8.14 GROUND INVESTIGATIONS - GEOTECHNICAL REPORT

GEOTECHNICAL REPORT ON GROUND INVESTIGATION

MARBLE HILL HOUSE

FOR

ENGLISH HERITAGE

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INFRASTRUCTURE
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APPROVAL & DISTRIBUTION SHEET

PROJECT DETAILS	
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FOREWORD

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1. INTRODUCTION

This interpretative report has been prepared on the instruction from English Heritage Trust, purchase order reference 600012897.

The subject site is located at Marble Hill House, Twickenham, TW1 2NL and comprises a level site that is occupied by a grade two listed manor house and its associated buildings. It is proposed to develop part of the site with a single story extension to the existing café, located in the former stable building which is also a grade two listed building. It is also proposed to develop a number of wooded and grassed areas in the vicinity of the main house with footpaths, areas of hard standing and children's play equipment. A ground investigation was requested by the appointed consulting engineer, The Morton Partnership Limited, to provide information on the ground conditions underlying the site.

The nominated fieldwork comprised two window sampler boreholes, a single hand augured exploratory hole as well as a series of hand dug trial undertaken in November 2016. In addition, in situ TRL DCP probes were carried out to provide CBR profiles of the near surface soils. This report is based upon the above fieldwork and subsequent geotechnical laboratory testing programme.

A Generic Human Health Risk Assessment (F16/299004/GRA) has been undertaken by CET Structures Limited however the documents have not been reproduced herein.

Attention is drawn to the fact that whilst every effort has been made to ensure the accuracy of the data supplied and any analysis derived from it, there is a potential for variations in ground conditions and contamination between and beyond the specific locations investigated. No liability can be accepted for any such variations. Furthermore, any recommendations are specific to the client's requirements as detailed herein and no liability will be accepted should these be used by third parties without prior consultation with CET Structures Ltd.

2. SITE SETTINGS

The subject site is located at Marble Hill House, Twickenham, TW1 2NL and comprises a level site that is occupied by a grade two listed manor house and its associated buildings. The site is centred at the approximate National Grid Reference TQ172736 as shown on Figure 1.

The main house occupies the centre of the subject site and is flanked to the east, west and south by woodland. To the north of main house, and beyond the wooded areas, the site is occupied by grass park land.

The former stable building is located to the west of the subject site and is currently utilized as a café.

Richmond Road forms the northern site boundary with numerous commercial and residential properties located beyond. Further small residential roads were noted to the east and west of the site, whilst to the south the site is bordered by the river Thames.

The subject site is essentially level, which is in general keeping with the surrounding area.

Reference to the publications of the British Geological Survey indicates that the site is underlain by the deposits of the London Clay Formation, which is overlain by superficial deposits of Kempton Park Gravel and Langley Silt. Typically these deposits may be described as follows: -

Stratum	Description
Langley Silt Member	Varies from silt to clay, commonly yellow-brown and massively bedded.
Kempton Park Gravel Formation	Sand and gravel, locally with lenses of silt, clay or peat. The gravel is predominantly flint derived from the destruction of the chalk and from older gravel deposits.
London Clay Formation	Comprises grey overconsolidated clay that weathers to a characteristic brown colour where it outcrops. Layers of claystone (septarian) nodules are common place within the London Clay Formation.

The ground investigation ascertained that the site was sequentially underlain by deposits of the Langley Silt Member and Kempton Park Gravel Formation. These deposits were mantled by Made Ground but the underlying London Clay was not encountered.

3. GROUND INVESTIGATION

The nominated fieldwork comprised two window sampler boreholes, one hand augured exploratory hole, eight hand dug trial pits and three TRL DCP tests undertaken in November 2016. The approximate locations of the exploratory holes are shown on Figure 2.

Details of the ground conditions encountered in the boreholes are presented on the engineer's logs included in Appendix A, as Figures A1 to A11. Reference should be made to these logs for detailed descriptions of the strata penetrated and the results of any in situ tests carried out. A summary only of the ground conditions encountered in the boreholes is presented below.

Either at ground level or below a mantle of grass or asphalt, Made Ground was encountered in each of the exploratory holes to a maximum depth of 1.4m below ground level in WS02. Typically this material was encountered as variable proportions of CLAY, SILT, SAND and GRAVEL with the gravel variously consisting of flint, brick, glass, clinker, ash, mortar, ceramic, clay tile, salt glaze fragments, slate, bone, bivalve shell and marble. TP02, TP04 and TP08 were each terminated with the Made Ground material.

Beneath the Made Ground, deposits of the Langley Silt Member were encountered in each of the remaining exploratory holes. The composition of the Langley Silt Member typically comprised firm to hard cohesive material that varied from SILT to CLAY or granular material in the form of SAND. The remaining trial pits, (TP01, TP03, TP05, TP06 and TP07) and HA01, were all terminated within the deposits of the Langley Silt Member, which was encountered to a maximum depth of 2.5m below ground level in WS01.

Beneath the Langley Silt Member the window sampler boreholes encountered grey brown and yellow brown, fine to coarse sandy GRAVEL of flint. This stratum was encountered in WS01 and WS02 to depths of 4.0m and 3.2m below ground level respectively and has been described as the Kempton Park Gravel Formation

Roots and rootlets were observed to a maximum depth of 2.5m below ground level in WS01.

All of the exploratory holes remained dry whilst open. However, it should be noted that groundwater levels may vary both seasonally and in the long term and the possibility of groundwater being present cannot therefore be ruled..

4. LABORATORY TESTING

The following geotechnical laboratory testing programme was carried out to provide further information on the engineering properties of the subsoil. Unless stated otherwise, these tests were carried out in accordance with BS 1377 "Methods of Test for Soils for Civil Engineering Purposes".

No.	Test	UKAS Accreditation
2	PSD tests using "wet sieve" and hydrometer techniques	CET
9	Moisture Content Determinations	CET
4	Atterberg limits	CET
7	pH and water soluble sulphate determinations	CET Supplier

5. DISCUSSION AND RECOMMENDATIONS

GENERAL

The subject site is located at Marble Hill House, Twickenham, TW1 2NL and comprises a level site that is occupied by a grade two listed manor house and its associated buildings. It is proposed to develop part of the site with a single story building adjacent to the existing café, located in the former stable building. It is also proposed to develop a number of wooded and grassed areas in the vicinity of the main house with footpaths, areas of hard standing and children's play equipment. A ground investigation was requested by the appointed consultant engineer, The Morton Partnership limited, to provide information on the ground conditions underlying the site and comment on foundation solutions for the proposed development.

The fieldwork comprised two window sampler boreholes, one hand augured exploratory hole, eight hand dug trial pits and three TRL DCP tests. The exploratory holes confirmed that the site was underlain by the anticipated geology of Langley Silt Member over Kempton Park Gravel Formation. The London Clay was not encountered but Made Ground was found to mantle the site.

Groundwater was not encountered in any of the exploratory holes during the course of the ground investigation. Notwithstanding the above, the comments made in Section 3 of this report should be borne in mind.

FOUNDATIONS

It is proposed to develop the existing café located within the yard of the former stable building with a single story extension. It is understood that the proposed extension will incorporate the existing perimeter brick wall around the courtyard. In addition to the existing brick wall, which will become a load bearing wall supporting the roof structure, columns will be required.

Roots and roots were encountered in WS01 and WS02 to depths of 2.5m and 1.9m below ground level, respectively. It was noted during the course of the fieldwork that a number of mature trees are located within the vicinity of the proposed construction, specifically in close proximity to the existing brick wall that surrounds the court yard.

Atterberg Limit tests carried out on samples recovered from the Langley Silt Member indicate that the clayey strata generally have a medium to low shrinkage potential as defined in N.H.B.C. Standards Chapter 4.2 "Building near trees". As such these soils would locally be expected to exhibit changes in volume in response to variations in natural moisture content.

Given the depth of root penetration and the presence of clayey stratum with a medium shrinkage potential it is recommended that foundations be constructed below the depth of observed root penetration and to at least the depths defined in N.H.B.C. Standards Chapter 4.2 "Building near trees" taking into account existing tree cover and any proposed planting. Based on the requirements of NHBC Standards Chapter 4.2 foundations are likely to be of the order of 2.5m deep at which depth they are likely to penetrate the Kempton Park Gravel Formation. Foundations bearing in various strata are not recommended due to the attendant risk of differential settlement and it is therefore recommended that all foundations should bear in the Kempton Park Gravel Formation.

A presumed net bearing value, which takes no account of settlement, of 100kN/m^2 is considered appropriate for foundations bearing in the Kempton Park Gravel Formation.

Foundations penetrating through the Langley Silt Member will need to incorporate the measures to protect the foundations from potential expansion of the clay soils on the recovery of any desiccation, if a tree dies or is removed, as recommended in NHBC Standards Chapter 4.2.

Consideration will need to be given to the interface between the proposed and the existing structure and the risk of differential movement between the two. Consideration may need to be given to debonding the proposed structure from the existing building to permit movement to take place without structural damage occurring to either building. In addition, if the proposed structure is to be founded variously on strips and pads analysis should be undertaken to confirm that differential settlement between the various foundation types is within tolerable limits.

GROUND FLOOR SLAB

Made Ground was encountered to a maximum depth of 1.4m below ground level in WS01. In light of the thickness of Made Ground encountered in the boreholes, ground bearing floor slabs are not recommended and suspended ground floor slabs should be adopted..

TEMPORARY WORKS FOR EXCAVATIONS

Localised collapses were noted within window sampler boreholes that penetrated into the deposits of the Kempton Park Gravel Formation. However the Made Ground and deposits of the Langley Silt Member remained stable whilst the exploratory hole was open.

In light of the above some form of shoring would be required to maintain the stability of excavations made into or through the Kempton Park Gravel Formation and where personnel are required to enter excavations the temporary support must be sufficient to provide a safe environment and sufficient to maintain the stability of the excavation. Careful consideration will need to be given to the design of temporary support where potential collapse could undermine the foundations to the existing structure.

Groundwater was not encountered in any of the exploratory holes and on this basis it is possible that shallow excavations would not be subject to substantial groundwater ingress in the short term however, groundwater control measures should be assessed in relation to the conditions encountered at the time of excavation/construction.

PAVEMENT DESIGN

Made Ground is not normally recommended as a sub-grade for pavement construction and any hardstanding or pavements constructed directly onto the Made Ground will be done so with the risk of settlement over time. In the event that movement of the pavement cannot be tolerated the Made Ground will need to be removed and replaced with an engineered fill material. Alternatively, if differential settlement can be tolerated, consideration could be given to partial removal of the Made Ground, proof rolling the exposed sub-grade to determine the presence of “soft” spots, which should then be removed and replaced with a suitably engineered fill and adopting a flexible construction. The risk of settlement could be further mitigated by the inclusion of geogrid reinforcement within the construction. If partial removal of Made Ground is adopted provision should be made for a long term maintenance programme to manage any subsequent settlement.

The presence of potentially desiccated soils within the wooded areas may result in seasonal swelling and shrinkage of the clay soils underlying the proposed pavements. In addition, the continued growth of trees could also result in on-going settlement and their removal or death could result in heave on recovery of desiccation. Heave and settlement along with physical disruption by root growth could both result in damage to pavement surfaces.

SURFACE WATER DISPOSAL

The Made Ground and underlying Langley Silt Member are likely to be unsuitable for the discharge of surface water however the granular Kempton Park Gravel Formation may considered. Prior to stripping the site of all hardstanding and below ground services, consideration could be given to retaining the existing surface water drainage system providing it has sufficient capacity to accommodate the modest increase in capacity

required. In the event that disposal to soakaways discharging into the Kempton Park Gravel Formation are to be considered soakage tests in accordance with BRE Digest 365 will be required.

