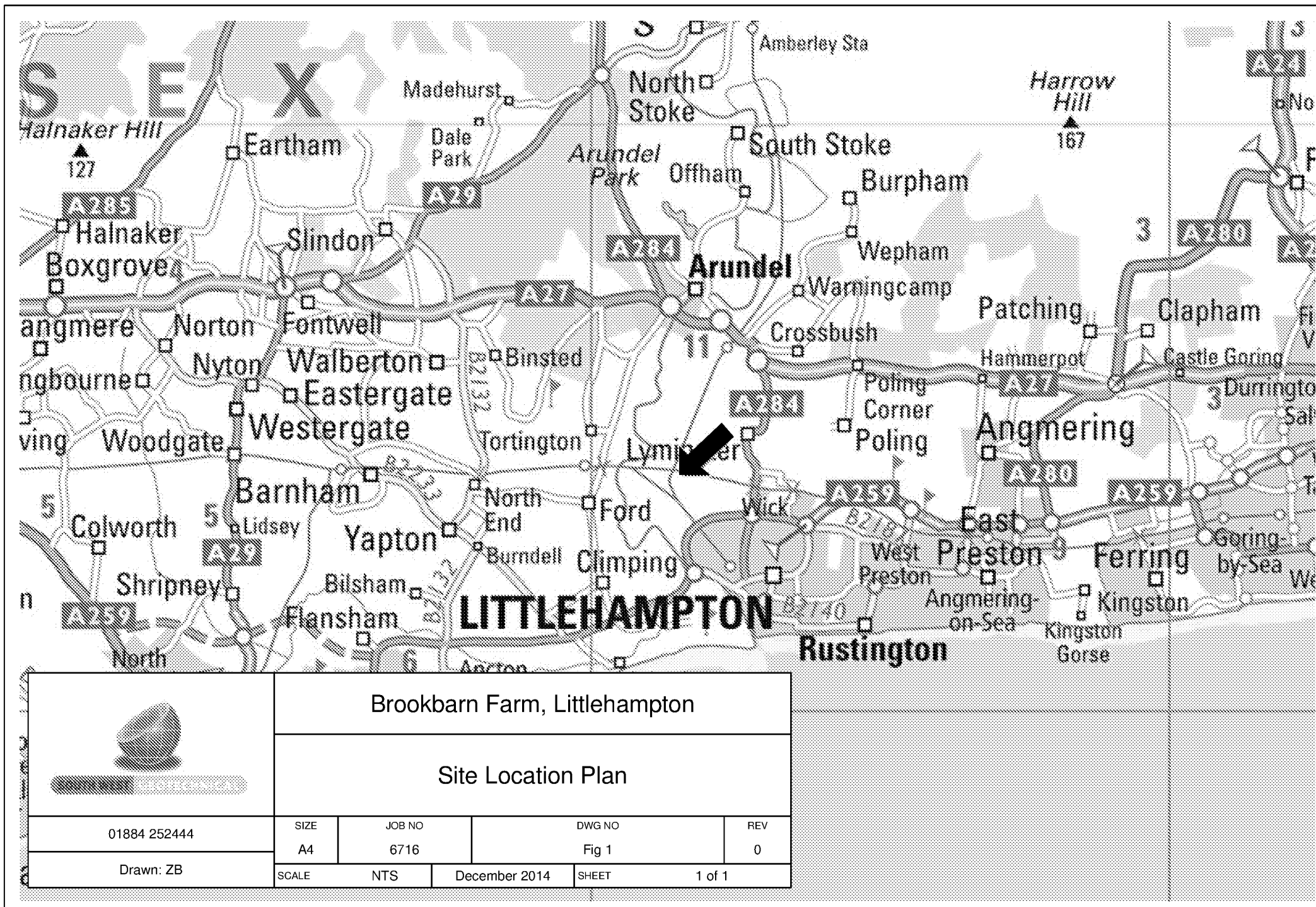
6 REFERENCES

1. BS EN 1997-2 (2007) Part 2: Ground investigation and testing
2. BS 5930 (1999) Code of Practice for site investigations
3. BS 1377 (1990) Methods of test for soils for civil engineering purposes
4. BS EN ISO 14688-2: 2004 Geotechnical Investigation and Testing – Identification and Classification of Soil.
5. The Standard Penetration Test (SPT): Methods and Use (1995) CIRIA Report 143
6. Design Guidance for Road Pavement Foundations (Draft HD25) (2009)
7. Concrete in Aggressive Ground (2005): BRE SD1
8. Huntley S L (1990); Use of a dynamic penetrometer as a ground investigation and design tool, Geol Soc Eng Geol SP No. 6
9. Warren G (2007); Heavy Weight, Ground Engineering, Technical Note



Figure 1

Site Location Plan



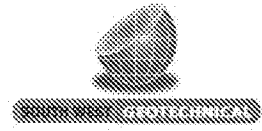
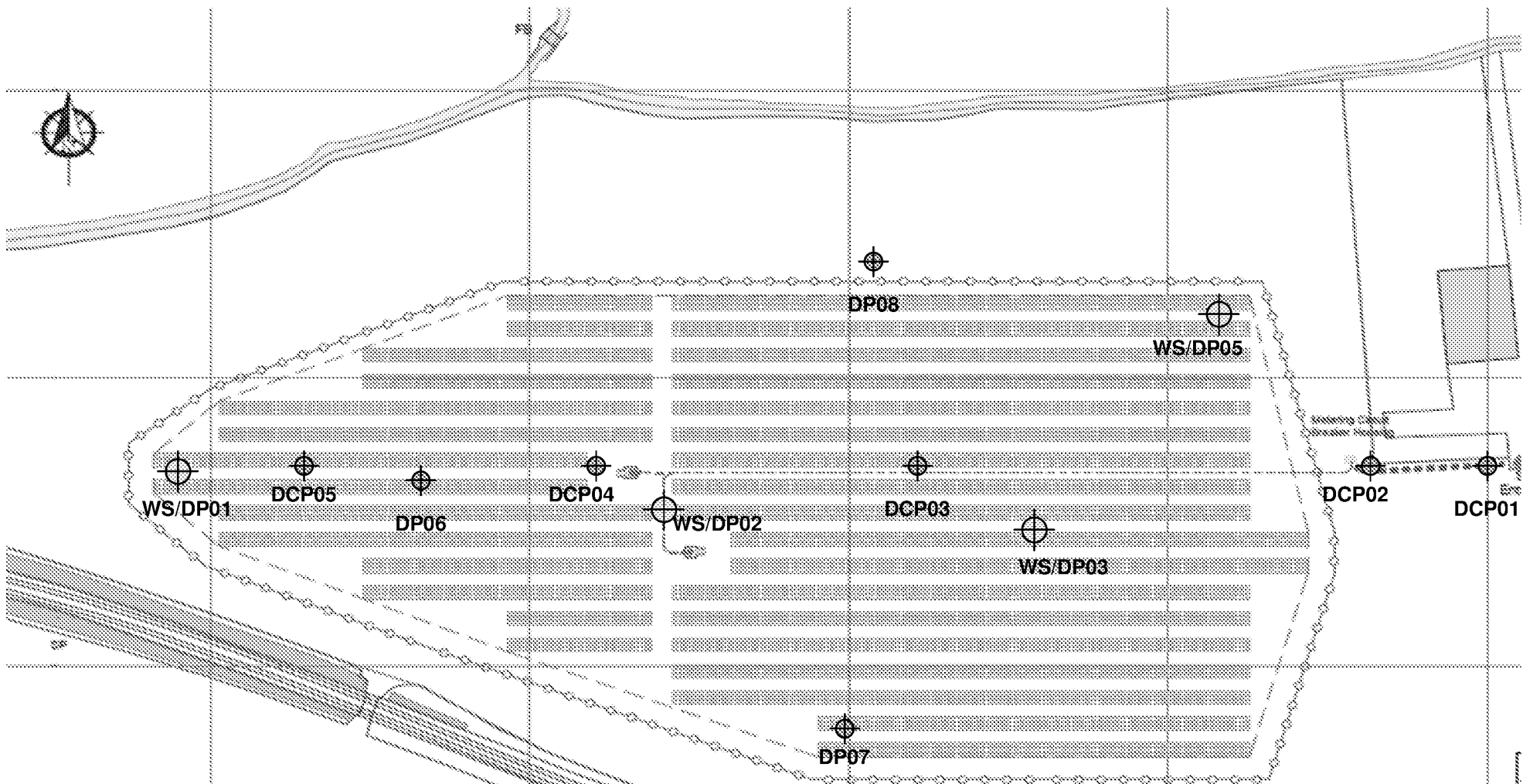
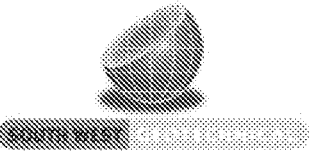
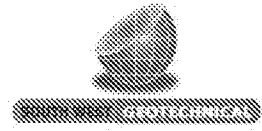


Figure 2

Exploratory Hole Location Plan



	Brookbarn Farm			
	Exploratory Hole Location Plan			
01884 252444	SIZE A4	JOB NO 6716	DWG NO Fig 2	REV 0
Drawn: ZB	SCALE	NTS	December 2014	SHEET 1 of 1



Appendix A

Exploratory Hole Logs & In-Situ Test Data



KEY TO EXPLORATORY HOLE LOGS

SAMPLING

Undisturbed

U	Driven tube sample (Blow count recorded in results column i.e. U = 20)
TW	Pushed thin wall tube sample
P	Pushed piston sample
L	Liner sample
CBR	CBR mould sample
BLK	Block sample
WS	Window sample
CS	Core sample

Disturbed

D	Small sample
B	Bulk sample

Other

W	Water sample
G	Gas sample
ES	Soil sample for environmental analysis
EW	Water sample for environmental analysis

IN-SITU TESTING

SPT S or SPT C Standard Penetration Test, open shoe (S) or solid cone (C)

As defined in BS 1377 : Part 9 (1990). Standard Penetration Test (SPT): a 50mm split spoon or solid cone sampler is driven 450mm into the base of the borehole using a 63.5 kg hammer with a 760mm drop. The penetration resistance (e.g. 21) is expressed as the N-value, and represents the number of blows required to obtain 300mm penetration below an initial seating drive of 150mm.

