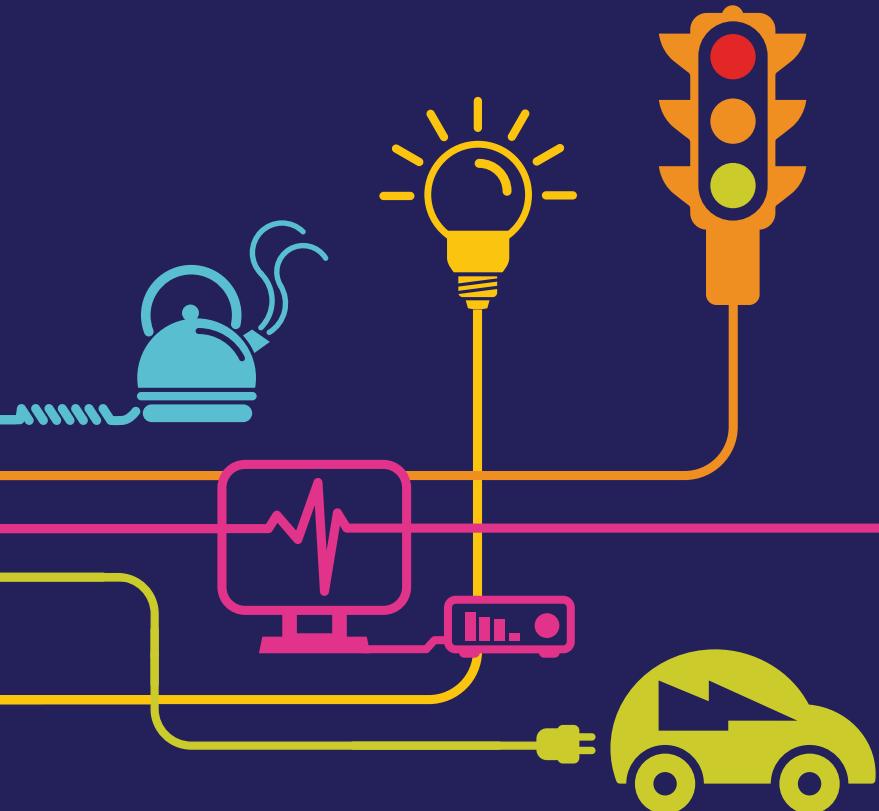


Environmental Statement Ground Environment Appendix 9K

Hinkley Point C Connection Project

*Regulation 5(2)(a) of the Infrastructure Planning
(Applications: Prescribed Forms and Procedure)
Regulations 2009*



Environmental Statement

Hinkley Point C Connection Project

5.9.2 – Ground Environment– Appendices (orange highlight indicates the contents of this Volume)

Appendix	Title
Volume 5.9.2.1	
9A	Preliminary Risk Assessment - Section A (Part 1)
Volume 5.9.2.2	
9A	Preliminary Risk Assessment - Section A (Part 2)
Volume 5.9.2.3	
9B	Preliminary Risk Assessment - Section B (Part 1)
Volume 5.9.2.4	
9B	Preliminary Risk Assessment - Section B (Part 2)
Volume 5.9.2.5	
9C	Preliminary Risk Assessment - Section C (Part 1)
Volume 5.9.2.6	
9C	Preliminary Risk Assessment - Section C (Part 2)
Volume 5.9.2.7	
9D	Preliminary Risk Assessment - Section D (Part 1)
Volume 5.9.2.8	
9D	Preliminary Risk Assessment - Section D (Part 2)
Volume 5.9.2.9	
9D	Preliminary Risk Assessment - Section D (Part 3)
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9D	Preliminary Risk Assessment - Section D (Part 4)
Volume 5.9.2.11	
9E	Preliminary Risk Assessment - Section E (Part 1)
Volume 5.9.2.12	
9E	Preliminary Risk Assessment - Section E (Part 2)
Volume 5.9.2.13	
9F	Preliminary Risk Assessment - Section F (Part 1)
Volume 5.9.2.14	
9F	Preliminary Risk Assessment - Section F (Part 2)
Volume 5.9.2.15	
9G	Preliminary Risk Assessment - Section G (Part 1)
Volume 5.9.2.16	
9G	Preliminary Risk Assessment - Section G (Part 2)
Volume 5.9.2.17	
9G	Preliminary Risk Assessment - Section G (Part 3)
Volume 5.9.2.18	
9H	Preliminary Risk Assessment - Section H
Volume 5.9.2.19	

Appendix	Title
9I	Coal Mining Risk Assessment (Part 1)
Volume 5.9.2.20	
9I	Coal Mining Risk Assessment (Part 2)
Volume 5.9.2.21	
9J	Factual Report on Ground Investigation Hinkley to Seabank 400kV Connection (Part 1)
Volume 5.9.2.22	
9J	Factual Report on Ground Investigation Hinkley to Seabank 400kV Connection (Part 2)
Volume 5.9.2.23	
9J	Factual Report on Ground Investigation Hinkley to Seabank 400kV Connection (Part 3)
Volume 5.9.2.24	
9K	Factual Report on Ground Investigation on New Electricity Substation at Sandford, Somerset

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Appendix 9K – Factual Report on Ground Investigation on New Electricity Substation at Sandford, Somerset

NATIONAL GRID TRANSMISSION PLC

FACTUAL REPORT
on
GROUND INVESTIGATION
on
NEW ELECTRICITY SUBSTATION
AT SANDFORD, SOMERSET

OCTOBER 2013
REPORT NO: 727635J

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Contract: New Electricity Substation, Sandford, Somerset

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Prepared by:

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Approved by:

A Lumber

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October 2013

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1 INTRODUCTION

This investigation was carried out on the instructions of the Electricity Alliance West (the Engineer) on behalf of National Grid Transmission Plc (the Client), with further technical direction and instructions being given by Jacobs Engineering Group Inc.

The purpose of the work was to investigate ground conditions, provide information for the design of foundations for the proposed electricity substation at Sandford, associated with the Hinkley to Seabank 400kV Connection. The work included an intrusive investigation and the preparation of this report.

This report details the work carried out on site; it contains a description of the site and the works undertaken, and the exploratory hole logs.

The ground investigation has been carried out using cable percussive and rotary core drilling techniques in general accordance with the recommendations of BS5930: 1999 *Code of Practice for Site Investigations*. Whilst every attempt is made to record full details of the strata encountered in the exploratory holes, techniques of hole formation and sampling will inevitably lead to disturbance, mixing or loss of material in some soils and rocks.

A comprehensive desk study, other than an inspection of geological maps, has not been requested or undertaken as part of this investigation. Nor has a preliminary risk assessment been completed. The chemical testing of samples of soil and water for contamination has not formed part of this investigation. No testing has been undertaken to detect the presence of gas in the ground.

No geotechnical laboratory testing has been undertaken as part of this investigation.

All information given in this report is based on the ground conditions encountered during the site work, and on the results of laboratory and field tests performed during the investigation. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those measured during the investigation.

This report was prepared by Structural Soils Limited for the sole and exclusive use of the National Grid Transmission Plc in response to particular instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.



2 SITE DESCRIPTION

2.1 Location and Topography

The overall site comprises the Hinkley to Seabank 400kV transmission line route (overhead and underground), and associated electricity substations, that are proposed between Hinkley Point in Somerset and Seabank Power Station in Avonmouth (see Exploratory Hole Location Plan 2-3 in Appendix A). The British National Grid Reference for the site described here of the proposed new electricity substation at Sandford, Somerset is ST 415 605.

The site, currently open farmland, is the proposed location of a substation that will connect the underground cable section of the route (to the south and south west) to the overhead section that will begin at the substation and end at Seabank power station in Avonmouth. It is located approximately 0.8km northeast of the village of Sandford and is accessed from *Drove Way* to the east of the site.

The site is bounded by further farmland on all sides, with *Drove Way* running northwest to southeast adjacent to the eastern site hedge line. Several drains / rhynes are present within the fields, generally orientated northwest to southeast. No services were identified on the site during the investigation.

Three boreholes were located across the proposed substation location at the British National Grid coordinates given in the table below, and also in a summary table included in Appendix A.

Table 1: Borehole locations (as built)		
Borehole	Eastings (m)	Northings (m)
SWABH2	341609.6	160349.6
SWABH6A	341653.9	160666.7
SWABH7	341580.5	160551.4

2.2 Geology

The British Geological Survey map (sheet 280, scale 1:50,000) shows the site to be underlain by

The three boreholes within this section of the investigation lie within an area underlain by the Mercia Mudstone Group (*mudstone and halite stone*). Recent Head Deposits (*silt, sand and gravel*) are shown to lie partially over the site location and directly to the west and southwest of the area investigated.



3 FIELDWORK

3.1 Scope of Works

3 no. cable percussion boreholes, all of which were extended by rotary coring, (SWABH2, SWABH6A and SWABH7) were completed between 7 and 28 June 2013 at locations shown on the Exploratory Hole Location Plan in Appendix A. The scope of investigation and choice of investigation equipment was decided by the Electricity Alliance West (the Engineer) in consultation with Jacobs Engineering Group Inc (the Client's consulting engineer). Sampling and in-situ testing details were specified by the Engineer.

The exploratory holes were logged by an engineer in general accordance with the recommendations of BS5930: 1999 (2010 Amendment 2, which incorporates the requirements of BS EN ISO 14688-1, 14688-2 and 14689-1) and C570 *Engineering in Mercia Mudstone*. Detailed descriptions, together with relevant comments, are given in the logs included in Appendix B.

Prior to the commencement of any exploratory hole or intrusive test a cable avoidance scan was carried out using a cable avoidance tool (CAT) and signal generator ('genny'), and inspection pits were hand dug at the borehole locations prior to commencement of drilling.

3.2 Boreholes

The boreholes were commenced using a cable tool percussion drilling rig and were 150mm diameter. Upon refusal (i.e. the cable percussion rig could not progress the boreholes further) the boreholes were extended using a rotary drilling rig to a maximum depth of 21.70m. 100mm diameter undisturbed samples were recovered from the cohesive strata in the cable percussive section of the boreholes, and small disturbed and bulk soil samples were taken at regular intervals.

Rotary coring was carried out using a double tube PWF core barrel to produce a hole of 121mm (and a core of 92mm diameter). Steel casing was inserted where necessary to offer temporary support to the hole. Air mist was used as a flush medium.

Standard Penetration Tests (SPT) were carried out at regular intervals in the boreholes (see Section 3.5, In-Situ Testing and Surveying).

Photographs of the core samples are contained in Appendix B.



3.3 Chemical Contamination Sampling

Samples for contamination testing were taken from the boreholes and placed in appropriate contamination sample containers that were supplied by the laboratory. Containers for volatiles testing of soil samples were filled to capacity. All samples were then kept in cool boxes with ice packs and were transported to the laboratories under Chain of Custody documentation, as promptly as possible to maintain sample integrity.

3.4 Backfill, Monitoring Wells and Installations

On completion 50mm diameter gas/groundwater monitoring wells were installed in the boreholes, the design having been decided by the Client's consulting engineer. The installation details are shown on the exploratory hole logs in Appendix B.

The well details are also summarised below:

TABLE 2: SUMMARY OF MONITORING WELL INSTALLATIONS

Location	Well Diameter (mm)	Well Depth (m bgl)	Well Response Zone (m bgl)	Type of Cover	Notes
SWABH2	50	3.50	1.50-3.50	Flush	
SWABH6A	50	3.50	1.50-3.50	Flush	
SWABH7	50	3.50	1.50-3.50	Flush	

The client or site owner should ensure that the monitoring wells (and their protective covers) are not damaged or covered until such time as information is no longer required from them. Extra costs would be incurred if it were necessary to reinstate damaged wells.