CONCRETE BELOW GROUND

Chemical testing was carried out on soil samples recovered from the strata encountered in the exploratory holes.

The ground investigation established that the underlying groundwater condition is likely to be classified as 'static'.

In accordance with BRE Special Digest 1:2005 Third Edition "Concrete in Aggressive Ground", Table C2 "Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations", the Design Sulphate Class and ACEC Class have been established based upon the available laboratory results. The results of the water sulphate, total potential sulphate and pH determinations indicate that the concrete could be designed to Design Sulphate Class DS-1 and ACEC Class AC-1, however localised elevations of water soluble sulphate indicate the requirement for the concrete to be designed to Design Sulphate Class DS-1 as well as ACEC Class AC-1s.

FIGURES

FIGURE 1

APPROXIMATE EXPLORATORY HOLE LOCATION PLAN

Marble Hill House – Proposed Café Extension

299004

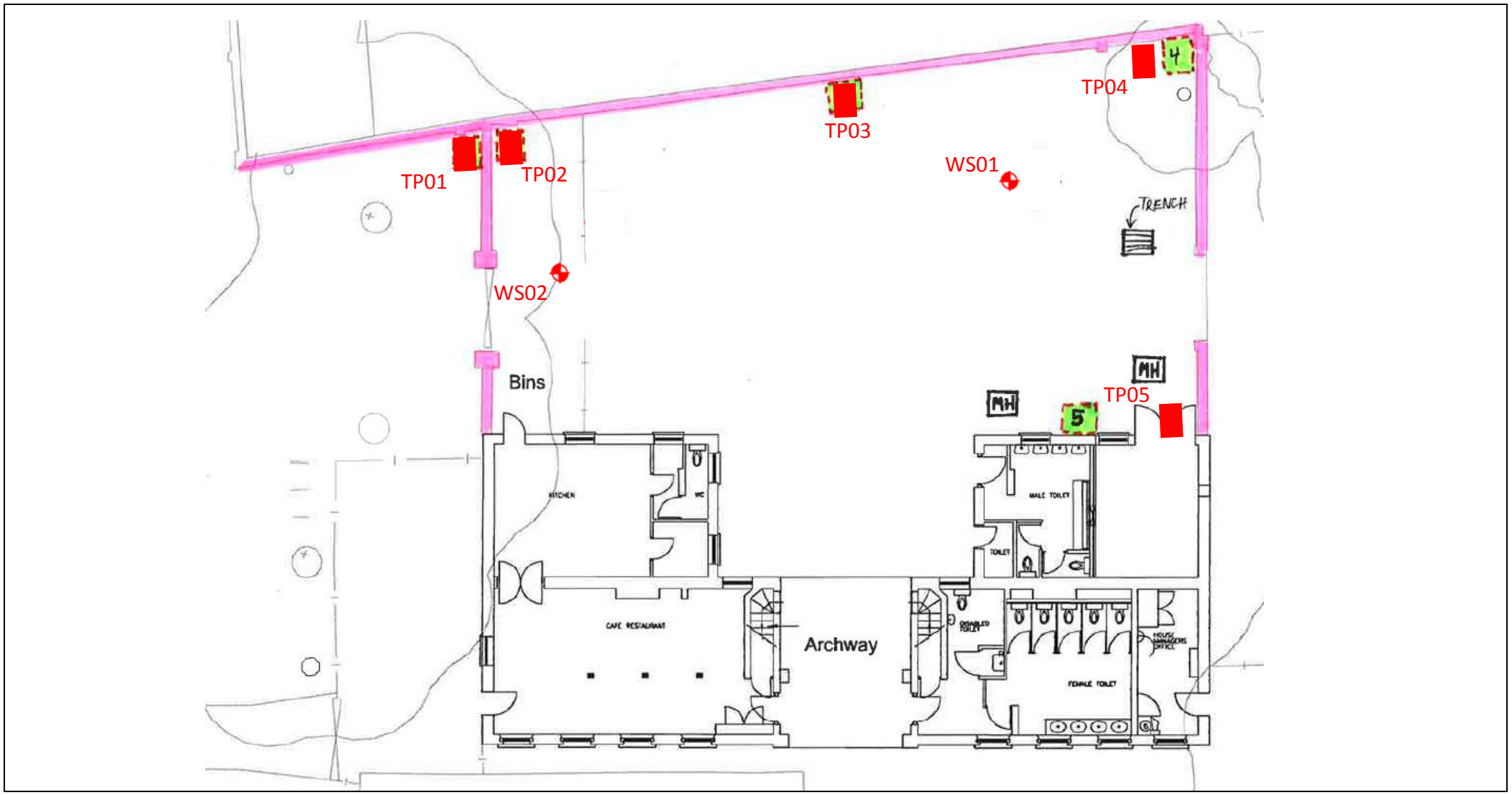
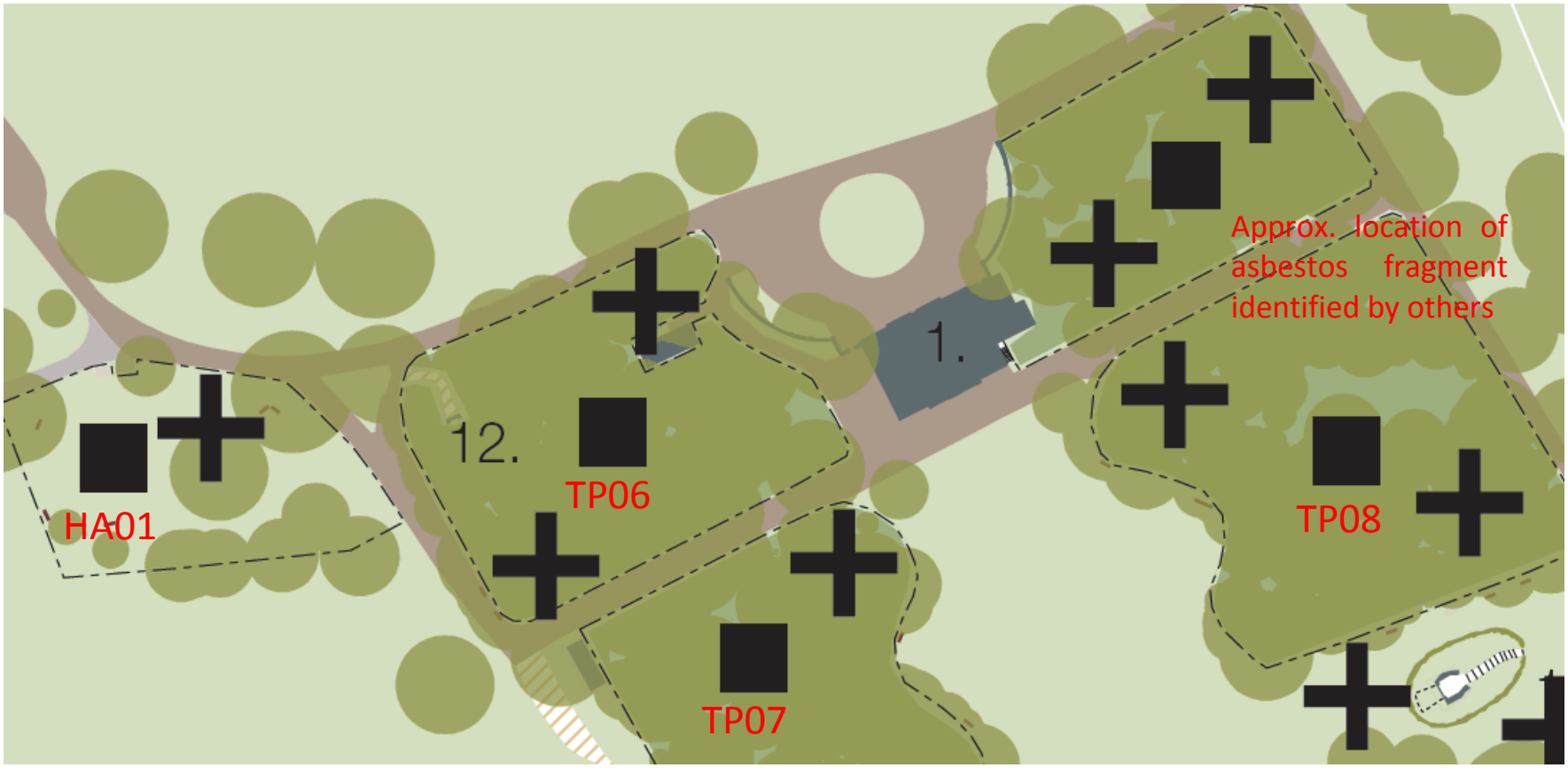


FIGURE 2

APPROXIMATE EXPLORATORY HOLE LOCATION PLAN

Marble Hill House – Proposed Pathways & Playground

299004



APPENDIX A

Fieldwork

INFRASTRUCTURE
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KEY TO BOREHOLE AND TRIAL PIT LOGS

Samples

D	Small disturbed sample
U	Undisturbed sample, 100mm nominal diameter
UT	Undisturbed thin walled sample, 100mm nominal diameter
B	Bulk disturbed samples (bar indicates sample range)
U38	Hand driven 'undisturbed' sample, 38mm nominal diameter
P	Undisturbed piston sample (bar indicates sample range)
W	Water sample
ICBR	In-situ California Bearing Ratio sample
*	No recovery sample
T	Tub sample
V	Vial sample
J	Jar sample

Tests

S	Standard penetration test
C	Cone penetration tests
N =	SPT/CPT 'N' Value (number of blows for 300mm full penetration)
80/150	Number of blows/total penetration(mm) for SPT/CPT test
25/25SP	As above for seating drive only
*	N value obtained over 450mm penetration
U =	Blows to achieve 450mm penetration for a U sample
V_h =	In-situ hand vane test in kN/m^2
m	In-situ CBR test by Mexe probe
V =	In-situ field vane test in kN/m^2
ppm =	Parts per million of flammable gas as methane equivalents
pp =	Pocket Penetrometer in kg/cm^2

Observations, Backfill and Installations

▼	Water strike – depth shown in metres below ground level.		
	Gravel backfill		Bentonite backfill
	Arisings backfill		Concrete
	Plain Pipe		Slotted Pipe

Client: **English Heritage**	Hole Diameter (mm):	**BOREHOLE NUMBER**
Method: Window Sampler		**WS01**
Date: 17/11/16	Co-ordinates E N / Ground Level (m AOD)	Ref. No: 299004
		Sheet 1 of 1

Backfill/Well		Water	Samples		In Situ Tests	Reduced	Depth &		
(m)	Legend	Depth (m)	Depth (m)	Type	Results	Level (m AOD)	*(Thickness)* (m)	Description of Strata	Legend
0.05							*(0.05)* 0.05	Asphalt	
0.20			0.20	TJV			*(0.10)* 0.15	COBBLES of possible limestone. Possible old courtyard floor.	
			0.50	TJV D				Firm, orange brown and dark grey, slightly fine to coarse sandy, gravelly, becoming slightly gravelly with depth, CLAY. Gravel is sub-angular to sub-rounded, fine to coarse, flint and brick. (Made Ground)	
			1.00	D			*(1.25)*		
			1.50	D			1.40	Firm, orange brown, sandy, locally very sandy, CLAY. Sand is fine and medium. (Langley Silt Member?)	
			2.00	D	Vh = 50		*(0.70)*		
			2.20	D			2.10 *(0.20)*	Firm, orange brown with white streaks, silty CLAY.	
			2.40	D			2.30 *(0.20)*	(Langley Silt Member?)	
			2.50 - 3.00	D			2.50	Firm, dark grey and black, with light grey streak, silty CLAY. (Langley Silt Member?)	
			3.00 - 4.00	D				Yellow brown, locally clayey, fine to coarse sandy GRAVEL of sub-angular and sub-rounded, fine to coarse flint. (Kempton Park Gravel Formation)	
							(1.50)		
4.00							4.00	*End of Borehole at 4.00 m*	

General Remarks:
1. Exploratory hole remained dry whilst open.
2. Roots noted to 2.5m below ground level.
3. Exploratory hole terminated at 4.0m below ground level due to refusal of window sampler.
4. Collapse noted from 4.0m below ground level up to 3.4m below ground level upon completion.