The depth on the borehole/ trial pit record is that of the start and end of the test. Where full penetration for the test has not been achieved, the final penetration depth is recorded.

IVN (kPa) In-situ Hand Vane shear strength: a hand shear vane test (or average of a series), conducted on undisturbed samples or within trial pits.

GIVN (kPa) Geonor in-situ vane shear strength carried out in base of borehole or self bored hole

VN (kPa) Hand Vane shear strength, conducted on disturbed or remoulded samples.
PP (kg/cm²) Pocket penetrometer test: a pocket Penetrometer reading (or average of a series). If reported in kPa, the value has been converted to an equivalent undrained shear strength.

Ik In situ permeability test
ICBR In-situ CBR test
IPBT In-situ plate bearing test
IPST In-situ plate settlement test

All test results are provided in Results column

DRILLING RECORDS

TCR Total Core Recovery %
SCR Solid Core Recovery %
RQD Rock Quality Designation %
FI Fracture Spacing mm. Minimum, typical and maximum spacings are recorded.



GROUNDWATER



Groundwater Strike



Groundwater level after standing time

INSTALLATION

Standpipe/ piezometer

Details of standpipe/piezometer installations are given on the left side of the log. The column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill.

SP	Standpipe
SPIE	Standpipe piezometer
PPIE	Pneumatic piezometer
EPIE	Electronic piezometer

NOTES

Water level observations of discernible entries during the advancing of the exploratory hole are given at the foot of the log and in the Legend column. The term "none observed" is used where no discrete entries are identified although this does not necessarily indicate that the hole has not been advanced below groundwater level. Under certain conditions groundwater cannot be observed, for instance, drilling with water flush or over water, or boring at a rate much faster than water can make its way into the borehole.

The declination of bedding and joints is given with respect to the normal to the core axis. Thus in a vertical borehole this will be the dip.

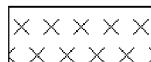
Remarks on chiselling times can be affected by a variety of factors not always related to the geotechnical properties of the strata. Chiselling records are given at the foot of the log.

The assessment of SCR, RQD and Fracture Spacing excludes artificial fractures.

KEY TO SOIL LEGENDS



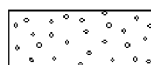
CLAY



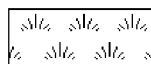
SILT



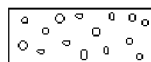
SAND



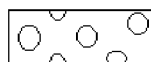
GRAVEL



PEAT



COBBLES



BOULDERS



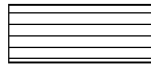
TOPSOIL



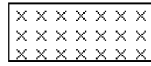
MADE GROUND



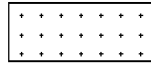
KEY TO ROCK LEGENDS



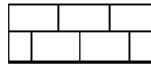
MUDSTONE



SILTSTONE



SANDSTONE



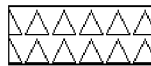
LIMESTONE



CHALK



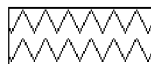
COAL



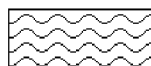
BRECCIA



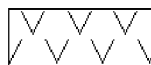
CONGLOMERATE



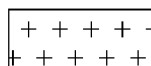
FINE GRAINED METAMORPHIC



MEDIUM/COARSE GRAINED METAMORPHIC



FINE GRAINED IGNEOUS



MEDIUM GRAINED IGNEOUS

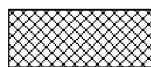


COARSE GRAINED IGNEOUS

KEY TO BACKFILL LEGENDS



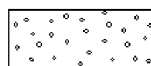
BENTONITE



ARISINGS



SAND



GRAVEL

REFERENCES

BS 1377 : 1990 : British Standard Methods of test for soils for civil engineering purposes. British Standards Institution.

BS 5930 : 1999 : Code of practice for site investigations. British Standards Institution.

		South West Geotechnical		Borehole No WS01					
Project Name Brookbarn Farm		Project No. 6716		Co-ords: -					
Location: Littlehampton		Level: -		Hole Type WS					
Client: Anesco		Dates: 11/12/2014		Scale 1:50					
Logged By NW									
Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15						TOPSOIL: Grass over soft dark brown clayey silt.	
		1.00	ES					MADE GROUND: Light brown silty clay with fragments of red brick, yellow sandstone and some minor black staining.	1
		1.30							
		1.50	D					MADE GROUND: Dark brown and black silty clay with frequent black staining, timber fragments and plastic sheeting, with a strong organic odour at base.	
		1.70						End of Borehole at 1.70 m	2
									3
									4
									5
									6
									7
									8
									9
Remarks: 1. Groundwater encountered at 1.30m, not struck during window sampling, but full when backfilled - groundwater sitting below clay bund. 2. Backfilled with arisings.									
									

				South West Geotechnical 			Borehole No WS02 Sheet 1 of 1	
Project Name Brookbarn Farm				Project No. 6716		Co-ords: -		Hole Type WS
Location: Littlehampton						Level: -		Scale 1:50
Client: Anesco						Dates: 11/12/2014		Logged By NW

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10		TOPSOIL: Grass over soft dark brown clayey silt.		
		0.50	D		0.60		MADE GROUND: Light brown silty clay.		
		1.00	ES		0.90		MADE GROUND: Brown and black sandy silty clay with little fine to medium angular gravel of polymict stone.		
					1.00		MADE GROUND: Bales of multicoloured thick polythene sheet - compressed into bales (supermarket waste?).	1	
End of Borehole at 1.00 m									
								2	
								3	
								4	
								5	
								6	
								7	
								8	
								9	

Remarks:	1. Groundwater encountered at 1.0m. 2. Backfilled with arisings.	
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South West Geotechnical

Borehole No

WS03

Sheet 1 of 1

Project Name

Brookbarn Farm

Project No.

6716

Co-ords: -

Location: Littlehampton

Level: -

Scale

1:50

Client: Anesco

Dates: 11/12/2014

Logged By

NW

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type					
				0.10			TOPSOIL: Grass over soft dark brown clayey silt.	
				0.58			MADE GROUND: Light brown silty clay with fragments of red plastic.	
				0.67			MADE GROUND: Light brown silty clay with fragments of red brick.	
		1.00	ES	1.00			MADE GROUND: Black hydrocarbon stained sandy silt with hydrocarbon odour.	1
		1.00	D				MADE GROUND: Light grey silty clay with an organic odour. Limited recovery.	
		1.50	ES					
		2.00	D	2.00			MADE GROUND: Black hydrocarbon stained sandy silty clayey silt with some gravel and frequent fragments of plastic, plastic netting and brick.	2
				3.00				
							End of Borehole at 3.00 m	3
								4
								5
								6
								7
								8
								9

Remarks:

1. Groundwater encountered at 1.0m.
2. Backfilled with arisings.



				South West Geotechnical 			Borehole No WS04 Sheet 1 of 1	
Project Name Brookbarn Farm				Project No. 6716		Co-ords: -		Hole Type WS
Location: Littlehampton						Level: -		Scale 1:50
Client: Anesco						Dates: 11/12/2014		Logged By NW

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10		TOPSOIL: Grass over soft dark brown clayey silt. Firm light brown silty sandy CLAY.		
		1.00	D					1	
		2.00	ES		2.00		Firm orange brown, very sandy, silty sandy CLAY.	2	
					3.00		End of Borehole at 3.00 m	3	
								4	
								5	
								6	
								7	
								8	
								9	

Remarks: 1. Groundwater not encountered. 2. Backfilled with arisings.		
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				Borehole No WS05 Sheet 1 of 1	
Project Name Brookbarn Farm			Project No. 6716		Co-ords: -
Location: Littlehampton			Level: -		Scale 1:50
Client: Anesco			Dates: 11/12/2014		Logged By NW

