

**Hillingdon Young Person's Hub
Falling Lane
Yiewsley
West Drayton
Middlesex**

Ground Investigation Factual Report



Report No. R17-12386

September 2017

Report prepared for the benefit of:

Mace
155 Moorgate
London
EC2M 6XB

Document Control		
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Revisions			
Reference	Revised By	Approved By	Date

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1. INTRODUCTION

It is proposed to develop the Young Person's Academy located at Falling Lane, Yiewsley, West Drayton, Middlesex. No specific development proposals were available at the time of drafting of this report, though it is understood that the development is to comprise the demolition of the existing school buildings and the construction of a new special needs secondary school for approximately 160 students.

Ashdown Site Investigation Limited was requested to provide an estimate for carrying out a ground investigation of the site by Mr. G. Madelin of Mace, 155 Moorgate, London, EC2M 6XB. The scope of the works allowed for and the terms and conditions under which the works were to be undertaken were set out within the offer letter Q17-5686/Rev 1, dated 21st July 2017.

The works were commissioned under a contract dated 10th August 2017.

The objectives of the works were to:

- a) Establish the expected geology and hydrogeology at the site;
- b) Investigate the shallow ground and groundwater conditions across the site; and
- c) Provide a factual report on the findings of the investigation.

This report should be read in conjunction with the Preliminary Ground Contamination Risk Assessment Report prepared by Ashdown Site Investigation Ltd¹.

¹ Ashdown Site Investigation Report No. R17-12386/ds, dated September 2017.

2. SITE DETAILS

The site comprises an irregular shaped plot of land located at Falling Lane, Yiewsley, West Drayton, Middlesex and is centred on the approximate Ordnance Survey national grid reference TQ 0613 8099. A site location plan and site plan are presented as Figure 1 and Figure 2, respectively.

The site is bounded by residential properties to the south and east, Rabbsfarm School to the west and open land to the north, with access to the site off Falling Lane to south.

The site is currently used as a school and comprises a single storey school building located centrally on the site, with five pre-fabricated classroom buildings located to the west and south west of the main school building. A modern extension is present on the east of the main school building. An asphalt surfaced car park separates the school building from the pre-fabricated classroom to the south west.

A garden area (including a wooden structure used as a classroom) was present to the east of the main school building, with a multi-use games area (MUGA) present to the north east.

The northern part of the site is comprised of a grassed playing field, with an approximately 1m high mound separating the playing field from the school building and the MUGA to the south.

Mature trees are present along the boundaries of the site.

3. GEOLOGICAL AND HYDROGEOLOGICAL INFORMATION

3.1 Expected Geology, Aquifer Designation & Groundwater Vulnerability

The stratigraphic succession that may be expected to underlie the site is presented in the following table.

Table 1. Expected Strata, Aquifer Designation and Description

Type	Stratum	Aquifer Designation	Source Protection Zone
Superficial	Langley Silt Member	Unproductive Stratum	The site does not lie within an Environment Agency Source Protection Zone with regard to the protection of the quality of groundwater that is abstracted for potable supply.
Bedrock	London Clay Formation	Unproductive Stratum	

The Langley Silt Member generally comprises soft structure-less sandy clay and silt with variable gravel content. The material may have been reworked by water flow to produce some lateral variability in the grain size of the soil. Where it has not been reworked by river action, it may be subject to significant collapse in volume where it is affected by water flow.

The eastern boundary of the site is inferred to be on a boundary between the Langley Silt Member and Lynch Hill Gravel Member. The Lynch Hill Gravel Member forms part of the river terrace gravel associated with the Thames. It typically comprises sand, derived mainly from the Tertiary beds, together with gravel of sub angular flint, chert and Lower Greensand rock types.

Nearby British Geological Society (BGS) boreholes suggest that the superficial Langley Silt Member extends to depths in the order of 2.5m to 5.0m below ground level, with a similar depth recorded for the Lynch Hill Gravel Member.

However, the Geology Maps also show that in the area to the east and south east of the site in the location of the Lynch Hill Gravel Member is shown as "worked ground". A review of the historical maps (1878) indicates the presence of a number of a gravel pit approximately 100m to the east of the site and a brick field 100m to the north east. A further gravel pit is shown approximately 200m to the south east of the south east of the site. A BGS borehole approximately 200m to the south east of the site and potentially within the former gravel pit, identified the depth of made ground to be approximately 4.0m below ground level, indicating that the gravel pit had been historically backfilled. No BGS boreholes are located within the former gravel pit or the brick field to the east and north east of the site.

The London Clay Formation that underlies both the Langley Silt and Lynch Hill Gravel Members, comprises a blue grey silty clay, which tends to weather to brown near to the upper surface. With depth, the clay becomes very stiff/hard, is frequently fissured and can contain some inclusions and beds of weak mudstone and siltstone.

Nearby BGS boreholes suggest that the London Clay formation extends to depths of between 25.0m – 30.0m below ground level.

4. GROUND INVESTIGATION

4.1 Introduction

The ground investigation comprised the excavation of a series of dynamic sampler boreholes. Gas and groundwater monitoring standpipes were installed in selected exploratory holes to enable future monitoring. The fieldwork was carried out on 30th August 2017. The exploratory hole locations are shown on Figure 2.

The scope of the fieldwork and positions of the boreholes were specified by Mace on a drawing provided for our use (Reference OHCAT Site investigation mark up 140817).

Descriptions of the strata encountered and comments on groundwater conditions are shown in the exploratory hole records given in Appendix A, together with notes to assist in their interpretation.

4.2 Exploratory Holes

4.2.1 Dynamic Sampler Boreholes

Eight boreholes (designated WS01 to WS05 and HA01 to HA03) were drilled to depths of between 1.00m and 3.00m below ground level.

The boreholes were formed by a series of 1.0m long, open ended, hollow steel tubes of up to 100mm diameter, each containing a removable plastic liner. The tubes, progressively reducing in diameter, were driven into the ground by means of a track-mounted drop weight. Each tube was extracted from the ground using a hydraulically operated jack and the enclosed sample was recovered in its plastic liner.

The system enables sub-samples to be taken for detailed examination and laboratory testing.

4.3 Sampling

Disturbed samples of soil were taken at the depths shown in the exploratory hole records and were collected in plastic bags, plastic tubs or amber jars fitted with gas tight lids.

On collection the amber jars were stored in cool boxes with cooling blocks to maintain temperatures below 4°C until transferred to refrigerators upon return to the office and subsequently forwarded to the external accredited chemical testing laboratory.

4.4 In Situ Testing

The depths of in situ testing, together with the test results, are either given on the exploratory hole records or are summarised separately in Appendix A. Notes providing additional information on the tests performed are included in the appendix.

4.4.1 DPSH Dynamic Probe (Super Heavy) Testing

Continuous dynamic probe tests were undertaken adjacent to boreholes WS01 to WS05. The tests were conducted to depths of between 2.4m and 4.0m below ground level using a super heavy DPSH-B² probing geometry.

The DPSH-B configuration is similar to that of the standard penetration test (SPT); the main differences being that the tip comprises a 90° cone, the driving rods are lighter than those used for SPT testing and the blow counts are recorded over 100mm increments rather than 300mm, as is the case for the SPT.

The blow counts recorded and the calculated dynamic point resistances, which account for inertia of the anvil and driving rods, are presented on the borehole records and separately in Appendix A.

4.4.2 Undrained Shear Strength

Undrained shear strength determinations were made in situ within the fine grained soils using a Geonor hand shear vane.

Additionally undrained shear strength determinations were made within samples of the fine grained soils held in the dynamic sampler liners using a hand penetrometer.

4.4.3 California Bearing Ratio Tests

Testing to determine the in situ California Bearing Ratio (CBR) of soils was conducted at shallow depths adjacent to boreholes WS01 to WS05 using a Transport Research Laboratory (TRL) cone penetrometer.

² As defined by BS EN ISO 22476-2:2005.

4.4.4 Soakage Testing

Falling head soakage tests were undertaken in boreholes WS03 and WS05 with the holes at a depth of 3.0m and 2.7m, respectively. The tests were carried out in general accordance with Kent County Council guidance³.

4.5 Installations

Gas and groundwater monitoring standpipes were installed within borehole WS01, WS04 and WS05 to depths of between 2.5m and 2.7m below ground level to enable future monitoring. Descriptions of the installations are shown on the exploratory hole records in Appendix A.

4.6 Laboratory Testing

Laboratory testing was scheduled by Ashdown Site Investigation Ltd and approved by Mace. Results from the laboratory tests are provided in Appendix B.

4.6.1 Geotechnical Testing

Geotechnical testing was undertaken by Ashdown Site Investigation Ltd in accordance with the methods given in BS1377⁴. Chemical testing to enable classification of the chemical environment of soils in accordance with BRE SD1⁵ was undertaken by an external UKAS accredited laboratory. Notes to assist with the interpretation of the tests are contained within Appendix B.

4.6.2 Chemical Testing

Chemical testing of selected samples was undertaken by a laboratory with recognised (UKAS and MCERTS) accreditation for quality control.

5. GROUND CONDITIONS

5.1 Stratigraphy

5.1.1 Surface Covering

A surface covering of topsoil, some 100mm to 150mm in thickness, was present at each of the borehole locations.

³ The Soakaway Design Guide published by Kent County Council, 2000.

⁴ BS1377:1990 Parts 1 to 8, Methods of test for soils for civil engineering purposes.

⁵ BRE Special Digest 1:2005 Concrete in Aggressive Ground.

5.1.2 *Made Ground*

Made ground, generally comprising gravelly sandy clay was recorded within the dynamic sampler boreholes (WS01-WS05) to shallow depths of between 0.20m and 0.30m below ground level.

Boreholes HA01-HA03 were specifically carried out within the mound in the central part of the site and recorded made ground, also comprising gravelly sandy clay, to the full depth of 1.0m.

Across all locations, the gravel fraction comprised variable quantities of flint, brick and charcoal-like material.

5.1.3 *Langley Silt Formation*

Underlying the made ground, boreholes WS01 to WS05 progressed into undisturbed stiff sandy silty clay deposits, to depths of between 2.40m and >3.00m below ground level.

These soils are considered to represent the Langley Silt Formation indicated on the published geological map.

5.1.4 *Lynch Hill Gravel Member*

Beneath the Langley Silt Formation deposits, where penetrated, boreholes encountered dense to very dense sandy fine to coarse gravel of flint.

These soils, which proved impenetrable by the dynamic sampling equipment below depths of between 2.5m and 2.7m, are considered to be representative of the Lynch Hill Gravel Member soils indicated on the published geology map.

5.2 *Stability*

Each of the exploratory holes was recorded to remain stable during the course of drilling.

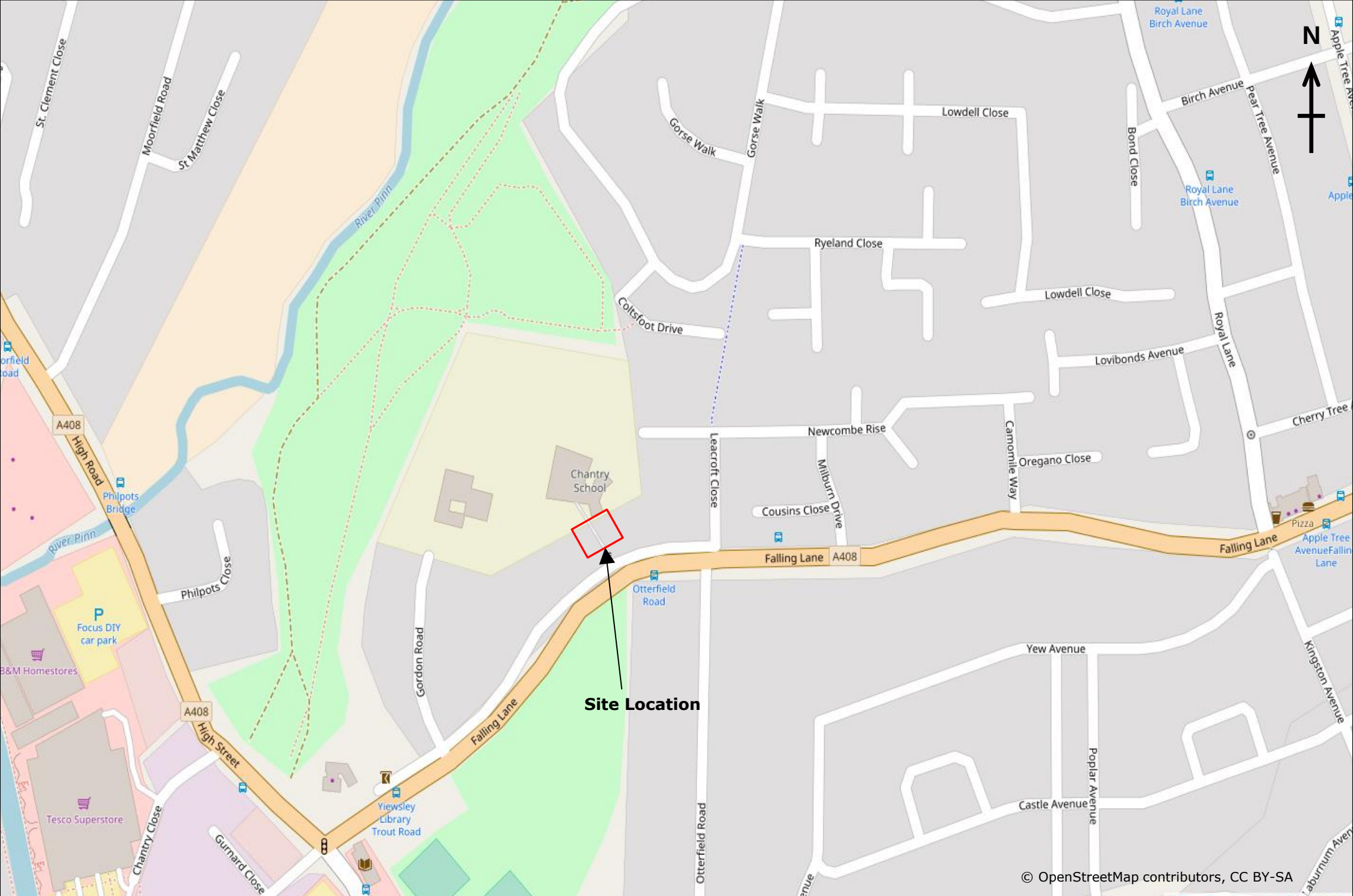
5.3 *Groundwater Conditions*

Groundwater was not encountered during the short period the boreholes remained open during the drilling works.