Driller:	IB	BOREHOLE RECORD	CET INFRASTRUCTURE Giving our all
Logged:	JAC	Scale 1:25	
Chked:		See Key Sheet for explanation of symbols, etc.	
Appr'd:		Marble Hill House	**FIG A1**

Client: **English Heritage**	Hole Diameter (mm):	**BOREHOLE NUMBER**
Method: Window Sampler		**WS02**
Date: 17/11/16	Co-ordinates E N	Ground Level (m AOD)	Ref. No: 299004	Sheet 1 of 1

Backfill/Well		Water	Samples		In Situ Tests	Reduced	Depth &		
(m)	Legend	Depth (m)	Depth (m)	Type	Results	Level (m AOD)	*(Thickness)* (m)	Description of Strata	Legend
0.05							*(0.10)*	Asphalt.	
0.20			0.20	TJV D			0.10		
							(0.30)	Firm, brown, slightly fine to coarse sandy, slightly gravelly CLAY. Gravel is sub-angular and sub-rounded, fine to coarse, flint and brick. (Made Ground)	
			0.50	TJV D			0.40		
								Very stiff to hard, yellow brown and brown, fine to coarse sandy, silty CLAY. Frequent coarse sand size fragments of white siltstone. (Langley Silt Member)	
			1.00	TJV D			*(1.50)*		
			1.50	D					
			1.80	D					
			2.00	D			1.90		
							(0.40)	Yellow brown, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine and medium, flint and siltstone. (Langley Silt Member)	
			2.30 - 3.20	D			2.30		
								Grey brown, fine to coarse sandy GRAVEL of sub-angular and sub-rounded, fine to coarse flint. (Kempton Park Gravel Formation)	
							(0.90)		
3.20							3.20	*End of Borehole at 3.20 m*	

General Remarks:
1. Exploratory hole remained dry whilst open.
2. Roots noted to 1.9m below ground level.
3. Exploratory hole terminated at 4.0m below ground level due to refusal of window sampler.
4. Collapse noted from 3.0m below ground level up to 2.4m below ground level and 3.2m below ground level up to 2.3m below ground level upon completion.

Driller:	IB	BOREHOLE RECORD	CET INFRASTRUCTURE Giving our all
Logged:	JAC	Scale 1:25	
Chked:		See Key Sheet for explanation of symbols, etc.	
Appr'd:		Marble Hill House	**FIG A2**

Client: **English Heritage**	Hole Diameter (mm): 75 to 2.00m	**BOREHOLE NUMBER HA01**
Method: Hand Auger		
Date: 17/11/16	Co-ordinates E N	Ground Level (m AOD)	Ref. No: 299004	Sheet 1 of 1

Backfill/Well (m)	Legend	Water Depth (m)	Samples Depth (m)	Samples Type	In Situ Tests Results	Reduced Level (m AOD)	Depth & (Thickness) (m)	Description of Strata	Legend
			0.50	TJV D			(0.60)	Grass over stiff, friable, brown, slightly fine to coarse sandy, slightly gravelly, clayey SILT. Gravel is sub-angular to sub-rounded, fine to coarse flint, brick and marble fragment. (Made Ground)	
			0.70	TJV D			0.60 (0.20) 0.80	Orange brown, slightly clayey, gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse flint and white siltstone. (Langley Silt Member)	
			1.00	TJV D			(0.30) 1.10	Yellow brown, slightly clayey, fine and medium SAND with occasional fine and medium gravel size, sub-rounded, white siltstone. (Langley Silt Member)	
			1.50	D			(0.90)	Yellow brown, clayey, fine and medium SAND.	
2.00			2.00	D			2.00	*End of Borehole at 2.00 m*	

General Remarks:
1. Exploratory hole remained dry and stable whilst open.
2. Roots and rootlets noted to 1.1m below ground level.

Driller:	IB	BOREHOLE RECORD Scale 1:25 See Key Sheet for explanation of symbols, etc.	CET INFRASTRUCTURE Giving our all
Logged:	JAC		
Chked:		Marble Hill House	**FIG A3**
Appr'd:			

Client: **English Heritage**		Depth (m) 1.20	Plant used: Hand Tools	TRIAL PIT NUMBER **TP01** Sheet 1 of 1
Width (m) 0.50	Length (m) 0.50	Method of Excavation : Hand Dug	Shoring: None	
Co-ordinates E N	Ground Level (mAOD)		Date Started :16/11/2016	

Samples/In Situ Tests			Change of Strata		Description of Strata	Legend
Depth (m)	Type	Test/Field Records	Reduced Level (mAOD)	Depth & *(Thickness)* (m)		
0.20	TJV			*(0.30)* 0.30	Firm, dark brown, slightly fine to coarse sandy, slightly gravelly, clayey SILT. Gravel is sub-angular and sub-rounded, fine to coarse brick, ceramic, flint and clay tile. (Made Ground)	
0.50	TJV			*(0.80)* 1.10	Stiff, friable, yellow brown, slightly clayey, slightly gravelly, fine and medium sandy, SILT. Gravel is sub-angular to sub-rounded, fine to coarse brick and lime mortar. Low cobble content of sub-angular brick at base of stratum. (Made Ground)	
				1.20	Stiff, friable, yellow brown, slightly clayey, fine and medium sandy, SILT. (Langley Silt Member)	
					End of Trial Pit at 1.20 m	

General Remarks:
1. Exploratory hole remained dry and stable whilst open.
2. Roots and rootlets noted to 1.2m below ground level.

Ref:	299004	TRIAL PIT RECORD Scale 1:25 Symbols and abbreviations in accoradance with AGS	CET INFRASTRUCTURE Giving our all
Logged:	JAC		
Check'd:		**Marble Hill House**	**FIG A4**
Appr'd:			

Client: **English Heritage**		Depth (m) 1.00	Plant used: Hand Tools	TRIAL PIT NUMBER **TP02** Sheet 1 of 1
Width (m) 0.45	Length (m) 0.55	Method of Excavation : Hand Dug	Shoring: None	
Co-ordinates E N	Ground Level (mAOD)		Date Started :16/11/2016	

Samples/In Situ Tests			Change of Strata		Description of Strata	Legend
Depth (m)	Type	Test/Field Records	Reduced Level (mAOD)	Depth & *(Thickness)* (m)		
				0.10	Asphalt.	
0.50	TJV			*(0.90)*	Light grey, slightly clayey, gravelly, fine to coarse SAND. Gravel is sub-angular and sub-rounded, fine to coarse brick, ceramic, clay tile, salt glaze fragments, flint and slate. Low cobble content of sub-angular brick. (Made Ground)	
				1.00	Brick COBBLES. Loose but possibly laid.	
					End of Trial Pit at 1.00 m	

General Remarks:
1. Exploratory hole remained dry and stable whilst open.
2. Roots and rootlets noted to 1.2m below ground level.
3. Trial pit terminated at 1.0m below ground level due to possible brick work obstruction at base of pit.

Ref:	299004	TRIAL PIT RECORD Scale 1:25 Symbols and abbreviations in accoradance with AGS	CET INFRASTRUCTURE Giving our all
Logged:	JAC		
Check'd:		**Marble Hill House**	**FIG A5**
Appr'd:			

Client: **English Heritage**		Depth (m) 1.30	Plant used: Hand Tools	TRIAL PIT NUMBER **TP03** Sheet 1 of 1
Width (m) 0.50	Length (m) 0.50	Method of Excavation : Hand Dug	Shoring: None	
Co-ordinates E N	Ground Level (mAOD)		Date Started :16/11/2016	

Samples/In Situ Tests			Change of Strata		Description of Strata	Legend
Depth (m)	Type	Test/Field Records	Reduced Level (mAOD)	Depth & *(Thickness)* (m)		
				(0.15) 0.15	Asphalt.	
0.30	TJV			*(0.35)* 0.50	Firm, brown, slightly fine to coarse sandy, slightly gravelly CLAY. Gravel is sub-angular and sub-rounded, fine to coarse, flint, brick, glass and clinker. (Made Ground)	
0.70	TJV			*(0.70)* 1.20	Light grey, gravelly, slightly clayey, fine to coarse SAND. Gravel is sub-angular and sub-rounded, fine to coarse, brick and lime mortar. (Made Ground)	
				1.30	Orange brown, clayey, fine to coarse SAND. (Langley Silt Member)	
					End of Trial Pit at 1.30 m	

General Remarks:
1. Exploratory hole remained dry and stable whilst open.
2. Roots and rootlets noted to 1.1m below ground level.

Ref:	299004	TRIAL PIT RECORD Scale 1:25 Symbols and abbreviations in accoradance with AGS	CET INFRASTRUCTURE Giving our all
Logged:	JAC		
Check'd:		**Marble Hill House**	**FIG A6**
Appr'd:			

Client: **English Heritage**		Depth (m) 0.85	Plant used:Hand Tools	TRIAL PIT NUMBER **TP04** Sheet 1 of 1
Width (m) 0.50	Length (m) 0.60	Method of Excavation : Hand Dug	Shoring: None	
Co-ordinates E N	Ground Level (mAOD)		Date Started :16/11/2016	

Samples/In Situ Tests			Change of Strata		Description of Strata	Legend
Depth (m)	Type	Test/Field Records	Reduced Level (mAOD)	Depth & *(Thickness)* (m)		
0.50	TJV			*(0.85)*	Firm, friable, slightly fine to coarse sandy, slightly gravelly, silty CLAY. Gravel is sub-angular and sub-rounded, fine to coarse brick, slate, mortar, flint and bivalve shell. (Made Ground)	
				0.85	*End of Trial Pit at 0.85 m*	

General Remarks:
1. Exploratory hole remained dry and stable whilst open.
2. Roots and rootlets noted to 0.85m below ground level.

Ref:	299004	TRIAL PIT RECORD Scale 1:25 Symbols and abbreviations in accoradance with AGS	CET INFRASTRUCTURE Giving our all
Logged:	JAC		
Check'd:		**Marble Hill House**	**FIG A7**
Appr'd:			

Client: **English Heritage**		Depth (m) 0.80	Plant used: Hand Tools	TRIAL PIT NUMBER **TP05** Sheet 1 of 1
Width (m) 0.50	Length (m) 0.50	Method of Excavation : Hand Dug	Shoring: None	
Co-ordinates E N	Ground Level (mAOD)		Date Started :16/11/2016	

Samples/In Situ Tests			Change of Strata		Description of Strata	Legend
Depth (m)	Type	Test/Field Records	Reduced Level (mAOD)	Depth & *(Thickness)* (m)		
				0.03	Asphalt.	
				0.13	COBBLES of possible limestone. Possible old courtyard floor.	
				(0.57)		
0.50	TJV				Firm, orange brown, fine and medium sandy, slightly gravelly, CLAY. Gravel is sub-angular and sub-rounded, fine and medium brick. (Made Ground)	
				0.70		
0.80		Vh = 89		0.80	Firm to stiff, orange brown, fine and medium sandy CLAY. (Langley Silt Member)	
					End of Trial Pit at 0.80 m	

General Remarks:
1. Exploratory hole remained dry and stable whilst open.
2. Roots and rootlets noted to 0.7m below ground level.