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type					
				0.10			TOPSOIL: Grass over soft dark brown clayey silt. MADE GROUND: Light brown silty clay with black hydrocarbon stained pockets of silty sand, plastic sheet and red brick.	
		1.00	ES	1.00			MADE GROUND: Light brown sandy silty clay. Limited recovery.	1
		2.00	D	2.00			MADE GROUND: Very wet dark brown sand, chert gravel, polystyrene (expanded), fibreglass and wood. Limited recovery.	2
				3.00			End of Borehole at 3.00 m	3
								4
								5
								6
								7
								8
								9

Remarks:	1. Groundwater encountered at 1.0m. 2. Backfilled with arisings.	
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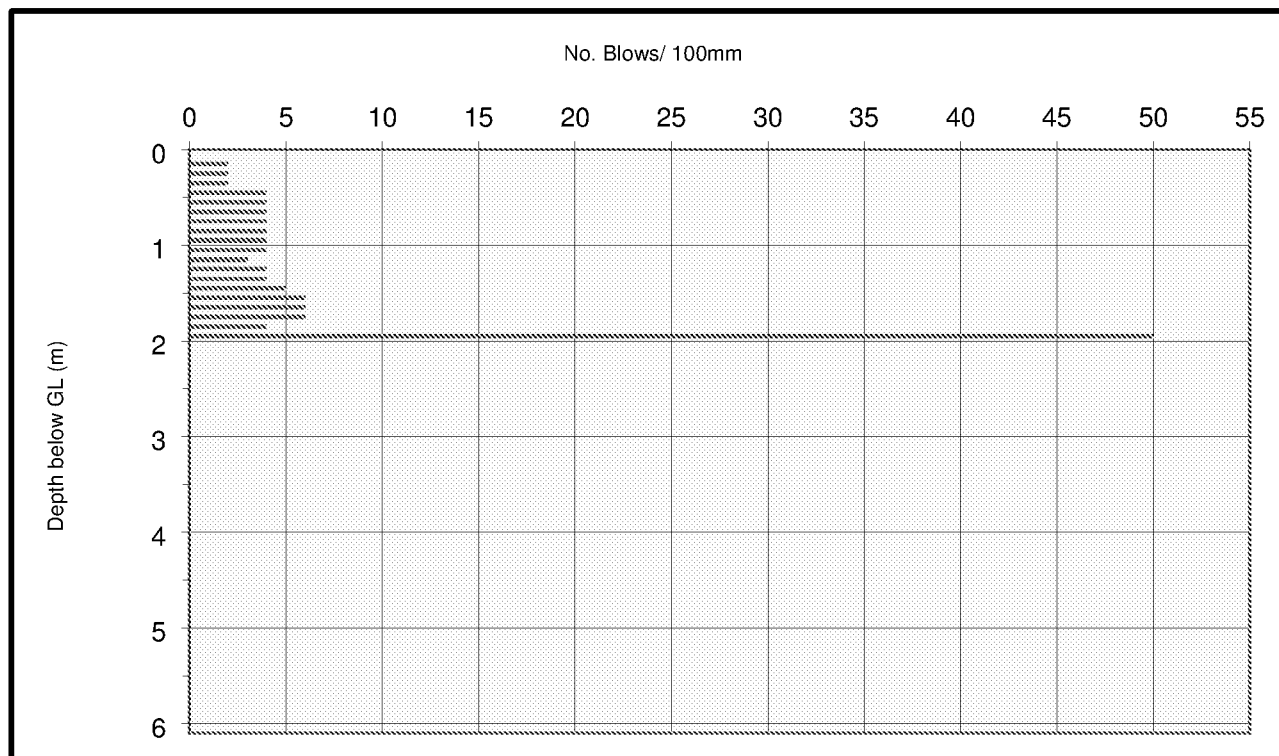
DYNAMIC PROBE RESULTS



Site Name Brookbarn Farm
 Probe Hole No. DPSH 1
 Type of Probe Test DPSH
 Grid Ref

Job no. 6716
 Date 00-Jan-00
 Rig Type Competitor

Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm
0.00									
0.10	2	2.10		4.10		6.10		8.10	
0.20	2	2.20		4.20		6.20		8.20	
0.30	2	2.30		4.30		6.30		8.30	
0.40	4	2.40		4.40		6.40		8.40	
0.50	4	2.50		4.50		6.50		8.50	
0.60	4	2.60		4.60		6.60		8.60	
0.70	4	2.70		4.70		6.70		8.70	
0.80	4	2.80		4.80		6.80		8.80	
0.90	4	2.90		4.90		6.90		8.90	
1.00	4	3.00		5.00		7.00		9.00	
1.10	3	3.10		5.10		7.10		9.10	
1.20	4	3.20		5.20		7.20		9.20	
1.30	4	3.30		5.30		7.30		9.30	
1.40	5	3.40		5.40		7.40		9.40	
1.50	6	3.50		5.50		7.50		9.50	
1.60	6	3.60		5.60		7.60		9.60	
1.70	6	3.70		5.70		7.70		9.70	
1.80	4	3.80		5.80		7.80		9.80	
1.90	50	3.90		5.90		7.90		9.90	
2.00		4.00		6.00		8.00		10.00	



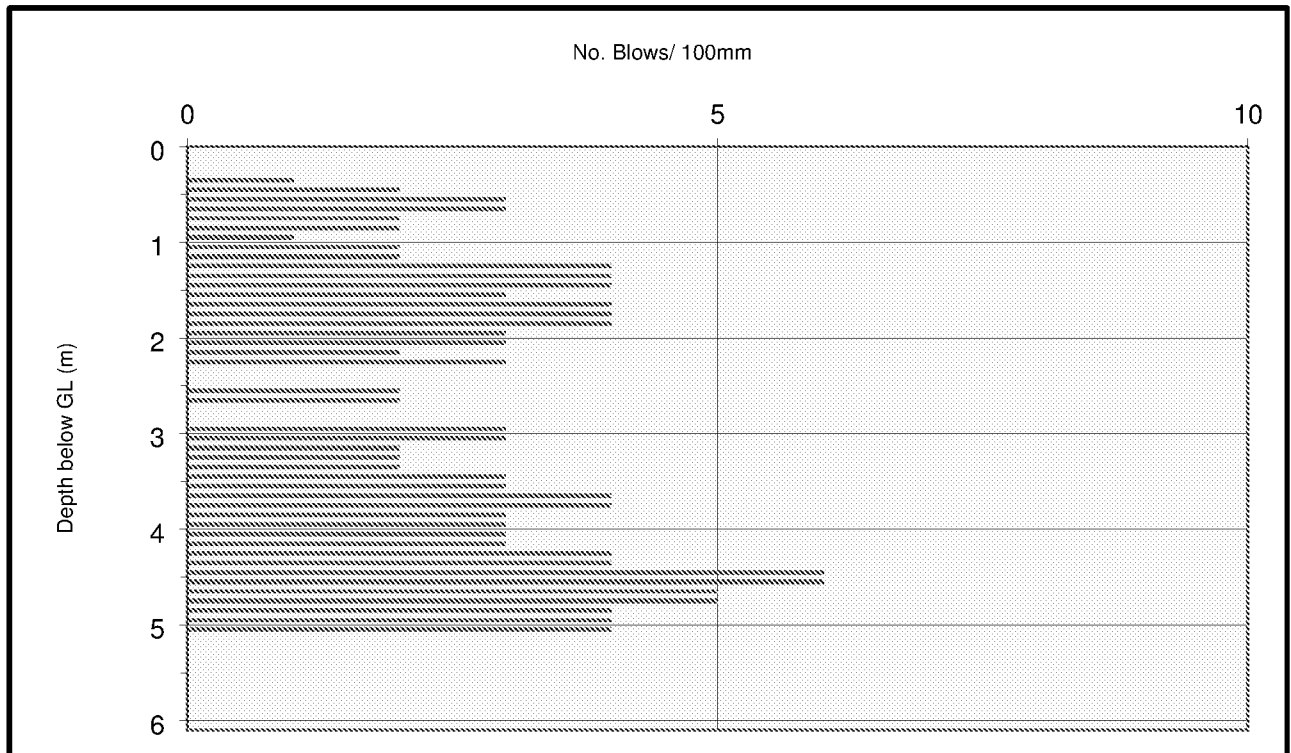
DYNAMIC PROBE RESULTS



Site Name Brookbarn Farm
Probe Hole No. DPSH 2
Type of Probe Test DPSH
Grid Ref

Job no. 6716
Date 00-Jan-00
Rig Type Competitor

Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm
0.00	0								
0.10	0	2.10	2	4.10	3	6.10		8.10	
0.20	0	2.20	3	4.20	4	6.20		8.20	
0.30	1	2.30	0	4.30	4	6.30		8.30	
0.40	2	2.40	0	4.40	6	6.40		8.40	
0.50	3	2.50	2	4.50	6	6.50		8.50	
0.60	3	2.60	2	4.60	5	6.60		8.60	
0.70	2	2.70	0	4.70	5	6.70		8.70	
0.80	2	2.80	0	4.80	4	6.80		8.80	
0.90	1	2.90	3	4.90	4	6.90		8.90	
1.00	2	3.00	3	5.00	4	7.00		9.00	
1.10	2	3.10	2	5.10		7.10		9.10	
1.20	4	3.20	2	5.20		7.20		9.20	
1.30	4	3.30	2	5.30		7.30		9.30	
1.40	4	3.40	3	5.40		7.40		9.40	
1.50	3	3.50	3	5.50		7.50		9.50	
1.60	4	3.60	4	5.60		7.60		9.60	
1.70	4	3.70	4	5.70		7.70		9.70	
1.80	4	3.80	3	5.80		7.80		9.80	
1.90	3	3.90	3	5.90		7.90		9.90	
2.00	3	4.00	3	6.00		8.00		10.00	