**Ashdown Site Investigation Ltd.
September 2017**

FIGURES

- Figure 1 Site Location Plan
- Figure 2 Borehole Location Plan



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ASHDOWN SITE INVESTIGATION

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DRAWN BY:	DATE:	SCALE (at A3):
RJ	31.8.17	1:500

SITE:
Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton

REPORT REF.:	FIGURE NO.:
R17-12386	Figure 2

DRAWING TITLE:
Borehole Location Plan

APPENDIX A

Exploratory Hole Notes

In Situ Testing Notes

Exploratory Hole Records

DPSH-B Dynamic Probe Records

Summary of In Situ TRL Cone Penetrometer (CBR) Test Results

Summary of Borehole Falling Head Soakage Test Results

NOTES FOR THE INTERPRETATION OF EXPLORATORY HOLE RECORDS

1 Symbols and abbreviations

Samples

U	'Undisturbed' Sample: - also known as 'U100' or 'U4' - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
Uo	Sample not obtained.
U*	Full penetration of sample not obtained.
Pi	Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
D	Disturbed Sample.
R	Root Sample.
B	Bulk Disturbed Sample.
W	Water Sample.
J	Jar Sample (sample taken in amber glass jar fitted with gas tight lid)
T	Tub Sample
Vi	Vial Sample

In situ Testing

S	Standard penetration test (SPT): In the borehole record the depth of the test is that at the start of the normal 450mm penetration. The number of blows per 75mm penetration is recorded, with the initial 150mm for seating blows being recorded followed by the blows recorded for the remaining 300mm of the test. The total blows to achieve the standard penetration of 300mm, discounting the seating blows, is noted as the N value on the log. Where the full penetration of the test cannot be achieved (a refusal) the number of blows achieved and the penetration achieved will be reported.
C	Standard Penetration Test (SPT) conducted usually in coarse grained soils or weak rocks using the same procedure as for the SPT but with a 50mm diameter, 60° apex solid cone fitted in place of the sampler. Variations in test results are indicated by the same symbols as for the SPT (above).
V	Shear Vane Test: Undrained shear strength (cohesion) (kN/m^2) shown within the Vane/Pen Test and N Value column.
H	Hand penetrometer Test: Undrained shear strength (cohesion) (kN/m^2) shown within the Vane/Pen Test and N Value column.
P	Perth Penetrometer Test: See "In Situ Testing Notes" for full description. Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column. In sand the number of blows is approximately equivalent to the SPT "N" value.

Excavation Method

CP	Cable Percussion Borehole
WLS	Dynamic Sampler Borehole using windowless sampler tubes
WS	Dynamic Sampler Borehole using window sampler tubes
TP	Trial Pit excavated using mechanic excavator
HDP	Trial Pit excavated using hand tools

2 **Soil Description**

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1:2002+A1:2013) and Part 2 Principles of classification (BS EN 14688-2:2004+A1:2013) as well as the BS5930:2015 code of Practice for Ground Investigations.

Fine Grained Soils

The consistency of fine grained soils given in the report is based on visual inspection of the samples and the strength is based on results of in situ and/or laboratory undrained shear strength tests when carried out.

The consistency is determined on the following basis:

Consistency	Manual Test
Very Soft	Soil exudes between fingers when squeezed in hand
Soft	Soils can be moulded by light finger pressure
Firm	Cannot be moulded by finger but rolled to 3mm threads without breaking/crumbling
Stiff	Crumbles/breaks when rolled to 3mm thick threads but can be moulded into a lump again
Very Stiff	Cannot be moulded and crumbles under pressure, can be indented by thumbnail

The terms used for the designation of the undrained shear strength are as follows:

Undrained Shear Strength	
Extremely to Very Low	<20 kPa
Low	20-40 kPa
Medium	40-75 kPa
High	75-150 kPa
Very High	150-300 kPa
Extremely high	300-600 kPa

Note: The undrained shear strength of the soils is measured either by laboratory testing or in the field using hand shear vane.

It is recognised that any coarse grained soil that has in excess of approximately 35% fine grained soil (clay and silt) can often be expected to behave as a fine grained soil despite the dominance of coarse grained material within the soil mass. To reflect this, it is the soil type that dominates the behaviour of the soil mass that appears on the exploratory hole records.

Coarse Grained Soils

The relative densities of coarse grained soils (sand and gravel) given in the report are based on field estimations and the results of the Standard Penetration Test (SPT) and equivalent correlation from other testing. The classification in terms of "N" Values is as follows:

SPT 'N' Value	Relative Density
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
Greater than 50	Very Dense

3 **Rock Description**

Description and classification of rocks has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of rock, Part 1 Identification and classification (BS EN ISO 14689-1:2003) as well as the BS5930:2015 code of Practice for Ground Investigations.

The description of rock mass includes the type of rock, structure, discontinuities and weathering.

The unconfined compressive strength of rock material is determined on the following basis:

Term	Field Identification	Unconfined Compressive Strength (MPa)
Extremely Weak	Indented by thumbnail	Less than 1
Very Weak	Crumbles under firm blows with point of geological hammer, peeled by pocket knife	1 to 5
Weak	Peeled by pocket knife with difficulty, shallow indentations made by firm blow with geological hammer	5 to 25
Medium Strong	Cannot be peeled or scraped with knife, can be fractured with single firm blow of geological hammer	25 to 50
Strong	Requires more than one blow of geological hammer to fracture	50 to 100
Very Strong	Requires many blows of geological hammer to fracture it	100 to 250
Extremely Strong	Can only be chipped with geological hammer	Greater than 250

The terms describing discontinuity and bedding spacing are as follows:

Bedding Thickness

Very Thick	>2000mm
Thick	2000-600mm
Medium	600-200mm
Thin	200-60mm
Very Thin	60-20mm
Thickly Laminated	20-6mm
Thinly Laminated	<6mm

Discontinuity Spacing

Very Wide	>2000mm
Wide	2000-600mm
Medium	600-200mm
Close	200-60mm
Very Close	60-20mm
Extremely Close	<20mm

Chalk

Chalk description is based on BS EN ISO 14688, BS EN ISO 14689 and BS5930. The classification of chalk generally follows the guidance offered by the Construction Industry Research and Information Association (CIRIA) C574, 'Engineering in Chalk'. This is based on assessment of chalk density, discontinuity and aperture spacing, and the proportion of intact chalk to silt of chalk. See additional chalk classification notes.

IN SITU TESTING NOTES

1 Standard Penetration Testing

Standard penetration testing (SPT) is carried out within a cased cable percussion borehole. The test is performed using either a split spoon (barrel) sampler in finer grained deposits, or, in coarser grained soils or weak rocks, using a 50mm diameter, 60° apex solid cone fitted in place of the sampler.

The sampler is driven into the deposits at the base of the borehole by means of a 63.5kg hammer falling freely through 760mm.

In the borehole record the depth of the test is that at the start of the normal 450mm penetration, the number of blows to achieve the standard penetration of 300mm (the "N" value) is shown after the test index letter, but the seating blows through the initial 150mm penetration are not reported unless the full penetration of 450mm cannot be achieved.

(BS EN ISO 22476-3:2005+A1:2011, Geotechnical investigation and testing – Field Testing, Part 3 and BS5930:2015 code of practice of for ground investigations)

2 Dynamic Probe Testing

The DPH (heavy) dynamic probing rig drives a 32mm diameter rod with a 15cm² area, 90° end cone into the ground by means of a 50kg hammer which falls freely through a distance of 0.5m. The number of blows per 100mm penetration (N_{100}) is recorded.

The DPSH (super heavy) dynamic probing rig drives a 35mm diameter rod with a 20cm² area, 90° end cone into the ground by means of a 63.5kg hammer that falls freely through a distance of 0.75m. The number of blows per 100mm penetration (N_{100}) is recorded. The results can provide a useful indication of the relative strength of the material. The dynamic probing is carried out in accordance with BS EN ISO 22476-2:2005+A1:2011 and BS5930.

3 Perth Penetrometer Test

In this test a hardened stainless steel rod is driven into the deposit by a 9.5kg sliding hammer falling freely through 600mm. After an initial penetration of 150mm the number of blows required to drive the rod a further 300mm is recorded. In sand the Perth blow count gives a close correlation to the "N-value" that could be expected from a standard penetration test (SPT) made in similar materials. The results are less reliable in coarser grained materials but can give an indication of their engineering properties. The perth penetrometer test is carried out in accordance with the Australian Standard AS 1289:6.3.3-1997, Method of Testing Soils for Engineering Purposes, there is no European equivalent code.

4 Undrained Shear Strength

Undrained shear strength determinations are made in situ within the fine grained soils using a Geonor hand shear vane or (usually in the case of window sampler boreholes) a hand penetrometer. The test records the undrained shear strength (cohesion) in kN/m². The shear vane records a maximum shear strength of 130kN/m² and the hand penetrometer records a maximum shear strength of 250kN/m².

3 California Bearing Ratio Test

In this test a hand held Farnell cone penetrometer apparatus is pushed into the deposits for the estimation of the California bearing ratio of the subgrade (for use in pavement design). The test equipment is design for the estimation of the bearing ratio of fine grained soils (clay and silt) only and is unsuitable for use in coarse grained soils and rock.

ASHDOWN SITE INVESTIGATION L · I · M · I · T · E · D E-mail: contact@ashdownsi.co.uk Web: www.ashdownsi.co.uk Tel: 01273 483119		Site Name: Hillingdon Young Persons Hub, Falling lane, Yiewsley, West Drayton												
		Job Number: R17-12386												
Start Date: 30/08/2017		Borehole Number: HA01	Sheet 1 of 1											
End Date: 30/08/2017														
Samples and In Situ Testing Dynamic Probe Blows/100mm Legend Depth Stratum Description														
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	0	5	10	15	20	25	30		0.00	Topsoil.
	J T	0.20											0.10	MADE GROUND: Brown gravelly sandy clay. Gravel is angular to subrounded fine to coarse flint and occasional charcoal- like material. Sand is fine to coarse.
	J T	0.50												
	J T	0.80												
													1.00	End of borehole at 1.00m
Remarks														
Groundwater: Borehole dry on completion.														Excavation Method: WLS
Stability: Borehole stable on completion.														Borehole Diameter: Various
Notes: n/a														Made By: RJ

ASHDOWN SITE INVESTIGATION L · I · M · I · T · E · D E-mail: contact@ashdownsi.co.uk Web: www.ashdownsi.co.uk Tel: 01273 483119 Site Name: Hillingdon Young Persons Hub, Falling lane, Yiewsley, West Drayton Job Number: R17-12386 Start Date: 30/08/2017 End Date: 30/08/2017		Borehole Number: HA02 Sheet 1 of 1													
Samples and In Situ Testing Dynamic Probe Blows/100mm Legend Depth Stratum Description															
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	0	5	10	15	20	25	30		0.00	Topsoil.	
	J T	0.20											0.10	MADE GROUND: Brown gravelly sandy clay. Gravel is angular to subrounded fine to coarse flint and occasional brick and charcoal-like material. Sand is fine to coarse.	
	J T	0.50													
	J T	0.80													
													1.00	End of borehole at 1.00m	
Remarks Groundwater: Borehole dry on completion. Stability: Borehole stable on completion. Notes: n/a														Excavation Method: WLS Borehole Diameter: Various Made By: RJ	

ASHDOWN SITE INVESTIGATION L · I · M · I · T · E · D E-mail: contact@ashdownsi.co.uk Web: www.ashdownsi.co.uk Tel: 01273 483119		Site Name: Hillingdon Young Persons Hub, Falling lane, Yiewsley, West Drayton												
		Job Number: R17-12386												
Start Date: 30/08/2017		Borehole Number: HA03	Sheet 1 of 1											
End Date: 30/08/2017														
Samples and In Situ Testing Dynamic Probe Blows/100mm Legend Depth Stratum Description														
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	0	5	10	15	20	25	30		0.00	Topsoil.
	J T	0.20											0.10	MADE GROUND: Brown gravelly sandy clay. Gravel is angular to rounded fine to coarse flint and occasional brick. and charcoal-like material. Sand is fine to coarse.
	J T	0.80											1.00	End of borehole at 1.00m
Remarks														
Groundwater: Borehole dry on completion.														Excavation Method: WLS
Stability: Borehole stable on completion.														Borehole Diameter: Various
Notes: n/a														Made By: RJ

Made By: RJ

ASHDOWN SITE INVESTIGATION L · I · M · I · T · E · D E-mail: contact@ashdownsi.co.uk Web: www.ashdownsi.co.uk Tel: 01273 483119		Site Name: Hillingdon Young Persons Hub, Falling lane, Yiewsley, West Drayton												
		Job Number: R17-12386												
		Start Date: 30/08/2017					Borehole Number: WS02							
		End Date: 30/08/2017												
Sheet 1 of 1														
Samples and In Situ Testing Dynamic Probe Blows/100mm Legend Depth Stratum Description														
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	0	5	10	15	20	25	30			
	J T	0.15												0.00
														0.10
														0.30
	D	0.50												
	H	0.50		170										
	J T	0.50												
	H	0.80		>250										
	V	1.00		>130										
	H	1.20		>250										
	D	1.50												
	H	1.50		140										
	J T	1.50												
	U	1.70	2.00											
	V	2.00		>130										
	J T	2.30												
	D	2.60												2.40
														2.60

Site Name: Hillingdon Young Persons Hub, Falling lane, Yiewsley, West Drayton

Job Number: R17-12386

Start Date: 30/08/2017

End Date: 30/08/2017

Borehole Number:

WS03

Sheet 1 of 1

Samples and In Situ Testing				Dynamic Probe		Legend	Depth	Stratum Description
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Blows/100mm			
	J T	0.15	0.30				0.00	Topsoil.
	B	0.20					0.10	MADE GROUND: Dark brown gravelly sandy clay. Gravel is angular to subrounded fine to coarse brick and occasional charcoal-like material.
	D	0.50					0.20	Sand is fine to coarse.
	H	0.50		>250				Stiff varying to very stiff orange brown slightly sandy silty CLAY. Sand is fine to medium. (Langley Silt Formation)
	J T	0.50						
	H	0.80		>250				
	V	1.00		>130				
	H	1.20		140				
	D	1.50						
	H	1.50		140				
	J T	1.50						
	U	1.70	2.00					
	V	2.00		120				
	D	2.50						
	H	2.50		225				
	J T	2.50						
	H	2.80		225				
	D	3.00					3.00	with rare gravel of flint towards base.
	V	3.00		>130				End of borehole at 3.00m

Remarks	
---------	--

Groundwater: Borehole dry on completion.