3.5 In-Situ Testing and Surveying

Standard Penetration Tests (SPT) were carried out in the exploratory holes, where noted in the preceding sections, in accordance with BS EN ISO 22476-3 using a hammer or hammers which had been calibrated for efficiency. The calibration certificates are included in Appendix C.

The SPT N-values are reported on the exploratory hole logs, on which the serial number of the hammers used is recorded. The full results are presented in tabular format on the Summary of Standard Penetration Tests in Appendix C, on which the normalised N_{60} values are also reported (equivalent N-value for a hammer delivering 60% of the theoretical drop energy). Plots showing both N and N_{60} values versus elevation are also included.

On completion of the works, a survey of the exploratory hole locations was undertaken using Global Positioning System (GPS) equipment. The coordinates of each exploratory hole were



measured relative to British National Grid, and the level relative to Ordnance Datum. These are shown on the exploratory hole logs contained in Appendix B which have been printed with a reduced level column.

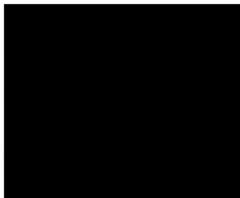
3.6 Monitoring and Post Fieldwork Environmental Sampling

Groundwater levels were recorded in the monitoring wells on four occasions. The results together with the temporal (weather) conditions are tabulated in Appendix D.

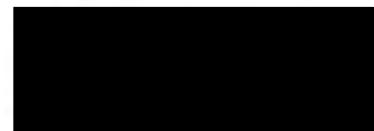
3.7 Laboratory Testing

Samples for potential geotechnical testing were returned to the company's laboratory in Bristol and those for potential contamination testing were sent to an accredited chemical testing laboratory. No geotechnical or contamination testing has been undertaken as part of this investigation.

STRUCTURAL SOILS LIMITED



A Dingle BSc (Hons) FGS



A M Lumber BEng (Hons)



4 REFERENCES

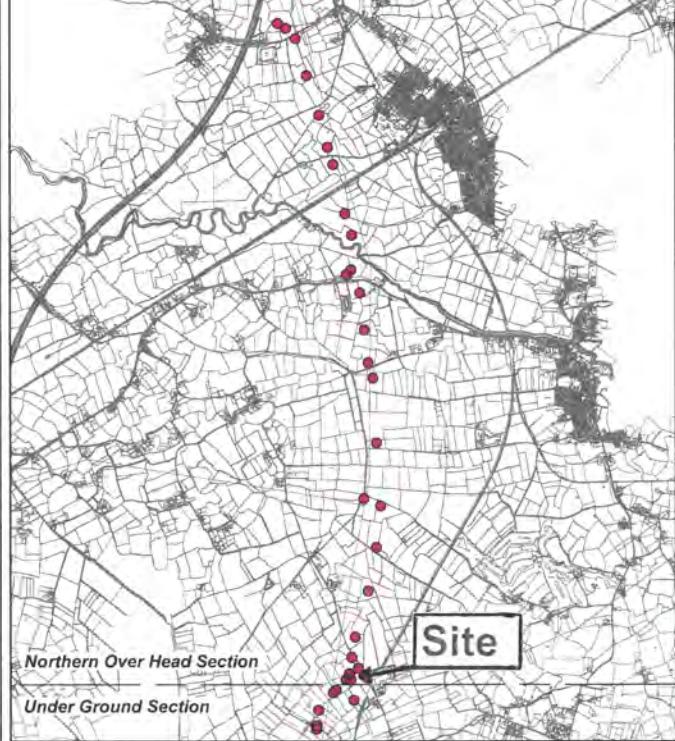
- 4.1** BS 5930:1999 *Code of Practice for Site Investigation*, including amendment A2 (2010)
- 4.2** British Geological Survey sheets 280, scale 1:50,000, published 1984
- 4.3** BS EN ISO 14688-1:2002 *Geotechnical investigation and testing – Identification and classification of soil: Part 1: Identification and description*
- 4.4** BS EN ISO 14688-1:2004 *Geotechnical investigation and testing – Identification and classification of soil: Part 2: Principles for a classification*
- 4.5** BS EN ISO 14689-1:2003 *Geotechnical investigation and testing – Identification and classification of rock: Part 1: Identification and description*
- 4.6** BS EN ISO 22476-3:2005 (updated February 2007) *Geotechnical Investigation and Testing – Field Testing Part 3: Standard Penetration Test*, including Amendment A1 (2011)
- 4.7** CIRIA Report C570 *Engineering in Mercia mudstone* (2001)

APPENDIX A

- (i) Exploratory Hole Location Plan
- (ii) Exploratory Hole Location Coordinates Summary Sheet



See Insert For Continuation of Northern Over Head Section



LEGEND

- Exploratory Positions

 STRUCTURAL SOILS LIMITED The Old School Still House Lane Bedminster Bristol BS3 4EB						0117 947 1000	0117 947 1004	ask@ssls.co.uk	www.ssls.co.uk	EAW							
PROJECT						Hinkley to Seabank 400kV Connection											
TITLE						EXPLORATORY HOLE LOCATION PLAN - (NORTHERN OVER HEAD)											
DRAWN BY: DATE: 18.08.2013																	
REV.	DATE	DESCRIPTION	BY	CHD.	APR.	30ft AD.	100ft E/W	727535	0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000m	0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000m	0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000m	0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000m	2-3				
DRAWN BY:		SCALE:	1:50,000		UPRIGHT:	A3		727535		0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000m		0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000m		2-3			



STRUCTURAL SOILS

SUMMARY TABLE OF GROUND LEVELS AND CO-ORDINATES AT EXPLORATORY HOLE LOCATIONS

Contract:		Client:		Contract Ref:
Hinkley to Seabank 400kV Connection		Electricity Alliance West		727635
Exploratory Position ID	Grid Co-Ordinates		Ground Level (m AOD)	Hole Type Codes
	Eastings (m)	Northings (m)		
SWA-BH2A	341609.6	160349.6	9.66	CP+RC
SWA-BH6A	341653.9	160666.7	6.31	CP+RC
SWA-BH7	341580.5	160551.4	7.50	CP+RC+CP+RC

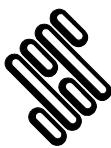
Notes:

Hole type codes: **CP** = Cable Percussion, **RC** = Rotary Cored



APPENDIX B

- (i) Key to Exploratory Hole Logs
- (ii) Borehole Logs
- (iii) Borehole Photographs

**KEY TO EXPLORATORY HOLE LOGS - SUMMARY OF ABBREVIATIONS****SAMPLING***Sample type codes*

B	=	Bulk disturbed sample.
C	=	Core sample.
CS	=	Core sample taken from rotary core for lab testing.
D	=	Small disturbed sample.
DSPT	=	Small disturbed sample originating from SPT test.
ES	=	Soil sample for environmental testing.
ExU	=	Extruded undisturbed sample remnants.
U	=	Undisturbed driven tube sample - Number of blows indicated. % recovery reported.
W	=	Water sample.

Undisturbed sample detail codes

U ₍₁₀₀₎	=	100mm diameter undisturbed sample.
--------------------	---	------------------------------------

IN-SITU TESTING

SPT _(c)	=	Standard Penetration Test using a solid 60 degree cone.
SPT	=	Standard Penetration Test using split spoon sampler. (SPT _(NR) indicates 'No Sample Recovery').
	=	* denotes extrapolated N value. NP denotes 'No Penetration'.
HP	=	Hand Penetrometer Test. Value given as shear strength c _u , in kPa.

ROTARY DRILLING INFORMATION

W	=	Water flush returns (%)
TCR	=	Total core recovery (%)
SCR	=	Solid core recovery (%)
RQD	=	Rock quality designations (%)
If	=	Fracture spacing (mm).

In the fracture column (i) denotes discontinuity is infilled (refer to Fracture Table for details).
 Where variable the minimum - average - maximum spacing may be quoted.
 'NI' denotes non-intact core. 'NA' denotes not applicable.

All lengths used to determine rock core mechanical properties taken along the centre line of the core.
 Obvious induced fractures have been ignored.

The assessment of solid core is based on lengths that show a full diameter and not necessarily a full circumference.

AZCL = Assumed zone of core loss.

ADDITIONAL NOTES

1. All soil and rock descriptions and legends in general accordance with BS EN ISO 14688-1, 14688-2, 14689-1, and BS5930:1999 including Amendment 2 (2010).
2. Material types divided by a broken line (---) indicates an unclear boundary.
3. The data on any sheet within the report showing the AGS icon is available in the AGS format.

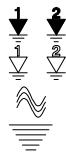


STRUCTURAL SOILS

Contract Reference: 727635

KEY TO EXPLORATORY HOLE LOGS - SUMMARY OF GRAPHIC SYMBOLS

WATER COLUMN SYMBOLS



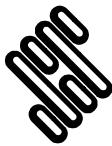
First water strike, second water strike etc.
 Standing water level following first strike, standing water level following second strike etc.
 Seepage.
 Standing water level recorded at documented date.

MATERIAL GRAPHIC LEGENDS

	CLAY		Clayey GRAVEL		Clayey GRAVEL with COBBLES		Clayey gravelly SAND
	Gravelly clayey SAND		Clayey gravelly SAND with COBBLES		Conglomerate		Clayey SAND
	Clayey SAND with COBBLES		Clayey sandy GRAVEL		GRAVEL		Gravelly CLAY
	Gravelly silty CLAY		Silty gravelly CLAY		Limestone		MADE GROUND
	Mudstone		PEAT		PEAT with COBBLES		Possible MADE GROUND

INSTRUMENTATION SYMBOLS

	Backfill		Bentonite cement grout		Bentonite seal		Concrete
	Gravel filter		Stopcock cover				
	Plain pipe		Slotted pipe				

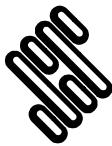


STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection						Client: Electricity Alliance West						Borehole: SWA-BH2A		
Contract Ref: 727635			Start: 20.6.13	Ground Level (m AOD): 9.66			National Grid Co-ordinate: E:341609.6 N:160349.6			Sheet: 1 of 6				
Samples & Testing														
Depth (m)	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata				Reduced Level
0.10-0.70	1	B								Light greyish brown gravelly SAND (TOPSOIL) with occasional plant rootlets. Gravel is fine to coarse, subangular to subrounded of sandstone and limestone.				(0.70)
0.70-1.20	2	B								Orangish greyish brown mottled black, slightly sandy slightly gravelly, CLAY with occasional fragments of coal. Gravel is fine to coarse, subangular to angular of sandstone and mudstone.				(0.50)
1.20-1.65	3	SPT								(SUPERFICIAL DEPOSITS)				8.46
1.20-1.60	4	B	N=11							Firm reddish brown mottled grey, slightly gravelly silty CLAY with pockets of greenish grey silt. Gravel is fine to coarse, subangular of mudstone and sandstone. (MERCIA MUDSTONE GROUP Zone IVa)				1.20
2.00-2.45	5	SPT												(1.90)
2.00-3.00	6	B												
2.00		HP												
3.00-3.45	7	U												6.56
3.00-4.00	9	B	50 blows 80% recovery											3.10
3.45-3.65	8	D								Stiff to very stiff to dark reddish brown mottled grey slightly sandy CLAY with rare pockets of greenish grey silty clay. (MERCIA MUDSTONE GROUP Zone IVa)				
4.00-4.45	10	SPT								... becoming stiff at 4.00m depth.				
4.00-4.50	11	B	N=37											
5.00-5.45	12	U	50 blows 20% recovery											(3.40)