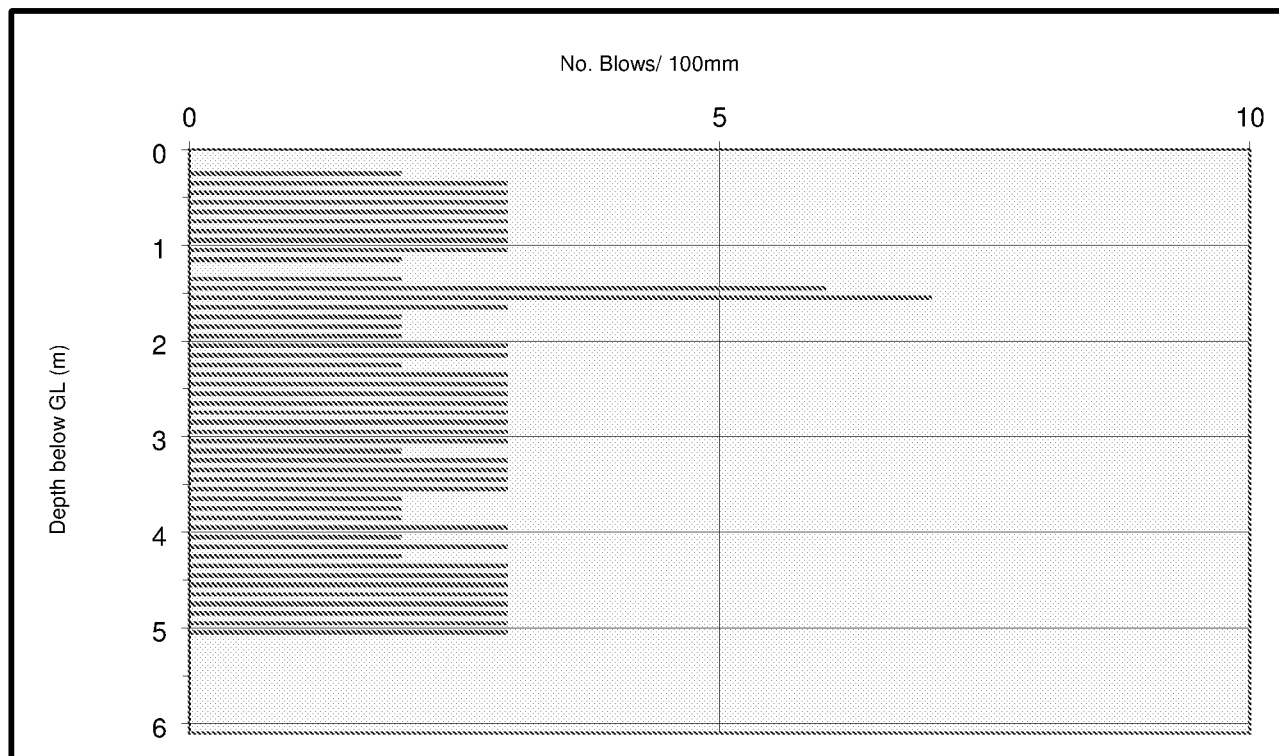
DYNAMIC PROBE RESULTS



Site Name Brookbarn Farm
 Probe Hole No. DPSH 3
 Type of Probe Test DPSH
 Grid Ref

Job no. 6716
 Date 00-Jan-00
 Rig Type Competitor

Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm
0.00	0								
0.10	0	2.10	3	4.10	3	6.10		8.10	
0.20	2	2.20	2	4.20	2	6.20		8.20	
0.30	3	2.30	3	4.30	3	6.30		8.30	
0.40	3	2.40	3	4.40	3	6.40		8.40	
0.50	3	2.50	3	4.50	3	6.50		8.50	
0.60	3	2.60	3	4.60	3	6.60		8.60	
0.70	3	2.70	3	4.70	3	6.70		8.70	
0.80	3	2.80	3	4.80	3	6.80		8.80	
0.90	3	2.90	3	4.90	3	6.90		8.90	
1.00	3	3.00	3	5.00	3	7.00		9.00	
1.10	2	3.10	2	5.10		7.10		9.10	
1.20	0	3.20	3	5.20		7.20		9.20	
1.30	2	3.30	3	5.30		7.30		9.30	
1.40	6	3.40	3	5.40		7.40		9.40	
1.50	7	3.50	3	5.50		7.50		9.50	
1.60	3	3.60	2	5.60		7.60		9.60	
1.70	2	3.70	2	5.70		7.70		9.70	
1.80	2	3.80	2	5.80		7.80		9.80	
1.90	2	3.90	3	5.90		7.90		9.90	
2.00	3	4.00	2	6.00		8.00		10.00	



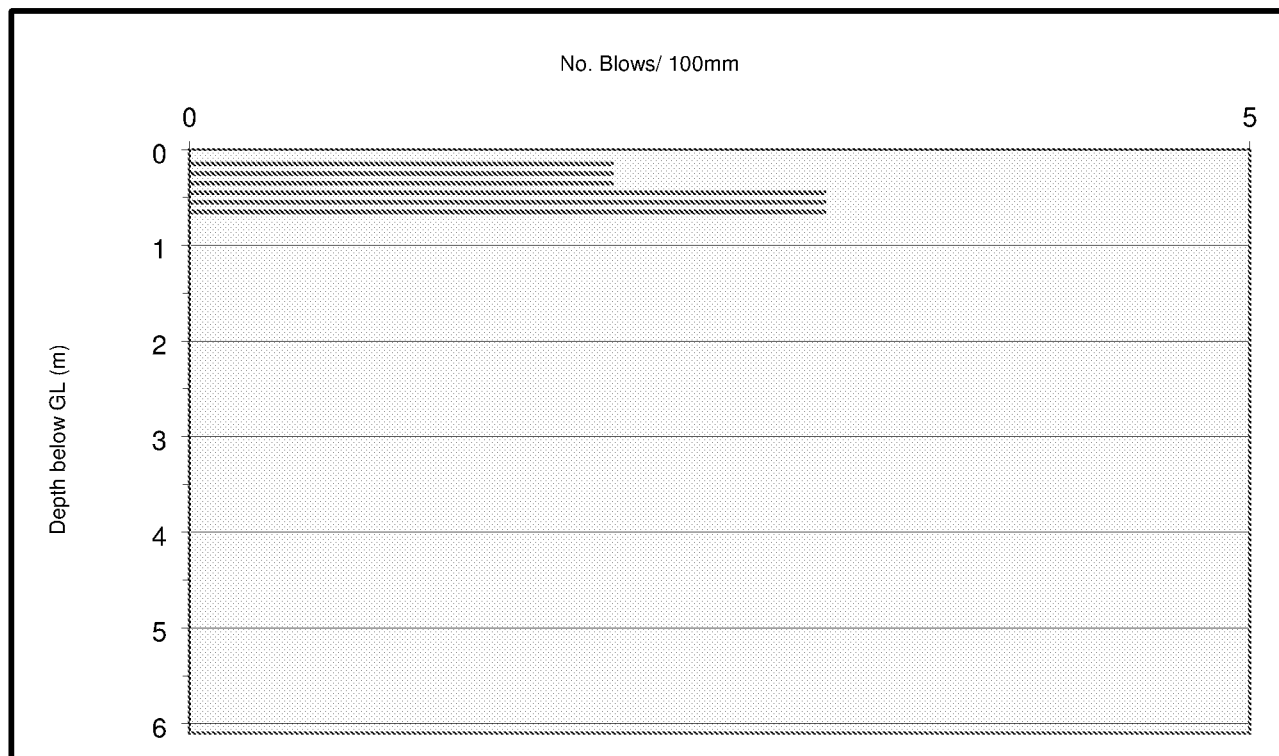
DYNAMIC PROBE RESULTS



Site Name Brookbarn Farm
Probe Hole No. DPSH 4
Type of Probe Test DPSH
Grid Ref

Job no. 6716
Date 00-Jan-00
Rig Type Competitor

Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm
0.00									
0.10	2	2.10	3	4.10	4	6.10		8.10	
0.20	2	2.20	3	4.20	4	6.20		8.20	
0.30	2	2.30	3	4.30	4	6.30		8.30	
0.40	3	2.40	3	4.40	4	6.40		8.40	
0.50	3	2.50	3	4.50	4	6.50		8.50	
0.60	3	2.60	3	4.60	4	6.60		8.60	
0.70	3	2.70	2	4.70	4	6.70		8.70	
0.80	2	2.80	2	4.80	4	6.80		8.80	
0.90	2	2.90	2	4.90	4	6.90		8.90	
1.00	2	3.00	2	5.00	4	7.00		9.00	
1.10	2	3.10	3	5.10		7.10		9.10	
1.20	2	3.20	4	5.20		7.20		9.20	
1.30	2	3.30	6	5.30		7.30		9.30	
1.40	2	3.40	4	5.40		7.40		9.40	
1.50	2	3.50	4	5.50		7.50		9.50	
1.60	2	3.60	4	5.60		7.60		9.60	
1.70	2	3.70	4	5.70		7.70		9.70	
1.80	2	3.80	4	5.80		7.80		9.80	
1.90	2	3.90	4	5.90		7.90		9.90	
2.00	2	4.00		6.00		8.00		10.00	