Stability: Borehole cased to 2.00m depth.

Notes: n/a

Excavation Method: WLS

Borehole Diameter: Various

Made By: RJ

Site Name: Hillingdon Young Persons Hub, Falling lane, Yiewsley, West Drayton

Job Number: R17-12386

Start Date: 30/08/2017

End Date: 30/08/2017

Borehole Number:

WS04

Sheet 1 of 1

Samples and In Situ Testing				Dynamic Probe			Stratum Description	
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Blows/100mm	Legend	Depth	
	J T	0.20	0.60				0.00	Topsoil
	B	0.25					0.15	MADE GROUND: Dark brown gravelly sandy clay. Gravel is angular to rounded fine to coarse brick, charcoal-like material and flint. Sand is fine to coarse.
	H	0.40		115			0.25	
	D	0.50						
	H	0.50		140				Stiff orange brown slightly sandy silty CLAY. Sand is fine to medium. (Langley Silt Formation)
	H	0.60		140				
	J T	0.60						
	U	0.70	1.00					
	V	1.00		>130				becoming stiff to very stiff below 1.00m depth.
	H	1.20		225				
	D	1.50	2.00					
	H	1.50		>250				with rare gravel of siltstone at 1.50m depth.
	J T	1.50						
	H	1.60		>250				
	U	1.70						
	V	2.00		110				with occasional gravel of flint below 2.20m depth.
	D	2.50						2.50
J T	2.50						2.60	
D	2.60					End of borehole at 2.60m		

Remarks	
---------	--

Groundwater: Borehole dry on completion.

Stability: Borehole stable on completion.

Notes: No Further Progress below 2.60m depth - too dense. Standpipe installed to 2.60m depth; 0.60 to 2.60m slotted pipe with gravel surround; 0.60m to ground level plain pipe with bentonite seal; completed with gas tap and security cover concreted flush with ground surface.

Excavation Method: WLS

Borehole Diameter: Various

Made By: RJ

ASHDOWN SITE INVESTIGATION L · I · M · I · T · E · D E-mail: contact@ashdownsi.co.uk Web: www.ashdownsi.co.uk Tel: 01273 483119		Site Name: Hillingdon Young Persons Hub, Falling lane, Yiewsley, West Drayton													
		Job Number: R17-12386													
		Start Date: 30/08/2017					Borehole Number: WS05								
End Date: 30/08/2017					Sheet 1 of 1										
Samples and In Situ Testing Dynamic Probe Legend Depth Stratum Description															
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	0	5	10	15	20	25	30		Depth	Stratum Description	
	J T	0.15	0.50										0.00	Topsoil	
	B	0.20												0.10	MADE GROUND: Brown slightly gravelly sandy silty clay. Gravel is angular to subrounded fine to coarse flint and rare brick. Sand is fine to coarse.
	D	0.60	1.25											0.20	Stiff varying to very stiff orange brown slightly gravelly slightly sandy silty CLAY. Gravel is angular to rounded fine flint. Sand is fine to medium. (Langley Silt Formation)
	J T	0.60													
	U	1.00													
	V	1.00		>130											
	H	1.30		>250											
	D	1.50		>250											
	H	1.50		>250											
	J T	1.50		>250											
	V	2.00		>130											
	D	2.20													
	J T	2.30													
	D	2.70												2.50	Dense to very dense orange brown clayey sandy angular to subrounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (Lynch Hill Gravel Member)
													2.70	End of borehole at 2.70m	
Remarks															
Groundwater: Borehole dry on completion.														Excavation Method: WLS	
Stability: Borehole cased to 2.00m depth.														Borehole Diameter: Various	
Notes: Nor further progress below 2.70m depth - too dense. Standpipe installed to 2.70m depth; 0.70 to 2.70m slotted pipe with gravel surround; 0.70m to ground level plain pipe with bentonite seal; completed with gas tap and security cover concreted flush with ground surface.														Made By: RJ	

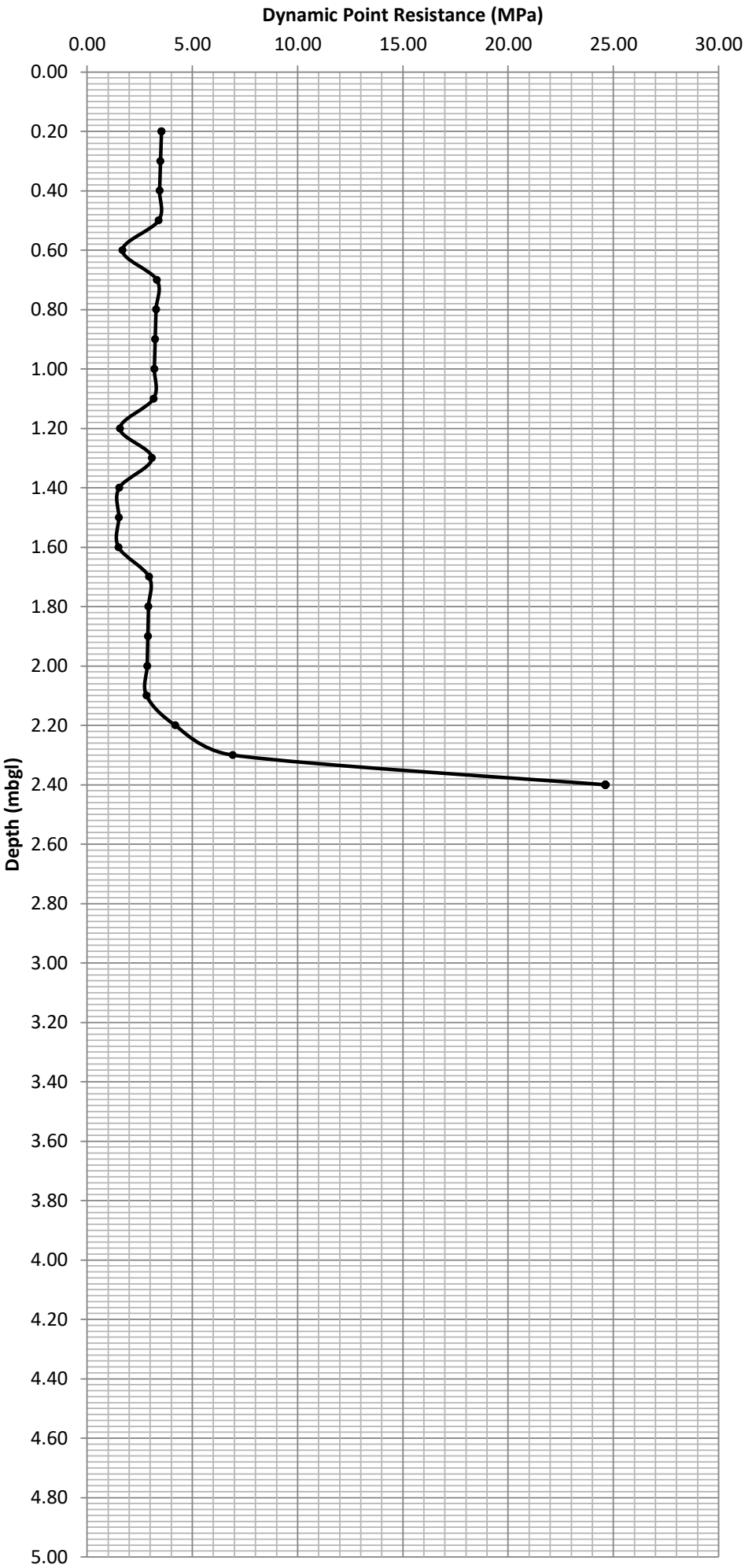
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Dynamic Probe Record

SITE Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton

Report Ref. R17-12386

Test Location Reference		WS01		
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20	2	0.05	3.69	3.53
0.30	2	0.05	3.69	3.49
0.40	2	0.05	3.69	3.44
0.50	2	0.05	3.69	3.40
0.60	1	0.10	1.84	1.68
0.70	2	0.05	3.69	3.31
0.80	2	0.05	3.69	3.27
0.90	2	0.05	3.69	3.23
1.00	2	0.05	3.69	3.20
1.10	2	0.05	3.69	3.16
1.20	1	0.10	1.84	1.56
1.30	2	0.05	3.69	3.08
1.40	1	0.10	1.84	1.52
1.50	1	0.10	1.84	1.51
1.60	1	0.10	1.84	1.49
1.70	2	0.05	3.69	2.95
1.80	2	0.05	3.69	2.92
1.90	2	0.05	3.69	2.88
2.00	2	0.05	3.69	2.85
2.10	2	0.05	3.69	2.82
2.20	3	0.03	5.53	4.19
2.30	5	0.02	9.22	6.91
2.40	18	0.01	33.19	24.63
2.50				
2.60				
2.70				
2.80				
2.90				
3.00				
3.10				
3.20				
3.30				
3.40				
3.50				
3.60				
3.70				
3.80				
3.90				
4.00				
4.10				
4.20				
4.30				
4.40				
4.50				
4.60				
4.70				
4.80				
4.90				
5.00				



Notes:
No further progress below 2.40m- hammer bouncing

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.74
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

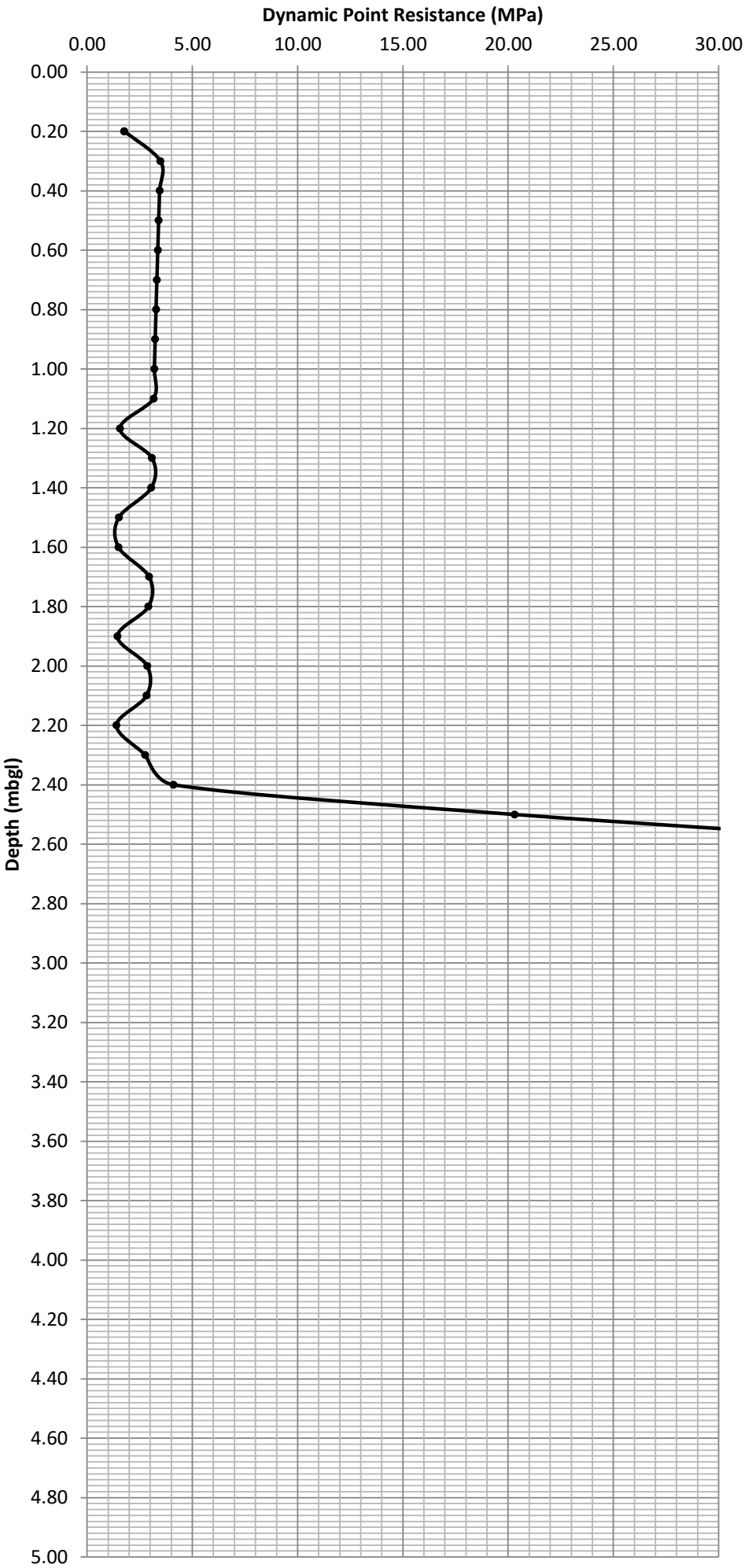
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Dynamic Probe Record