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks			
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)				
20/06/13	16:45	8.00	4.50	150	Dry	9.70	10.40	01:00				
21/06/13	08:15	8.00	4.50	150	6.00	10.80	11.80	01:00				
21/06/13	16:45	12.50	9.00	150	Dry	12.50	14.00	01:45				
24/06/13	08:00	12.50	9.00	150	1.80							
24/06/13	16:40	14.00	9.00	150	Dry							
27/06/13	09:00	13.40	0.00	150	1.40							
28/06/13	07:00	16.50	16.50	150	16.00							
01/07/13	07:30	21.70	21.70	150	5.40							
Method Used:	Inspection pit + Cable Percussion + Rotary Cored		Plant Used:	Dando 2000 + Comacchio GEO 205			Drilled By:	HA + JP	Logged By:	BSaimen + JShallcross + CReader	Scale:	Check By:

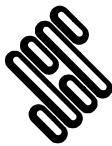


STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection						Client: Electricity Alliance West						Borehole: SWA-BH2A				
Contract Ref: 727635			Start: 20.6.13	Ground Level (m AOD): 9.66			National Grid Co-ordinate: E:341609.6 N:160349.6			Sheet: 2 of 6						
Depth (m)	Samples & Testing			Mechanical Log				Water	Description of Strata			Reduced Level	Depth (Thickness)	Material Graphic Legend		
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)		Backfill & Instrumentation							
5.45	13	D														
5.50-6.50	14	B								Stiff to very stiff to dark reddish brown mottled grey slightly sandy CLAY with rare pockets of greenish grey silty clay. (MERCIA MUDSTONE GROUP Zone IVa) becoming stiff at 4.00m depth. (stratum text copied from layer at 3.10m depth from previous sheet)			3.16	6.50		
6.50-6.89	15	SPT		N=64*												
6.50-7.00	16	B								Very stiff dark reddish brown slightly sandy CLAY with occasional lithorelicts of extremely weak mudstone. (MERCIA MUDSTONE GROUP Zone IVa)						
8.00-8.35	17	SPT		N=77*										(3.20)		
8.00-8.50	18	B														
9.50-9.91	19	SPT(c)		N=60*												
9.50-10.00	20	B								Very stiff to hard reddish brown gravelly CLAY. Gravel is subangular fine to medium of mudstone lithorelicts. (MERCIA MUDSTONE GROUP Zone IVa)			-0.04	9.70		
10.00-11.00	21	B							 1 hour of chiseling between 9.70m and 10.40m as per drillers logs.				(2.10)		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks			
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)				
									installed as shown on completion. 5. SPT hammers EQU084-2012 ($E_r = 67.22\%$), EQU089-2012 ($E_r = 61.46\%$) used.			
									All dimensions in metres			
Method Used:	Inspection pit + Cable Percussion + Rotary Core			Plant Used:	Dando 2000 + Comacchio GEO 205			Drilled By:	HA + JP	Logged By:	BSaimen + JShallcross + CReader	Scale: Check By:

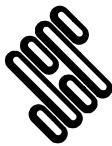


STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection						Client: Electricity Alliance West						Borehole: SWA-BH2A			
Contract Ref: 727635			Start: 20.6.13	Ground Level (m AOD): 9.66			National Grid Co-ordinate: E:341609.6 N:160349.6			Sheet: 3 of 6					
Depth (m)	Samples & Testing			Mechanical Log				Water	Description of Strata			Reduced Level	Depth (Thickness)	Material Graphic Legend	
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)		Backfill & Instrumentation						
11.00-11.12	22	SPT B	N=333*							Very stiff to hard reddish brown gravelly CLAY. Gravel is subangular fine to medium of mudstone lithorelicts. (MERCIA MUDSTONE GROUP Zone IVa)					
11.00-11.50	23									(stratum text copied from layer at 9.70m depth from previous sheet) . . . between 11.00m and 11.45m greenish grey very weak siltstone as per SPT sample at 11.00m.		-2.14	11.80		
11.50-12.50	24	B								Very stiff dark reddish brown slightly sandy CLAY with occasional lithorelicts of very weak of mudstone. (MERCIA MUDSTONE GROUP)			(0.70)		
12.50-12.90	25	SPT B	N=61*							Hard to extremely weak reddish brown MUDSTONE recovered as reddish brown, gravelly clay. (MERCIA MUDSTONE GROUP)			-2.84	12.50	
12.50-13.00	26									. . . between 12.50m and 12.95m very weak thinly laminated reddish brown mudstone with greenish grey laminations of siltstone.					
13.00-14.00	27	B												(1.80)	
14.00-14.30	28	SPT	N=100*												
14.30-15.30		HP	c _u =150/155							Stiff reddish brown silty CLAY with frequent lithorelicts of extremely weak red mudstone up to 15mm with occasional pockets of greenish grey completely weathered siltstone (silty clay). (MERCIA MUDSTONE GROUP Zone III)					
14.30										. . . between 14.89m and 15.00m depth pockets of completely weathered greenish grey siltstone.					
15.30-16.30		SPT(c)	N=86							. . . between 15.30m and 15.40m depth reddish brown clay with occasional lithorelicts of extremely weak red mudstone (MMGIVa) (possible differential weathering).					
15.30-15.75	30									Extremely weak extremely closely jointed reddish brown silty MUDSTONE with occasional irregular pockets of completely weathered greenish grey clay crumbles/breaks up into angular blocks of fine to coarse mudstone. Bedding and bedding fractures are subhorizontal.					
16.30-16.75	31	SPT(c)	N=79												

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)			

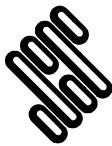


STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection					Client: Electricity Alliance West					Borehole: SWA-BH2A			
Contract Ref: 727635		Start: 20.6.13		Ground Level (m AOD): 9.66		National Grid Co-ordinate: E:341609.6 N:160349.6			Sheet: 4 of 6				
Depth (m)	Samples & Testing			Mechanical Log			Water	Description of Strata			Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)		If (mm)	Backfill & Instrumentation				
16.50-17.50													
16.50		HP	c _u =150/175										
17.50-18.50													
17.50-17.91	29	SPT(c)	N=118*									-7.84	17.50
18.50-19.50													
18.50-18.90	32	SPT(c)	N=122*										
19.50-20.50													
19.50-19.90	33	SPT(c)	N=120*										
20.50-21.50													
21.15		HP	c _u =62/62										
21.50-22.50													

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)			
Method Used:	Inspection pit + Cable Percussion + Rotary Core	Plant Used:	Dando 2000 + Comacchio GEO 205	Drilled By:	HA + JP	Logged By:	BSaimen + JShallcross + CReader	Scale:	All dimensions in metres	Check By:	IGS



STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection						Client: Electricity Alliance West				Borehole: SWA-BH2A			
Contract Ref: 727635			Start: 20.6.13	Ground Level (m AOD): 9.66			National Grid Co-ordinate: E:341609.6 N:160349.6			Sheet: 5 of 6			
Depth (m)	Samples & Testing			Mechanical Log			Water	Description of Strata				Reduced Level	
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation			Depth (Thickness)	Material Graphic Legend	
22.50-22.95	34	SPT(c)	N=61	0					No recovery (ZLC) (possible intensely fractured zone). (stratum text copied from layer at 21.50m depth from previous sheet)		-12.84	22.50	ZCL
									Borehole terminated at 22.50m depth.				

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)			
									All dimensions in metres	Scale:	
Method Used:	Inspection pit + Cable Percussion + Rotary Cored		Plant Used:	Dando 2000 + Comacchio GEO 205		Drilled By:	HA + JP		Logged By:	BSaimen + JShallcross + CReader	Check By:





STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection		Client: Electricity Alliance West		Borehole: SWA-BH2A
Contract Ref: 727635	Start: 20.6.13	Ground Level (m AOD): 9.66	National Grid Co-ordinate: E:341609.6 N:160349.6	Sheet: 6 of 6

SWA-BH2A 14.30m to 16.30m



SWA-BH2A 16.50m to 21.50m

Method Used:	Inspection pit + Cable Percussion + Rotary Cored	Plant Used:	Dando 2000 + Comacchio GEO 205	Drilled By:	HA + JP	Logged By:	BSaimen + JShallcross + CReader	Check By:	
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STRUCTURAL SOILS

BOREHOLE LOG

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)			
11/06/13	08:15	3.00	1.50	150	Dry	4.00	4.50	00:30	1. Borehole location CAT scanned and pit hand dug to 1.20m depth prior to drilling. 2. Contam samples (T + J + 2xV at 1.00m and 3.00m depth). 3. Cable percussion borehole terminated in mudstone at 9.00m - rotary follow-on undertaken to completion depth.		
12/06/13	08:30	3.00	1.50	150	1.00	6.50	7.30	00:45			
12/06/13	16:45	4.50	1.50	150	Dry	8.00	9.00	01:30			
19/06/13	08:30	9.00	7.50	150	6.80						
19/06/13	08:45	9.00	7.50	150	1.10						
21/06/13	09:45	12.60	9.30	150	11.50						
24/06/13	11:00	18.50	9.00	150	1.40						
Method Used:	Cable Percussion + Rotary Cored		Plant Used:	Dando 2000 + Comacchio GEO 205		Drilled By:	HA + JP	Logged By:	BSaimen + WDixon	Check By:	IGS

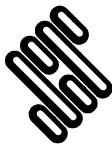


STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection						Client: Electricity Alliance West						Borehole: SWA-BH6A			
Contract Ref: 727635			Start: 11.6.13	Ground Level (m AOD): 6.31			National Grid Co-ordinate: E:341653.9 N:160666.7			Sheet: 2 of 8					
Depth (m)	Samples & Testing			Mechanical Log				Water	Description of Strata			Reduced Level	Depth (Thickness)	Material Graphic Legend	
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)								
4.00-4.45	11	SPT	N=50						Stiff becoming very stiff reddish brown mottled grey gravelly CLAY. Gravel is subangular to subrounded fine to medium mudstone. (MERCIA MUDSTONE GROUP Zone III) (stratum text copied from layer at 3.00m depth from previous sheet)						
4.00-4.50	12	B													
4.00-5.00	14	B													
4.50-4.95	13	SPT	N=50												
5.00-5.35	15	SPT													
5.00-5.50	16	B	N=77*						Extremely weak MUDSTONE recovered as very dense reddish brown clayey GRAVEL of angular to subangular fine to medium mudstone. (MERCIA MUDSTONE GROUP Zone II)			1.31	5.00		
6.50-6.80	17	SPT													
6.50-7.00	18	B	N=100*												
7.00-8.00	19	B											(4.30)		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks			
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)				
Method Used:	Cable Percussion + Rotary Cored		Plant Used:	Dando 2000 + Comacchio GEO 205		Drilled By:	HA + JP	Duration (hh:mm)				
Logged By:	BSaimen + WDixon			Check By:					All dimensions in metres			