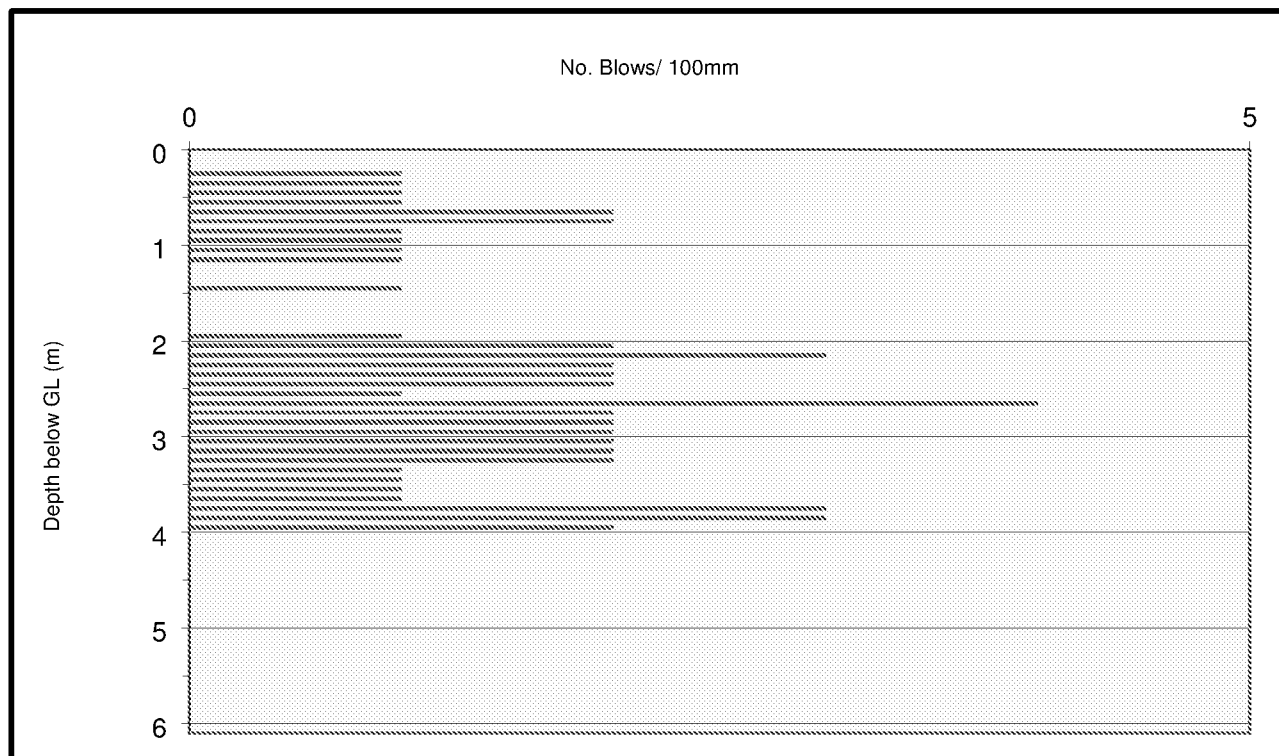
DYNAMIC PROBE RESULTS



Site Name Brookbarn Farm
Probe Hole No. DPSH 5
Type of Probe Test DPSH
Grid Ref

Job no. 6716
Date 00-Jan-00
Rig Type Competitor

Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm
0.00									
0.10	0	2.10	3	4.10	1	6.10		8.10	
0.20	1	2.20	2	4.20	1	6.20		8.20	
0.30	1	2.30	2	4.30	2	6.30		8.30	
0.40	1	2.40	2	4.40	2	6.40		8.40	
0.50	1	2.50	1	4.50	2	6.50		8.50	
0.60	2	2.60	4	4.60	2	6.60		8.60	
0.70	2	2.70	2	4.70	2	6.70		8.70	
0.80	1	2.80	2	4.80	2	6.80		8.80	
0.90	1	2.90	2	4.90	2	6.90		8.90	
1.00	1	3.00	2	5.00	2	7.00		9.00	
1.10	1	3.10	2	5.10		7.10		9.10	
1.20	0	3.20	2	5.20		7.20		9.20	
1.30	0	3.30	1	5.30		7.30		9.30	
1.40	1	3.40	1	5.40		7.40		9.40	
1.50	0	3.50	1	5.50		7.50		9.50	
1.60	0	3.60	1	5.60		7.60		9.60	
1.70	0	3.70	3	5.70		7.70		9.70	
1.80	0	3.80	3	5.80		7.80		9.80	
1.90	1	3.90	2	5.90		7.90		9.90	
2.00	2	4.00	1	6.00		8.00		10.00	



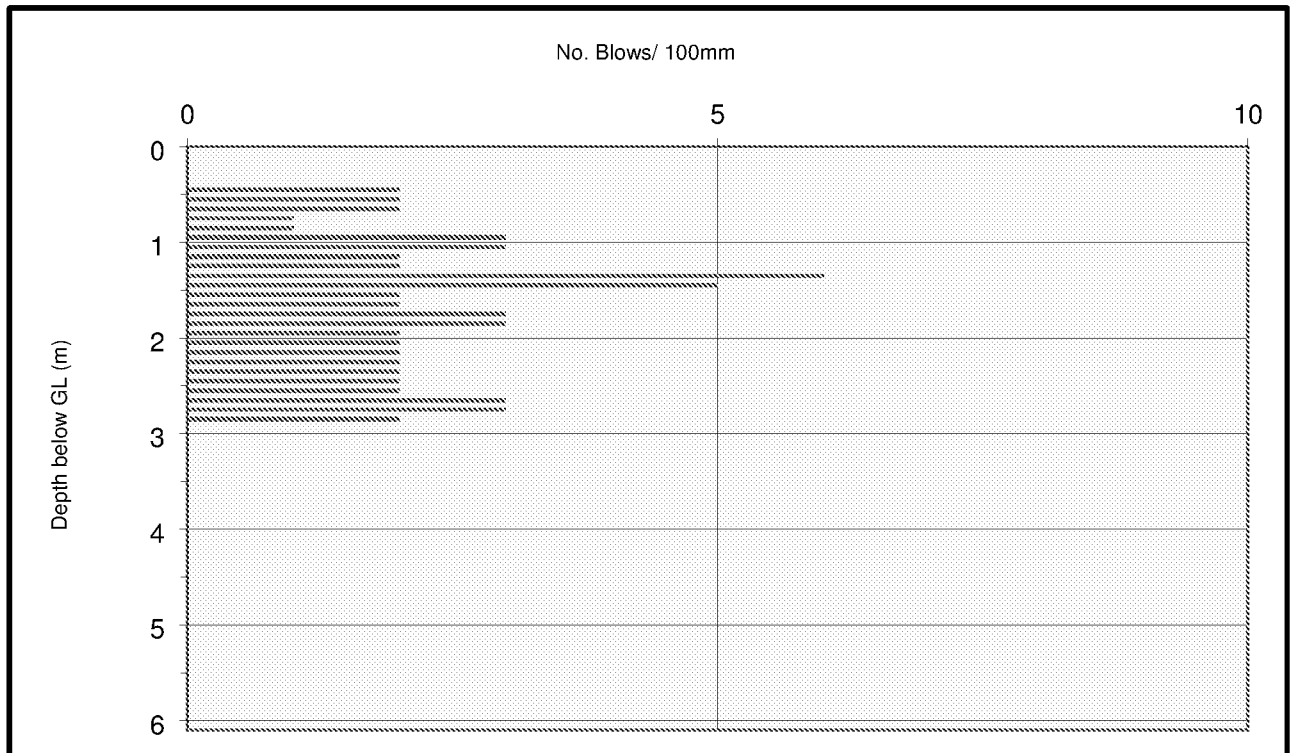
DYNAMIC PROBE RESULTS



Site Name Brookbarn Farm
Probe Hole No. DPSH 6
Type of Probe Test DPSH
Grid Ref

Job no. 6716
Date 00-Jan-00
Rig Type Competitor

Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm
0.00	0								
0.10	0	2.10	2	4.10	2	6.10		8.10	
0.20	0	2.20	2	4.20	2	6.20		8.20	
0.30	0	2.30	2	4.30	2	6.30		8.30	
0.40	2	2.40	2	4.40	2	6.40		8.40	
0.50	2	2.50	2	4.50	1	6.50		8.50	
0.60	2	2.60	3	4.60	1	6.60		8.60	
0.70	1	2.70	3	4.70	1	6.70		8.70	
0.80	1	2.80	2	4.80	2	6.80		8.80	
0.90	3	2.90	2	4.90	2	6.90		8.90	
1.00	3	3.00	2	5.00	2	7.00		9.00	
1.10	2	3.10	3	5.10		7.10		9.10	
1.20	2	3.20	6	5.20		7.20		9.20	
1.30	6	3.30	5	5.30		7.30		9.30	
1.40	5	3.40	4	5.40		7.40		9.40	
1.50	2	3.50	4	5.50		7.50		9.50	
1.60	2	3.60	2	5.60		7.60		9.60	
1.70	3	3.70	2	5.70		7.70		9.70	
1.80	3	3.80	2	5.80		7.80		9.80	
1.90	2	3.90	2	5.90		7.90		9.90	
2.00	2	4.00	2	6.00		8.00		10.00	