SITE Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton

Report Ref. R17-12386

Test Location Reference		WS02		
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20	1	0.10	1.84	1.77
0.30	2	0.05	3.69	3.49
0.40	2	0.05	3.69	3.44
0.50	2	0.05	3.69	3.40
0.60	2	0.05	3.69	3.36
0.70	2	0.05	3.69	3.31
0.80	2	0.05	3.69	3.27
0.90	2	0.05	3.69	3.23
1.00	2	0.05	3.69	3.20
1.10	2	0.05	3.69	3.16
1.20	1	0.10	1.84	1.56
1.30	2	0.05	3.69	3.08
1.40	2	0.05	3.69	3.05
1.50	1	0.10	1.84	1.51
1.60	1	0.10	1.84	1.49
1.70	2	0.05	3.69	2.95
1.80	2	0.05	3.69	2.92
1.90	1	0.10	1.84	1.44
2.00	2	0.05	3.69	2.85
2.10	2	0.05	3.69	2.82
2.20	1	0.10	1.84	1.40
2.30	2	0.05	3.69	2.76
2.40	3	0.03	5.53	4.10
2.50	15	0.01	27.66	20.31
2.60	31	0.00	57.16	41.56
2.70				
2.80				
2.90				
3.00				
3.10				
3.20				
3.30				
3.40				
3.50				
3.60				
3.70				
3.80				
3.90				
4.00				
4.10				
4.20				
4.30				
4.40				
4.50				
4.60				
4.70				
4.80				
4.90				
5.00				



Notes:
No further progress below 2.60m- hammer bouncing

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.74
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

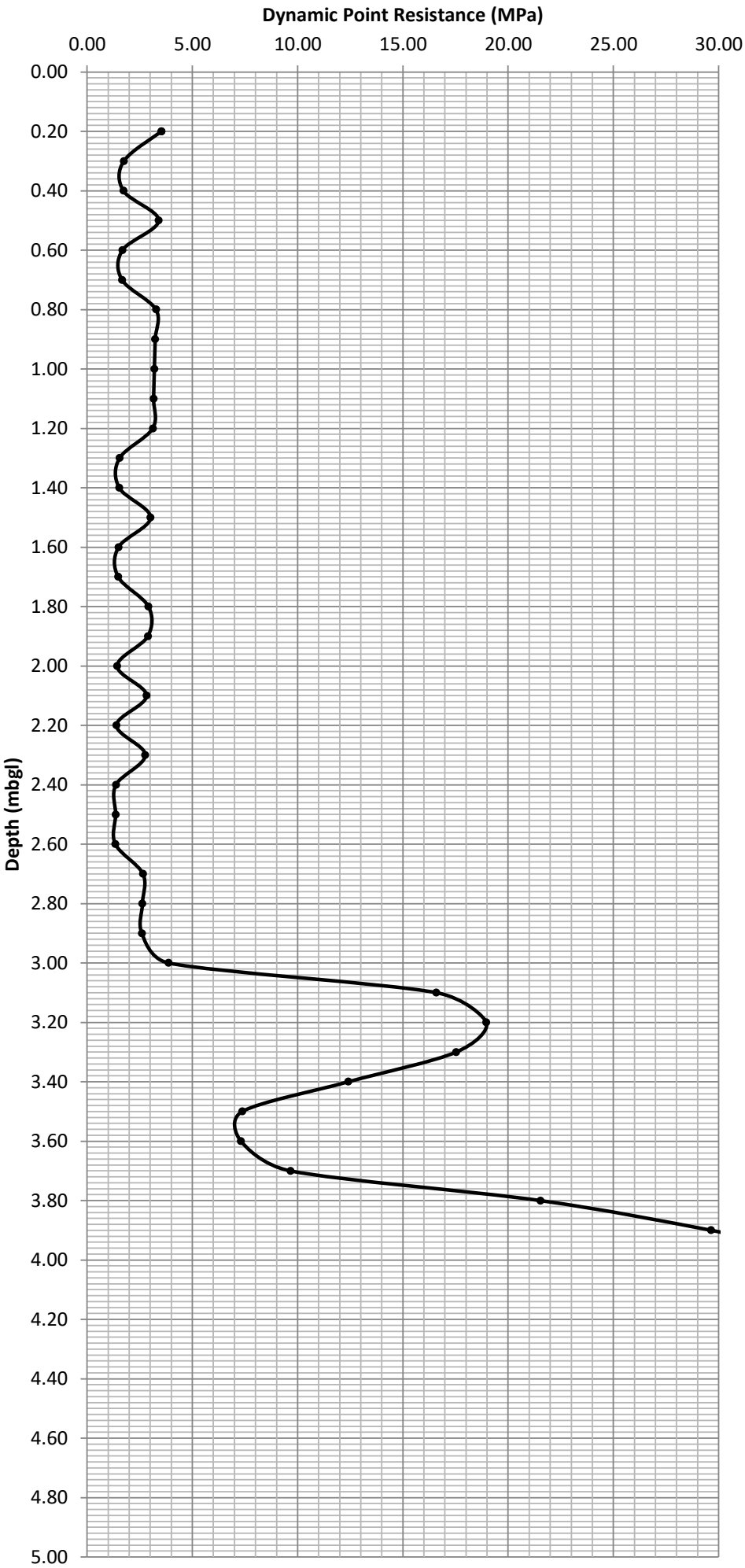
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Dynamic Probe Record

SITE Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton

Report Ref. R17-12386

Test Location Reference		WS03		
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20	2	0.05	3.69	3.53
0.30	1	0.10	1.84	1.74
0.40	1	0.10	1.84	1.72
0.50	2	0.05	3.69	3.40
0.60	1	0.10	1.84	1.68
0.70	1	0.10	1.84	1.66
0.80	2	0.05	3.69	3.27
0.90	2	0.05	3.69	3.23
1.00	2	0.05	3.69	3.20
1.10	2	0.05	3.69	3.16
1.20	2	0.05	3.69	3.12
1.30	1	0.10	1.84	1.54
1.40	1	0.10	1.84	1.52
1.50	2	0.05	3.69	3.01
1.60	1	0.10	1.84	1.49
1.70	1	0.10	1.84	1.47
1.80	2	0.05	3.69	2.92
1.90	2	0.05	3.69	2.88
2.00	1	0.10	1.84	1.43
2.10	2	0.05	3.69	2.82
2.20	1	0.10	1.84	1.40
2.30	2	0.05	3.69	2.76
2.40	1	0.10	1.84	1.37
2.50	1	0.10	1.84	1.35
2.60	1	0.10	1.84	1.34
2.70	2	0.05	3.69	2.65
2.80	2	0.05	3.69	2.63
2.90	2	0.05	3.69	2.60
3.00	3	0.03	5.53	3.87
3.10	13	0.01	23.97	16.59
3.20	15	0.01	27.66	18.96
3.30	14	0.01	25.81	17.53
3.40	10	0.01	18.44	12.41
3.50	6	0.02	11.06	7.38
3.60	6	0.02	11.06	7.31
3.70	8	0.01	14.75	9.66
3.80	18	0.01	33.19	21.53
3.90	25	0.00	46.10	29.64
4.00	31	0.00	57.16	36.43
4.10				
4.20				
4.30				
4.40				
4.50				
4.60				
4.70				
4.80				
4.90				
5.00				



Notes:
No further progress below 4.0m- hammer bouncing

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.74
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

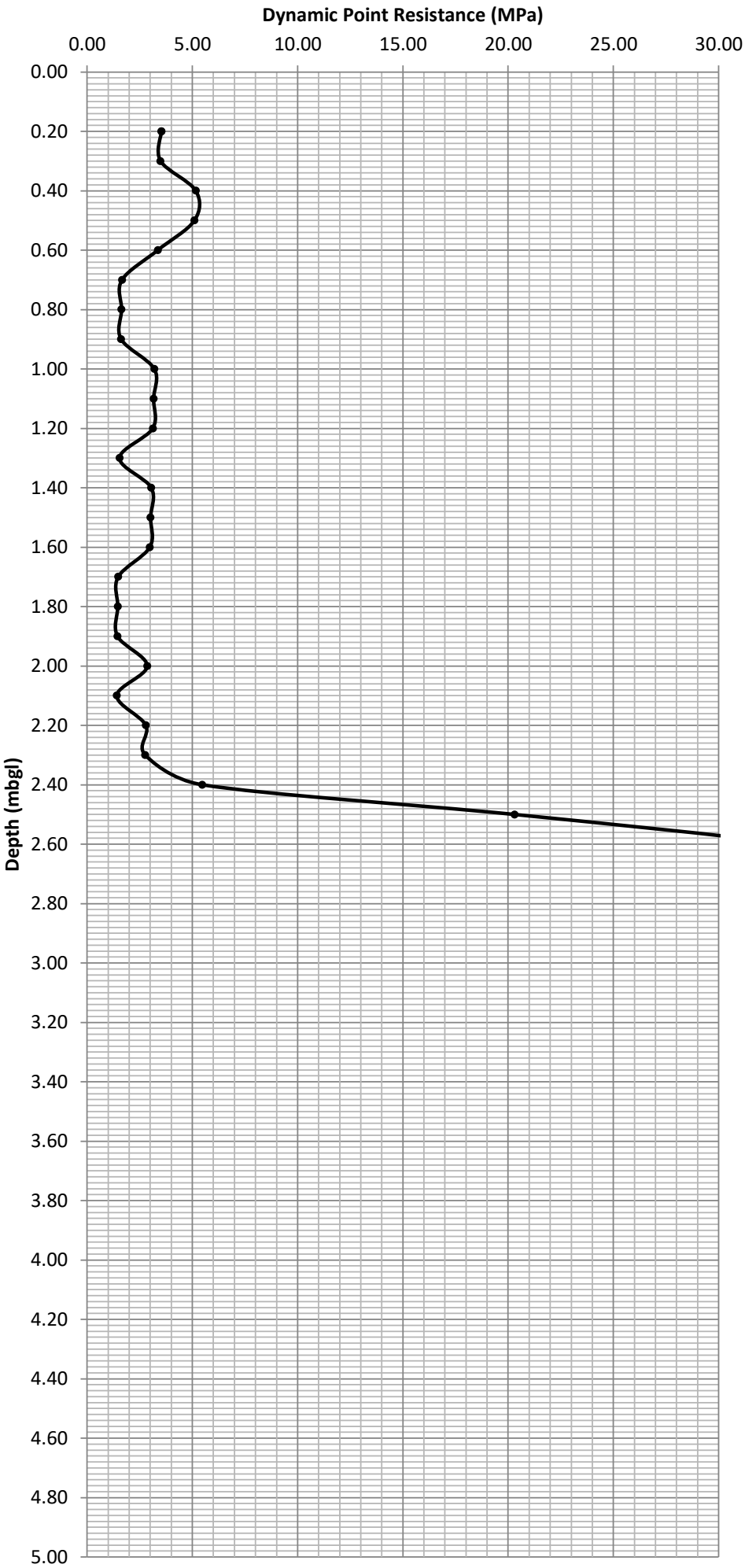
ASHDOWN SITE INVESTIGATION LTD

Dynamic Probe Record

SITE Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton

Report Ref. R17-12386

Test Location Reference		WS04		
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20	2	0.05	3.69	3.53
0.30	2	0.05	3.69	3.49
0.40	3	0.03	5.53	5.16
0.50	3	0.03	5.53	5.10
0.60	2	0.05	3.69	3.36
0.70	1	0.10	1.84	1.66
0.80	1	0.10	1.84	1.64
0.90	1	0.10	1.84	1.62
1.00	2	0.05	3.69	3.20
1.10	2	0.05	3.69	3.16
1.20	2	0.05	3.69	3.12
1.30	1	0.10	1.84	1.54
1.40	2	0.05	3.69	3.05
1.50	2	0.05	3.69	3.01
1.60	2	0.05	3.69	2.98
1.70	1	0.10	1.84	1.47
1.80	1	0.10	1.84	1.46
1.90	1	0.10	1.84	1.44
2.00	2	0.05	3.69	2.85
2.10	1	0.10	1.84	1.41
2.20	2	0.05	3.69	2.79
2.30	2	0.05	3.69	2.76
2.40	4	0.03	7.38	5.47
2.50	15	0.01	27.66	20.31
2.60	25	0.00	46.10	33.51
2.70	32	0.00	59.00	42.47
2.80	38	0.00	70.07	49.94
2.90				
3.00				
3.10				
3.20				
3.30				
3.40				
3.50				
3.60				
3.70				
3.80				
3.90				
4.00				
4.10				
4.20				
4.30				
4.40				
4.50				
4.60				
4.70				
4.80				
4.90				
5.00				



Notes:
No further progress below 2.80m- hammer bouncing

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.74
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