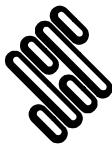


STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection						Client: Electricity Alliance West				Borehole: SWA-BH6A				
Contract Ref: 727635			Start: 11.6.13	Ground Level (m AOD): 6.31			National Grid Co-ordinate: E:341653.9 N:160666.7			Sheet: 3 of 8				
Depth (m)	Samples & Testing			Mechanical Log				Water	Description of Strata			Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)		Backfill & Instrumentation					
8.00-8.12	20	SPT B	N=375*							Extremely weak MUDSTONE recovered as very dense reddish brown clayey GRAVEL of angular to subangular fine to medium mudstone. (MERCIA MUDSTONE GROUP Zone II) (stratum text copied from layer at 5.00m depth from previous sheet)				
8.00-9.00	21													
9.00-9.14	22	SPT	N=250*							... possible loss of recovery between 9.90m and 10.20m depth and recovered as fine to coarse angular blocks of weak mudstone (possibly becoming MMGII).	-2.99	9.30		
9.30-9.60				67	33	33						-3.19	9.50	
9.60-11.10				73	37	37				Recovered as fine to coarse angular GRAVEL of reddish brown weak silty mudstone. (MERCIA MUDSTONE GROUP)			(1.20)	
				73	37	37				Very weak/weak very thinly to thinly bedded reddish brown silty MUDSTONE with greenish grey pockets/patches of siltstone up to 30mm. Fractures (both bedding fractures and joints) 10° to 55° are very closely to closely spaced undulating rough/planar rough with brown discolouration/fine to medium extremely weak gravel of mudstone. (MERCIA MUDSTONE GROUP Zone I) ... at 10.30m depth joint is 25° planar rough clear.				
				80	130					... at 10.42m and 10.45m depth joint is 55° undulating rough open with red clay. ... bedding fractures at 10.50m and 10.56m depth are 5° to 10° undulating rough open infilled with fine to medium mudstone gravel.				
11.00-11.30	23	SPT(c)	N=103*	87	26	16				... between 10.60m and 10.70m depth mudstone is between MMGI and MMGII.	-4.39	10.70		
11.10-12.60				NI	110	150				Very weak to weak reddish brown extremely closely jointed/fissured silty MUDSTONE breaks up into fine to coarse angular blocks of weak mudstone when handled. Fractures/joints are extremely closely spaced and planar open. (MERCIA MUDSTONE GROUP) ... between 10.70 and 10.77m depth joint is 65° planar rough with smears of red clay with non intact lower wall rock.			(2.20)	
										Description on next sheet				

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks			
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)				
									All dimensions in metres	Scale:		
Method Used:	Cable Percussion + Rotary Cored		Plant Used:	Dando 2000 + Comacchio GEO 205			Drilled By:	HA + JP	Logged By:	BSaimen + WDixon	Check By:	IGS

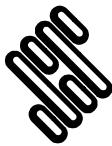


STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection						Client: Electricity Alliance West						Borehole: SWA-BH6A				
Contract Ref: 727635			Start: 11.6.13	Ground Level (m AOD): 6.31			National Grid Co-ordinate: E:341653.9 N:160666.7			Sheet: 4 of 8						
Depth (m)	Samples & Testing			Mechanical Log				Water	Description of Strata			Reduced Level	Depth (Thickness)	Material Graphic Legend		
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)		Backfill & Instrumentation							
12.60-14.10 12.60-12.72	24	SPT(c)	N=273*		87	26	16		NI 110 150	... between 10.75m and 10.90m depth non intact recovered as fine to coarse angular blocks of weak silty mudstone with black discolouration at fracture/joint surface.			-6.59	12.90 (0.70)		
					73	33	25		NI 180 200	... between 10.90m and 11.30m depth MMGII graded mudstone breaks up into fine to coarse angular blocks of mudstone. ... between 11.28m and 12.60m depth mudstone becomes very weak and MMGII. ... between 11.60m and 11.97m depth occasional pockets of greenish grey siltstone.						
14.10-15.60 14.10-14.21	25	SPT(c)	N=231*		100	10	0			Very weak to weak reddish brown extremely closely jointed/fissured silty MUDSTONE breaks up into fine to coarse angular blocks of weak mudstone when handled. Fractures/joints are extremely closely spaced and planar open. (MERCIA MUDSTONE GROUP)			-7.29	13.60 (1.05)		
					90	50	17		NI 60 140	... between 10.70 and 10.77m depth joint is 65° planar rough with smears of red clay with non intact lower wall rock. (stratum text copied from layer at 10.70m depth from previous sheet) ... between 12.00m depth and 12.15m depth mudstone grades back to MMGII. ... between 12.15m and 12.30m depth possible differential weathering. ... between 12.22m and 12.28m depth mudstone becomes MMGI (possible differential weathering). ... possible loss of recovery between 12.60m and 12.90m depth.						
15.60-17.10 15.60-15.70	26	SPT(c)	N=259*							Very weak thinly bedded reddish brown silty MUDSTONE with occasional randomly orientated vein of gypsum (up to 3mm) and pockets of greenish grey siltstone. Bedding fracture approximately 15° very closely spaced undulating rough infilled with fine to coarse disintegrated gravel of mudstone. (MERCIA MUDSTONE GROUP Zone I)			-8.34	14.65 (2.45)		
										... between 13.20m and 13.30m depth vein (3mm) of gypsum dipping at 65°. ... 3mm vein of gypsum dipping at 65° between 13.50m and 13.60m depth.						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)			
Method Used:		Cable Percussion + Rotary Cored		Plant Used:	Dando 2000 + Comacchio GEO 205		Drilled By:	HA + JP	Logged By:	BSaimen + WDixon	Check By:
All dimensions in metres											IGS

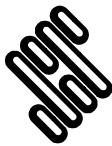


STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection						Client: Electricity Alliance West						Borehole: SWA-BH6A				
Contract Ref: 727635			Start: 11.6.13	Ground Level (m AOD): 6.31			National Grid Co-ordinate: E:341653.9 N:160666.7			Sheet: 5 of 8						
Depth (m)	Samples & Testing			Mechanical Log				Backfill & Instrumentation	Water	Description of Strata			Reduced Level	Depth (Thickness)	Material Graphic Legend	
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)									
17.10-18.60	27	SPT(c)	N=246*					NI		very weak. ... between 14.10m and 14.60m depth recovered non intact (possible MMGII and MMGII) due to possible drilling action.						
17.10-17.19				90	50	17		60		... between 14.80m and 15.20m depth joint is 70° planar rough with black discolouration staining on it.						
								140		... between 14.90m and 15.00m depth joint is planar with smears of red clay.						
										Extremely weak to very weak reddish brown mottled greenish grey extremely closely fissured MUDSTONE crumbles/breaks up into fine to coarse angular blocks of extremely weak/very weak mudstone. Bedding is 5° to 28°. (MERCIA MUDSTONE GROUP Zone II)						
18.60-20.10	28	SPT(c)	N=273*					100	30	17	... between 14.65m and 14.80m mudstone is very weak and recovered as fine to coarse angular gravel of mudstone. (stratum text copied from layer at 14.65m depth from previous sheet)					
18.60-18.69										... between 16.00m and 16.12m depth recovered as fine to coarse angular blocks of weak/very weak mudstone (possibly grades back to MMGII).						
										... between 16.14m and 16.45m depth bedding fractures are extremely closely spaced/undulating rough with black discolouration on it.						
										... between 16.45m and 16.60m depth becomes MMGII and non intact in places.						
										... occasional greenish grey pockets of siltstone between 16.50m and 16.90m depth.						
										Weak becoming very weak reddish brown silty MUDSTONE recovered/crumbles into fine to coarse angular blocks of weak/very weak mudstone. (MERCIA MUDSTONE GROUP Zone II)						
										... between 17.45m and 18.60m depth vein of white gypsum up to 4mm dips at 55°.						
										... between 17.90m and 18.00m depth MMGII grades back to very stiff reddish brown clay with occasional weak lithorelicts (MMGIVa).						
										Very weak very thinly to thinly bedded reddish brown MUDSTONE with occasional greenish grey mottling and veins (up to 3mm) of gypsum. Bedding fracture 5° very closely to closely spaced undulating rough infilled with reddish brown clay up to 3mm. (MERCIA MUDSTONE GROUP)						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks				
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)					
										All dimensions in metres		Scale:	
Method Used:	Cable Percussion + Rotary Cored		Plant Used:	Dando 2000 + Comacchio GEO 205			Drilled By:	HA + JP	Logged By:	BSaimen + WDixon	Check By:		IGS



STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection						Client: Electricity Alliance West						Borehole: SWA-BH6A			
Contract Ref: 727635			Start: 11.6.13	Ground Level (m AOD): 6.31			National Grid Co-ordinate: E:341653.9 N:160666.7			Sheet: 6 of 8					
Depth (m)	Samples & Testing			Mechanical Log				Water	Description of Strata				Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation							
20.10-20.55	29	SPT	N=100	90	17	7	↓								
<p>... bedding fractures at 18.40m, 18.47m and 18.52m depth are very closely to closely spaced.</p> <p>Extremely weak to very weak reddish brown silty MUDSTONE recovered/crumbles into fine to coarse blocks of very weak to weak red mudstone. (MERCIA MUDSTONE GROUP Zone II)</p> <p>... between 18.85m and 19.10m depth mudstone is extremely weak to very weak and crumbles into fine to coarse angular blocks of mudstone.</p> <p>... between 19.10 and 19.45m depth recovered as fine to coarse angular/blocks of very weak/extremely weak red mudstone.</p> <p>... between 19.45m and 19.60m depth mudstone is weak and becomes MMGI and contains greenish grey pockets of siltstone (non intact).</p> <p>... below 19.60m depth MMGI grades back to MMGII.</p> <p>Weak to very weak thinly bedded reddish brown mottled greenish grey silty MUDSTONE with bands of greenish grey siltstone. Bedding fracture 5° closely spaced undulating rough infilled with red brown clay/fine to medium gravel of red mudstone. (MERCIA MUDSTONE GROUP Zone I)</p> <p>... between 19.75m and 19.82m depth joint is 85° planar rough/planar open clean with brown discoloration.</p> <p>... mudstone between 19.75m and 20.10m depth contains reopened fractures. (stratum text copied from layer at 19.75m depth from previous sheet)</p> <p>Borehole terminated at 20.10m depth.</p>															

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)			



STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection		Client: Electricity Alliance West		Borehole: SWA-BH6A
Contract Ref: 727635	Start: 11.6.13	Ground Level (m AOD): 6.31	National Grid Co-ordinate: E:341653.9 N:160666.7	Sheet: 7 of 8

SWA-BH6A 9.30m to 11.10m



SWA-BH6A 11.10m to 14.10m

Method Used: Cable Percussion + Rotary Cored	Plant Used: Dando 2000 + Comacchio GEO 205	Drilled By: HA + JP	Logged By: BSaimen + WDixon	Check By: [Redacted]
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STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection		Client: Electricity Alliance West		Borehole: SWA-BH6A
Contract Ref: 727635	Start: 11.6.13	Ground Level (m AOD): 6.31	National Grid Co-ordinate: E:341653.9 N:160666.7	Sheet: 8 of 8

SWA-BH6A 14.10m to 17.10m



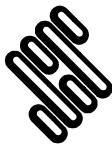
SWA-BH6A 17.10m to 20.10m



STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection				Client: Electricity Alliance West				Borehole: SWA-BH7				
Contract Ref: 727635		Start: 7.6.13 End: 18.6.13		Ground Level (m AOD): 7.50		National Grid Co-ordinate: E:341580.5 N:160551.4		Sheet: 1 of 6				
Depth (m)	Samples & Testing			Mechanical Log				Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)					
0.00-0.80	1	B							Grass overlaying soft brown sandy CLAY (TOPSOIL).			
1.00	3	B								6.70	0.80	
1.00-1.20	4	D										
1.20-1.65	5	SPT	N=16									
1.20-1.70	6	B								6.30	1.20	
1.70-2.00	7	D										
2.00-3.00	10	D										
2.00-2.45	8	U	70 blows 60% recovery									
2.45-2.65	9	D										
3.00	11	B										
3.00	2	ES										
3.00-3.45	12	SPT	N=20									
3.00-3.50	13	B										
3.50-4.00	14	D										
4.00-4.45	15	U										
4.00-5.00	17	D	40 blows 70% recovery									
4.45-4.65	16	D										
5.00-5.45	18	SPT										
5.00-5.50	19	D	N=39									
									Description on next sheet			