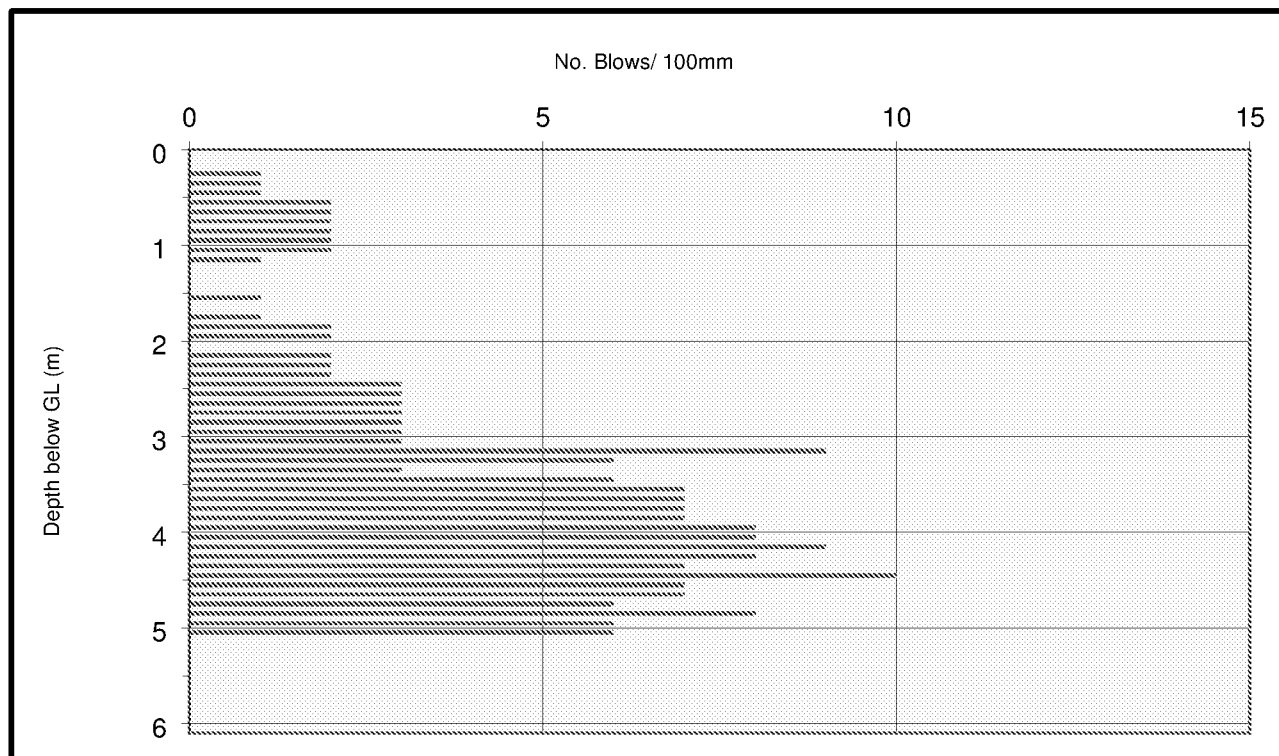
DYNAMIC PROBE RESULTS



Site Name Brookbarn Farm
Probe Hole No. DPSH 7
Type of Probe Test DPSH
Grid Ref

Job no. 6716
Date 00-Jan-00
Rig Type Competitor

Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm
0.00	0								
0.10	0	2.10	2	4.10	9	6.10		8.10	
0.20	1	2.20	2	4.20	8	6.20		8.20	
0.30	1	2.30	2	4.30	7	6.30		8.30	
0.40	1	2.40	3	4.40	10	6.40		8.40	
0.50	2	2.50	3	4.50	7	6.50		8.50	
0.60	2	2.60	3	4.60	7	6.60		8.60	
0.70	2	2.70	3	4.70	6	6.70		8.70	
0.80	2	2.80	3	4.80	8	6.80		8.80	
0.90	2	2.90	3	4.90	6	6.90		8.90	
1.00	2	3.00	3	5.00	6	7.00		9.00	
1.10	1	3.10	9	5.10		7.10		9.10	
1.20	0	3.20	6	5.20		7.20		9.20	
1.30	0	3.30	3	5.30		7.30		9.30	
1.40	0	3.40	6	5.40		7.40		9.40	
1.50	1	3.50	7	5.50		7.50		9.50	
1.60	0	3.60	7	5.60		7.60		9.60	
1.70	1	3.70	7	5.70		7.70		9.70	
1.80	2	3.80	7	5.80		7.80		9.80	
1.90	2	3.90	8	5.90		7.90		9.90	
2.00	0	4.00	8	6.00		8.00		10.00	



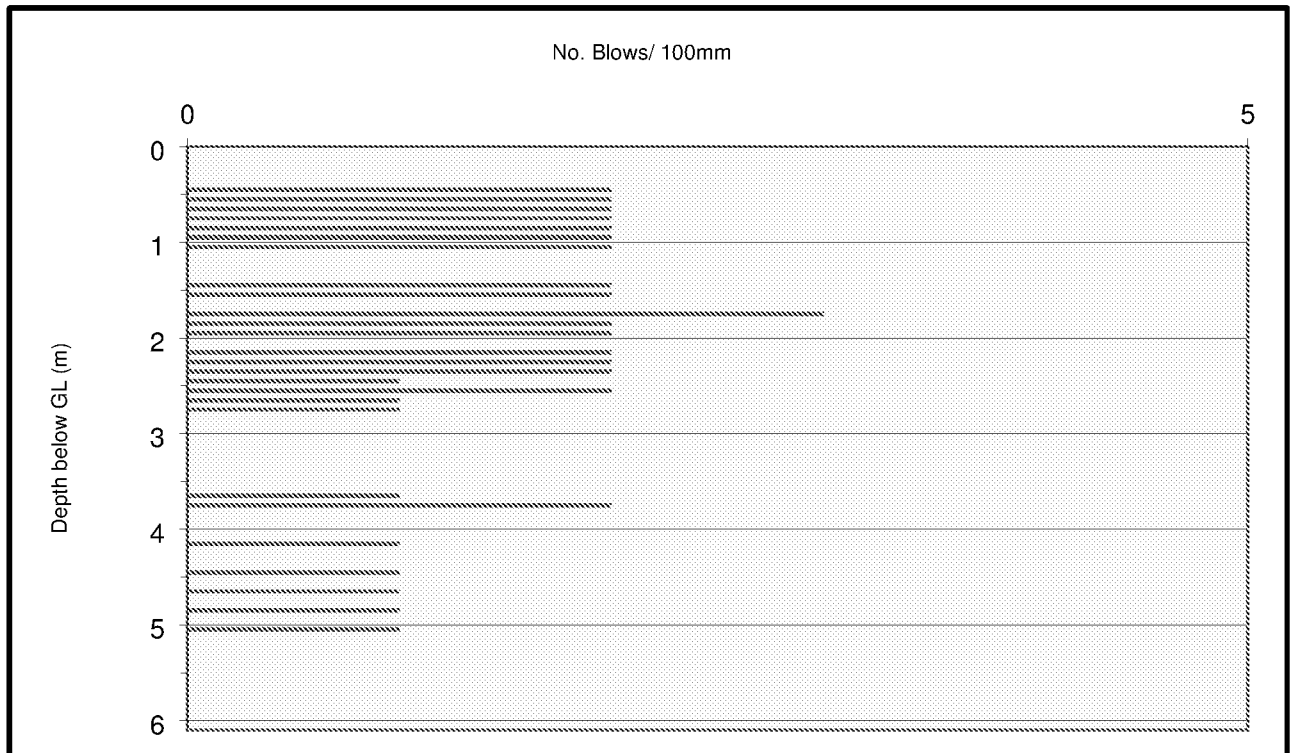
DYNAMIC PROBE RESULTS



Site Name Brookbarn Farm
Probe Hole No. DPSH 8
Type of Probe Test DPSH
Grid Ref

Job no. 6716
Date 00-Jan-00
Rig Type Competitor

Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm	Depth (m bgl)	No. blows/ 100mm
0.00	0								
0.10	0	2.10	2	4.10	1	6.10		8.10	
0.20	0	2.20	2	4.20	0	6.20		8.20	
0.30	0	2.30	2	4.30	0	6.30		8.30	
0.40	2	2.40	1	4.40	1	6.40		8.40	
0.50	2	2.50	2	4.50	0	6.50		8.50	
0.60	2	2.60	1	4.60	1	6.60		8.60	
0.70	2	2.70	1	4.70	0	6.70		8.70	
0.80	2	2.80	0	4.80	1	6.80		8.80	
0.90	2	2.90	0	4.90	0	6.90		8.90	
1.00	2	3.00	0	5.00	1	7.00		9.00	
1.10	0	3.10	0	5.10		7.10		9.10	
1.20	0	3.20	0	5.20		7.20		9.20	
1.30	0	3.30	0	5.30		7.30		9.30	
1.40	2	3.40	0	5.40		7.40		9.40	
1.50	2	3.50	0	5.50		7.50		9.50	
1.60	0	3.60	1	5.60		7.60		9.60	
1.70	3	3.70	2	5.70		7.70		9.70	
1.80	2	3.80	0	5.80		7.80		9.80	
1.90	2	3.90	0	5.90		7.90		9.90	
2.00	0	4.00	0	6.00		8.00		10.00	