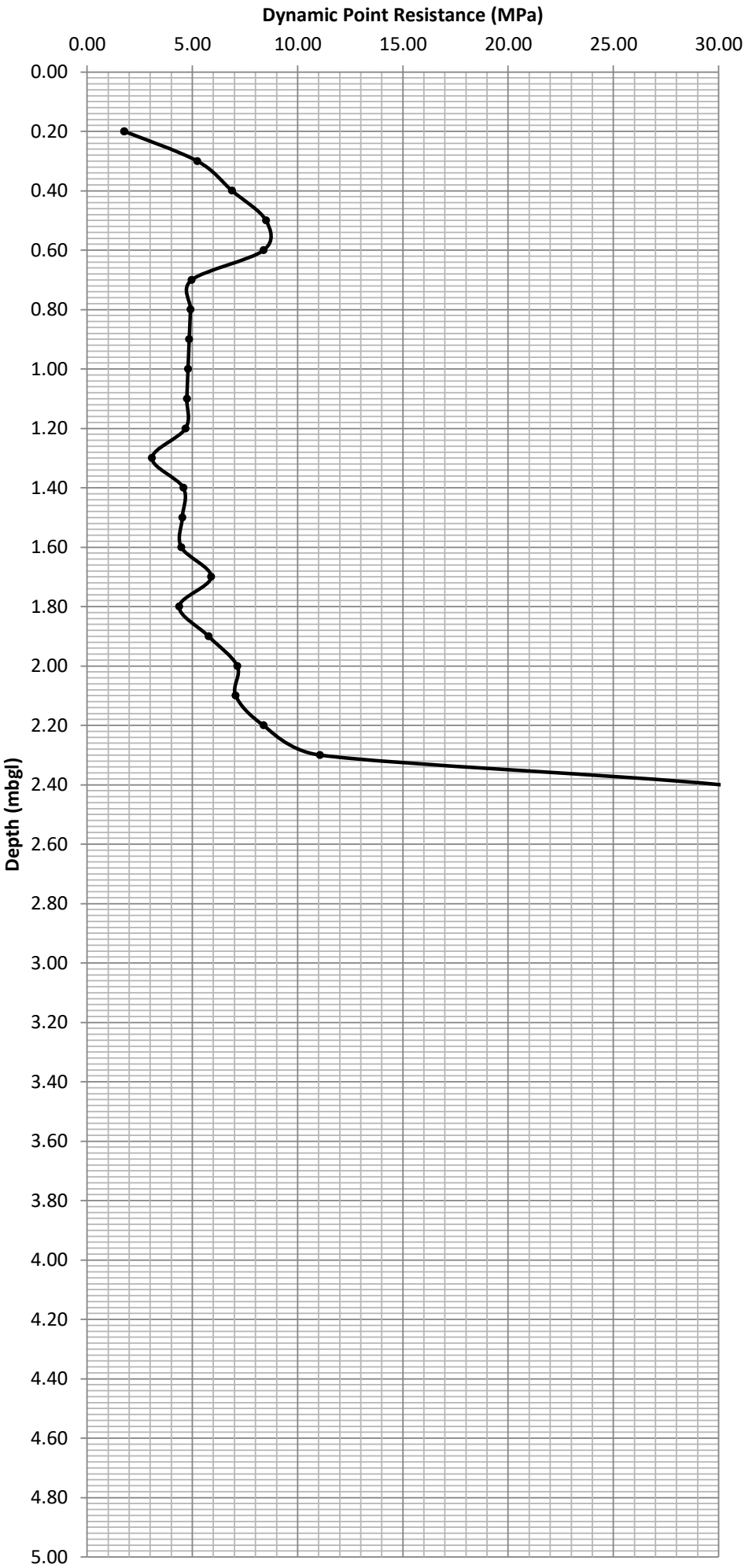
ASHDOWN SITE INVESTIGATION LTD

Dynamic Probe Record

SITE Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton

Report Ref. R17-12386

Test Location Reference		WS05		
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20	1	0.10	1.84	1.77
0.30	3	0.03	5.53	5.23
0.40	4	0.03	7.38	6.89
0.50	5	0.02	9.22	8.50
0.60	5	0.02	9.22	8.39
0.70	3	0.03	5.53	4.97
0.80	3	0.03	5.53	4.91
0.90	3	0.03	5.53	4.85
1.00	3	0.03	5.53	4.79
1.10	3	0.03	5.53	4.74
1.20	3	0.03	5.53	4.68
1.30	2	0.05	3.69	3.08
1.40	3	0.03	5.53	4.57
1.50	3	0.03	5.53	4.52
1.60	3	0.03	5.53	4.47
1.70	4	0.03	7.38	5.90
1.80	3	0.03	5.53	4.37
1.90	4	0.03	7.38	5.77
2.00	5	0.02	9.22	7.13
2.10	5	0.02	9.22	7.06
2.20	6	0.02	11.06	8.38
2.30	8	0.01	14.75	11.06
2.40	22	0.00	40.57	30.10
2.50	29	0.00	53.47	39.27
2.60	32	0.00	59.00	42.90
2.70	35	0.00	64.54	46.45
2.80				
2.90				
3.00				
3.10				
3.20				
3.30				
3.40				
3.50				
3.60				
3.70				
3.80				
3.90				
4.00				
4.10				
4.20				
4.30				
4.40				
4.50				
4.60				
4.70				
4.80				
4.90				
5.00				



Notes:
No further progress below 2.70m- hammer bouncing

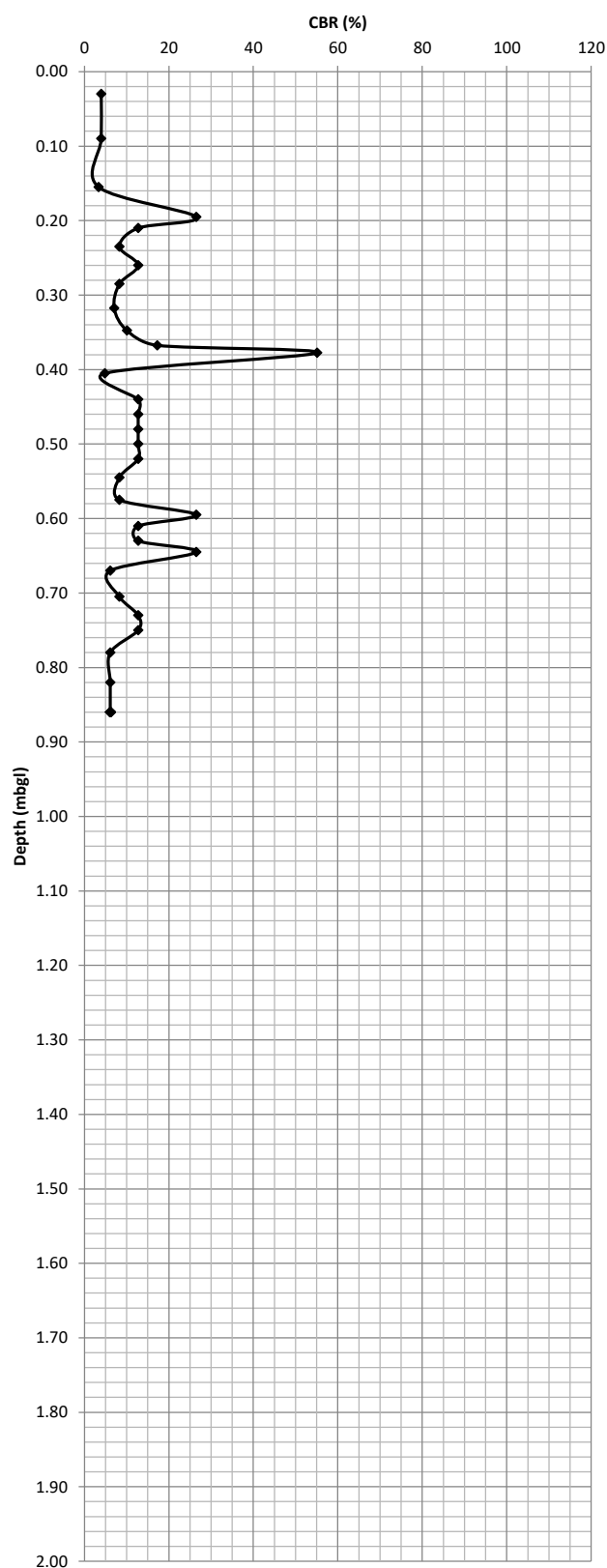
Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.74
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

TRL Dynamic Cone Penetrometer Record

Report Ref.

R17-12386

Test Location Reference	WS01
Depth of Start of Test (mbgl)	0.00

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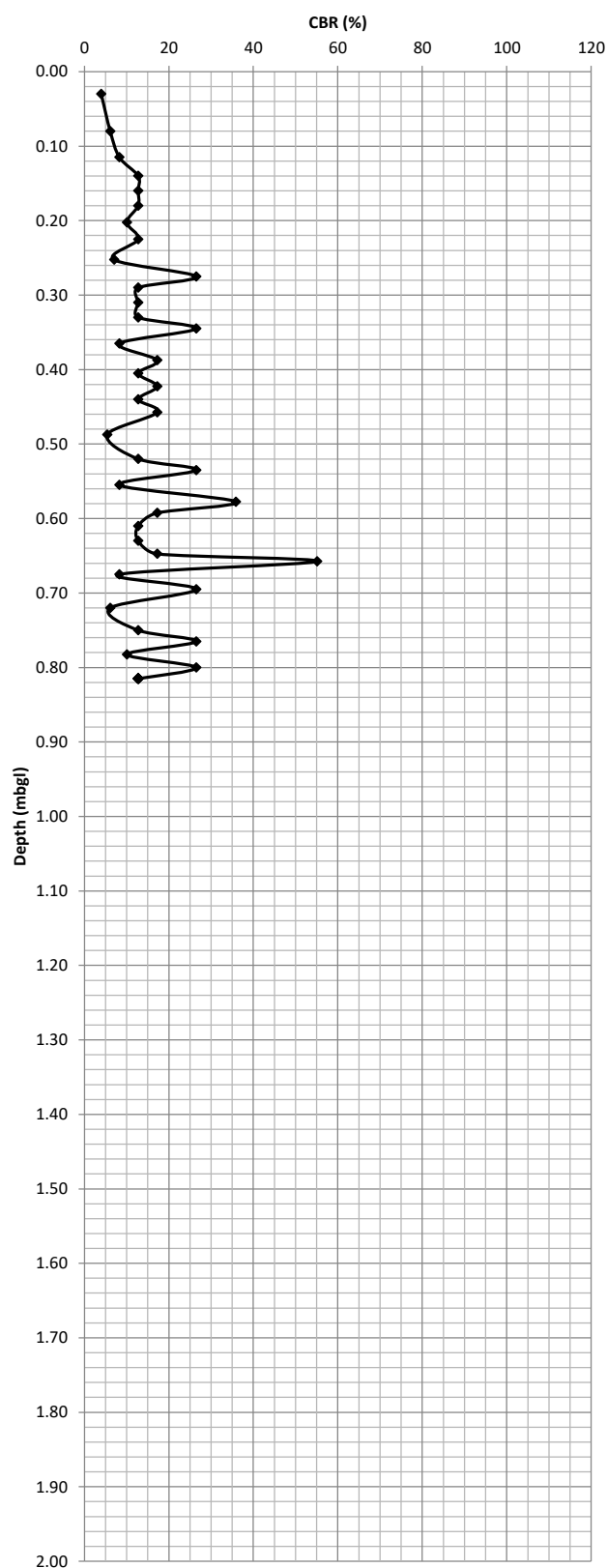
Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

Report Ref.

R17-12386

Test Location Reference	WS02
Depth of Start of Test (mbgl)	0.00

[illegible]

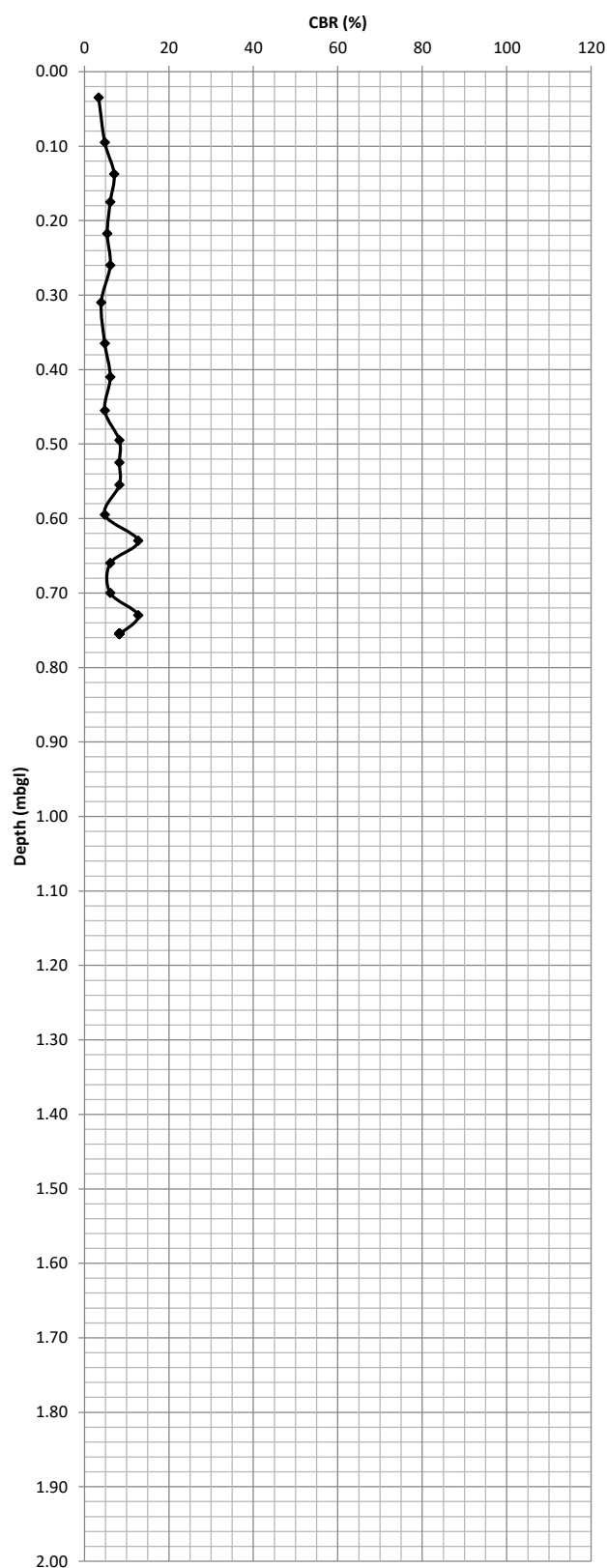
Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

Report Ref.

R17-12386

Test Location Reference	WS03
Depth of Start of Test (mbgl)	0.00

[illegible]

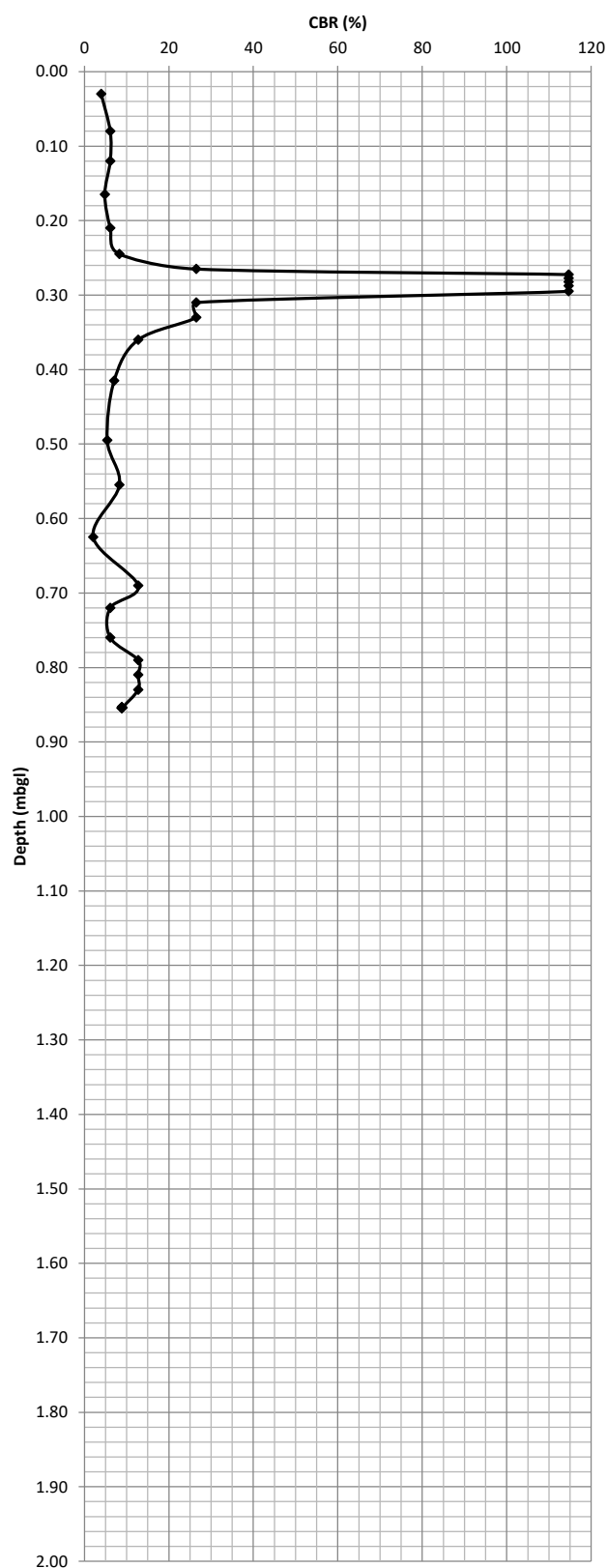
Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

Report Ref.