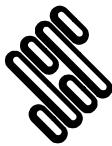


STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection					Client: Electricity Alliance West				Borehole: SWA-BH7				
Contract Ref: 727635		Start: 7.6.13	Ground Level (m AOD): 7.50		National Grid Co-ordinate: E:341580.5 N:160551.4		Sheet: 2 of 6						
Depth (m)	Samples & Testing			Mechanical Log			Water	Description of Strata		Reduced Level	Depth (Thickness)	Material Graphic Legend	
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)						
5.50-6.50	20	D						Very stiff brownish red mottled light grey slightly gravelly CLAY. Gravel is fine to occasionally medium surrounded claystone lithorelicts (MERCIA MUDSTONE GROUP Zone IVa) <i>(stratum text copied from layer at 5.00m depth from previous sheet)</i>		(2.00)	0.50	7.00	
6.50-6.95	21	SPT B	N=35										
6.50-7.00	22												
7.00-8.00	23	SPT HP	N=57* $c_u=150/145/150$										
7.00-7.42				20	0	0							
7.00													
8.00-9.20	1a			100	0	0							
8.00-8.45		SPT HP	N=8 $c_u=40/40/20$										
8.20				100	0	0							
9.20-10.20	1			55	0	0							
9.20-9.65		SPT	N=52										
10.20-11.30				82	0	0							
10.60													

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)			
14/06/13	15:30	13.70	13.40	150	3.30				4. Cable percussion drilling undertaken from ground level to 17.90m and rotary casing re-inserted to base of borehole. 5. Rotary cored from 17.9m to 20m depth. 6. 50mm diameter gas/groundwater standpipe installed as shown on completion. 7. SPT hammers EQU084-2012 ($E_r = 67.22\%$),		
17/06/13	12:05	13.70	13.70	150	1.95						
									All dimensions in metres		
Method Used:	Inspection pit + Cable Percussion +		Plant Used:	Dando 2000 + Comacchio GEO 205		Drilled By:	HA + JP + AL		Logged By:	BSaimen + WDixon	Check By:
Rotary Cored											



STRUCTURAL SOILS

BOREHOLE LOG

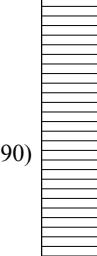
Contract: Hinkley to Seabank 400kV Connection						Client: Electricity Alliance West						Borehole: SWA-BH7			
Contract Ref: 727635			Start: 7.6.13	Ground Level (m AOD): 7.50			National Grid Co-ordinate: E:341580.5 N:160551.4			Sheet: 3 of 6					
Depth (m)	Samples & Testing			Mechanical Log				Backfill & Instrumentation	Water	Description of Strata			Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)								
11.30-12.20	2	SPT	N=47	82	0	0				weak angular gravel of red mudstone (possible MMGII).			-3.80	11.30	
11.30-11.75				72	0	0				Very stiff reddish brown mottled greenish grey silty CLAY with occasional fine to coarse angular lithorelicts of weak mudstone. (MERCIA MUDSTONE GROUP Zone IVa)					
12.20-13.20	3	SPT	N=45	70	0	0				Recovered as fine to coarse subangular to subrounded GRAVEL of weak reddish brown silty mudstone. (MERCIA MUDSTONE GROUP)			(1.90)		
12.20-12.65				70	0	0				. . . between 10.80m and 11.00m depth possibly roundness developed by the continuous percolation of water through possible fractures/weathered zone.					
13.05	4	HP	c _u =65/65							Recovered as soft reddish brown generally silty CLAY. Gravel is fine to coarse angular lithorelicts of very weak mudstone. (MERCIA MUDSTONE GROUP Zone III)			-5.70	13.20	
13.20-14.20										Weak reddish brown mottled green silty MUDSTONE with occasional greenish grey mottling bands of greenish grey siltstone crumbles or breaks up into fine to coarse angular blocks weak mudstone up to 50mm. Bedding is 20°. (MERCIA MUDSTONE GROUP Zone II)					
13.20-13.65	4	SPT	N=51							. . . between 12.20m and 12.50m depth recovered as fine to coarse angular blocks of weak mudstone.			(0.50)	ZCL	
13.70-14.15										. . . between 13.05m and 13.15m depth bed of firm reddish brown and greenish grey silty clay (MMGIVa) with some weathered lithorelicts of mudstone.					
13.70-14.20	2	SPT B	N=16	0	0	0				No recovery from rotary core run 13.20m to 14.20m (possible intensely fractured zone).			-6.20	13.70	
13.70-14.20	3									Medium dense reddish brown slightly clayey fine to coarse gravel of MUDSTONE (Cable percussion drilling from 13.70m depth).					
15.20-15.55	4	SPT B	N=76*							(MERCIA MUDSTONE GROUP)			(2.30)		
15.20-15.50										Dense reddish brown clayey GRAVEL of angular to subangular fine to medium MUDSTONE.					
										(MERCIA MUDSTONE GROUP)					

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	EQU089-2012 ($E_r = 61.46\%$), EQU251-2013 ($E_r = 70.02\%$) used.		
Method Used:	Inspection pit + Cable Percussion + Rotary Core			Plant Used:	Dando 2000 + Comacchio GEO 205		Drilled By:	HA + JP + AL	All dimensions in metres	Scale:	
									Logged By:	BSaimen + WDixon	Check By:



STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection				Client: Electricity Alliance West				Borehole: SWA-BH7						
Contract Ref: 727635		Start: 7.6.13	Ground Level (m AOD): 7.50	National Grid Co-ordinate: E:341580.5 N:160551.4		Sheet: 4 of 6								
Depth (m)	Samples & Testing			Mechanical Log				Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend	
	No	Type	Results	TCR (%)	SCR (%)	RQD (%)	If (mm)							
16.70-17.05	6	SPT B	N=68*							Very dense reddish brown slightly clayey sandy GRAVEL of angular to subangular fine to medium MUDSTONE (MERCIA MUDSTONE GROUP)		(0.50)		
16.70-17.00	7									Extremely weak reddish brown and light grey MUDSTONE. (MERCIA MUDSTONE GROUP)	-9.50	17.00		
17.00-17.50	8	B										(0.90)		
17.50-17.78	9	SPT	N=118*									-10.40	17.90	
17.90-18.50				83	0	0				Weak reddish brown mottled green extremely closely fissured/jointed silty MUDSTONE recovered as fine to coarse angular blocks of red mudstone up to 50mm (possible intensely fractured zone). (MERCIA MUDSTONE GROUP Zone II)				
18.50-20.00				53	13	13				... mudstone between 18.90m and 19.80m depth weak crumbles into fine to coarse angular blocks. ... possible loss of recovery of 55% between 18.50m and 20.00m depth (possible loss within weathered MMGI between 18.50m and 19.80m depth).			(1.90)	
												-12.30	19.80	
										Extremely weak reddish brown MUDSTONE. (MERCIA MUDSTONE GROUP Zone I)	-12.50	20.00		
										... joint between 19.80m and 20.00m depth subvertical undulating rough open with smears of clay. ... bedding fracture at 19.90m depth is undulating rough open.				
										Borehole terminated at 20.00m depth.				



STRUCTURAL SOILS

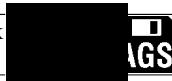
BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection		Client: Electricity Alliance West		Borehole: SWA-BH7
Contract Ref: 727635	Start: 7.6.13	Ground Level (m AOD): 7.50	National Grid Co-ordinate: E:341580.5 N:160551.4	Sheet: 5 of 6

SWA-BH7 7.00m to 11.30m



SWA-BH7 11.30m to 13.20m

Method Used:	Inspection pit + Cable Percussion + Rotary Cored	Plant Used:	Dando 2000 + Comacchio GEO 205	Drilled By:	HA + JP + AL	Logged By:	BSaimen + WDixon	Check By:	
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STRUCTURAL SOILS

BOREHOLE LOG

Contract: Hinkley to Seabank 400kV Connection	Client: Electricity Alliance West	Borehole: SWA-BH7
Contract Ref: 727635	Start: 7.6.13 Ground Level (m AOD): 7.50 End: 18.6.13	National Grid Co-ordinate: E:341580.5 N:160551.4 Sheet: 6 of 6

SWA-BH7 17.90m to 20.00m



APPENDIX C

- (i) Standard Penetration Test (SPT) Summary Sheet
- (ii) SPT Hammer Calibration Records
- (iii) SPT N value versus Elevation Plot
- (iv) SPT $N_{(60)}$ Value versus Elevation Plot

STANDARD PENETRATION TEST SUMMARY TABLE

Exploratory Position ID	Depth (m)	Hole Dia (mm)	Casing Depth (m)	Water Depth (m)	Seating Drive		Test Drive			Hammer ID	Calibration Date	Energy Ratio (%)	N ₆₀	Comments
					Blows	Pen (mm)	Blows	R (mm)	Result					
SWA-BH2A	1.20	150	0.00	dry	1,2	150	2,3,3,3		N=11	EQU084-2012	28/09/2012	67.22	12	
	2.00	150	1.50	dry	2,2	150	3,3,4,5		N=15	EQU084-2012	28/09/2012	67.22	17	
	4.00	150	4.00	dry	3,5	150	7,7,10,13		N=37	EQU084-2012	28/09/2012	67.22	41	
	6.50	150	4.50	dry	4,6	150	12,14,18,6+	235	N=64*	EQU084-2012	28/09/2012	67.22	72	
	8.00	150	4.50	dry	6,11	150	17,19,14+	195	N=77*	EQU084-2012	28/09/2012	67.22	86	
	9.50	150	4.50	dry	5,8	150	10,15,18,8+	255	N=60*	EQU084-2012	28/09/2012	67.22	67	SPT(c)
	11.00	150	9.00	dry	25	75	50+	45	N=333*	EQU084-2012	28/09/2012	67.22	373	
	12.50	150	9.00	dry	10,14	150	14,16,16,4+	245	N=61*	EQU084-2012	28/09/2012	67.22	68	
	14.00	150	9.00	dry	10,12	150	20,30	150	N=100*	EQU084-2012	28/09/2012	67.22	112	
	15.30	146	14.30		8,13	150	17,19,24,26		N=86	EQU089-2012	28/09/2012	61.46	88	SPT(c)
	16.30	146	14.30		6,11	150	14,18,23,24		N=79	EQU089-2012	28/09/2012	61.46	81	SPT(c)
	17.50	146	16.80		6,16	150	18,24,29,29+	255	N=118*	EQU089-2012	28/09/2012	61.46	121	SPT(c)
	18.50	146	16.80		7,16	150	21,29,33,17+	245	N=122*	EQU089-2012	28/09/2012	61.46	125	SPT(c)
	19.50	146	18.50		5,11	150	24,26,27,23+	250	N=120*	EQU089-2012	28/09/2012	61.46	123	SPT(c)
	22.50	146	21.70		4,8	150	11,11,18,21		N=61	EQU089-2012	28/09/2012	61.46	62	SPT(c)
SWA-BH6A	1.20	150	0.00	dry	1,1	150	2,2,2,3		N=9	EQU084-2012	28/09/2012	67.22	10	
	3.00	150	1.50	dry	3,5	150	5,8,10,13		N=36	EQU084-2012	28/09/2012	67.22	40	

Notes:

1. Tests carried out in general accordance with BS EN ISO 22476-3:2005, including amendment A1 (2011).

2. Reported blows are for 75mm penetration unless indicated "+".

3. Where full test drive was not achieved, actual penetration (R) and extrapolated N value (N*) reported.

4. Tests carried out using a split spoon sampler unless noted as SPT(c) (denotes use of solid cone method) in the comments column.

5. Entries in the water depth column reflects the measured water depth at time of test.

$$N_{60} = (\text{Measured hammer energy ratio} / 60) \times N \text{ value}$$

 STRUCTURAL SOILS The Old School Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By			Date	Contract Ref:
	[REDACTED]			ADINGLE	
	Contract:	Hinkley to Seabank 400kV Connection			14.8.13
			Page		1 of 3
					AGS

STANDARD PENETRATION TEST SUMMARY TABLE

Exploratory Position ID	Depth (m)	Hole Dia (mm)	Casing Depth (m)	Water Depth (m)	Seating Drive		Test Drive			Hammer ID	Calibration Date	Energy Ratio (%)	N ₆₀	Comments
					Blows	Pen (mm)	Blows	R (mm)	Result					
SWA-BH6A	4.00	150	1.50	dry	4,8	150	10,15,25,0		N=50	EQU084-2012	28/09/2012	67.22	56	
	4.50	150	1.50	dry	5,9	150	12,15,18,5		N=50	EQU084-2012	28/09/2012	67.22	56	
	5.00	150	5.00	dry	8,8	150	8,30,12+,0+	195	N=77*	EQU084-2012	28/09/2012	67.22	86	
	6.50	150	6.00	2.10	6,17	150	24,26	150	N=100*	EQU084-2012	28/09/2012	67.22	112	
	8.00	150	7.50	2.10	25	75	50+	40	N=375*	EQU084-2012	28/09/2012	67.22	420	
	9.00	150	7.50	1.10	25	75	50+	60	N=250*	EQU084-2012	28/09/2012	67.22	280	
	11.00	146	9.30		7,11	150	19,31+	145	N=103*	EQU089-2012	28/09/2012	61.46	106	SPT(c)
	12.60	146	9.30		25	60	50+	55	N=273*	EQU089-2012	28/09/2012	61.46	280	SPT(c)
	14.10	146	9.30		25	40	50+	65	N=231*	EQU089-2012	28/09/2012	61.46	237	SPT(c)
	15.60	146	9.30		25	45	50+	58	N=259*	EQU089-2012	28/09/2012	61.46	265	SPT(c)
	17.10	146	9.30		25	30	50+	61	N=246*	EQU089-2012	28/09/2012	61.46	252	SPT(c)
	18.60	146	9.30		25	33	50+	55	N=273*	EQU089-2012	28/09/2012	61.46	280	SPT(c)
	20.10	146	9.00		6,14	150	18,22,30,30		N=100	EQU089-2012	28/09/2012	61.46	102	
SWA-BH7	1.20	150	0.00	dry	2,2	150	3,4,4,5		N=16	EQU084-2012	28/09/2012	67.22	18	
	3.00	150	1.50	dry	2,3	150	3,4,5,8		N=20	EQU084-2012	28/09/2012	67.22	22	
	5.00	150	1.50	dry	5,8	150	8,10,10,11		N=39	EQU084-2012	28/09/2012	67.22	44	
	6.50	150	1.50	dry	4,8	150	10,10,10,5		N=35	EQU084-2012	28/09/2012	67.22	39	

Notes:

1. Tests carried out in general accordance with BS EN ISO 22476-3:2005, including amendment A1 (2011).
2. Reported blows are for 75mm penetration unless indicated "+".
3. Where full test drive was not achieved, actual penetration (R) and extrapolated N value (N*) reported.
4. Tests carried out using a split spoon sampler unless noted as SPT(c) (denotes use of solid cone method) in the comments column.
5. Entries in the water depth column reflects the measured water depth at time of test.

$$N_{60} = (\text{Measured hammer energy ratio} / 60) \times N \text{ value}$$

 STRUCTURAL SOILS The Old School Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By			Date	Contract Ref:
	<div style="display: flex; align-items: center;"> <div style="flex: 1; background-color: black; height: 30px; margin-right: 10px;"></div> ADINGLE </div>			14.8.13	
	Contract:	<div style="display: flex; align-items: center;"> <div style="flex: 1; background-color: black; height: 30px; margin-right: 10px;"></div> Hinkley to Seabank 400kV Connection </div>			Page
				2 of 3	AGS

STANDARD PENETRATION TEST SUMMARY TABLE

Exploratory Position ID	Depth (m)	Hole Dia (mm)	Casing Depth (m)	Water Depth (m)	Seating Drive		Test Drive			Hammer ID	Calibration Date	Energy Ratio (%)	N ₆₀	Comments
					Blows	Pen (mm)	Blows	R (mm)	Result					
SWA-BH7	7.00	150	1.50	dry	4,6	150	10,12,15,13+	265	N=57*	EQU084-2012	28/09/2012	67.22	64	
	8.00	146	7.00		1,1	150	1,2,2,3		N=8	EQU089-2012	28/09/2012	61.46	8	
	9.20	146	7.00	0.50	4,11	150	11,14,13,14		N=52	EQU089-2012	28/09/2012	61.46	53	
	11.30	146	11.20	0.50	2,5	150	9,11,11,16		N=47	EQU089-2012	28/09/2012	61.46	48	
	12.20	146	11.20	0.50	4,6	150	6,9,12,18		N=45	EQU089-2012	28/09/2012	61.46	46	
	13.20	146	11.20	0.50	3,4	150	6,12,14,19		N=51	EQU089-2012	28/09/2012	61.46	52	
	13.70	150	13.70	13.00	1,2	150	3,4,5,4		N=16	EQU251-2013	13/03/2013	70.02	19	
	15.20	150	15.20	2.60	5,8	150	14,18,18+	198	N=76*	EQU251-2013	13/03/2013	70.02	89	
	16.70	150	16.60	10.00	11,14	123	15,15,21	225	N=68*	EQU251-2013	13/03/2013	70.02	79	
	17.50	150	16.90	2.50	7,13	150	22,28+	127	N=118*	EQU251-2013	13/03/2013	70.02	138	

Notes:

1. Tests carried out in general accordance with BS EN ISO 22476-3:2005, including amendment A1 (2011).
2. Reported blows are for 75mm penetration unless indicated "+".
3. Where full test drive was not achieved, actual penetration (R) and extrapolated N value (N*) reported.
4. Tests carried out using a split spoon sampler unless noted as SPT(c) (denotes use of solid cone method) in the comments column.
5. Entries in the water depth column reflects the measured water depth at time of test.

$$N_{60} = (\text{Measured hammer energy ratio} / 60) \times N \text{ value}$$

 STRUCTURAL SOILS The Old School Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By			Date	Contract Ref:
	 ADINGLE			14.8.13	
	Contract:	 Hinkley to Seabank 400kV Connection			Page

SPT Calibration Report



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Hammer Energy Measurement Report

Type of Hammer SPT HAMMER
 Client STRUCTURAL SOILS
 Test No EQU707
 Test Depth (m) 7.87
 Date of Test 28 September 2012
 Valid until 28 September 2013
 Hammer ID EQU089

Mass of the hammer $m =$ 63.5kg
 Falling height $h =$ 0.76m
 $E_{\text{theor}} = m \times g \times h =$ 473J

Characteristics of the instrumented rod

Diameter $d_r =$ 0.052 m
 Length of the instrumented rod 0.558 m
 Area $A =$ 11.61 cm²
 Modulus $E_a =$ 206843 MPa

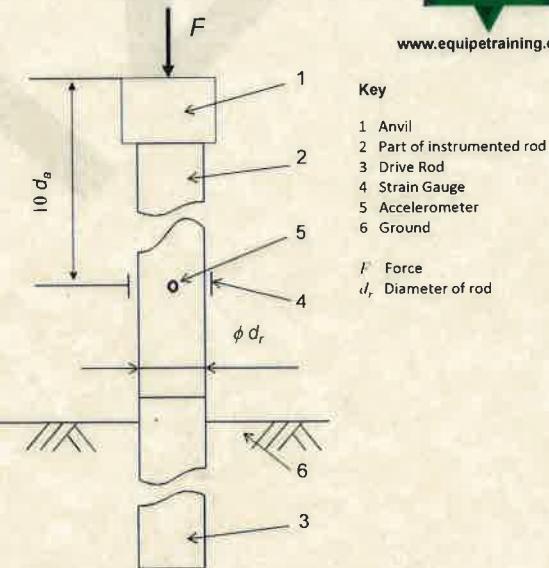
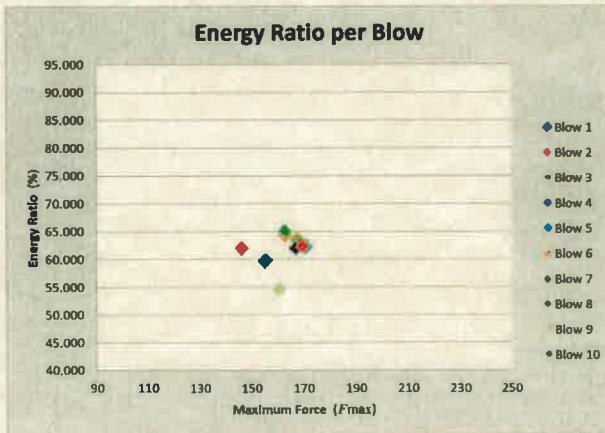
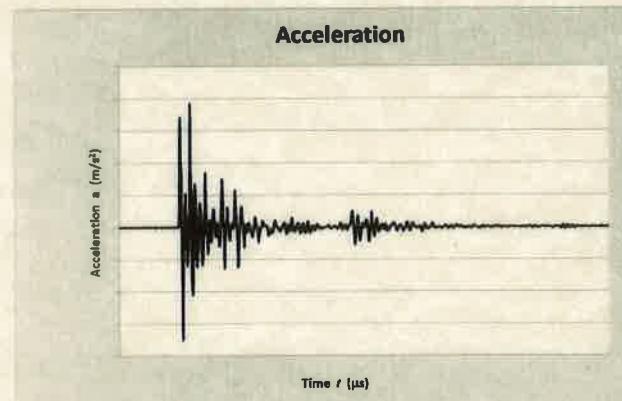
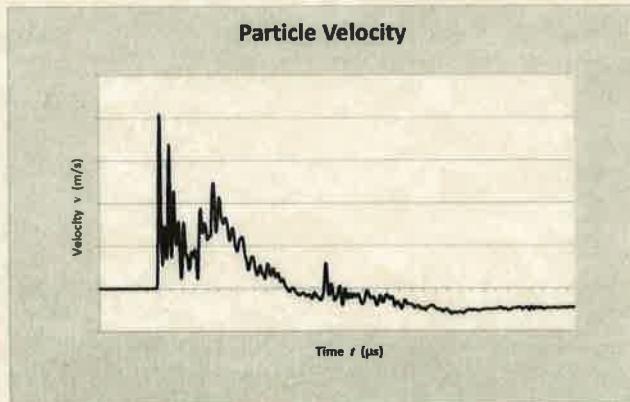
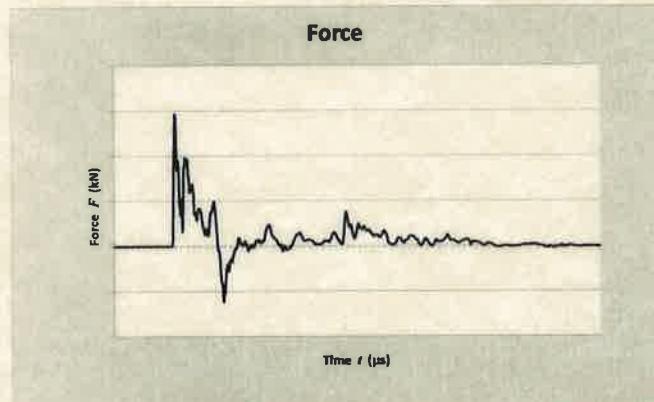


Fig. B.1 and B.2 BS EN ISO 22476-3 : 2005



Observations:

1.

 $E_{\text{meas}} = 0.291 \text{ kN-m}$ $E_{\text{theor}} = 0.473 \text{ kN-m}$

$$\text{Energy Ratio} = \frac{E_{\text{meas}}}{(E_r)} = \frac{E_{\text{meas}}}{E_{\text{theor}}} = 61.46\%$$

Equipe SPT Analyzer Version 1.0

JML

Prepared by: [REDACTED]

Checked by: [REDACTED]

Date

08/10/2012

SPT Calibration Report



www.equipetraining.co.uk

Hammer Energy Measurement Report

Type of Hammer SPT HAMMER
 Client STRUCTURAL SOILS
 Test No EQU704
 Test Depth (m) 7.83
 Date of Test 28 September 2012
 Valid until 28 September 2013
 Hammer ID EQU084

Mass of the hammer $m = 63.5\text{kg}$
 Falling height $h = 0.76\text{m}$
 $E_{\text{theor}} = m \times g \times h = 473\text{J}$

Characteristics of the instrumented rod

Diameter $d_r = 0.052\text{ m}$
 Length of the instrumented rod 0.558 m
 Area $A = 11.61\text{ cm}^2$
 Modulus $E_a = 206843\text{ MPa}$

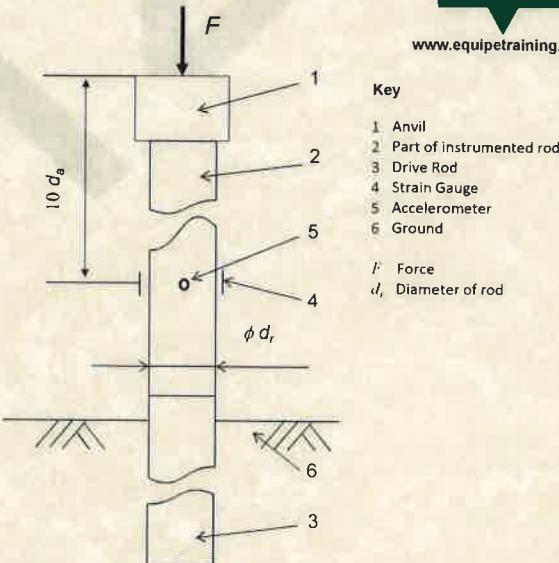
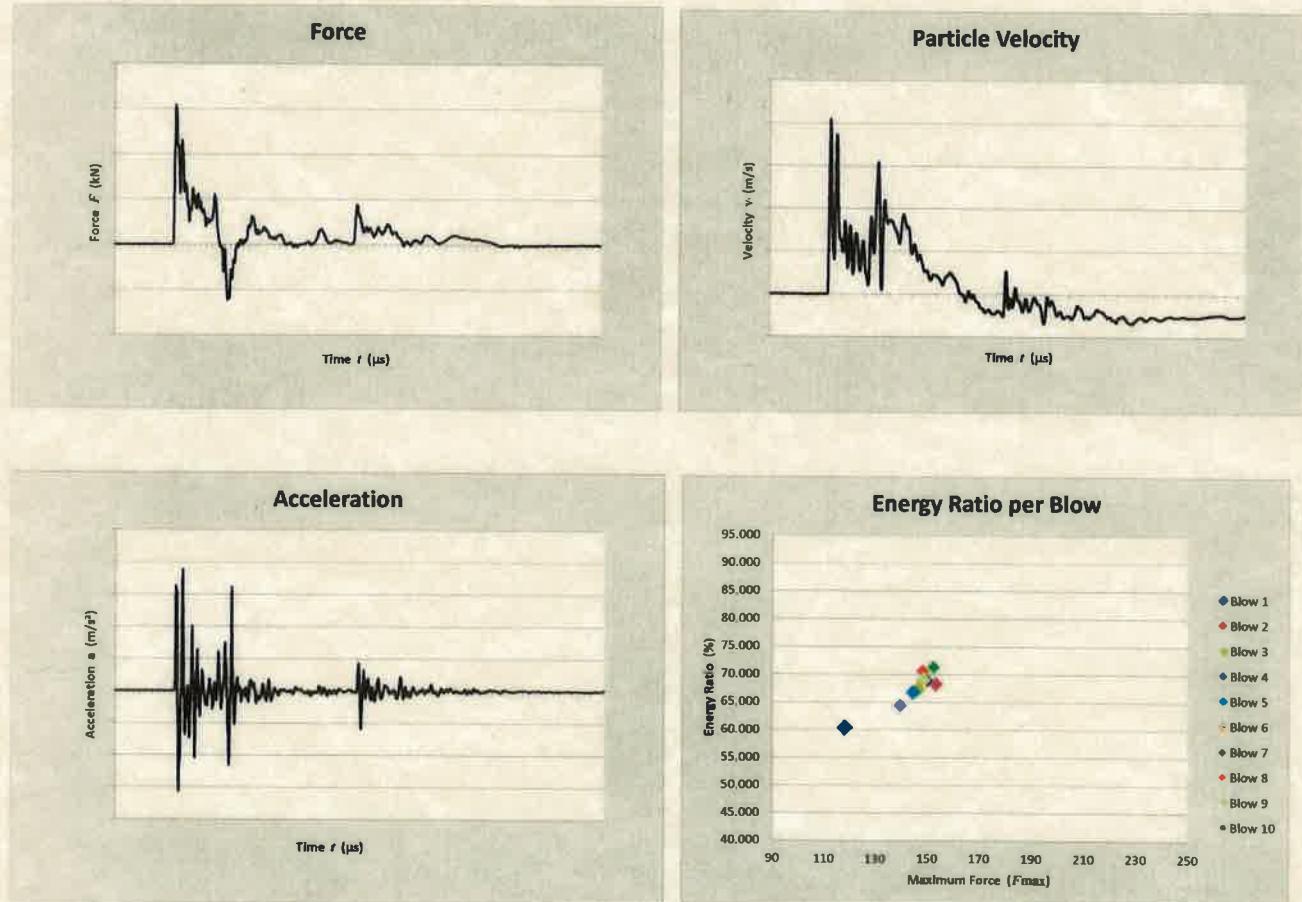


Fig. B.1 and B.2 BS EN ISO 22476-3 : 2005



Observations:

1.

$$E_{\text{meas}} = 0.318 \text{ kN-m}$$

$$E_{\text{theor}} = 0.473 \text{ kN-m}$$

$$\text{Energy Ratio} = \frac{E_{\text{meas}}}{(E_t)} = \frac{E_{\text{meas}}}{E_{\text{theor}}} = 67.22\%$$

Equipe SPT Analyzer Operator:

JML

Prepared by:

Checked by:

Date

08/10/2012

SPT Calibration Report

Hammer Energy Measurement Report

Type of Hammer SPT HAMMER
 Client STRUCTURAL SOILS
 Test No EQU822
 Test Depth (m) 10.50
 Date of Test 13 March 2013
 Valid until 13 March 2014
 Hammer ID EQU251
 Mass of the hammer $m = 63.5\text{kg}$
 Falling height $h = 0.76\text{m}$
 $E_{\text{theor}} = m \times g \times h = 473\text{J}$
Characteristics of the instrumented rod
 Diameter $d_r = 0.052\text{ m}$
 Length of the instrumented rod 0.558 m
 Area $A = 11.61\text{ cm}^2$
 Modulus $E_s = 206843\text{ MPa}$

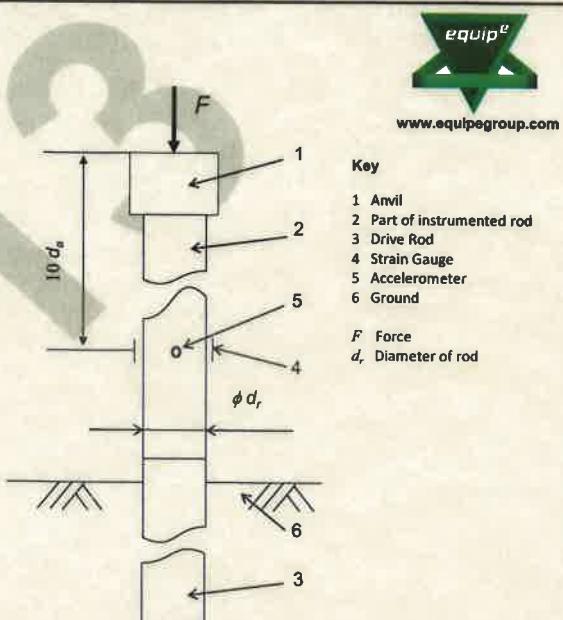
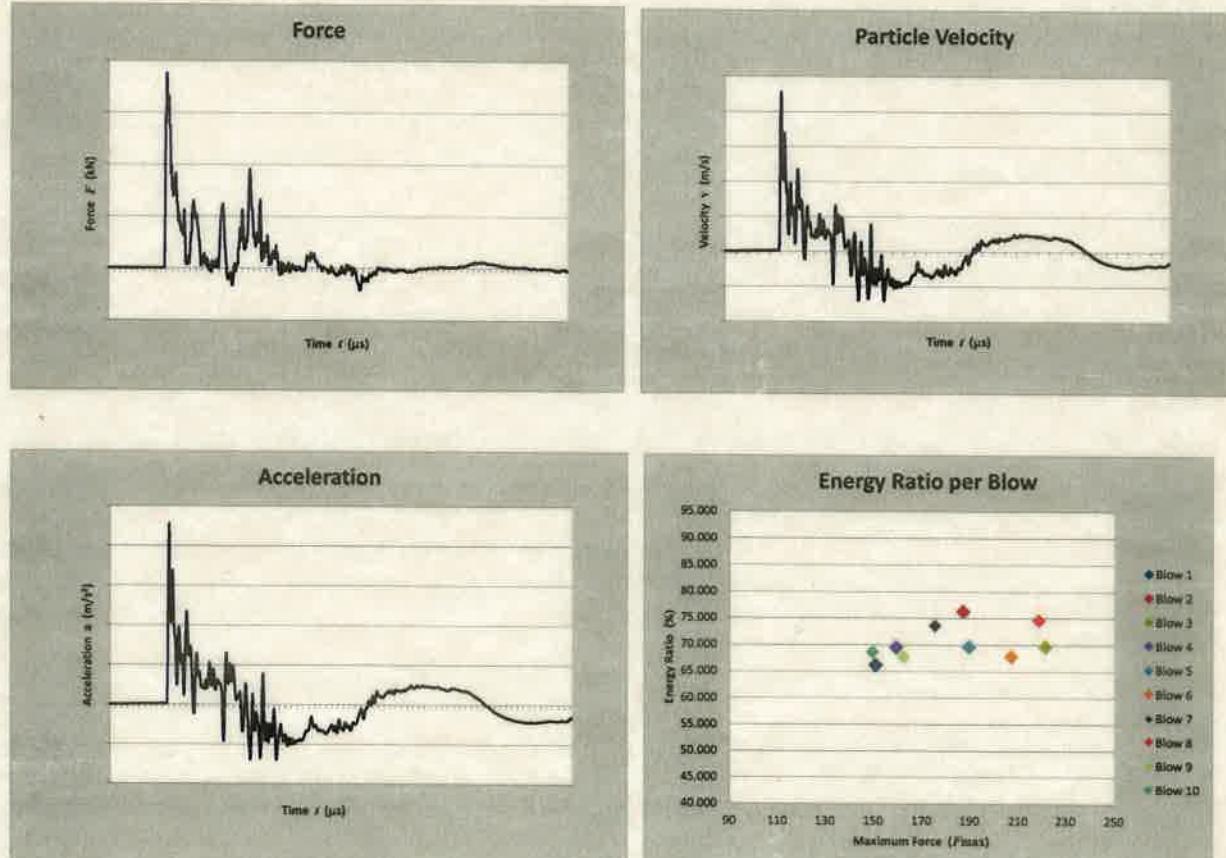


Fig. B.1 and B.2 BS EN ISO 22476-3 : 2005 + A1 : 2011



Observations:

1.

$$E_{\text{meas}} = 0.331\text{ kN-m}$$

$$E_{\text{theor}} = 0.473\text{ kN-m}$$

$$\text{Energy Ratio} = \frac{E_{\text{meas}}}{(E_r)} = \frac{E_{\text{meas}}}{E_{\text{theor}}} = 70.02\%$$

Equipe SPT Analyzer Operator:

KS

Prepared by: [REDACTED]

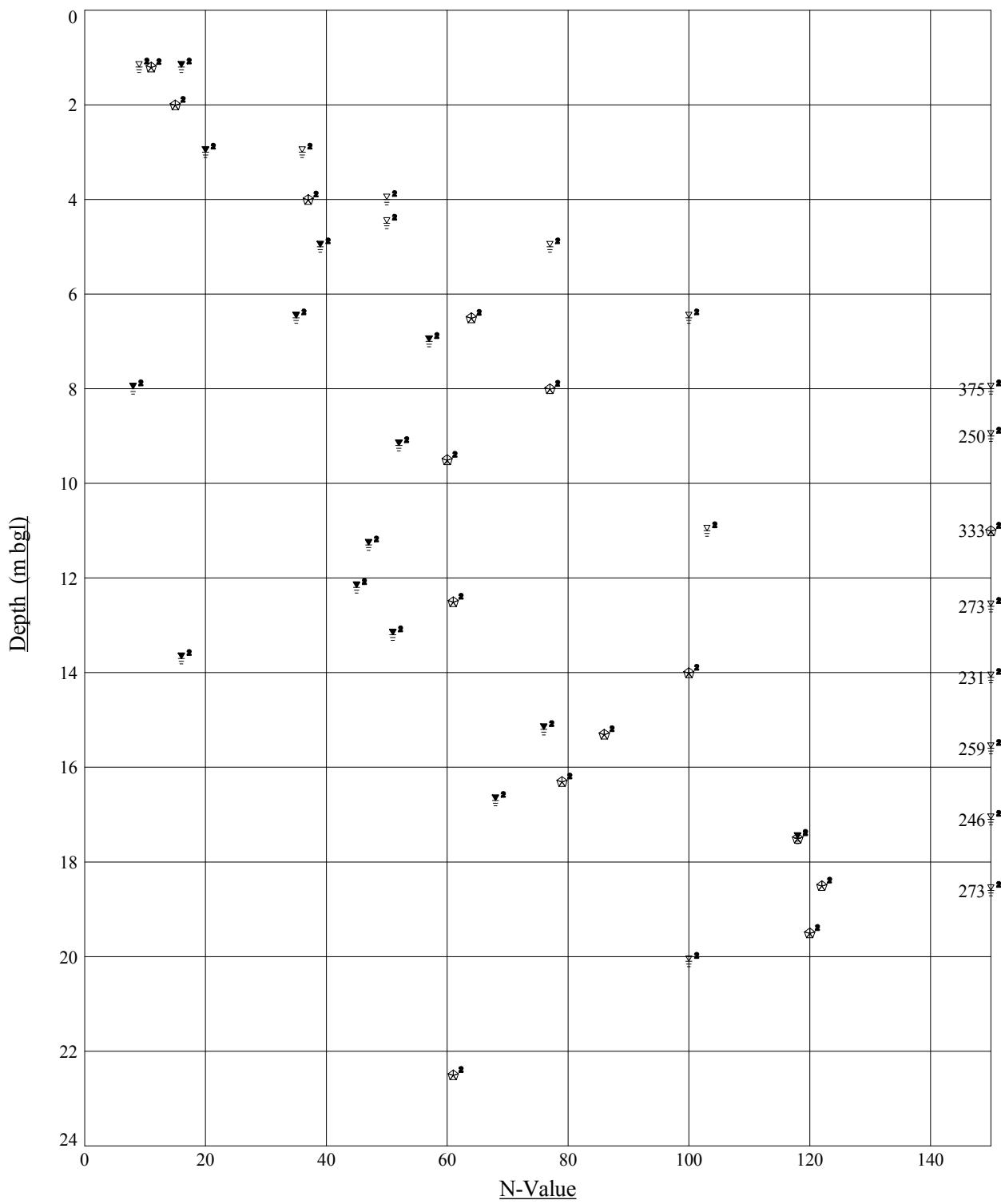
Checked by: [REDACTED]

Date

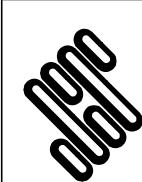
22/03/2013

STANDARD PENETRATION TEST (SPT N-Value)

VS DEPTH



Key: \diamond = SWA-BH2A, \triangle = SWA-BH6A, \square = SWA-BH7



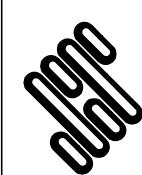
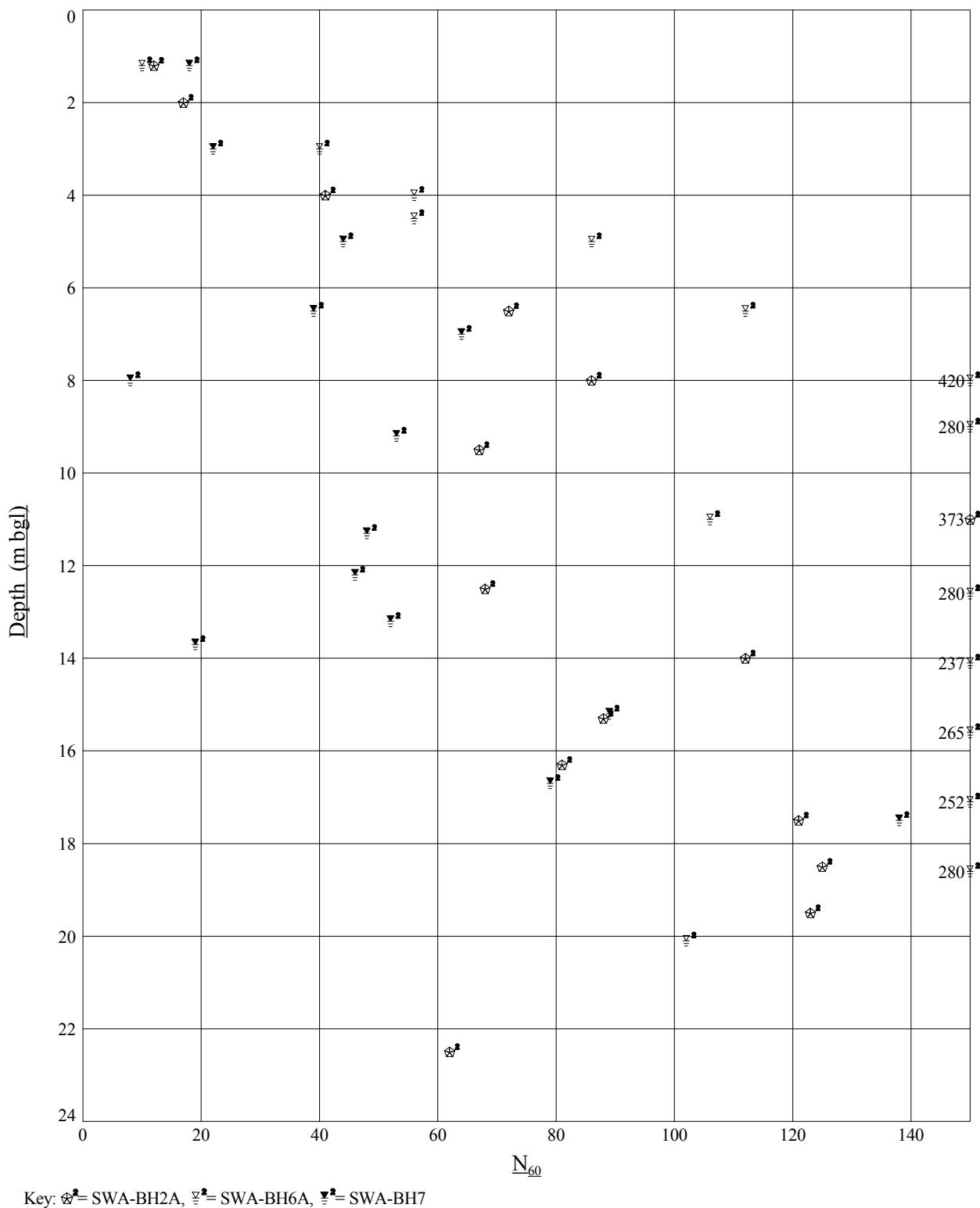
STRUCTURAL SOILS
The Old School
Stillhouse Lane
Bedminster
Bristol BS3 4EB

Contract	Hinkley to Seabank 400kV Connection	
	Date	Compiled By
	18.10.13	[Redacted]
Client	Electricity Alliance West	
	Contract Ref:	727635



STANDARD PENETRATION TEST (SPT N_{60})

VS DEPTH



STRUCTURAL SOILS
The Old School
Stillhouse Lane
Bedminster
Bristol BS3 4EB

Contract
Hinkley to Seabank 400kV Connection
Client
Electricity Alliance West

Date

18.10.13

Compiled By

[Redacted]

727635



APPENDIX D

(i) Groundwater Monitoring Results

IN-SITU WATER MONITORING RESULTS

	Weather	Ground Conditions	Wind Conditions	Air Temperature (°C)	Equipment Used & Remarks
Round 1	Sunny	Dry	Light	-	Dipmeter
Round 5	Sunny	Dry	Light	-	Dipmeter

Exploratory Position ID	Pipe Ref	Pipe Diameter	Monitoring Round / Test Number	Reported Installation Depth (m)	Measured Installation Depth (m)	Response Zone	Date & Time of Monitoring	Water Depth (m)	Remarks
SWA-BH2A	1	50	5 / 1	3.50	3.45	1.50 to 3.50	11/07/2013	2.49	
SWA-BH6A	1	50	1 / 1	3.50	3.46	1.50 to 3.50	28/06/2013	0.86	
SWA-BH6A	1	50	5 / 1	3.50	3.49	1.50 to 3.50	11/07/2013	0.99	
SWA-BH7	1	50	1 / 1	3.40	2.84	1.50 to 3.40	28/06/2013	0.94	
SWA-BH7	1	50	5 / 1	3.40	2.89	1.50 to 3.40	11/07/2013	1.30	

Key: NDA denotes 'no data available'.

 STRUCTURAL SOILS The Old School Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By	Date	Checked By	Date	Contract Ref: 727635
	[REDACTED]	16/10/13	[REDACTED]	18/10/13	
Contract:	Hinkley to Seabank 400kV Connection				Page: 1 of 1