TRL Dynamic Cone Penetration Test

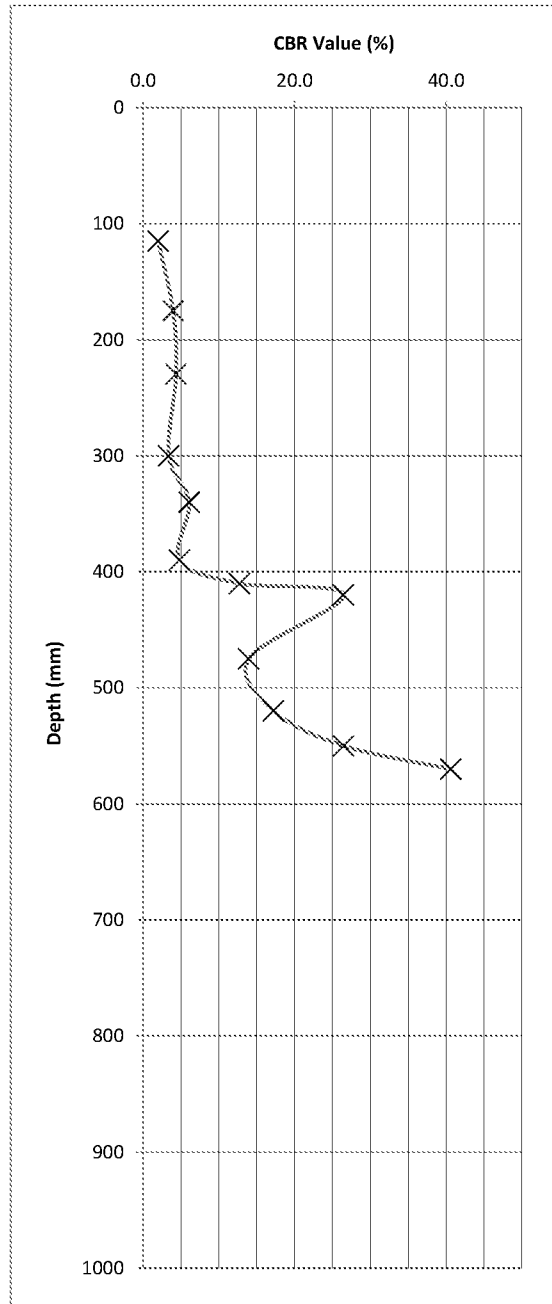


Site Brookbarn Farm, Littlehampton
 Location See site plan
 Surface conditions Grass over soft topsoil

Job No. 6716

Test No. 1
 Depth (mm) 0

No. blows	Depth gauge (mm)	Total blows	Penetration (mm)	mm/blow	Depth (mm)	CBR
0	170	0	0	0	0	
1	285	1	115	115	115	2.0
1	345	2	60	60	175	4.0
1	400	3	55	55	230	4.4
1	470	4	70	70	300	3.4
1	510	5	40	40	340	6.1
1	560	6	50	50	390	4.8
1	580	7	20	20	410	12.7
1	590	8	10	10	420	26.5
3	645	11	55	18	475	14.0
3	690	14	45	15	520	17.3
3	720	17	30	10	550	26.5
3	740	20	20	7	570	40.7



Tested in accordance with Design Manual for Roads and Bridges Draft HD 25 (2009) and HD 29/08

Test by NW

Date 11/12/2014

Checked by JH

Date 13/11/2013

TRL Dynamic Cone Penetration Test

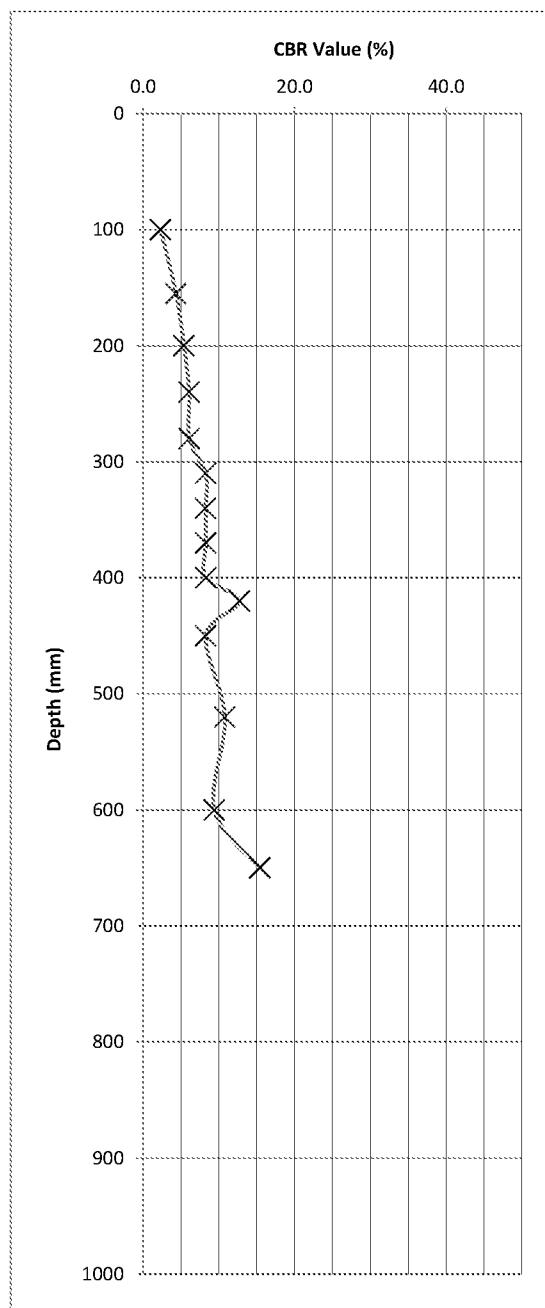


Site Brookbarn Farm, Littlehampton
 Location See site plan
 Surface conditions Grass over soft topsoil

Job No. 6716

Test No. 2
 Depth (mm) 0

No. blows	Depth gauge (mm)	Total blows	Penetration (mm)	mm/blow	Depth (mm)	CBR
0	180	0	0	0	0	
1	280	1	100	100	100	2.3
1	335	2	55	55	155	4.4
1	380	3	45	45	200	5.4
1	420	4	40	40	240	6.1
1	460	5	40	40	280	6.1
1	490	6	30	30	310	8.3
1	520	7	30	30	340	8.3
1	550	8	30	30	370	8.3
1	580	9	30	30	400	8.3
1	600	10	20	20	420	12.7
1	630	11	30	30	450	8.3
3	700	14	70	23	520	10.8
3	780	17	80	27	600	9.4
3	830	20	50	17	650	15.4



Tested in accordance with Design Manual for Roads and Bridges Draft HD 25 (2009) and HD 29/08

Test by NW

Date 11/12/2014

Checked by JH

Date 13/11/2013

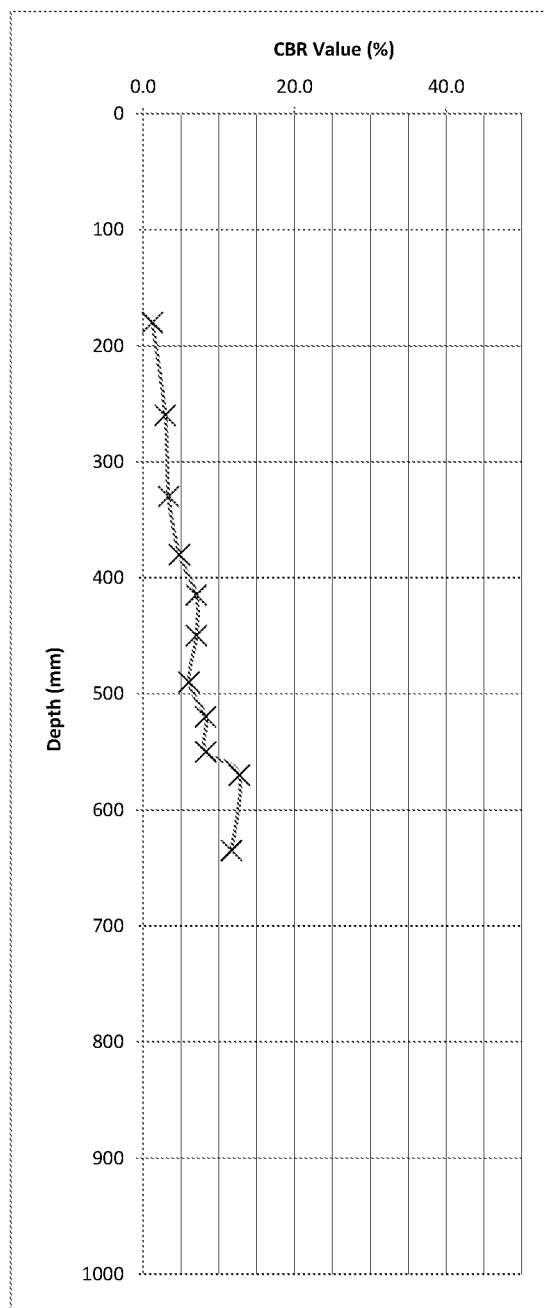
TRL Dynamic Cone Penetration Test



Site Brookbarn Farm, Littlehampton Job No. 6716
 Location See site plan
 Surface conditions Waterlogged grass over very soft topsoil

Test No. 3
 Depth (mm) 0

No. blows	Depth gauge (mm)	Total blows	Penetration (mm)	mm/blow	Depth (mm)	CBR
0	200	0	0	0	0	
1	380	1	180	180	180	1.2
1	460	2	80	80	260	2.9
1	530	3	70	70	330	3.4
1	580	4	50	50	380	4.8
1	615	5	35	35	415	7.0
1	650	6	35	35	450	7.0
1	690	7	40	40	490	6.1
1	720	8	30	30	520	8.3
1	750	9	30	30	550	8.3
1	770	10	20	20	570	12.7
3	835	13	65	22	635	11.7



Tested in accordance with Design Manual for Roads and Bridges Draft HD 25 (2009) and HD 29/08

Test by NW Date 11/12/2014 Checked by JH Date 13/11/2013

TRL Dynamic Cone Penetration Test

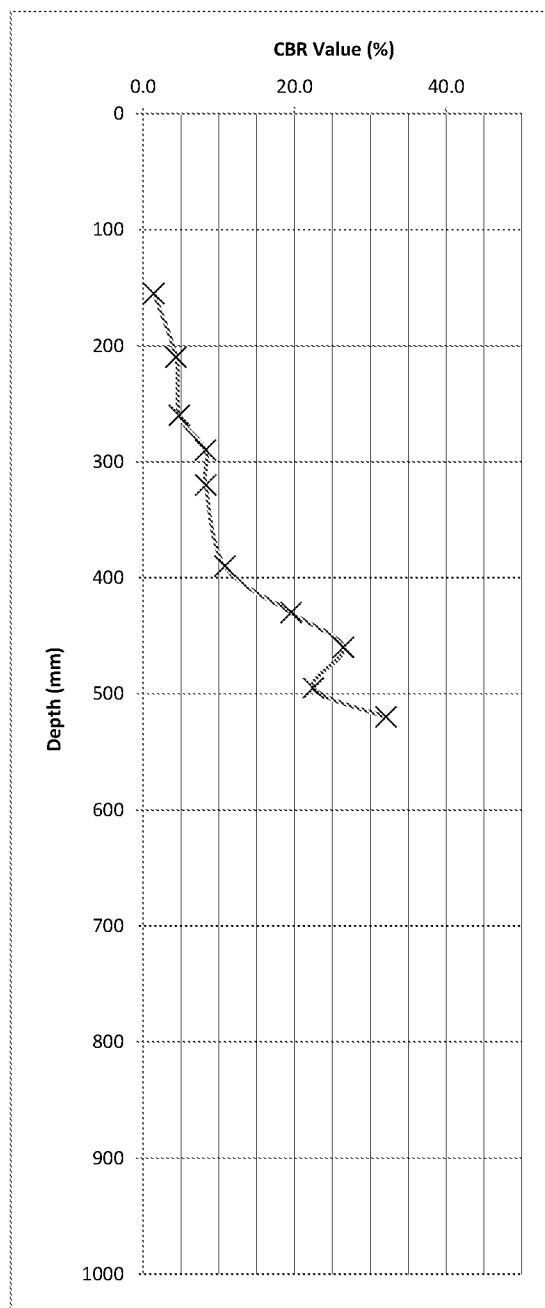


Site Brookbarn Farm, Littlehampton
 Location See site plan
 Surface conditions Grass over soft topsoil

Job No. 6716

Test No. 4
 Depth (mm) 0

No. blows	Depth gauge (mm)	Total blows	Penetration (mm)	mm/blow	Depth (mm)	CBR
0	190	0	0	0	0	
1	345	1	155	155	155	1.5
1	400	2	55	55	210	4.4
1	450	3	50	50	260	4.8
1	480	4	30	30	290	8.3
1	510	5	30	30	320	8.3
3	580	8	70	23	390	10.8
3	620	11	40	13	430	19.5
3	650	14	30	10	460	26.5
3	685	17	35	12	495	22.5
3	710	20	25	8	520	32.1



Tested in accordance with Design Manual for Roads and Bridges Draft HD 25 (2009) and HD 29/08

Test by NW

Date 11/12/2014

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Date 13/11/2013

TRL Dynamic Cone Penetration Test

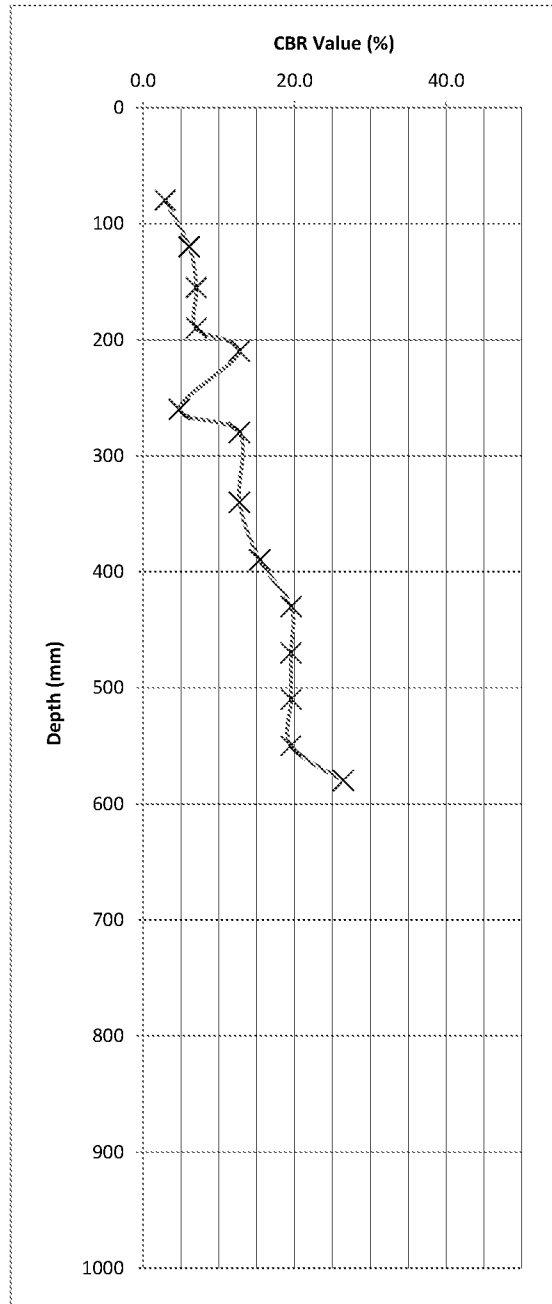


Site Brookbarn Farm, Littlehampton
 Location See site plan
 Surface conditions Grass over soft topsoil

Job No. 6716

Test No. 5
 Depth (mm) 0

No. blows	Depth gauge (mm)	Total blows	Penetration (mm)	mm/blow	Depth (mm)	CBR
0	200	0	0	0	0	
1	280	1	80	80	80	2.9
1	320	2	40	40	120	6.1
1	355	3	35	35	155	7.0
1	390	4	35	35	190	7.0
1	410	5	20	20	210	12.7
1	460	6	50	50	260	4.8
1	480	7	20	20	280	12.7
3	540	10	60	20	340	12.7
3	590	13	50	17	390	15.4
3	630	16	40	13	430	19.5
3	670	19	40	13	470	19.5
3	710	22	40	13	510	19.5
3	750	25	40	13	550	19.5
3	780	28	30	10	580	26.5



Tested in accordance with Design Manual for Roads and Bridges Draft HD 25 (2009) and HD 29/08

Test by NW

Date 11/12/2014

Checked by JH

Date 13/11/2013