R17-12386

Test Location Reference	WS04
Depth of Start of Test (mbgl)	0.00

[illegible]

Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

Report Ref.

Test Location Reference	WS05
Depth of Start of Test (mbgl)	0.00

Figure 1 is a line graph showing the relationship between Depth (mbgl) and CBR (%). The Y-axis represents Depth (mbgl) from 0.00 to 2.00. The X-axis represents CBR (%) from 0 to 120. The graph shows a single data series with a peak CBR of approximately 28% at a depth of 0.17 mbgl, and a general downward trend in CBR as depth increases, reaching about 5% at 0.83 mbgl.

Depth (mbgl)	CBR (%)
0.05	5
0.07	10
0.09	15
0.11	18
0.13	20
0.15	25
0.17	28
0.19	25
0.21	20
0.23	18
0.25	15
0.27	12
0.29	10
0.31	8
0.33	6
0.35	5
0.37	4
0.39	3
0.41	2
0.43	1
0.45	1
0.47	1
0.49	1
0.51	1
0.53	1
0.55	1
0.57	1
0.59	1
0.61	1
0.63	1
0.65	1
0.67	1
0.69	1
0.71	1
0.73	1
0.75	1
0.77	1
0.79	1
0.81	1
0.83	1

Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

ASHDOWN SITE INVESTIGATION LIMITED

Site: Hillingdon Young Persons Hub, Falling Lane,
Yiewsley, West Drayton

Report No.: R17-12386
Sheet No.: 1 of 1

SUMMARY OF BOREHOLE FALLING HEAD SOAKAGE TEST RESULTS

WS03		WS05	
Time (mins)	Depth to water (m bgl)	Time (mins)	Depth to water (m bgl)
0	0.00	0	0.00
1	0.02	1	0.01
2	0.03	2	0.06
5	0.11	3	0.12
10	0.13	5	0.15
15	0.18	10	0.18
30	0.21	15	0.23
60	0.28	40	0.28
75	0.30	55	0.33
90	0.34	100	0.38
		160	0.65
Borehole Depth (m bgl)	3.00	Borehole Depth (m bgl)	2.70
Casing Depth (m bgl)	2.00	Casing Depth (m bgl)	2.00
Borehole Diameter (mm)	92.00	Borehole Diameter (mm)	92.00
Casing Diameter (mm)	105.00	Casing Diameter (mm)	105.00

Notes: bgl – below ground level.

APPENDIX B

Geotechnical Laboratory Testing Notes
Geotechnical Test Results
Contamination Test Results

GEOTECHNICAL LABORATORY TESTING NOTES

1 Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1:2002+A1:2013) and Part 2 Principles of classification (BS EN 14688-2:2004 +A1:2013) as well as the BS5930:2015 code of Practice for Ground Investigations.

2 Index Tests

Index (Atterberg Limit) tests are undertaken on samples of fine grained soils provide the primary information for the classification of fine grained soils.

Fine grained soil is tested to determine its liquid and plastic limits, which are moisture contents that define boundaries between material consistency states. These tests are used to evaluate indices used for soil identification and to help determine the shrinkage and swelling characteristics of the soil under conditions of changing moisture content. The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

The consistency index is derived from the Index Tests and is summarized in the following table. These divisions may be approximate, particularly for low plasticity soils. The consistency recorded on the soil classification summary is derived from the consistency index.

Consistency	Consistency Index
Very Soft	<0.25
Soft	0.25 to 0.50
Firm	0.50 to 0.75
Stiff	0.75 to 1.00
Very Stiff	>1.00

3 Particle Size Distribution Tests

Sieve analyses are carried out soil samples to establish their particle size distribution that can assist in the assessment of the permeability and classification of granular soils.

The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

4 Natural Moisture/ Saturated Moisture Content Determination of Chalk

The results of natural moisture or saturated moisture content tests of disturbed samples of chalk are used to assist in the classification of the chalk to determine key geotechnical parameters of strength, density and crushing properties.

The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

5 Soil Suction Testing

Soil suction tests are undertaken for the determination of the state of desiccation in clay soils.

The testing is carried out in accordance with the Building Research Establishment Information Paper IP4/93, dated February 1993.

6 Triaxial Compression Tests

Undrained triaxial compression tests are carried out on undisturbed samples of cohesive soil in order to assist in the determination of the undrained shear strength of the soil. The results of moisture content and density determinations are also included.

The tests are carried out in accordance with BS1377: Part 7: 1990 + A1:1994 Shear strength tests (total stress).

7 Shear Vane and Hand Penetrometer Testing

Undisturbed samples are tested in the laboratory using a Geonor Hand Shear Vane for the determination of their undrained shear strength.

The vane tests are carried out in general accordance with BS1377: Part 7: 1990 + A1:1994 Shear strength tests (total stress).

8 One Dimensional Consolidation Tests

One-dimensional consolidation tests are performed on undisturbed soil samples to ascertain their settlement characteristics.

The tests are carried out in accordance with BS1377: Part 5: 1990 + A1:1994 Compressibility, Permeability and Durability tests.

9 Dry Density / Moisture Content Relationship (Compaction) Testing

Compaction testing for the determination of the dry density / moisture content relationship is carried out on using either a 2.5kg, 4.5kg hammer or a vibrating hammer.

The tests are carried out in accordance with the British Standard BS1377: Part 4: 1990 + A1 & A2:2002 Compaction-related tests.

10 California Bearing Ratio

The soil is usually compacted at the as dug "natural" moisture content and often at moisture contents around the natural moisture content.

The California bearing ratio is determined in accordance with the British Standard BS1377: Part 4: 1990 + A1 & A2:2002 Compaction related tests.

11 Chemical Testing

Soil samples are tested for their concentration of water soluble sulphate and pH for use in concrete mix design.

Water samples are tested for total sulphate concentration and pH value.

Where a water soluble sulphate content in soils or a total sulphate content in groundwater exceeds 3000mg/l SO_4 the magnesium sulphate content of the samples is required to be determined (BRE Special Digest 1:2005).

ASHDOWN SITE INVESTIGATION LIMITED

Soil Classification Summary

Site Name:	Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton	Job No:	R17-12386
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BH/TP No.	Depth (m)	Nat. Moist. Cont. (w %)	Equiv. Moist. Cont. (wa %)	Atterberg Limits			Class'n	Cons. Index (Ic)	% passing 425 µm sieve	Visual Description of Sample
				WI %	Wp %	Ip %				
WS03	3.00	16		30	16	14	CL	1.00*	95	Very stiff brown slightly gravelly slightly sandy CLAY. Gravel is fine flint.
WS04	1.50	18		40	16	24	CI	0.92*	99	Stiff dark brown slightly gravelly silty CLAY. Gravel is fine siltstone.
WS05	1.50	14		38	18	20	CI	1.20*	100	Very stiff brown slightly sandy silty CLAY.
WS05	2.20	14		34	18	16	CL	1.25*	95	Very stiff brown slightly gravelly silty CLAY. Gravel is fine to coarse flint.

ASHDOWN SITE INVESTIGATION LIMITED

Quick Undrained Triaxial Summary

Site Name:	Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton	Job No:	R17-12386
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BH/TP No.	Depth (m)	Nat. Moist. Cont. (w %)	Undrained Triaxial Tests					Shear Vane Strength kPa	Hand Pen. Strength kPa	Visual Description of Sample
			Bulk Density Mg/m3	Sample Diameter mm	Cell Pressure kPa	Max.Dev. Stress kPa	Shear Strength kPa			
WS01	1.70	21	2.23	70	50	144	72		110	Brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium flint. (Sample unsuitable for shear vane).
WS02	1.70	18	2.28	70	50	181	91		185	Brown slightly gravelly slightly sandy CLAY. Gravel is fine to medium flint. (Sample unsuitable for shear vane).
WS03	1.70	19	2.16	82	50	175	88	95	115	Brown slightly sandy CLAY.
WS04	0.70	19	1.86	86	50	161	81	>130	240	Brown slightly sandy CLAY. (Sample collapsed on extrusion and unsuitable to test).
WS04	1.70	20	2.02	74	50	149	75	100	155	Brown slightly sandy CLAY.
WS05	1.00	15	2.08	80				>130	>250	Brown slightly sandy CLAY with occasional dark brown iron staining and a single medium root.

Test Method: Quick Undrained Triaxial Test BS1377: Part 7: 1990	Sheet No. 1
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ASHDOWN SITE INVESTIGATION LIMITED

California Bearing Ratio (CBR)

Site Name	Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton	Job No.	R17-12386
Soil Description	Dark brown slightly gravelly silty CLAY. Gravel is fine to coarse flint.	BH/TP No.	WS01
Test Method	BS1377 : Part 4 : 1990, clause 7	Depth (m)	0.20

Specimen Preparation

Condition	Remoulded
Details	Recompacted with specified standard effort using 2.5kg rammer

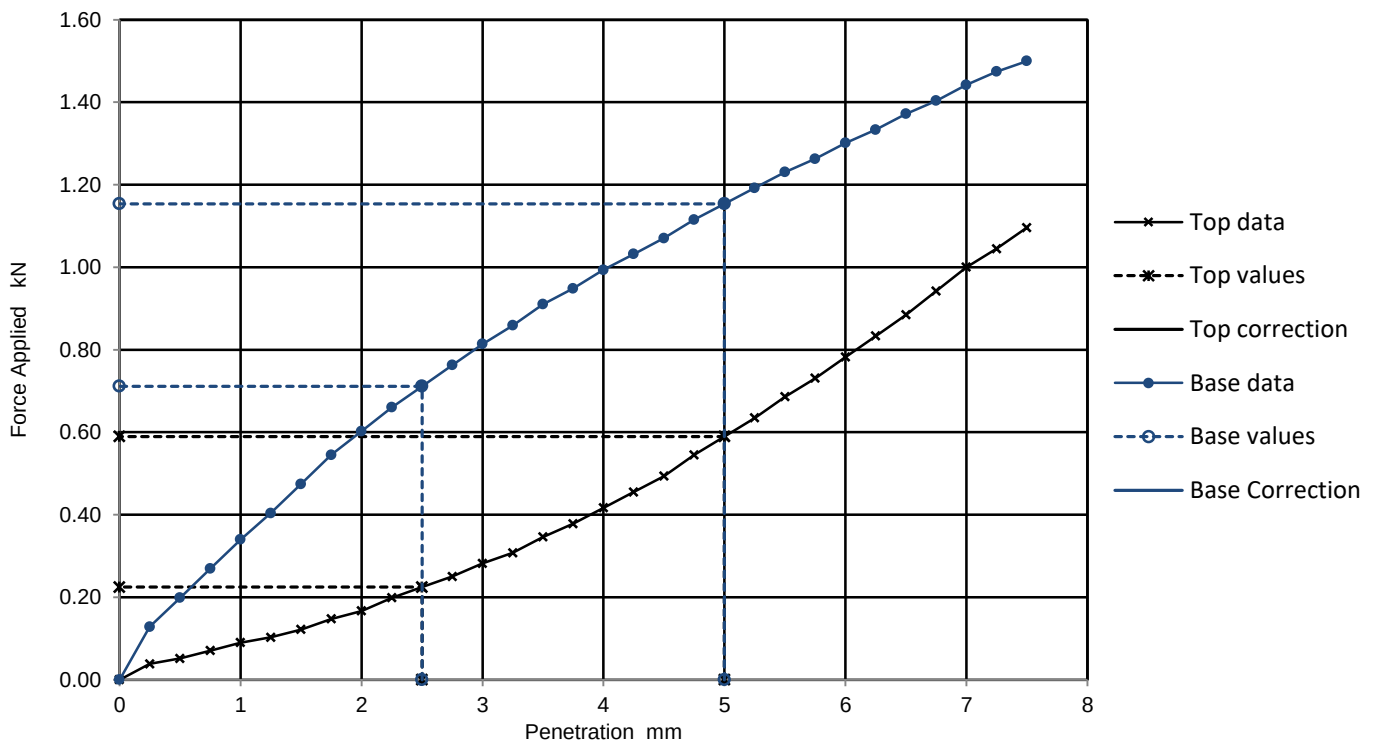
Material retained on 20mm sieve removed*	4 %
--	-----

Initial Specimen details	Bulk density	1.91 Mg/m3
	Dry density	1.61 Mg/m3
	Moisture content	19.0 %

Soaking details	Not soaked
Period of soaking	days
Time to surface	days
Amount of swell recorded	mm
Dry density after soaking	Mg/m3

Surcharge applied	13 kg
	8 kPa

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values %			
	2.5mm	5.0mm	Highest	Average
No	1.7	2.9	2.9	N/A
No	5.4	5.8	5.8	

Moisture Content %
20
19

General remarks

Where CBR values at each end are within 10% of the mean value the average is reported.
* retained fraction percentage based on initial mass and not dry mass of sample.