Ref:	299004	TRIAL PIT RECORD Scale 1:25 Symbols and abbreviations in accoradance with AGS	CET INFRASTRUCTURE Giving our all
Logged:	JAC		
Check'd:		**Marble Hill House**	**FIG A8**
Appr'd:			

Client: **English Heritage**		Depth (m) 1.00	Plant used:Hand Tools	TRIAL PIT NUMBER **TP06** Sheet 1 of 1
Width (m) 0.30	Length (m) 0.30	Method of Excavation : Hand Dug	Shoring: None	
Co-ordinates E N	Ground Level (mAOD)		Date Started :18/11/2016	

Samples/In Situ Tests			Change of Strata		Description of Strata	Legend
Depth (m)	Type	Test/Field Records	Reduced Level (mAOD)	Depth & *(Thickness)* (m)		
				0.10	Firm, black, slightly fine to coarse sandy, silty CLAY. Organic odour noted. (Made Ground)	
				(0.20)		
				0.30	Yellow brown, slightly clayey, silty, fine and medium SAND. Rare fine and medium gravel size sub-rounded flint and a singular fine gravel size fragment of sub-rounded brick. (Made Ground)	
0.50	D TJV			*(0.70)*		
				1.00	Yellow brown, clayey, silty, fine and medium SAND. (Langley Silt Member)	
					End of Trial Pit at 1.00 m	

General Remarks:
1. Exploratory hole remained dry and stable whilst open.
2. Roots and rootlets noted to 1.0m below ground level.
3. DCP01 carried out alongside trial pit.

Ref:	299004	TRIAL PIT RECORD Scale 1:25 Symbols and abbreviations in accoradance with AGS	CET INFRASTRUCTURE Giving our all
Logged:	JAC		
Check'd:		**Marble Hill House**	**FIG A9**
Appr'd:			

Client: **English Heritage**		Depth (m) 1.00	Plant used: Hand Tools	TRIAL PIT NUMBER **TP07** Sheet 1 of 1
Width (m) 0.30	Length (m) 0.30	Method of Excavation : Hand Dug	Shoring: None	
Co-ordinates E N	Ground Level (mAOD)		Date Started :18/11/2016	

Samples/In Situ Tests			Change of Strata		Description of Strata	Legend
Depth (m)	Type	Test/Field Records	Reduced Level (mAOD)	Depth & *(Thickness)* (m)		
				0.10	Firm, black, slightly fine to coarse sandy, silty CLAY. Organic odour noted. (Made Ground)	
0.20	TJV			*(0.20)*		
				0.30	Yellow brown, slightly clayey, silty, fine and medium SAND. Rare gravel of sub-rounded, fine and medium brick and mortar. (Made Ground)	
0.50	D			*(0.70)*		
				1.00	Yellow brown, clayey, silty, fine and medium SAND. (Langley Silt Member)	
					End of Trial Pit at 1.00 m	

General Remarks:
1. Exploratory hole remained dry and stable whilst open.
2. Roots and rootlets noted to 1.0m below ground level.
3. DCP02 carried out alongside trial pit.

Ref:	299004	TRIAL PIT RECORD Scale 1:25 Symbols and abbreviations in accoradance with AGS	CET INFRASTRUCTURE Giving our all
Logged:	JAC		
Check'd:		**Marble Hill House**	**FIG A10**
Appr'd:			

Client: **English Heritage**		Depth (m) 1.00	Plant used:Hand Tools	TRIAL PIT NUMBER **TP08** Sheet 1 of 1
Width (m) 0.30	Length (m) 0.30	Method of Excavation : Hand Dug	Shoring: None	
Co-ordinates E N	Ground Level (mAOD)		Date Started :18/11/2016	

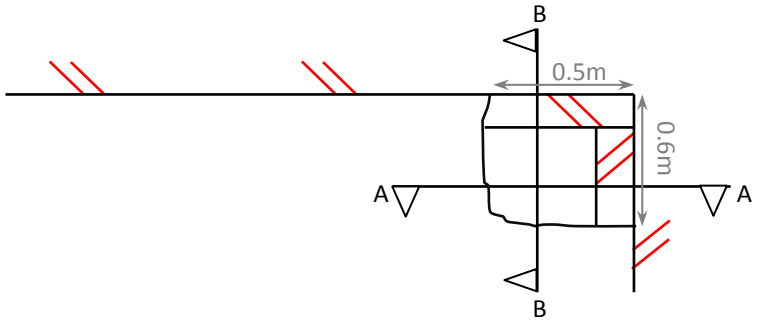
Samples/In Situ Tests			Change of Strata		Description of Strata	Legend
Depth (m)	Type	Test/Field Records	Reduced Level (mAOD)	Depth & *(Thickness)* (m)		
				(0.70)	Black, becoming dark orange brown with depth, slightly fine to coarse sandy, slightly gravelly, silty CLAY. Gravel is sub-angular and sub-rounded, fine to coarse, ceramic, glass, clay tile and clinker. (Made Ground)	
0.50	TJV					
0.60	D	Vh = 92				
				0.70		
0.80	D			*(0.30)*	Brown, slightly clayey, slightly gravelly, silty, fine to medium SAND. Gravel is angular to sub-rounded, fine and medium brick, bone, clay pipe stem, ceramic, glass and flint. (Made Ground)	
				1.00	*End of Trial Pit at 1.00 m*	

General Remarks:
1. Exploratory hole remained dry and stable whilst open.
2. Roots and rootlets noted to 1.0m below ground level.
3. DCP03 carried out alongside trial pit.

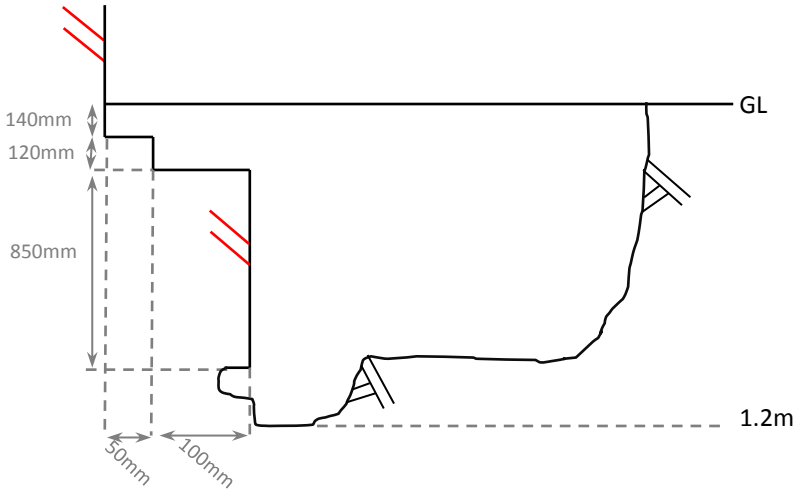
Ref:	299004	TRIAL PIT RECORD Scale 1:25 Symbols and abbreviations in accoradance with AGS	CET INFRASTRUCTURE Giving our all
Logged:	JAC		
Check'd:		**Marble Hill House**	**FIG A11**
Appr'd:			

Lead No:	299004	Scale:	N.T.S	Date:	Drawn by:	Checked:	Approved:
Project:	Marble Hill House			16/11/2016	JAC	PTE	PTE

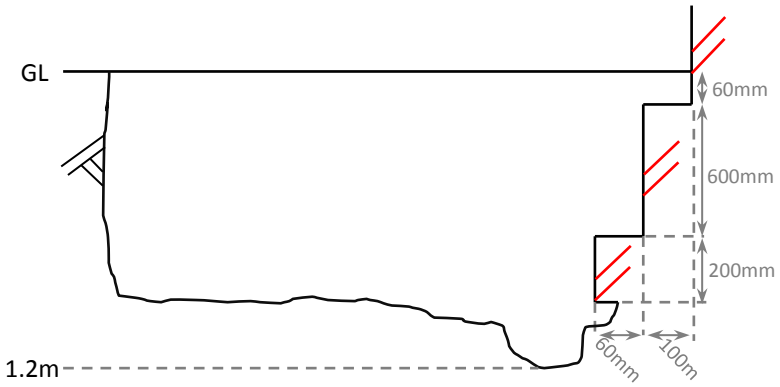
Plan



Section A-A



Section B-B



Notes

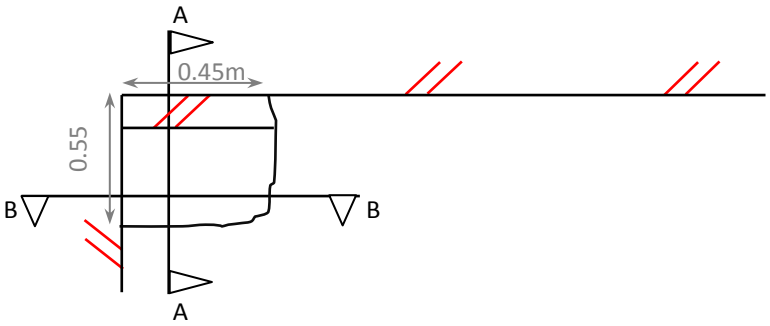
1 - Please see engineer's log TP01 for details of ground conditions encountered.

TP01

INFRASTRUCTURE
Giving our all

Lead No:	299004	Scale:	N.T.S	Date:	Drawn by:	Checked:	Approved:
Project:	Marble Hill House			16/11/2016	JAC	PTE	PTE

Plan



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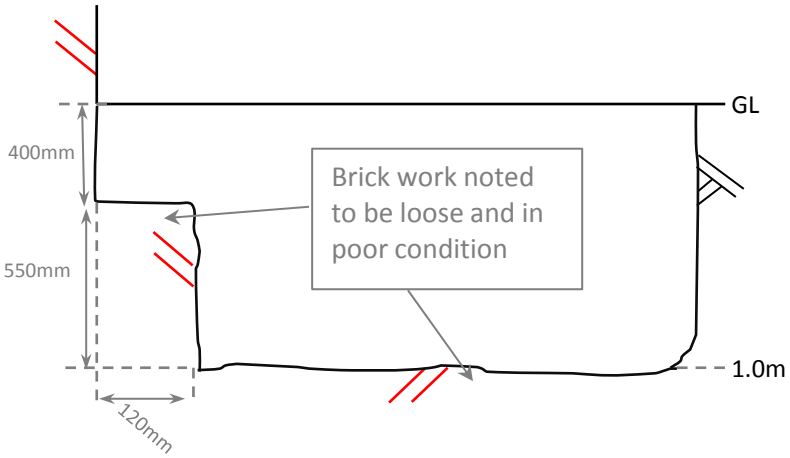

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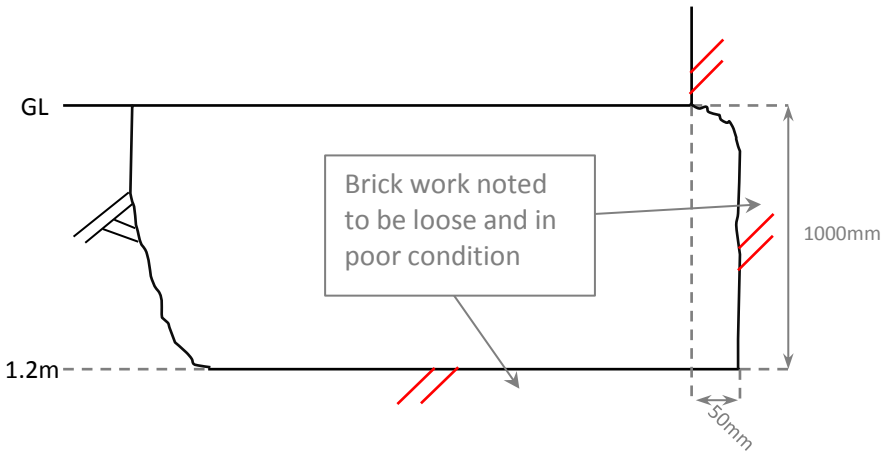


Notes

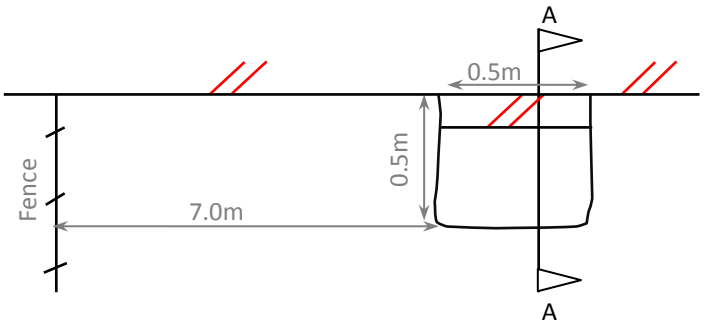
1 - Please see engineer's log TP02 for details of ground conditions encountered.

TP02

INFRASTRUCTURE
Giving our all

Lead No:	299004	Scale:	N.T.S	Date:	Drawn by:	Checked:	Approved:
Project:	Marble Hill House			16/11/2016	JAC	PTE	PTE

Plan



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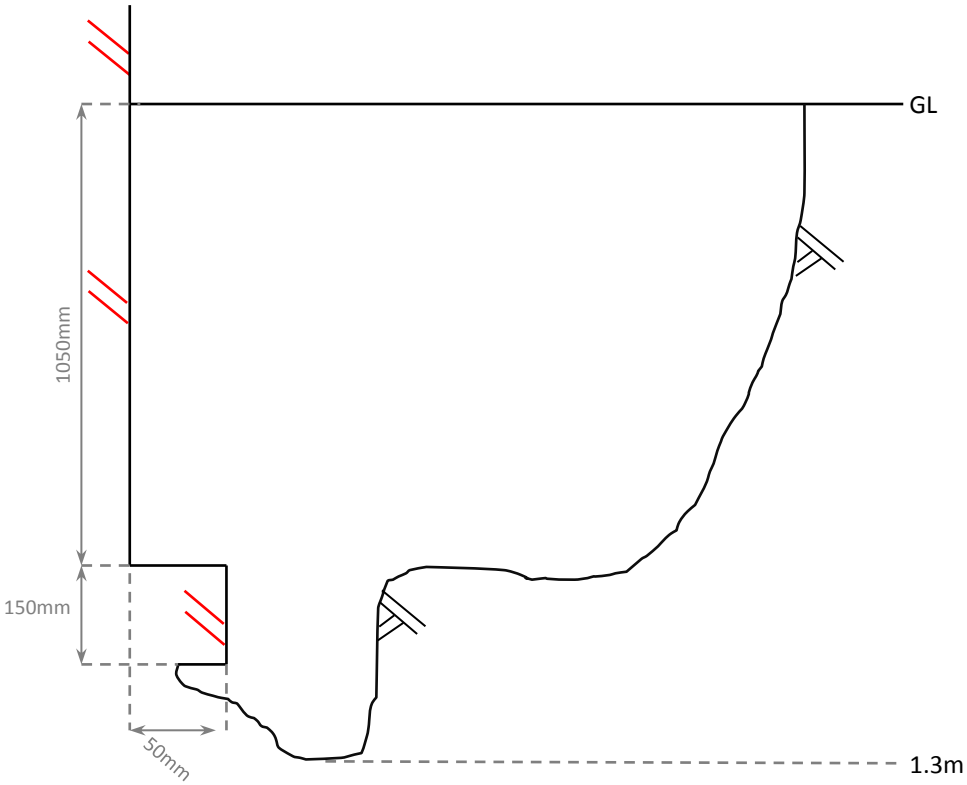


Notes

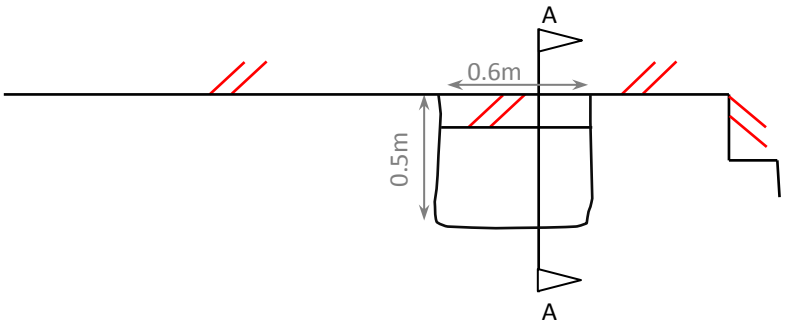
1 - Please see engineer's log TP03 for details of ground conditions encountered.

TP03

INFRASTRUCTURE
Giving our all

Lead No:	299004	Scale:	N.T.S	Date:	Drawn by:	Checked:	Approved:
Project:	Marble Hill House			16/11/2016	JAC	PTE	PTE

Plan



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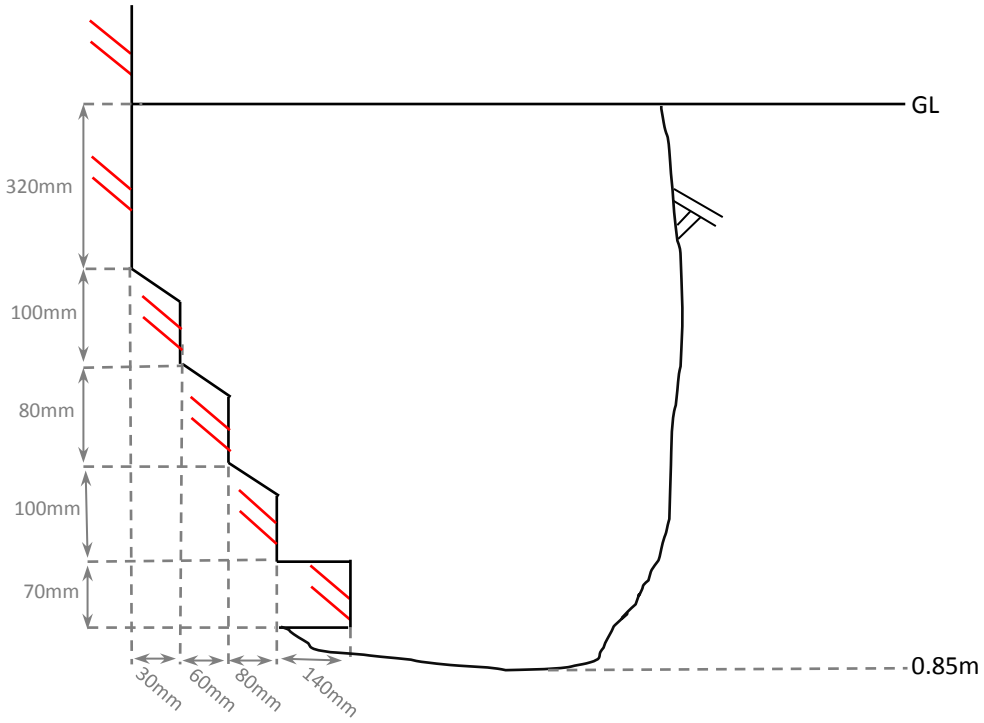


Notes

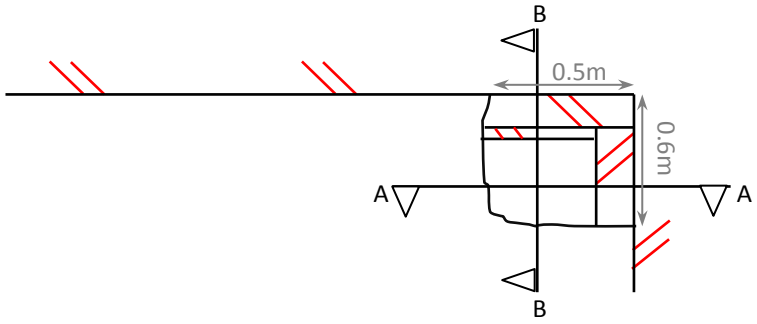
1 - Please see engineer's log TP04 for details of ground conditions encountered.

TP04

CET INFRASTRUCTURE Giving our all

Lead No:	299004	Scale:	N.T.S	Date:	Drawn by:	Checked:	Approved:
Project:	Marble Hill House			16/11/2016	JAC	PTE	PTE

Plan



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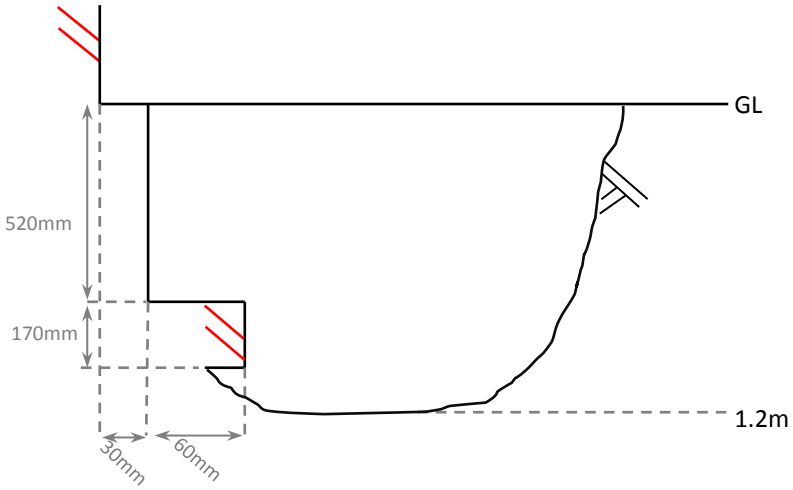
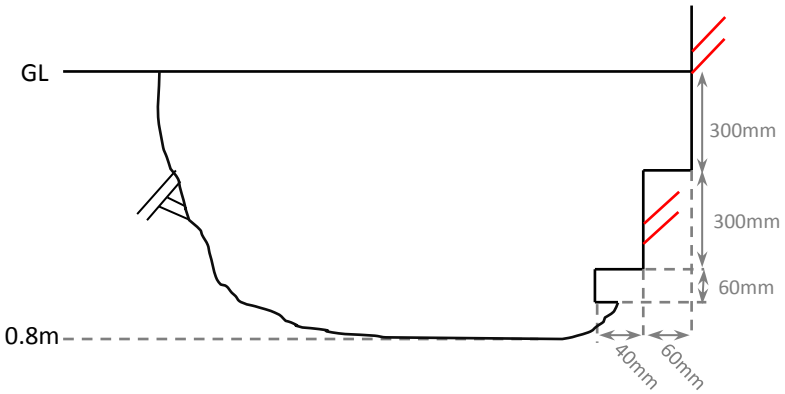


Section B-B



Notes

1 - Please see engineer's log TP05 for details of ground conditions encountered.

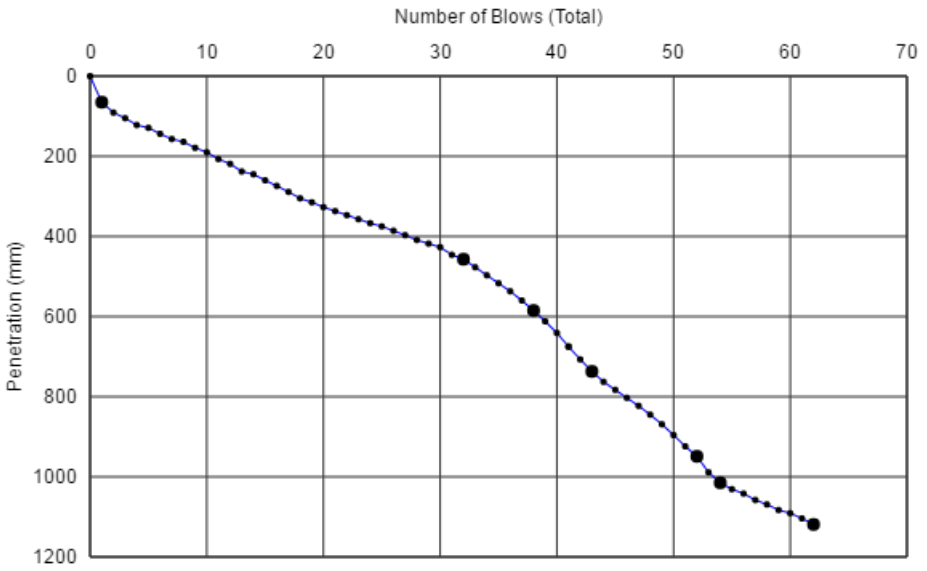
TP05

INFRASTRUCTURE
Giving our all

TEST REPORT:	**Estimation of California Bearing Ratio By DCP Method** In accordance with in-house procedure STP S9 (60° Cone)		
REPORT NUMBER:	299004 / 8015.1.1.1		
CLIENT REF:	299004	CLIENT:	English Heritage
DATE COMPLETED:	06/12/2016	ADDRESS:	The Engine House, Fire Fly Avenue, Swindon, SN2 2EH
TESTED BY:	James Connaughton	SITE:	Marble Hill House
LAYERS REMOVED:	No layers removed	LOCATION:	DCP01 (TP06)

TEST RESULTS

Gradient Ref	Depth from (mm)	Depth to (mm)	No. of blows (per layer)	Blow rate (mm/blow)	Estimated C.B.R. Value (%)
1	0	65	1	65.0	3.7
2	65	457	31	12.6	21
3	457	585	6	21.3	12
4	585	737	5	30.4	8.2
5	737	949	9	23.6	11
6	949	1015	2	33.0	7.5
7	1015	1119	8	13.0	20
8					



Remarks:
Depth of layer(s): 0mm
Layer Type: No layers removed

For and on behalf of CET
Phil West - Consultancy Manager

Approved Signatory
06-Dec-16

UKAS TESTING
0927

Report Format: S/RepSTP S9a

CET, Northdown House
Ashford Road
Harrietsham ME17 1QW

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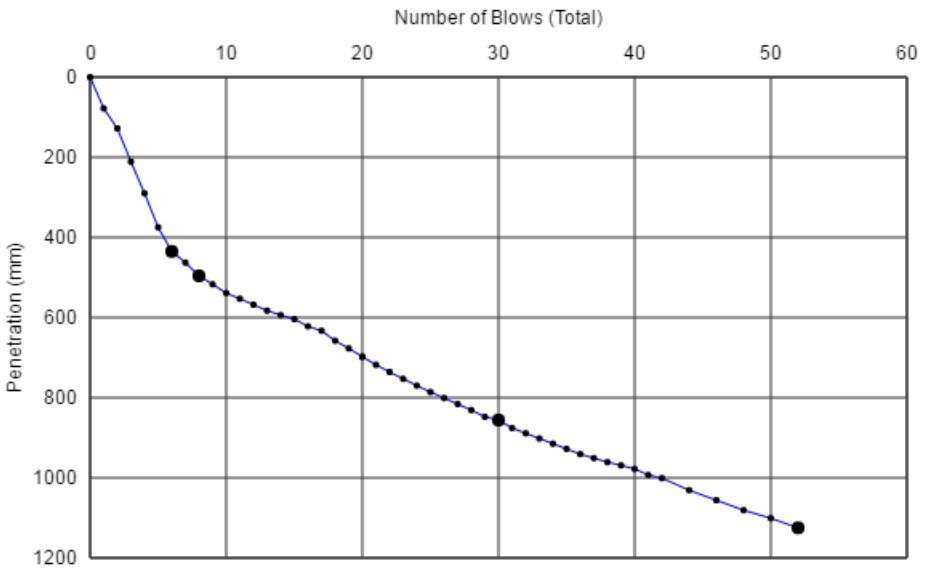
enquiries@cet-uk.com
www.cet-uk.com

TEST REPORT:	**Estimation of California Bearing Ratio By DCP Method** In accordance with in-house procedure STP S9 (60° Cone)		
REPORT NUMBER:	299004 / 8015.1.1.2		
CLIENT REF:	299004	CLIENT:	English Heritage
DATE COMPLETED:	06/12/2016	ADDRESS:	The Engine House, Fire Fly Avenue, Swindon, SN2 2EH
TESTED BY:	James Connaughton	SITE:	Marble Hill House
LAYERS REMOVED:	No layers removed	LOCATION:	DCP02 (TP07)

TEST RESULTS

Gradient Ref	Depth from (mm)	Depth to (mm)	No. of blows (per layer)	Blow rate (mm/blow)	Estimated C.B.R. Value (%)
1	0	435	6	72.5	3.3
2	435	496	2	30.5	8.1
3	496	856	22	16.4	16
4	856	1125	22	12.2	21
5					



Remarks:
Depth of layer(s): 0mm
Layer Type: No layers removed

For and on behalf of CET
Phil West - Consultancy Manager

Approved Signatory
06-Dec-16

UKAS TESTING
0927

Report Format: S/RepSTP S9a

CET, Northdown House
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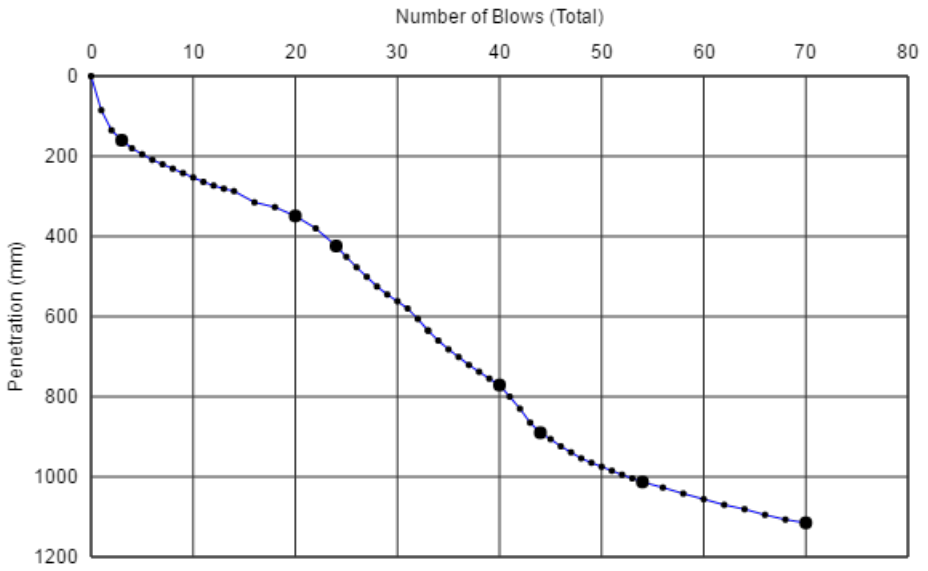
www.cet-uk.com

TEST REPORT:	**Estimation of California Bearing Ratio By DCP Method** In accordance with in-house procedure STP S9 (60° Cone)		
REPORT NUMBER:	299004 / 8015.1.1.3		
CLIENT REF:	299004	CLIENT:	English Heritage
DATE COMPLETED:	06/12/2016	ADDRESS:	The Engine House, Fire Fly Avenue, Swindon, SN2 2EH
TESTED BY:	James Connaughton	SITE:	Marble Hill House
LAYERS REMOVED:	No layers removed	LOCATION:	DCP03 (TP08)

TEST RESULTS

Gradient Ref	Depth from (mm)	Depth to (mm)	No. of blows (per layer)	Blow rate (mm/blow)	Estimated C.B.R. Value (%)
1	0	160	3	53.3	4.5
2	160	349	17	11.1	24
3	349	424	4	18.8	14
4	424	771	16	21.7	12
5	771	890	4	29.8	8.4
6	890	1013	10	12.3	21
7	1013	1115	16	6.4	43
8					



Remarks:
Depth of layer(s): 0mm
Layer Type: No layers removed

For and on behalf of CET
Phil West - Consultancy Manager

Approved Signatory
06-Dec-16

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Report Format: S/RepSTP S9a

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APPENDIX B

Laboratory Testing

INFRASTRUCTURE
Giving our all

TEST REPORT : **DETERMINATION OF THE MOISTURE CONTENT OF SOILS**
BS 1377:Part 2:1990 clause 3.2 - oven drying method

REPORT No.:	F16-299004-167820-1	CLIENT:	English Heritage
SAMPLE No.:	See Below	ADDRESS:	The Engine House,Fire Fly Avenue, Swindon, Wiltshire
CLIENT REF:	See Below	SITE:	Marble Hill House
DATE SAMPLED:	18/11/2016	SUPPLIER:	Details not supplied
SAMPLED BY:	James Connaughton	MATERIAL:	See Below
DATE RECEIVED:	30/11/2016	LOCATION:	See Below
DATE TEST COMPLETED:	01/12/2016	ACCEPT STD.:	Contract Specification
TESTED BY:	JW/SCRL	PREPARATION METHOD:	BS1377:Part1:1990 cl 7.3 & 7.4.5
TYPE OF SAMPLE:	Disturbed	VARIATIONS:	None

ORIENTATION OF TEST SPECIMEN WITHIN
ORIGINAL SAMPLE : N/A

RESULTS:

SAMPLE NO.	CLIENT REF/LOCATION	MATERIAL DESCRIPTION	MOISTURE CONTENT
167820/1	WS01 0.50	Brown very Silty Sandy Clay with occ Gravel	12%
167821/1	WS01 1.00	Brown very Silty Sandy Clay with occ Gravel	17%
167822/1	WS01 1.50	Brown very Silty Sandy Clay with occ Gravel	21%
167823/1	WS01 2.00	Brown very Silty Sandy Clay	19%
167824/1	WS01 2.20	Brown very Silty Sandy Clay with occ Gravel	25%
167825/1	WS02 0.50	Light Brown very Sandy Silty Granular material with Clay Pockets	11%
167826/1	WS02 1.00	Light Brown very Sandy Silty Granular material with Clay Pockets	11%
167827/1	WS02 1.50	Brown Sandy Silty Clay with occ Gravel	12%
167828/1	WS02 1.80	Light Brown very Sandy Silty Granular material with Clay Pockets	10%

REMARKS:

For and on behalf of CET

John Newbery - Laboratory Manager
Matt Oliver- Site Manager
Adrian McGilvery - Senior Technician
Chris Davidson - Laboratory Supervisor
Phil Mayhew - Operations Supervisor

UKAS TESTING
0927

Remaining sample will be retained for a minimum of 28 days from date of report.

REPORT FORMAT: L/Rep S2(Multi)/7

Approved Signatory
13-Dec-16

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Harrietsham, Nr Maidstone
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INFRASTRUCTURE
Giving our all

TEST REPORT : **DETERMINATION OF THE PLASTICITY INDEX OF SOIL**
BS 1377:Part 2:1990 clause 5.4

REPORT No.:	F16-299004-167821-2	CLIENT:	English Heritage
SAMPLE No.:	167821/2	ADDRESS:	The Engine House,Fire Fly Avenue, Swindon, Wiltshire
CLIENT REF:	WS01 1.00	SITE:	Marble Hill House
DATE SAMPLED:	18/11/2016	SUPPLIER:	Details not supplied
SAMPLED BY:	James Connaughton	MATERIAL:	Brown very silty sandy caly with occ gravel
DATE RECEIVED:	30/11/2016	LOCATION:	WS01 1.00
DATE TEST COMPLETED:	05/12/2016	ACCEPT STD:	Contract Specification
TESTED BY:	ALW	PREPARATION METHOD:	BS 1377:Part 1:1990
TYPE OF SAMPLE:	Disturbed	VARIATIONS:	No Variations

ORIENTATION OF TEST SPECIMEN WITHIN ORIGINAL SAMPLE: N/A

RESULT:

TEST DETAILS	TEST RESULT	SPECIFICATION DETAILS		
		Lower Limits		Upper Limits
THE LIQUID LIMIT OF THE SAMPLE: **BS 1377: Part 2: 1990 clause 4.4 (1 point)**	39%	N/A	-	N/A
THE PLASTIC LIMIT OF THE SAMPLE: **To BS1377 : Part2 : 1990 cl 5.3**	16%	N/A	-	N/A
THE PLASTICITY INDEX OF THE SAMPLE:	23%			
The Percentage Passing 425µm Test Sieve :	75%			
Sample History :	**The material was tested after washing through a 425µm test sieve**			

REMARKS:

Specification details not applicable.

Remaining sample will be retained for a minimum of 28 days from date of report.

For and on behalf of CET

John Newbery - Laboratory Manager
Matt Oliver- Site Manager
Adrian McGilvery - Senior Technician
Chris Davidson - Laboratory Supervisor
Phil Mayhew - Operations Supervisor

UKAS TESTING
0927

Approved Signatory
13-Dec-16

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Kent ME17 1QW

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INFRASTRUCTURE
Giving our all

TEST REPORT : **DETERMINATION OF THE PLASTICITY INDEX OF SOIL**
BS 1377:Part 2:1990 clause 5.4

REPORT No.:	F16-299004-167823-2	CLIENT:	English Heritage
SAMPLE No.:	167823/2	ADDRESS:	The Engine House,Fire Fly Avenue, Swindon, Wiltshire
CLIENT REF:	WS01 2.00	SITE:	Marble Hill House
DATE SAMPLED:	18/11/2016	SUPPLIER:	Details not supplied
SAMPLED BY:	James Connaughton	MATERIAL:	Brown very silty sandy clay
DATE RECEIVED:	30/11/2016	LOCATION:	WS01 2.00
DATE TEST COMPLETED:	5/12/2016	ACCEPT STD:	Contract Specification
TESTED BY:	ALW	PREPARATION METHOD:	BS 1377:Part 1:1990
TYPE OF SAMPLE:	Disturbed	VARIATIONS:	No Variations

ORIENTATION OF TEST SPECIMEN WITHIN ORIGINAL SAMPLE: N/A

RESULT:

TEST DETAILS	TEST RESULT	SPECIFICATION DETAILS		
		Lower Limits		Upper Limits
THE LIQUID LIMIT OF THE SAMPLE: **BS 1377: Part 2: 1990 clause 4.4 (1 point)**	38%	N/A	-	N/A
THE PLASTIC LIMIT OF THE SAMPLE: **To BS1377 : Part2 : 1990 cl 5.3**	14%	N/A	-	N/A
THE PLASTICITY INDEX OF THE SAMPLE:	24%			
The Percentage Passing 425µm Test Sieve :	99%			
Sample History :	**The material was tested in the natural state**			

REMARKS:

Specification details not applicable.

Remaining sample will be retained for a minimum of 28 days from date of report.

For and on behalf of CET

John Newbery - Laboratory Manager
Matt Oliver- Site Manager
Adrian McGilvery - Senior Technician
Chris Davidson - Laboratory Supervisor
Phil Mayhew - Operations Supervisor

UKAS TESTING
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Approved Signatory
13-Dec-16

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Kent ME17 1QW

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INFRASTRUCTURE
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TEST REPORT : **DETERMINATION OF THE PLASTICITY INDEX OF SOIL**
BS 1377:Part 2:1990 clause 5.4

REPORT No.:	F16-299004-167826-2	CLIENT:	English Heritage
SAMPLE No.:	167826/2	ADDRESS:	The Engine House,Fire Fly Avenue, Swindon, Wiltshire
CLIENT REF:	WS02 1.00	SITE:	Marble Hill House
DATE SAMPLED:	18/11/2016	SUPPLIER:	Details not supplied
SAMPLED BY:	James Connaughton	MATERIAL:	Light brown very sandy, silty granular material with clay pockets
DATE RECEIVED:	30/11/2016	LOCATION:	WS02 1.00
DATE TEST COMPLETED:	06/12/2016	ACCEPT STD:	Contract Specification
TESTED BY:	ALW	PREPARATION METHOD:	BS 1377:Part 1:1990
TYPE OF SAMPLE:	Disturbed	VARIATIONS:	No Variations

ORIENTATION OF TEST SPECIMEN WITHIN ORIGINAL SAMPLE: N/A

RESULT:

TEST DETAILS	TEST RESULT	SPECIFICATION DETAILS		
		Lower Limits		Upper Limits
THE LIQUID LIMIT OF THE SAMPLE: **BS 1377: Part 2: 1990 clause 4.4 (1 point)**	31%	N/A	-	N/A
THE PLASTIC LIMIT OF THE SAMPLE: **To BS1377 : Part2 : 1990 cl 5.3**	12%	N/A	-	N/A
THE PLASTICITY INDEX OF THE SAMPLE:	19%			
The Percentage Passing 425µm Test Sieve :	96%			
Sample History :	**The material was tested after washing through a 425µm test sieve**			

REMARKS:

Specification details not applicable.

Remaining sample will be retained for a minimum of 28 days from date of report.

For and on behalf of CET

John Newbery - Laboratory Manager
Matt Oliver- Site Manager
Adrian McGilvery - Senior Technician
Chris Davidson - Laboratory Supervisor
Phil Mayhew - Operations Supervisor

UKAS TESTING
0927

Approved Signatory
13-Dec-16

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INFRASTRUCTURE
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TEST REPORT : **DETERMINATION OF THE PLASTICITY INDEX OF SOIL**
BS 1377:Part 2:1990 clause 5.4

REPORT No.:	F16-299004-167827-2	CLIENT:	English Heritage
SAMPLE No.:	167827/2	ADDRESS:	The Engine House,Fire Fly Avenue, Swindon, Wiltshire
CLIENT REF:	WS02 1.50	SITE:	Marble Hill House
DATE SAMPLED:	18/11/2016	SUPPLIER:	Details not supplied
SAMPLED BY:	James Connaughton	MATERIAL:	Brown Sandy Silty Clay with occ Gravel
DATE RECEIVED:	30/11/2016	LOCATION:	WS02 1.50
DATE TEST COMPLETED:	05/12/2016	ACCEPT STD:	Contract Specification
TESTED BY:	ALW	PREPARATION METHOD:	BS 1377:Part 1:1990
TYPE OF SAMPLE:	Disturbed	VARIATIONS:	No Variations

ORIENTATION OF TEST SPECIMEN WITHIN ORIGINAL SAMPLE: N/A

RESULT:

TEST DETAILS	TEST RESULT	SPECIFICATION DETAILS		
		Lower Limits		Upper Limits
THE LIQUID LIMIT OF THE SAMPLE: **BS 1377: Part 2: 1990 clause 4.4 (1 point)**	35%	N/A	-	N/A
THE PLASTIC LIMIT OF THE SAMPLE: **To BS1377 : Part2 : 1990 cl 5.3**	16%	N/A	-	N/A
THE PLASTICITY INDEX OF THE SAMPLE:	19%			
The Percentage Passing 425µm Test Sieve :	85%			
Sample History :	**The material was tested after washing through a 425µm test sieve**			

REMARKS:

Specification details not applicable.

Remaining sample will be retained for a minimum of 28 days from date of report.

For and on behalf of CET

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INFRASTRUCTURE
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TEST REPORT: **DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION OF SOIL MATERIALS**
BS 1377 : Part 2 : 1990 : clause 9.2 : Wet Sieving Method
BS 1377 : Part 2 : 1990 : clause 9.5 - Fine Grading by Hydrometer Method

REPORT NUMBER:	F16-299004-167829-2	CLIENT:	English Heritage
SAMPLE NUMBER:	167829/2	ADDRESS:	The Engine House,Fire Fly Avenue, Swindon, Wiltshire
CLIENT REFERENCE:	TP06 0.50	SITE:	Marble Hill House
DATE RECEIVED:	18/11/2016	SUPPLIER:	Details Not Supplied
DATE SAMPLED	30/11/2016	MATERIAL :	Brown Slightly Silty Sand with Clay Pockets
SAMPLED BY:	James Connaughton	CLASSIFICATION:	Class 2A wet cohesive material
DATE TEST COMPLETED:	09/12/2016	LOCATION:	TP06 0.50
TESTED BY:	JW	PREPARATION METHOD:	BS 1377:Part 1:1990 clause 7.3 & 7.4.5
ORIENTATION OF TEST SPECIMEN		VARIATIONS:	No variations
WITHIN ORIGINAL SPECIMEN:	N/A	TYPE OF SAMPLE:	Disturbed

RESULT:

BS TEST SIEVE	PERCENTAGE PASSING	SPECIFICATION FOR HIGHWAY WORKS GRADING SPECIFICATION LIMITS		
mm	%			
125	100	100	-	100
100	100			
90	100			
75	100			
63	100			
50	100			
37.5	100			
28	100			
20	100			
14	100			
10	100			
6.3	100			
5.0	100			
3.35	100			
2.00	99	80	-	100
1.18	99			
0.600	98			
0.425	96			
0.300	85			
0.212	66			
0.150	53			
0.063	30	15	-	100
0.020	23			
0.006	16			
0.002	12			

Remarks: The material tested complies with the grading specification requirements stated above .

A particle density of (assumed) 2.65 Mg/m³ has been used in the hydrometer calculation

For and on behalf of CET

Remaining sample will be retained for a minimum of 28 days from date of report.

John Newbery - Laboratory Manager
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INFRASTRUCTURE
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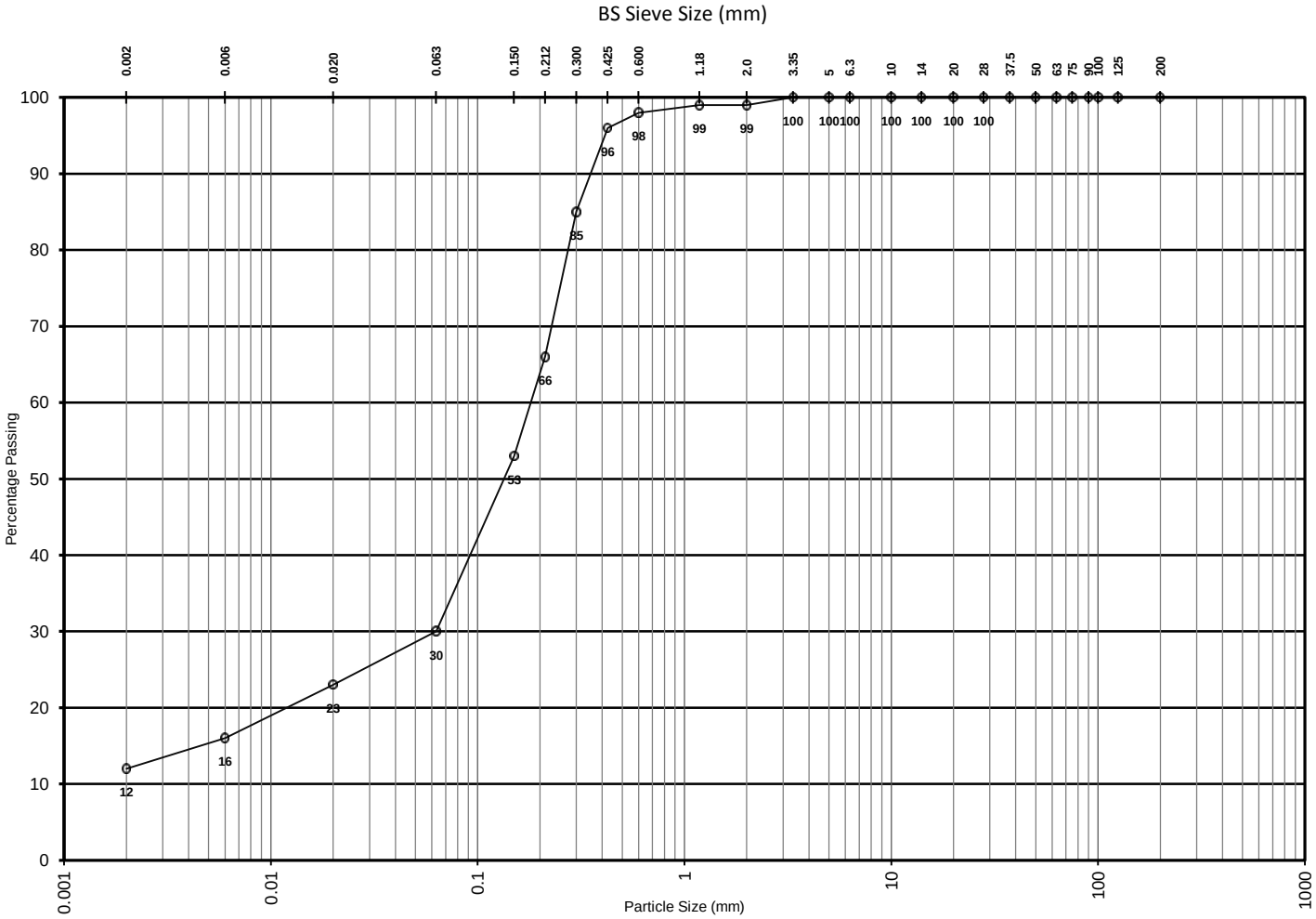
TEST REPORT: **DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION OF SOIL MATERIALS**
SEDIMENTATION BY THE HYDROMETER METHOD:
BS 1377 : Part 2 : 1990 : clause 9.5 - Fine Grading by Hydrometer Method
BS 1377 : Part 2 : 1990 : clause 9.2 - Wet Sieving Method

REPORT NUMBER: F16-299004-167829-2

ORGANIC MATTER CONTENT: Less than 0.5%

PRETREATMENT FOR ORGANIC MATTER: N/A



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		
	0.002	0.006	0.020	0.063	0.20	0.63	2.0	6.3	20	63	200
	SILT			SAND			GRAVEL			COBBLE	BOULDERS

Percentage BOULDERS: 0%

Percentage COBBLES: 0%

Percentage GRAVEL: 1%

Percentage SAND: 69%

Percentage SILT: 18%

Percentage CLAY: 12%

Report Format: L/Rep Hydro rev.2

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INFRASTRUCTURE
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TEST REPORT: **DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION OF SOIL MATERIALS**
BS 1377 : Part 2 : 1990 : clause 9.2 : Wet Sieving Method
BS 1377 : Part 2 : 1990 : clause 9.5 - Fine Grading by Hydrometer Method

REPORT NUMBER:	F16-299004-167830-2	CLIENT:	English Heritage
SAMPLE NUMBER:	167830/2	ADDRESS:	The Engine House,Fire Fly Avenue, Swindon, Wiltshire
CLIENT REFERENCE:	TP07 0.50	SITE:	Marble Hill House
DATE RECEIVED:	30/11/2016	SUPPLIER:	Details Not Supplied
DATE SAMPLED	18/11/2016	MATERIAL :	Light Brown Slightly Silty Sand with Clay Pockets
SAMPLED BY:	James Connaughton	CLASSIFICATION:	Class 2A wet cohesive material
DATE TEST COMPLETED:	09/12/2016	LOCATION:	TP07 0.50
TESTED BY:	JW	PREPARATION METHOD:	BS 1377:Part 1:1990 clause 7.3 & 7.4.5
ORIENTATION OF TEST SPECIMEN		VARIATIONS:	No variations
WITHIN ORIGINAL SPECIMEN:	N/A	TYPE OF SAMPLE:	Disturbed

RESULT:

BS TEST SIEVE	PERCENTAGE PASSING	SPECIFICATION FOR HIGHWAY WORKS GRADING SPECIFICATION LIMITS		
mm	%			
125	100	100	-	100
100	100			
90	100			
75	100			
63	100			
50	100			
37.5	100			
28	100			
20	100			
14	100			
10	100			
6.3	100			
5.0	100			
3.35	100			
2.00	100	80	-	100
1.18	99			
0.600	99			
0.425	62			
0.300	42			
0.212	34			
0.150	31			
0.063	26	15	-	100
0.020	19			
0.006	9			
0.002	6			

Remarks: The material tested complies with the grading specification requirements stated above .

A particle density of (assumed) 2.65 Mg/m³ has been used in the hydrometer calculation

For and on behalf of CET

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Matt Oliver- Site Manager
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Phil Mayhew - Operations Supervisor

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Remaining sample will be retained for a minimum of 28 days from date of report.

Report Format: L/Rep S8a/2

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13-Dec-16

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INFRASTRUCTURE
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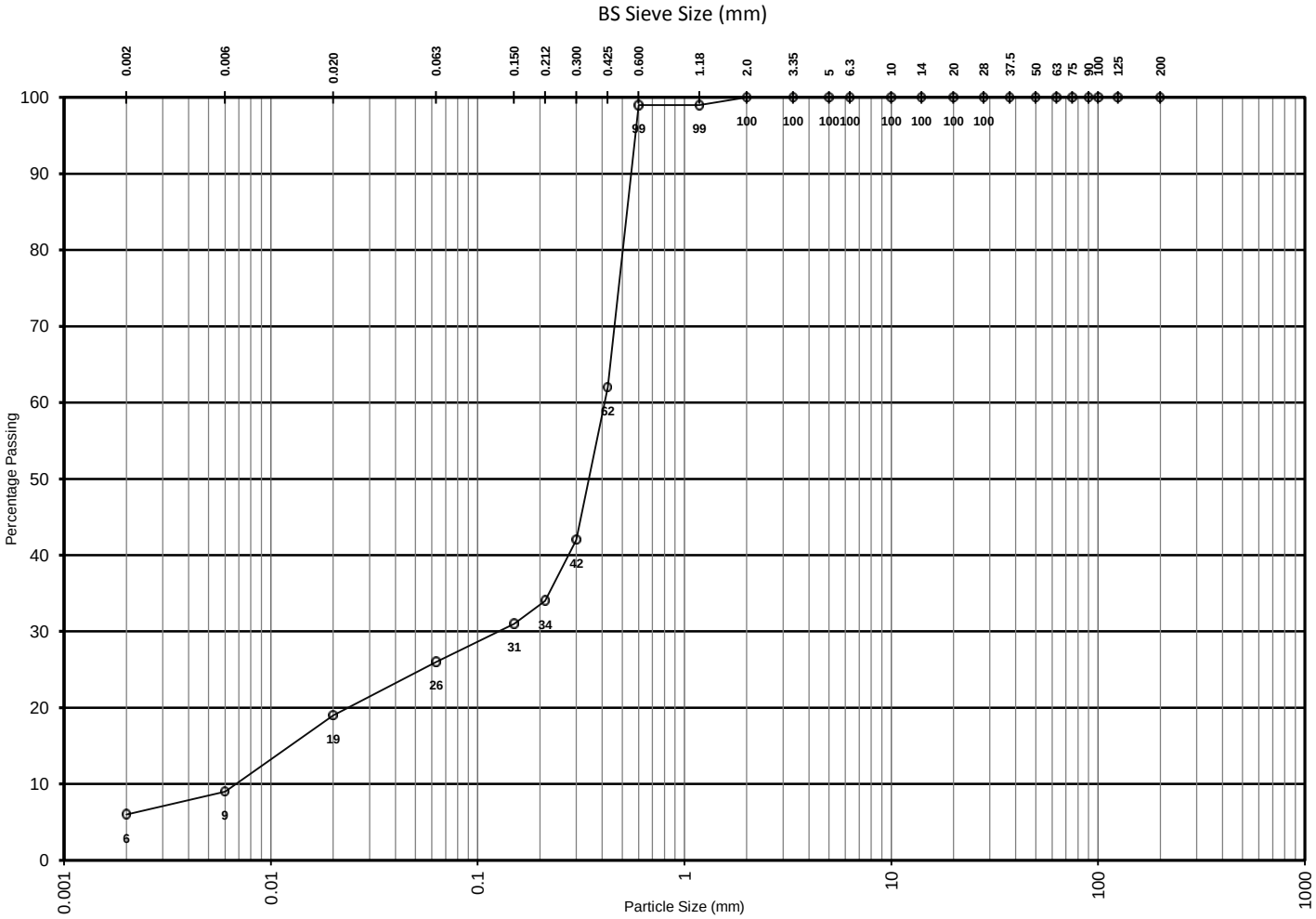
TEST REPORT: **DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION OF SOIL MATERIALS**
SEDIMENTATION BY THE HYDROMETER METHOD:
BS 1377 : Part 2 : 1990 : clause 9.5 - Fine Grading by Hydrometer Method
BS 1377 : Part 2 : 1990 : clause 9.2 - Wet Sieving Method

REPORT NUMBER: F16-299004-167830-2

ORGANIC MATTER CONTENT: Less than 0.5%

PRETREATMENT FOR ORGANIC MATTER: N/A



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		
	0.002	0.006	0.020	0.063	0.20	0.63	2.0	6.3	20	63	200
	SILT			SAND			GRAVEL			COBBLE	BOULDERS

Percentage BOULDERS: 0%

Percentage COBBLES: 0%

Percentage GRAVEL: 0%

Percentage SAND: 74%

Percentage SILT: 20%

Percentage CLAY: 6%

Report Format: L/Rep Hydro rev.2

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