Test specific remarks

Sheet No

1

ASHDOWN SITE INVESTIGATION LIMITED

California Bearing Ratio (CBR)

Site Name	Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton	Job No.	R17-12386
Soil Description	Brown slightly gravelly silty CLAY. Gravel is fine to coarse flint.	BH/TP No.	WS04
Test Method	BS1377 : Part 4 : 1990, clause 7	Depth (m)	0.25

Specimen Preparation

Condition	Remoulded
Details	Recompacted with specified standard effort using 2.5kg rammer

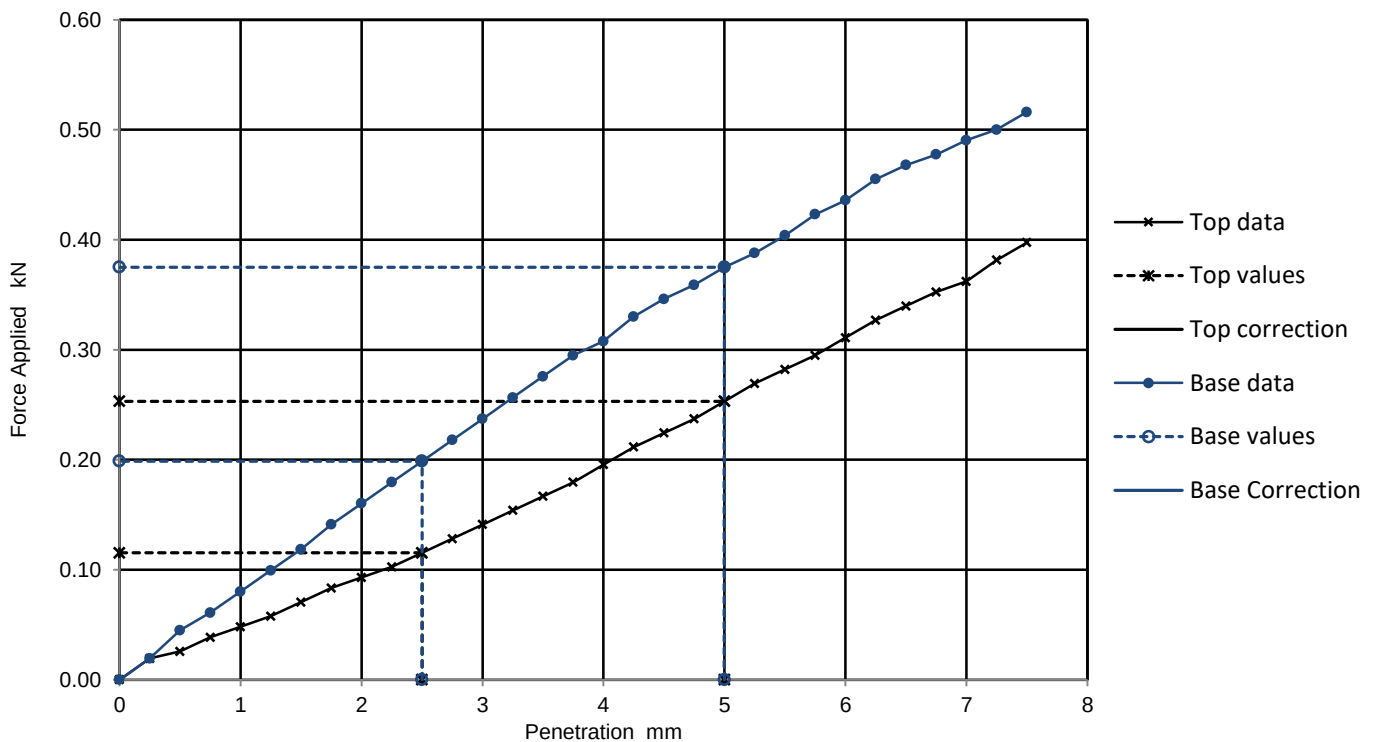
Material retained on 20mm sieve removed*	2 %
--	-----

Initial Specimen details	Bulk density	1.96 Mg/m3
	Dry density	1.63 Mg/m3
	Moisture content	20.0 %

Soaking details	Not soaked
Period of soaking	days
Time to surface	days
Amount of swell recorded	mm
Dry density after soaking	Mg/m3

Surcharge applied	13 kg
	8 kPa

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values %			
	2.5mm	5.0mm	Highest	Average
No	0.9	1.3	1.3	N/A
No	1.5	1.9	1.9	

Moisture Content %
19
20

General remarks

Where CBR values at each end are within 10% of the mean value the average is reported.
* retained fraction percentage based on initial mass and not dry mass of sample.

Test specific remarks

Sheet No

2

ASHDOWN SITE INVESTIGATION LIMITED

California Bearing Ratio (CBR)

Site Name	Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton	Job No.	R17-12386
Soil Description	Brown slightly gravelly silty CLAY. Gravel is fine to coarse flint.	BH/TP No.	WS05
Test Method	BS1377 : Part 4 : 1990, clause 7	Depth (m)	0.20

Specimen Preparation

Condition	Remoulded
Details	Recompacted with specified standard effort using 2.5kg rammer

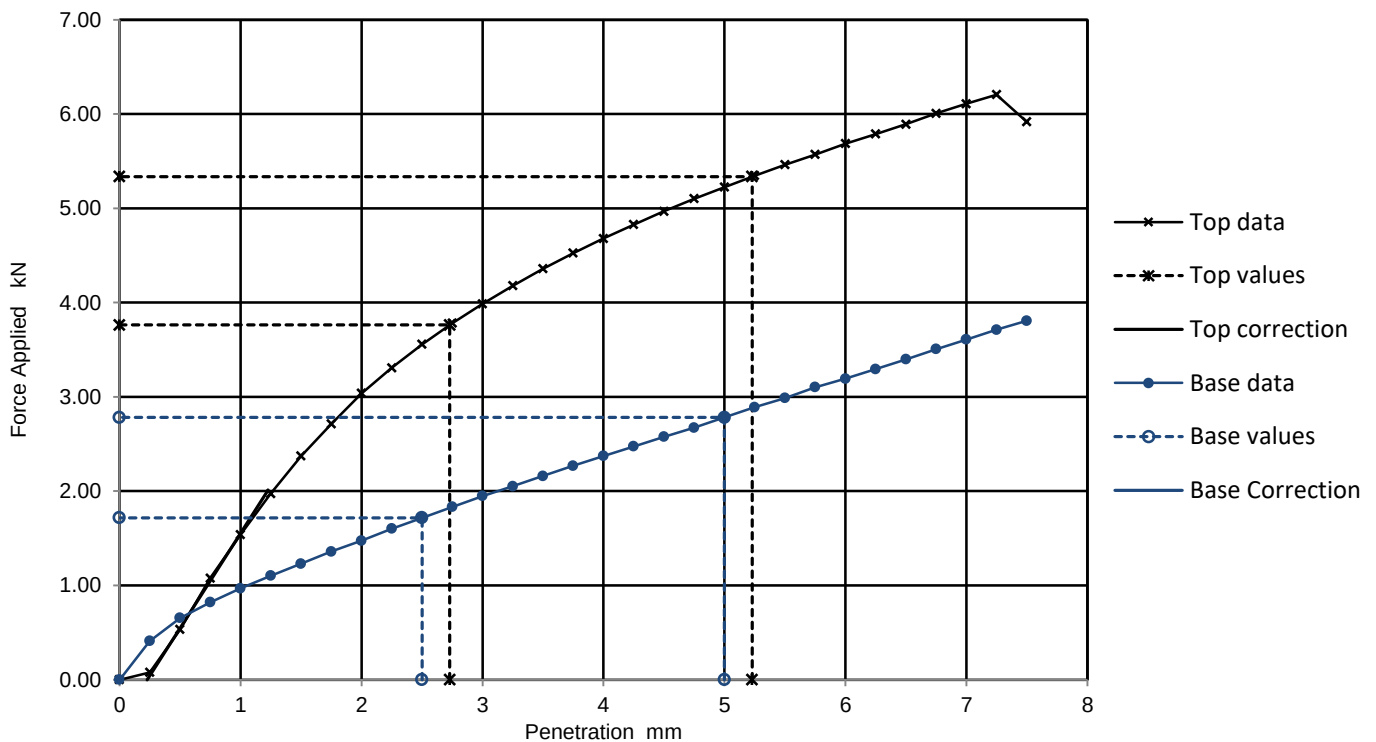
Material retained on 20mm sieve removed*	1 %
--	-----

Initial Specimen details	Bulk density	1.79 Mg/m3
	Dry density	1.61 Mg/m3
	Moisture content	11.0 %

Soaking details	Not soaked
Period of soaking	days
Time to surface	days
Amount of swell recorded	mm
Dry density after soaking	Mg/m3

Surcharge applied	13 kg
	8 kPa

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values %			
	2.5mm	5.0mm	Highest	Average
Yes	29.0	27.0	29.0	N/A
No	13.0	14.0	14.0	

Moisture Content %
12
10

General remarks

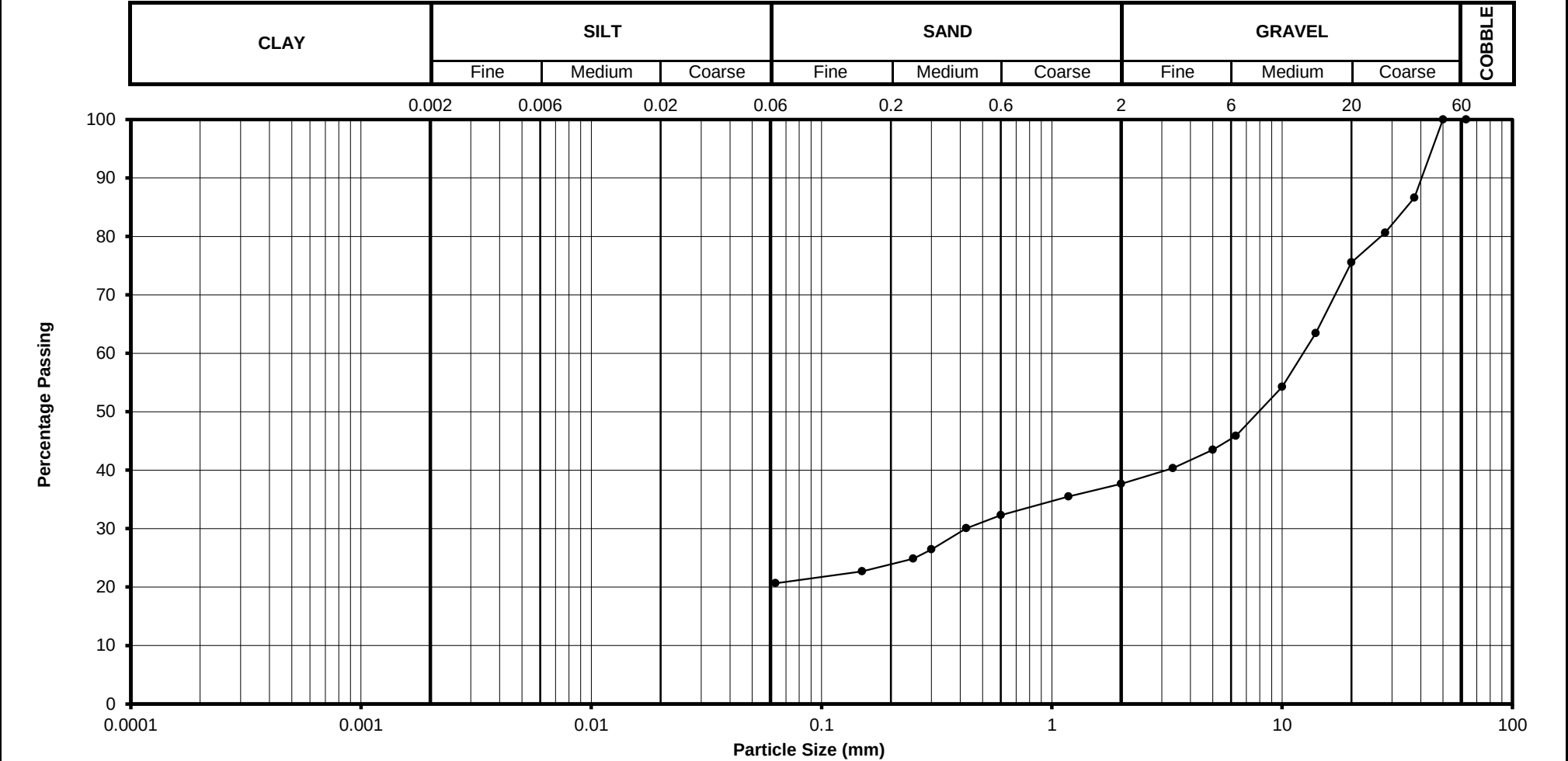
Test specific remarks

Where CBR values at each end are within 10% of the mean value the average is reported.
* retained fraction percentage based on initial mass and not dry mass of sample.

Sheet No

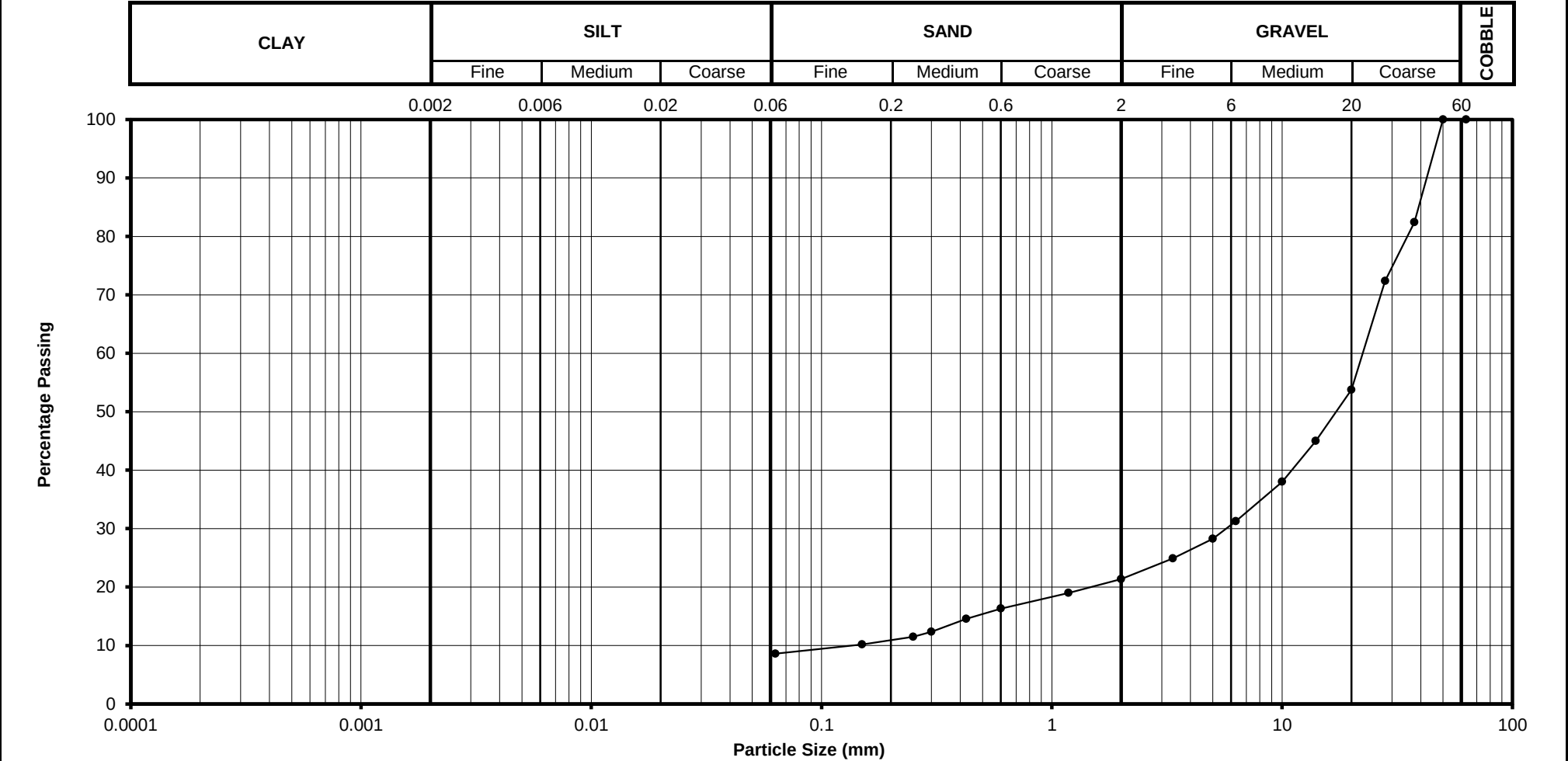
3

Particle Size Distribution by Wet Sieve; BS1377: Part 2 1990



Job Name	Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton	BH/ TP No.	WS02	Sample Description	Sandy very clayey GRAVEL.
Job No.	R17-12386	Sample Depth (m)	2.60		

Particle Size Distribution by Wet Sieve; BS1377: Part 2 1990



Job Name	Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Drayton	BH/ TP No.	WS04	Sample Description	Sandy clayey GRAVEL.
Job No.	R17-12386	Sample Depth (m)	2.60		



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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 17-13823

Issue: 1

Date of Issue: 08/09/2017

Contact: David Harris

Customer Details: Ashdown Site Investigation Ltd
The Old Dairy
Swanborough Farm
Lewes
East Sussex BN7 3PF

Quotation No: Q15-00267

Order No: P17-5208

Customer Reference: R17-12386

Date Received: 01/09/2017

Date Approved: 08/09/2017

Details: Hillingdon Young Persons Hub, Falling Lane, Yeivisley, West D

Approved by:

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)



Sample Summary

Report No.: 17-13823

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
110660	WS01 1.50	30/08/2017	01/09/2017	Silty loam	
110661	WS03 2.50	30/08/2017	01/09/2017	Silty loam	
110662	WS04 2.50	30/08/2017	01/09/2017	Silty loam	
110663	WS02 1.50	30/08/2017	01/09/2017	Silty loam	
110664	WS05 0.60	30/08/2017	01/09/2017	Silty loam	
110665	WS04 0.50	30/08/2017	01/09/2017	Silty loam	



Results Summary

Report No.: 17-13823

ELAB Reference				110660	110661	110662	110663	110664	110665
Customer Reference									
Sample ID									
Sample Type				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location				WS01	WS03	WS04	WS02	WS05	WS04
Sample Depth (m)				1.50	2.50	2.50	1.50	0.60	0.50
Sampling Date				30/08/2017	30/08/2017	30/08/2017	30/08/2017	30/08/2017	30/08/2017
Determinand	Codes	Units	LOD						
Anions									
Water Soluble Sulphate	M	g/l	0.02	0.03	0.02	0.03	0.03	0.03	0.03
Inorganics									
Total Sulphur	N	%	0.01	0.65	0.03	0.01	0.02	0.02	0.01
Acid Soluble Sulphate (SO ₄)	U	%	0.02	0.09	0.09	0.10	0.10	0.08	0.08
Miscellaneous									
pH	M	pH units	0.1	7.3	8.5	8.5	8.4	7.9	8.1



Method Summary

Report No.: 17-13823

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	07/09/2017	113	Electromeric
Acid Soluble Sulphate	U	Air dried sample	08/09/2017	115	Ion Chromatography
Water soluble anions	M	Air dried sample	05/09/2017	172	Ion Chromatography
Total organic carbon/Total sulphur	N	Air dried sample	06/09/2017	216	IR

Tests marked N are not UKAS accredited

Report Information

Report No.: 17-13823

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis (dried at < 30°C)

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

-
- | | |
|---|--|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage



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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 17-13822

Issue: 1a

Date of Issue: 06/09/2017

Contact: David Harris

Customer Details: Ashdown Site Investigation Ltd
The Old Dairy
Swanborough Farm
Lewes
East Sussex BN7 3PF

Quotation No: Q15-00267

Order No: P17-5210

Customer Reference: R17-12386

Date Received: 01/09/2017

Date Approved: 06/09/2017

Details: Hillingdon Young Persons Hub, Falling Lane, Yiewsley, West Dr

Approved by:

Mike Varley, Technical Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)



Sample Summary

Report No.: 17-13822

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
110649	HA01 0.20	30/08/2017	01/09/2017	Silty loam	
110650	HA02 0.50	30/08/2017	01/09/2017	Silty loam	
110651	WS01 0.60	30/08/2017	01/09/2017	Silty loam	
110652	WS02 0.15	30/08/2017	01/09/2017	Silty loam	
110653	WS02 0.50	30/08/2017	01/09/2017	Silty loam	
110654	WS03 0.15	30/08/2017	01/09/2017	Silty loam	
110655	WS03 0.50	30/08/2017	01/09/2017	Silty loam	
110656	WS04 0.20	30/08/2017	01/09/2017	Silty loam	
110657	WS04 0.60	30/08/2017	01/09/2017	Silty loam	
110658	WS05 0.15	30/08/2017	01/09/2017	Silty loam	
110659	WS05 0.60	30/08/2017	01/09/2017	Silty loam	

Results Summary

Report No.: 17-13822

ELAB Reference	110649	110650	110651	110652	110653	110654
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	HA01	HA02	WS01	WS02	WS02	WS03
Sample Depth (m)	0.20	0.50	0.60	0.15	0.50	0.15
Sampling Date	30/08/2017	30/08/2017	30/08/2017	30/08/2017	30/08/2017	30/08/2017

Determinand	Codes	Units	LOD						
Metals									
Arsenic	M	mg/kg	1	12.9	12.2	15.5	13.0	13.4	8.7
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	27.7	25.5	41.3	31.3	39.4	22.9
Copper	M	mg/kg	5	37.2	34.2	21.8	29.2	21.4	16.7
Lead	M	mg/kg	5	104	104	17.4	79.9	16.5	17.2
Mercury	M	mg/kg	0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	21.0	19.0	29.9	21.1	27.5	15.8
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	118	98.5	76.2	90.7	75.2	101
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	0.7	1.0	0.5	0.7	0.6	0.5
Miscellaneous									
pH	M	pH units	0.1	7.6	7.4	n/t	6.9	n/t	7.2
Soil Organic Matter	U	%	0.1	2.9	2.4	n/t	2.4	n/t	1.2
Polyaromatic hydrocarbons									
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1	n/t	< 0.1	n/t	< 0.1
Acenaphthylene	M	mg/kg	0.1	0.2	< 0.1	n/t	< 0.1	n/t	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	n/t	< 0.1	n/t	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	n/t	< 0.1	n/t	< 0.1
Phenanthrene	M	mg/kg	0.1	0.8	< 0.1	n/t	0.8	n/t	< 0.1
Anthracene	M	mg/kg	0.1	0.2	< 0.1	n/t	0.1	n/t	< 0.1
Fluoranthene	M	mg/kg	0.1	2.4	< 0.1	n/t	1.9	n/t	0.2
Pyrene	M	mg/kg	0.1	2.2	< 0.1	n/t	1.6	n/t	0.2
Benzo(a)anthracene	M	mg/kg	0.1	1.4	< 0.1	n/t	1.0	n/t	0.1
Chrysene	M	mg/kg	0.1	1.6	< 0.1	n/t	1.1	n/t	0.1
Benzo (b) fluoranthene	M	mg/kg	0.1	1.7	< 0.1	n/t	1.1	n/t	0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	1.8	< 0.1	n/t	1.3	n/t	0.2
Benzo (a) pyrene	M	mg/kg	0.1	1.8	< 0.1	n/t	1.1	n/t	0.2
Indeno (1,2,3-cd) pyrene	M	mg/kg	0.1	1.4	< 0.1	n/t	1.0	n/t	0.2
Dibenzo(a,h)anthracene	M	mg/kg	0.1	0.4	< 0.1	n/t	0.4	n/t	0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	1.2	< 0.1	n/t	0.7	n/t	0.1
Total PAH(16)	M	mg/kg	0.4	17.4	0.4	n/t	12.4	n/t	1.8

Results Summary

Report No.: 17-13822

ELAB Reference	110655	110656	110657	110658	110659
Customer Reference					
Sample ID					
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS03	WS04	WS04	WS05	WS05
Sample Depth (m)	0.50	0.20	0.60	0.15	0.60
Sampling Date	30/08/2017	30/08/2017	30/08/2017	30/08/2017	30/08/2017

Determinand	Codes	Units	LOD					
Metals								
Arsenic	M	mg/kg	1	11.2	11.9	12.5	11.3	11.3
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	31.8	26.2	27.2	22.3	30.4
Copper	M	mg/kg	5	18.8	47.9	24.4	29.8	17.8
Lead	M	mg/kg	5	15.2	108	28.4	76.6	13.1
Mercury	M	mg/kg	0.5	< 0.5	0.5	< 0.5	0.5	< 0.5
Nickel	M	mg/kg	5	20.6	18.5	22.4	17.5	20.5
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	84.6	143	66.0	94.0	62.3
Inorganics								
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	0.5	0.7	0.6	1.0	0.8
Miscellaneous								
pH	M	pH units	0.1	n/t	7.8	n/t	7.7	n/t
Soil Organic Matter	U	%	0.1	n/t	3.0	n/t	2.5	n/t
Polyaromatic hydrocarbons								
Naphthalene	M	mg/kg	0.1	n/t	0.2	n/t	< 0.1	n/t
Acenaphthylene	M	mg/kg	0.1	n/t	0.1	n/t	< 0.1	n/t
Acenaphthene	M	mg/kg	0.1	n/t	< 0.1	n/t	< 0.1	n/t
Fluorene	M	mg/kg	0.1	n/t	< 0.1	n/t	< 0.1	n/t
Phenanthrene	M	mg/kg	0.1	n/t	0.9	n/t	< 0.1	n/t
Anthracene	M	mg/kg	0.1	n/t	0.4	n/t	< 0.1	n/t
Fluoranthene	M	mg/kg	0.1	n/t	2.4	n/t	0.1	n/t
Pyrene	M	mg/kg	0.1	n/t	2.1	n/t	0.1	n/t
Benzo(a)anthracene	M	mg/kg	0.1	n/t	1.4	n/t	< 0.1	n/t
Chrysene	M	mg/kg	0.1	n/t	1.7	n/t	< 0.1	n/t
Benzo (b) fluoranthene	M	mg/kg	0.1	n/t	1.7	n/t	< 0.1	n/t
Benzo(k)fluoranthene	M	mg/kg	0.1	n/t	1.7	n/t	0.1	n/t
Benzo (a) pyrene	M	mg/kg	0.1	n/t	1.8	n/t	0.1	n/t
Indeno (1,2,3-cd) pyrene	M	mg/kg	0.1	n/t	1.5	n/t	0.2	n/t
Dibenzo(a,h)anthracene	M	mg/kg	0.1	n/t	0.4	n/t	< 0.1	n/t
Benzo[g,h,i]perylene	M	mg/kg	0.1	n/t	1.3	n/t	0.1	n/t
Total PAH(16)	M	mg/kg	0.4	n/t	17.8	n/t	0.8	n/t



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Results Summary
Report No.: 17-13822

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
110649	0.20	HA01	Brown soil with stones	No asbestos detected	n/t	n/t	n/t	n/t
110650	0.50	HA02	Brown soil with stones and clinker	No asbestos detected	n/t	n/t	n/t	n/t
110652	0.15	WS02	Brown soil with stones	No asbestos detected	n/t	n/t	n/t	n/t
110658	0.15	WS05	Brown soil with stones	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 17-13822

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	05/09/2017	110	Colorimetry
pH	M	Air dried sample	06/09/2017	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	06/09/2017	118	ICPMS
PAH (GC-FID)	M	As submitted sample	04/09/2017	133	GC-FID
Water soluble boron	N	Air dried sample	05/09/2017	202	Colorimetry
Soil organic matter	U	Air dried sample	05/09/2017	BS1377:P3	Titrimetry
Asbestos identification	U	As submitted sample	05/09/2017	PMAN	Microscopy

Tests marked N are not UKAS accredited

Report Information

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Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis (dried at < 30°C)

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

-
- | | |
|---|--|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage