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Ground Investigation Report

Project Name: 5 Cleve Road

Location: London, NW6 3RN

Client: Blackcap Ltd

Project ID: J13570

Report Date: 25 May 2018

Report Issue: 1

SUMMARY

The site comprises a detached house with a front courtyard and rear garden. There is an existing lower ground floor level, which is currently used for storage. It is proposed to renovate the existing lower ground floor, to construct new light wells at the front of the house, and to construct a new extension at the rear of the house. The rear extension will include a single level basement.

Geological records indicate the site to be underlain by London Clay.

The site is located within the London Borough of Camden, and in accordance with the local council's planning policies a Basement Impact Assessment is required. This report forms Stage 3 (Ground Investigation) of the Basement Impact Assessment process.

Stages 1 and 2 (Screening and Scoping) have been undertaken by others.

An Unexploded Ordnance (UXO) risk assessment was not was not included in our brief.

A single phase of intrusive investigation was carried out. The trial pit and borehole locations were agreed with the Client's engineers.

The soils encountered comprised a covering of Made Ground, overlying London Clay.

Groundwater was encountered in the shallow soils within some foundation inspection trial pits. Groundwater levels were monitored over a one month period following the initial intrusive investigation. The groundwater level appears to be at about 1.0 – 1.5m below street level.

An allowable bearing capacity of 125 kN/m^2 within the London Clay is recommended for the new retaining walls. NHBC High Volume Change Potential precautions will apply.

The sulphate content of the fill and natural soil was found to fall within Class DS-4. The ACEC classification for the site is AC-3.

Excavations will require de-watering, which should be achievable using sump pumps or ejector pumps.

Detailed information on the proposed development, such as detailed final layout, loadings and serviceability limits was not provided. Accordingly, where geotechnical design advice is provided it is on the prescriptive basis allowed for by Eurocode 7: employing conventional and conservative design rules.

Contamination issues are not covered in this report. Limited testing for soil waste characterisation is included for soils which might be removed from the site in course of the proposed development. Further assessment may be required to provide sufficient data for detailed waste classification.

As with any site, areas of contamination not identified during investigation works may come to light during the course of redevelopment. Accordingly, a discovery strategy must be in place during the redevelopment to ensure that any hitherto unknown contamination is identified and dealt with in an appropriate manner. Depending on the nature of any such contamination, it may prove necessary to reassess the remedial strategy for the site.

The investigation was conducted and this report has been prepared for the sole internal use and reliance of Blackcap Ltd and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorization of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The findings and opinions conveyed via this investigation report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd believes are reliable. Nevertheless, Southern Testing Laboratories Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

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For and on behalf of Southern Testing Laboratories Limited

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A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in a project order form completed by Blackcap Limited, dated 28th March 2018.

2 Location

The site is located on the southern side of Cleve Road, about 300m to the south of West Hampstead London Underground station. The approximate National Grid Reference of the site is TQ 25593 84342. The site location is indicated on Figure 1 within Appendix A.

3 Proposed Construction

It is proposed to construct new light wells at the front of the existing house, and a basement extension at the rear.

4 Object

This report forms Stage 3 (Ground Investigation) of the Basement Impact Assessment (BIA) process to support the Client's planning application in accordance with the requirements of the London Borough of Camden. Stages 1 and 2 (Screening and Scoping) have been undertaken by others.

Camden's policies are published in the following documents:

- Ref [1] - Camden Planning Guidance CPG4 – Basements and Light Wells
- Ref [2] - Camden Development Policy DP 27 – Basements and Light Wells

The purpose of this Stage 3 Ground Investigation Report is to provide geotechnical information to inform the design of the basement elements, and to provide information for later stages of the BIA process. The wider BIA process is intended to enable London Borough of Camden to consider a scheme's potential impact on local drainage and flooding, and on the structural stability of neighbouring properties through its effect on groundwater conditions and ground movements.

5 Scope

This report presents our exploratory hole logs and test results and our interpretation of these data.

A UXO risk assessment was not requested within our brief for the investigation.

As with any site there may be differences in soil conditions between exploratory hole positions.

This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

The ground/site investigation has been completed with reference to BS 5930 Ref [3] and BS 10175 Ref [4].

Contamination issues are not considered in this report. Limited testing for soil waste characterisation is included for soils which might be removed from the site in course of the proposed development. Further assessment may be required to provide sufficient data for detailed waste classification.

The findings and opinions conveyed via this investigation report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd believes are reliable. Nevertheless, Southern Testing Laboratories Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

The investigation was conducted and this report has been prepared for the sole internal use and reliance of Blackcap Ltd and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorization of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The recommendations contained in this report may not be appropriate to alternative development schemes.

Detailed information on the proposed development, such as detailed final layout, loadings and serviceability limits was not provided. Accordingly, where geotechnical design advice is provided it is on the prescriptive basis allowed for by Eurocode 7: employing conventional and conservative design rules.

The contamination screening values used are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based on them. Their validity should be confirmed at the time of site development.

B PRELIMINARY INFORMATION

6 Geology

The British Geological Survey Map No 256 (North London) indicates that the site geology consists of London Clay.

6.1 London Clay

London Clay is a well-known stiff (high strength) blue-grey, fissured clay, which weathers to a brown colour near the surface. It contains thin layers of nodular calcareous mudstone - "claystone" - from place to place, and crystals of water clear calcium sulphate (selenite) are common. Although slopes will stand in the clay at steep angles in the short term, the long-term stable slope angle is about 7^{o} for grassed, or cleared slopes, and a few degrees more for wooded slopes.

7 Site Description

7.1 General Site Description and Boundaries

The site comprises an approximately rectangular plot of land, containing a detached three storey house, which has a lower ground floor. The boundaries are as follows:

Boundary	Description
Northern	This boundary lies along Cleve Road. There is a low brick wall that forms a partition between the front courtyard of the site and the pavement along the southern edge of Cleve Road.
Western	A wooden fence forms a partition between the subject site and the neighbouring building. An alleyway runs between the subject house and this fence, providing access to the rear garden of the site.
Southern	A wooden fence separates the rear garden of the subject site and the rear garden of the adjacent house.
Eastern	The eastern elevation of the subject house runs along this boundary. In the front courtyard and rear garden a brick wall forms a partition between the site and the adjacent house. There is an alleyway along the other side of this boundary (the subject house is detached).

7.2 Topography and Drainage

The house has a lower ground floor level, which is about 1m lower than the street level of Cleve Road. The rear garden is at the same level as the lower ground floor. The topography of the surrounding area slopes down to the south east at 1 – 2 degrees.

Drainage appears to be to mains sewers.

7.3 Vegetation

The front courtyard has several small bushes / shrubs.

The rear garden contains several mature trees, including a large Horse Chestnut (about 15 -20m in height, and about 6m from the existing rear elevation of the house). There are several other mature deciduous trees at the rear of the garden, including a Sycamore/Maple.

It is recommended that an arboricultural survey is undertaken in order to help determine the potential impact of the proposed basement on the nearby trees.

7.4 Buildings and Land Use on Site and Nearby

The existing house is three storeys in height, and of brick construction with a pitched roof. There is a two storey rear extension. The house has a lower ground floor level.

The building to the west of the site comprises a five storey block of flats. This building also has a lower ground floor.

The building to the east of the site comprises a three storey detached house, with a lower ground floor.

7.5 Inaccessible Site Areas

Access was restricted within part of the lower ground floor due to stored furniture; however, access was made to the trial hole and borehole locations which were indicated by the Client's structural engineer.

7.6 Site Photographs

A series of photographs showing views around the site is included in Appendix F.

C GROUND INVESTIGATION

8 Strategy and Method

The strategy adopted for the intrusive investigation comprised the following:

Activity / Method	Purpose	Max Depth Range (mbgl)	Installations / Notes
WLS01 and WLS02	Boreholes to investigate the shallow ground conditions within external areas. To allow SPT's and collection of samples for geotechnical and contamination testing. Installation of shallow groundwater monitoring wells.	6.0	19mm diameter piezometer installed in each borehole.
TP01 – TP04 Hand-dug	Inspection pits to prove existing foundations detail	0.8	

Exploratory hole locations are shown in Figure 2 in Appendix A. The borehole locations were supplied by the Client's structural engineer.

In-situ test and sampling methods descriptions employed are given in Appendix B together with the test results.

SPT Energy Ratio certificates and a Summary Table of SPT N Values is provided within Appendix B.

9 Weather Conditions

The fieldwork was carried out on 20th April 2018, at which time the weather was generally warm and dry.

10 Soils as Found

The soils encountered are described in detail in the attached exploratory hole logs (Appendix A), but in general comprised London Clay. At the front of the site, a covering of Made Ground was present; at the rear, a thin covering of topsoil was present. A summary is given below:

Depth to base (m)	Thickness (m)	Soil Type	Description
1.3	1.3	MADE GROUND	Topsoil overlying firm brown slightly sandy gravelly clay. Gravel comprises brick, flint and concrete. (WLS01 only)
0.2	0.2	MADE GROUND (TOPSOIL)	Loose dark brown organic silty sandy clay, with rootlets. (WLS02 only)
6 +	Unknown (base not reached)	LONDON CLAY	Firm, becoming increasingly stiff with depth, brown clay. From about 2.2 – 2.8m, the clay is thinly laminated and contained selenite crystals. Claystone nodules were noted from around 5.5m bgl.

The soils found are generally in accordance with those anticipated.

Roots (up to 10mm in diameter) were found underneath the foundation in TP02.

11 Contamination

Made Ground was observed in all of the trial hole locations. No other visual or olfactory evidence of contamination was noted. The chemical analyses undertaken in the course of this investigation, and appended to this report (see Appendix E), may be used as part of a preliminary waste classification. This report should be forwarded to waste receiving sites for their own assessment, to confirm classification of the soils for offsite disposal, and whether they can accept the material. Additional testing and Waste Acceptance Criteria (WAC) may be needed for confirmation of the material's classification.

12 Groundwater Observations

Groundwater was observed in the exploratory holes as follows:

Hole ID	Water Strike Depth (m)	Comment	Stratum
TP01	0.45	Groundwater encountered within foundation inspection trial pit at rear of house. Water level appeared stable.	MADE GROUND.
TP03	0.7	Groundwater encountered within foundation inspection trial pit at rear of house. Water level appeared stable.	MADE GROUND / LONDON CLAY

D DISCUSSION OF GEOTECHNICAL TEST RESULTS AND RECOMMENDATIONS

13 Geotechnical Laboratory Tests

The following geotechnical laboratory testing was carried out on selected samples in order to aid material classification and characterise soil properties. The test method references and results are given in Appendix C.

Laboratory Test	Number of Samples Tested	Stratum
Moisture Content	8	London Clay
Atterberg Limit	4	London Clay
Water soluble sulphate content of soil	3	London Clay
pH value of soil	3	London Clay

14 Soil Classification and Properties

14.1 Made Ground

Thin covering of topsoil, overlying Made Ground of variable clay, sand and gravel content. The Made Ground is generally sandy, slightly gravelly clay, although in one location (TP01) sandy medium to coarse flint gravels were encountered. The gravel contained within the Made Ground generally comprised flint, brick and occasionally concrete.

14.2 London Clay Formation

The London Clay soils at this site were generally seen as firm becoming stiff very closely fissured slightly sandy clays. Fine sand partings and claystone nodules were noted, along with selenite crystals.

The Atterberg limit results for this material indicates clays of very high plasticity. Liquid Limit results were seen within the range 72 to 74%, Plastic Limit results between 22 to 29% and Plasticity Indices between 43 to 50%, indicating a High Volume Change Potential.

A plot of cohesion against depth within the London Clay has been included within Appendix D as Figure 3, based upon the limited SPT N values (using a factor f_1 of 4.5 as suggested by Stroud.

14.3 Summary of Geotechnical Parameters

Soil Type: Made Ground

Parameters	Range	Suggested Design Value
Effective Angle of Friction, ϕ' (degrees)	-	27
Bulk Density (Mg/m^3)	-	1.9

Soil Type: London Clay

Parameters	Range	Suggested Design Value
Plasticity Index (%)	43 – 50	47
Long-term cohesion (kN/m^2)	-	0

Parameters	Range	Suggested Design Value
Bulk Density (Mg/m^3)	-	2.0
Coefficient of Compressibility, M_v (m^2/MN)	-	0.1
Effective Angle of Friction, ϕ' (degrees)	-	25

15 Groundwater Levels

Groundwater levels vary considerably from season to season and year to year, often rising close to the ground surface in wet or winter weather, and falling in periods of drought. Long-term monitoring from boreholes or standpipes is required to assess the ground water regime and this was not possible during the course of this site investigation.

The results of the groundwater monitoring programme are shown in the table below:

Hole ID	Base of installation (mbgl)	Groundwater level (mbgl)		
		20th April 2018	4th May 2018	18th May 2018
WLS01	6.15	-	4.89	4.14
WLS02	6.18	-	4.69	4.05
BH1 (pre-existing borehole at front of site)	5.11	1.11	1.05	1.22

Groundwater was not encountered in the boreholes during the intrusive investigation, but was encountered in two of the foundation inspection trial pits.

The groundwater level in the two boreholes is comparable (although it is noted that the surface level of WLS02 is about 1m below the surface level of WLS01), and appears to be rising slowly. The groundwater levels in WLS01 and WLS02 do not appear to have reached equilibrium yet. A pre-existing borehole was located within the front courtyard. Measurements of the groundwater level were taken during the intrusive investigation, and again during the monitoring visits. The groundwater level in this borehole is about 1.0 – 1.2m bgl.

It is considered that the stable groundwater level is likely to be around 1.0 – 1.5m below street level. This could be confirmed by long-term monitoring of the boreholes.

It is likely that the proposed basement extension will intersect the groundwater table. Based on the relatively slow rate at which the water levels in WLS01 and WLS02 are rising, the London Clay clearly has very low permeability. Seepages into the excavation should be controllable using sump pumps. Groundwater levels will need to be considered in the design of any temporary and permanent support works.

The London Clay may be unstable below the groundwater table.

16 Swelling and Shrinkage

Shrinkable soils are subject to changes in volume as their moisture content is altered. Soil moisture contents vary from season to season and can be influenced by a number of factors including the action of roots. The resulting shrinkage or swelling of the soil can cause subsidence or heave damage to foundations, the structures they support and services.

The designer should be aware that precautions regarding swelling and shrinkage are applicable, and in this respect NHBC precautions provide a helpful guide with respect to minimum foundation depths and deepening particularly within the zone of influence of trees.

Assessment of foundation depths should take into account trees, hedgerow and shrubs which are to be removed, remaining or are proposed which may be allowed to reach maturity.

We would recommend that a NHBC High Volume Change Potential site classification be adopted for design purposes.

Full details of protective measures are given in NHBC Standards Ref [5], Chapter 4.2 to which the reader is referred.

The depth of the proposed basement and associated foundation works is likely to be below the influence of any trees (subject to the Engineer's assessment).

17 Heave

Due to stress relief following the removal of soils to form the basement structure, both immediate (undrained) and long-term (drained) heave displacements can be expected to occur in the underlying soils. These will be slightly mitigated by the new structural loads; however, the net movement is likely to be a heave.

The immediate (undrained) heave displacements will occur during excavation of the basement, and before the construction of basement elements (e.g. slabs). Only the long-term (drained) heave displacements will need to be catered for in design, to overcome the problem of uplift pressures. This is normally overcome by installing appropriate void forming materials beneath the basement elements.

As a preliminary estimate, the combined short and long-term heave displacements are expected to be in the order of about 15 – 20mm in the centre of the proposed basement. This is based on the assumed soil profile. A detailed analysis, incorporating vertical and horizontal ground movements, would need to be undertaken in order to determine the potential damage to neighbouring buildings.

18 Soakaways

No soakage testing has been carried out, however, due to the clay nature of the soils on site it is considered that soakaway drainage would not work on this site.

19 Sulphates and Acidity

Chemical analysis of the underlying soils has been undertaken to establish the aggressive chemical environment for concrete in accordance with the BRE Special Digest 1, Ref [6].

The recorded pH values in the London Clay are in the range 7.5 - 7.9. The range of pH values in the Made Ground is 8.3 – 8.9.

The recorded sulphate concentrations were in the range 202 – 3226 mg/lSO_4. The high value (from WLS02 @ 4.5m) is likely to be due to selenite crystals within the London Clay. Selenite was noted in the London Clay below a depth of about 2.2 – 2.8m bgl. The proposed basement will be deeper than this. The Design Sulphate Class is DS-4. Groundwater should be assumed to be mobile, given the site observations. The ACEC site classification is AC-3.

20 Bearing Pressures

All loadings should be transferred beneath any fill or Made Ground, topsoil, soft or disturbed soils and be placed on the underlying natural clay soils (London Clay). Based on the results of this investigation an allowable bearing capacity of 125kN/m^2 could be adopted for foundations set on the London Clay below about 3m bgl.

The proposed basement extends outside the existing footprint of the house. Light wells are proposed at the front of the house. New foundations will be required for the basement extension and light well. Considering the soils found and anticipated geotechnical parameters, cantilevered reinforced concrete retaining walls are likely to be appropriate.

The proposed basement will need to be tanked, and the effects of hydrostatic uplift should be considered in the design of the basement. The proximity of trees should also be considered in the design.

21 Excavations and Dewatering

Statutory support will be required in all excavations where personnel must work.

The Made Ground and London Clay will be prone to instability in open excavations and during wet weather. They will soften and weaken rapidly where seepages occur, or if exposed to moisture.

Where excavation is proposed in close proximity to existing structures care will need to be taken to avoid undermining foundations.

Hard bands, such as claystones within the London Clay, may be encountered. Claystone was encountered in one borehole (WLS01) at a depth of 5.5m bgl. Where necessary, allowance should be made for breaking these out using hydraulic hammers or similar. Seepages may preferentially occur around claystone layers.

Based on the groundwater monitoring undertaken to date, it appears that the proposed basement will intersect the groundwater table. Therefore, it must be assumed that influx of water into the excavations will occur. Minor seepages could be controlled by use of sump pumps; however, ejector pumps may be required for larger seepages / influxes.

22 Retaining Structures

Soil parameters for the design of retaining walls are given in the tables in Section 12.4, and are summarised in the table below:

Soil Type	Bulk Density (kN/m^3)	Undrained Shear Strength (temporary condition) (kN/m^2)	Long term (Drained) condition	
			c' (kN/m^2)	φ^o
Made Ground	19	N/A	0	27
London Clay	20	See Figure 3 (Appendix D)	0	25

The proposed basement will extend out from the rear of the existing house. Light wells are proposed at the front of the house.

Careful consideration will be required when designing temporary and permanent support / propping systems with respect to adjacent foundations and structures.

It is recommended that a full structural survey/inspection of the existing and adjacent structures is undertaken prior to the onset of work on site. A monitoring programme should be considered.

REFERENCES

[1] London Borough of Camden, “Camden Planning Guidance CPG4 - Basements and Lightwells,” 2015.

[2] London Borough of Camden, “Camden Development Policy DP27 - Basements and Lightwells”.

[3] BSI Standards, “BS 5930 Code of pratice for ground investigations,” 2015.

[4] BSI Standards, “BS10175 Investigation of potentially contaminated sites – Code of pratice,” 2013.

[5] NHBC, “NHBC Standards Plus,” [Online]. Available: http://www.nhbc.co.uk/Builders/ProductsandServices/TechZone/nhbcstandards/.

[6] Building Research Establishment (BRE), “SD1 Concrete in aggressive ground,” 2005.

[7] BSI Standards, “BS 3882:2015 Specification for Topsoil,” 2015.

[8] BSI Standards, “BS EN ISO 22476-3:2005+A1:2011 Geotechnical investigation and testing. Field testing. Standard penetration test,” 2011.

[9] BSI Standards, “BS EN ISO 22475-1:2006 Geotechnical investigation and testing. Sampling methods and groundwater measurements. Technical principles for execution.,” 2006.

[10] BSI Standards, “BS ISO 18400-100:2017 Soil quality. Sampling. Guidance on the selection of sampling standards,” 2017.

[11] BSI Standards, “BS ISO 18400-101:2017 Soil quality. Sampling. Framework for the preparation and application of a sampling plan,” 2017.

[12] BSI Standards, “BS ISO 18400-103:2017 Soil quality. Sampling. Safety,” 2017.

[13] BSI Standards, “BS ISO 18400-105:2017 Soil quality. Sampling. Packaging, transport, storage and preservation of samples,” 2017.

[14] BSI Standards, “BS ISO 18400-107:2017 Soil quality. Sampling. Recording and reporting,” 2017.

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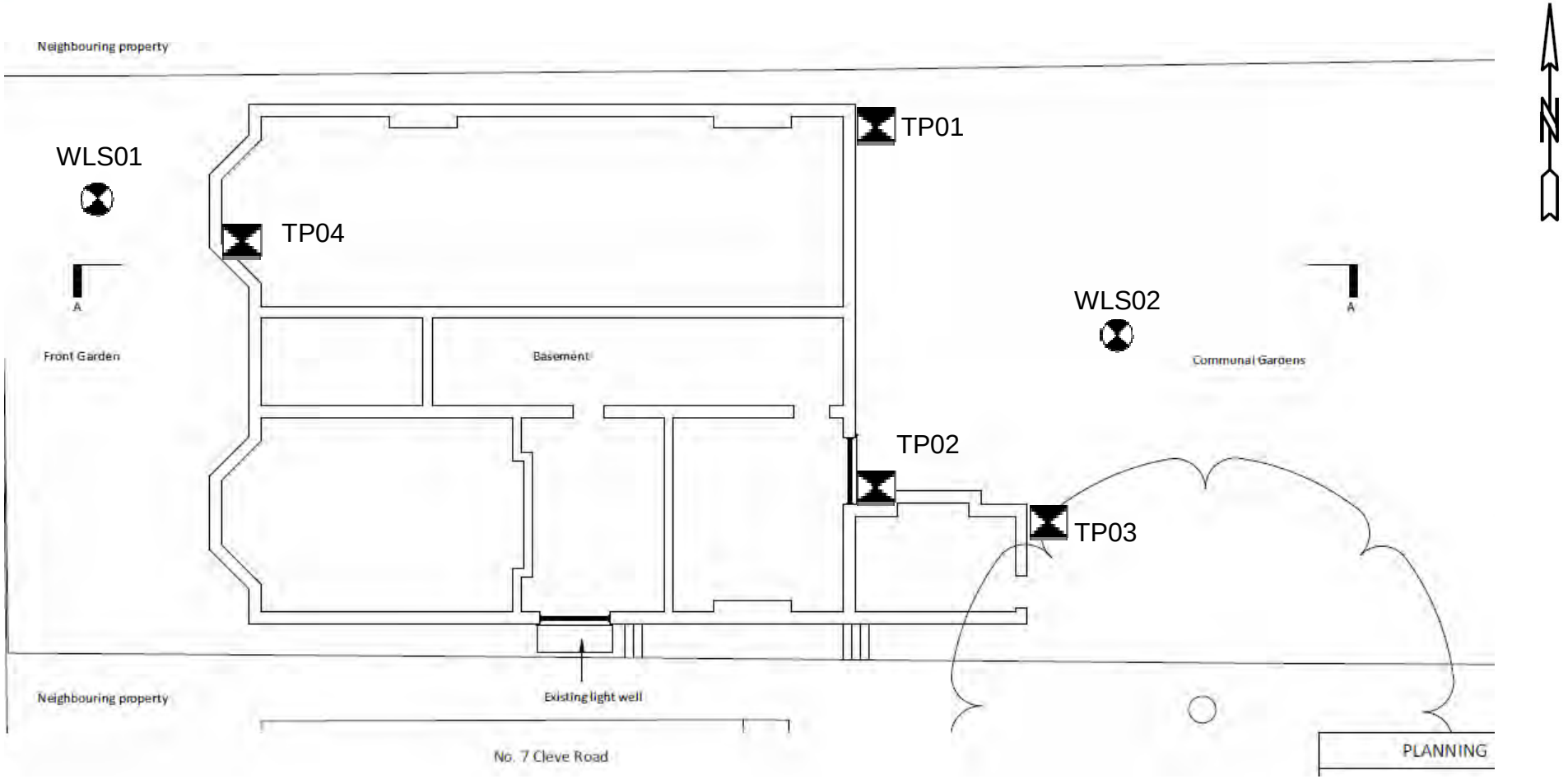
APPENDIX A

Site Plans and Exploratory Hole Logs

A

Site:	5 Cleve Road, London, NW6 3RN	Project ID	J13570
Figure 1	Site Location Plan	Date:	23rd May 2018



NB: Positions of exploratory holes / test positions are only indicative unless dimensioned.

Site:	5 Cleve Road, London, NW6 3RN	Project ID	J13570
Figure 2	Site Investigation Layout Plan	Date:	23rd May 2018

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Key to Exploratory Hole Logs, Plans and Sections

Backfill Symbols		Pipe Symbols		Principal Soil Types		Principal Rock Types		Drilling Records	
Arisings		Plain Pipe		Topsoil		Mudstone		Water Strike	
Concrete		Slotted Pipe		Made Ground		Claystone		Depth Water Rose	
Blacktop		Piezometer		Clay		Siltstone		Total Core Recovery (%) [TCR]	
Bentonite		Piezometer Tip		Silt		Sandstone		Solid Core Recovery (%) [SCR]	
Gravel Filter		Filter Tip		Sand		Limestone		Rock Quality Index (%) RQD]	
Sand Filter		Extensometer		Gravel		Chalk		Fracture Index (fractures / m) [FI]	
		Inclinometers		Peat					

All soil and rock descriptions are in general accordance with BS5930 2015, BS EN ISO 14688-1:2002+A1:2013 and BS EN ISO 14689-1:2003. Chalk descriptions are also based on CIRIA C574 and "Logging the Chalk – R.N. Mortimer 2015". The Geology Code is only provided where a positive identification of the sample strata has been made.

Location / Method Identifiers	
BH	Borehole (undefined)
CP	Cable Percussive
RC	Rotary Core
RO	Rotary Open Hole
ODC	Rotary Odex/Symmetrix drilling cased
CP+RC	Cable Percussive to Rotary Core
SNC	Sonic
CFA	Continuous Flight Auger
FA	Flight Auger
VC	Vibro Core
WLS+RC	Windowless (Dynamic) Sampler to Rotary Core
WLS	Windowless Sampler
WS	Window Sampler
HA	Hand Auger
C	Road / Pavement Core
IP	Inspection Pit (Hand Excavation)
TP	Trial Pit (Machine Excavated)
OP	Observation Pit (Supported Excavation Hand or Machine)

In-situ Test Location / Method	
DP	Dynamic Probe
CPT	Cone Penetration Test
CBR	In-situ CBR Test
DCP	CBR using Dynamic Cone Penetrometer
CBRT	CBR using TRL Probe
PB	Plate Bearing Test
SPT (S)	Standard Penetration Test (Split Barrel Sampler)
SPT (C)	Standard Penetration Test (Solid Cone)
N	SPT Result
-/-	Blows/Penetration (mm) after seating drive
-*/-	Total Blows / Penetration (mm)
( )	Extrapolated Value
PPT	Perth Penetration (In-House Method - Equivalent N Value)
HP / UCS	Strength from Hand Penetrometer (kN/m^2)
IVN	Strength from Hand Vane ((kN/m^2)
PID	Photo Ionisation Detector (ppm)
MEXE	Mexi-Cone CBR (%)

Samples / Test Type	
B	Bulk Sample
BLK	Block Sample
C	Core Sample
CBRS	CBR Mould Sample
D	Small Disturbed Sample
ES	Environmental Sample (Soil)
EW	Environmental Sample (Water)
GS	Environmental Sample (Gas)

Samples / Test Type	
SPTLS	Standard Penetration Test Split Barrel Sample
TW	Thin Wall Push In Sample (e.g. Shelby Sampler)
U	Undisturbed Open Drive Sample (blows to take)
UT	Thin Wall Undisturbed Open Drive Sample (blows to take)
W	Water Sample (Geotechnical)
SP	Sample from Stockpile
P	Piston Sample
AMAL	Amalgamated Sample

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Start - End Date	Project ID:	Hole Type:	WLS01
20/04/2018	J13570	WLS	Sheet 1 of 1

Project Name:	5 Cleve Road	Remarks:	Co-ordinates:	Level:	Logger:
					TRL
Location:	London, NW6 3RN	Hand dug to 1.3m. Installation details: GL - 1.0m plain pipe and bentonite surround. 1.0 - 6.0m BGL: slotted pipe with geosock and gravel surround. Dry on completion.			
Client:	Blackcap Ltd				

Well	Water Strikes	Samples and Insitu Testing: Depth (m bgl)	Type	Results	Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
						(0.15)		0.15	MADE GROUND: Topsoil comprising firm dark brown sandy CLAY with rootlets.
						(1.15)			MADE GROUND: Firm brown slightly sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded brick, flint and occasionally concrete.
		1.00	ES						*0.9 - 1.1m: gravel is predominantly brick.*
									1.1 - 1.3m cobbles comprising lean mix concrete.
								1.30	
		1.50	D			(0.30)			Firm to stiff brown mottled orangish brown CLAY.
		1.50	HP	UCS(kPa)=140.0				1.60	
		1.90	D						Firm to stiff very closely fissured brown CLAY. Fissures occasionally have bluish grey stain/ discolouration on surface.
		2.00	HP	UCS(kPa)=140.0					
		2.00	SPT(S)	N=4 (0,0/0,1,1,2)		(1.20)			*2.1 - 2.8m: stiff, and closely fissured with bluish grey stain on fissured surfaces.*
		2.50	D						
		2.50	HP	UCS(kPa)=190.0				2.80	
		3.00	HP	UCS(kPa)=200.0					Firm to stiff thinly laminated closely fissured brown CLAY, with rare fine selenite crystals.
		3.00	SPT(S)	N=12 (1,2/3,3,3,3)					
		3.50	D						
		3.50	HP	UCS(kPa)=250.0					*At 3.65m: claystone nodule.*
		4.00	HP	UCS(kPa)=230.0					
		4.00	SPT(S)	N=16 (3,3/3,4,4,5)					
		4.50	D			(3.20)			*4.5 - 6.0m: becoming stiffer.*
		4.50	HP	UCS(kPa)=220.0					*At 4.6m: sandy patch.*
		5.00	HP	UCS(kPa)=270.0					*4.7 - 4.9m: mottled bluish grey.*
		5.00	SPT(S)	N=17 (3,3/3,4,5,5)					
		5.50	D						*At 5.5m: claystone nodule.*
		5.50	HP	UCS(kPa)=250.0					
		6.00	HP	UCS(kPa)=290.0				6.00	End of borehole at 6.000m
		6.00	SPT(S)	N=19 (3,3/4,4,6,5)					

Hole Details		Casing Details		Waterstrike (m bgl)						Standing/Chiselling (m bgl)			
Depth (m bgl)	Dia. (mm)	Depth (m bgl)	Dia. (mm)	Date	Depth Strike	Depth Casing	Depth Sealed	Rose to:	Time (mins)	From	To	Time	Remarks

Southern Testing ST Consult

www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020

Start - End Date	Project ID:	Hole Type:	WLS02
20/04/2018	J13570	WLS	Sheet 1 of 1

Project Name:	5 Cleve Road	Remarks:	Co-ordinates:	Level:	Logger:
					TRL
Location:	London, NW6 3RN	Hand dug to 1.0m. Installation details: GL - 1.0m plain pipe and bentonite surround. 1.0 - 6.0m BGL: slotted pipe with geosock and gravel surround. Dry on completion.			
Client:	Blackcap Ltd				

Well	Water Strikes	Samples and Insitu Testing: Depth (m bgl)	Type	Results	Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
		0.10	ES			(0.20)		0.20	MADE GROUND: Topsoil comprising loose dark brown organic silty sandy CLAY with rootlets.
		0.50	D						Firm to stiff yellowish brown to brown CLAY.
		0.50	ES						
		0.50	HP	UCS(kPa)=100.0					
		1.00	D						
		1.00	ES			(2.00)			
		1.00	HP	UCS(kPa)=100.0					*1.3 - 2.2m: with light bluish grey veining/fissuring.*
		1.00	SPT(S)	N=4 (0,1/1,1,1,1)					
		1.50	D						
		1.50	HP	UCS(kPa)=180.0					
		2.00	D						
		2.00	HP	UCS(kPa)=170.0				2.20	
		2.00	SPT(S)	N=6 (0,0/1,2,1,2)					Firm to stiff thinly laminated very closely to closely fissured CLAY. Some fissures are light bluish grey. With occasional fine selenite crystals.
		2.50	D						
		2.50	HP	UCS(kPa)=200.0					
		3.00	HP	UCS(kPa)=190.0					
		3.00	SPT(S)	N=8 (1,1/1,2,2,3)		(2.10)			
		3.50	D						
		3.50	HP	UCS(kPa)=260.0					
		4.00	HP	UCS(kPa)=290.0					
		4.00	SPT(S)	N=11 (1,2/2,2,3,4)				4.30	
		4.50	D						Stiff thinly to thickly laminated very closely to closely fissured brown CLAY. With occasional fine selenite crystals.
		4.50	HP	UCS(kPa)=320.0					
		5.00	HP	UCS(kPa)=350.0					
		5.00	SPT(S)	N=11 (2,2/2,2,3,4)		(1.70)			
		5.20	D						
		5.50	HP	UCS(kPa)=410.0					
		6.00	D					6.00	End of borehole at 6.000m
		6.00	HP	UCS(kPa)=400.0					
		6.00	SPT(S)	N=12 (2,2/2,3,3,4)					

1 2 3 4 5 6 7 8 9 10

Hole Details		Casing Details		Waterstrike (m bgl)						Standing/Chiselling (m bgl)			
Depth (m bgl)	Dia. (mm)	Depth (m bgl)	Dia. (mm)	Date	Depth Strike	Depth Casing	Depth Sealed	Rose to:	Time (mins)	From	To	Time	Remarks

Southern Testing ST Consult

www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020

Start - End Date:	Project ID:	Machine Type:	TP01
20/04/2018	J13570	Hand dug	Sheet 1 of 1

Project Name:	5 Cleve Road	Remarks:	Co-ordinates:	Level (m AOD):	Logger:
					TRL
Location:	London, NW6 3RN	Groundwater encountered at 0.45m bgl. Unable to deepen hole due to loose gravel.			
Client:	Blackcap Ltd				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
				(0.15)		0.15	MADE GROND (TOPSOIL): loose dark brown organic silty sandy CLAY with rootlets.
				(0.45)			MADE GROUND: loose clayey sandy medium to coarse subangular flint GRAVEL.
						0.60	Pit terminated at 0.60m.

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:		Unstable.	
Length:			
Depth:	0.60		

Southern Testing ST Consult	Start - End Date:	Project ID:	Machine Type:	TP02
www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020	20/04/2018	J13570	Hand dug	Sheet 1 of 1

Project Name:	5 Cleve Road	Remarks:	Co-ordinates:	Level (m AOD):	Logger:
					TRL
Location:	London, NW6 3RN	Roots encountered underneath foundation. Dry.			
Client:	Blackcap Ltd				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
				(0.20)		0.20	MADE GROUND (TOPSOIL): loose brown sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded brick. With rootlets, and occasional whole bricks.
				(0.40)		0.60	Firm to stiff light brown mottled light yellowish brown slightly sandy CLAY, with roots. Roots are up to 10mm in diameter, eminating from underneath foundation.
							Pit terminated at 0.60m.

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:		Stable.	
Length:			
Depth:	0.60		

Southern Testing ST Consult	Start - End Date:	Project ID:	Machine Type:	TP03
www.southerntesting.co.uk tel:01342 333100 www.stconsult.co.uk tel:01604 500020	20/04/2018	J13570	Hand dug.	Sheet 1 of 1

Project Name:	5 Cleve Road	Remarks:	Co-ordinates:	Level (m AOD):	Logger:
					TRL
Location:	London, NW6 3RN	Groundwater encountered at 0.7m bgl.			
Client:	Blackcap Ltd				

Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
				(0.40)		0.40	MADE GROUND (TOPSOIL): loose brown sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded brick. With rootlets, and occasional whole bricks.
				(0.80)		1.20	Firm to stiff yellowish brown CLAY.
							Pit terminated at 1.20m.

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:		Stable.	
Length:			
Depth:	1.20		

Southern Testing ST Consult

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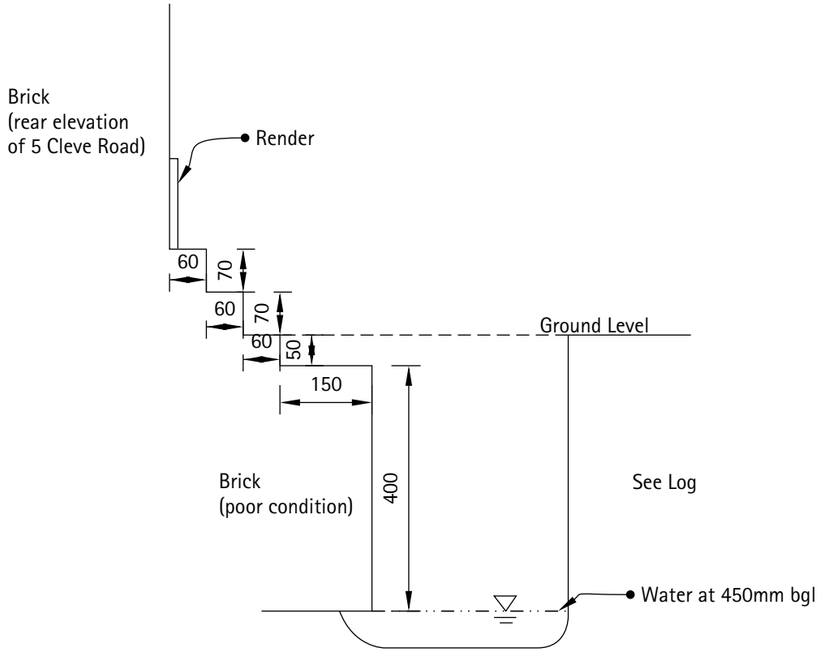
Start - End Date:	Project ID:	Machine Type:	TP04
20/04/2018	J13570	Hand dug	Sheet 1 of 1

Project Name:	5 Cleve Road	Remarks:	Co-ordinates:	Level (m AOD):	Logger:
					TRL
Location:	London, NW6 3RN	Dry.			
Client:	Blackcap Ltd				

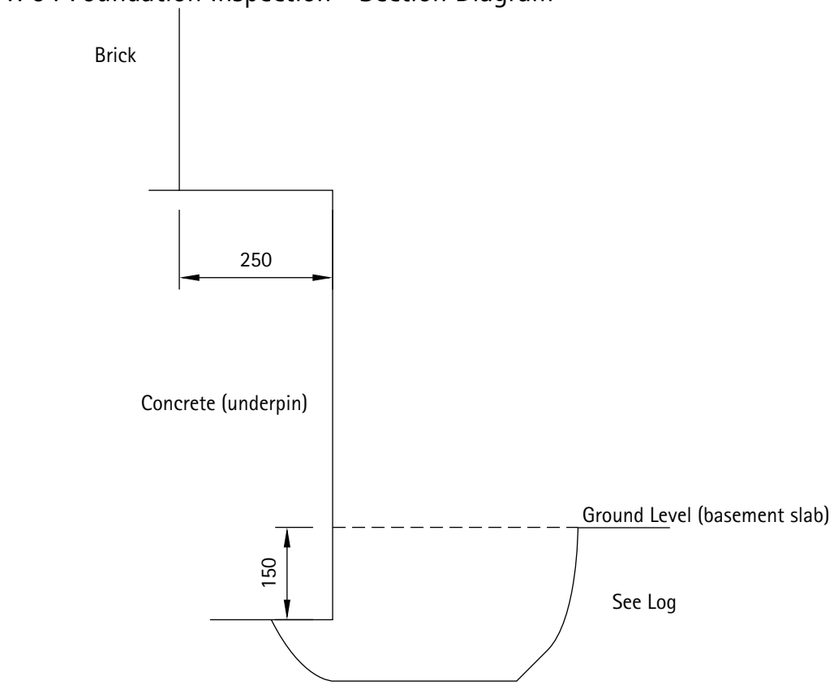
Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description
Depth (m)	Type	Results					
				(0.15)		0.15	CONCRETE.
0.30	HP	UCS(kPa)=190.00		(0.35)		0.50	Stiff brown CLAY.
							Pit terminated at 0.50m.

Pit Dimension (m)		Pit Stability:	Water Strikes:
Width:		Stable	
Length:			
Depth:	0.50		

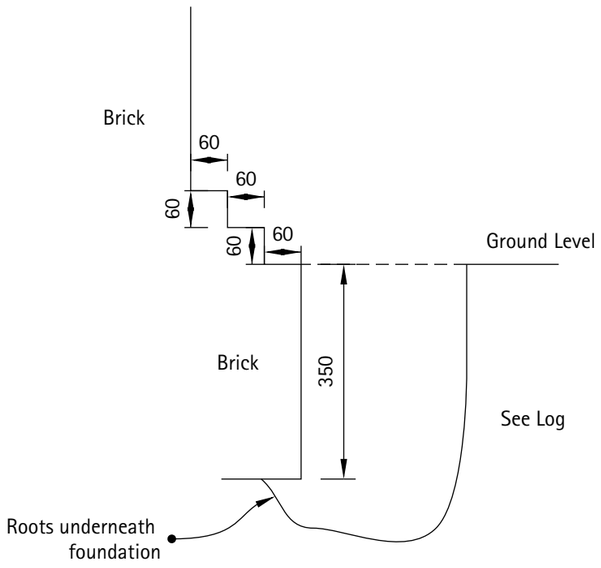
TP01 Foundation Inspection - Section Diagram



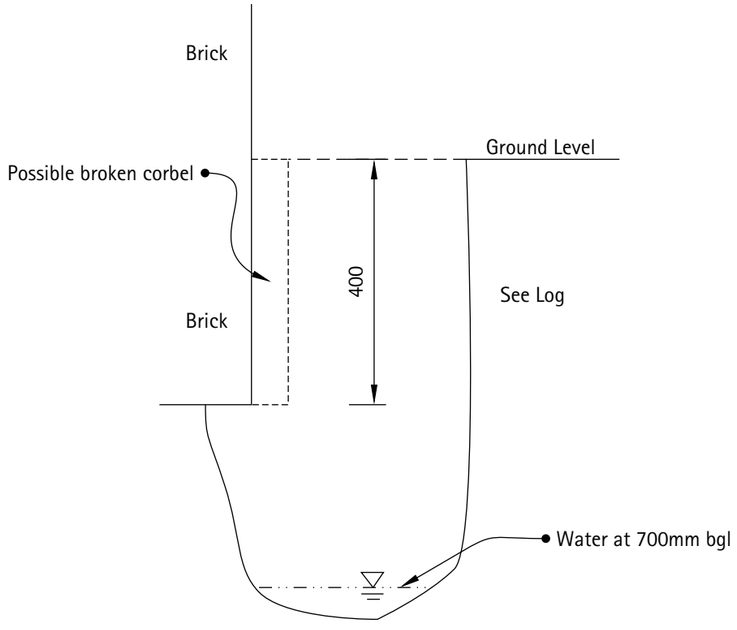
TP04 Foundation Inspection - Section Diagram



TP02 Foundation Inspection - Section Diagram



TP03 Foundation Inspection - Section Diagram



Notes

1. All dimensions in mm unless stated otherwise.

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Keeble House, Stuart Way, East Grinstead,
West Sussex. RH19 4QA
Tel: 01342 333100 Fax: 01342 410321
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Client: Blackcap Ltd	
Job Title: 5 Cleve Road, London, NW6 3RN	
Description: Trial Pit Sections	
Drawing No: 1	
Scale: 1:100	Paper Size: A3
Drawn by: TRL	Checked by: DS
Date: 02/05/2018	

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APPENDIX B

Field Sampling and In-Situ Test Methods and Results

B

Soil and Rock Descriptions

All soil and rock descriptions are in general accordance with BS5930 Ref [3].

Anthropogenic soils ('made ground' or 'fill') describe materials which have been placed by man and can be divided into those composed of reworked natural soils and those composed of or containing man-made materials. 'Fill' is used to describe material placed in a controlled manner and 'made ground' is used to describe materials placed without strict engineering control.

The classification of materials such as topsoil is based on visual description only and should not be interpreted to mean that the material complies with criteria used in BS 3882 Ref [7].

The geology code is only provided on logs where a positive identification of the sample strata has been made.

Inspection Pit

Inspection pits are hand excavated from the surface (maximum depth 1.2 – 1.5m) using appropriate tools to locate and avoid existing buried services at exploratory hole positions. They are also regularly used as part of investigations on existing structures to expose and determine foundation detail.

Trial Pits and Trenches

Trial pits and trenches are unsupported excavations, mechanically excavated by machine to the required depth to enable visual examination, in situ testing and sampling as required from outside the excavation.

Dynamic Sampling - Windowless

Windowless samplers are designed for taking disturbed, continuous soil samples to depths up to 10 metres (depending on ground conditions). The samplers comprise steel tubes of about 50-100mm diameter with a rigid plastic liner (no window) and are driven into the ground with a sliding hammer mounted on a tracked purpose-designed soil sampling rig. After driving and extracting the sampler from the ground, the plastic liner is extracted together with the enclosed soil sample. The sample can then either be extracted, split and sub-sampled or plastic end caps may be fitted, the tube labelled and transported for future examination and sub-sampling.

Soil samples are disturbed by the driving process with both techniques and can be regarded as being between Class 5 up to Class 3 samples at best (in favourable ground).

The major advantage of using windowless samplers is that the plastic liner greatly reduces the possibility of cross-contamination between successive samples.

An equivalent in-situ test to the Standard Penetration Test can be carried out with the windowless sampler rig.

Standard Penetration Test (SPT)

The Standard Penetration Test (SPT) is specified in BS EN ISO 22476-3 Ref [8]. In this test, an open-ended tube is driven into the ground by blows from a free-falling hammer (with specified sizes, weights and distances).

The tube is seated by driving to a penetration of 150mm, or by 25 blows, whichever occurs first. It is then driven for a maximum of a further 300mm and the number of blows is termed the penetration resistance (N). If 300mm penetration cannot be achieved in 50 blows, the test drive is terminated and penetration depth is recorded.

When testing in gravels, a conical end piece is attached to the tube. The test is then called an SPT(C).

A classification of relative density descriptions as used on borehole logs, based upon uncorrected SPT N values, is given within BS5930 Ref [3] and set out as follows:

Classification based on uncorrected SPT N Value	Term
0 - 4	Very Loose
4 - 10	Loose
10 – 30	Medium Dense
30 – 50	Dense
Over 50	Very Dense

Hand Penetrometer Test

The handheld soil penetrometer consists of a spring loaded and calibrated plunger which is forced into cohesive soil. A reading of unconfined compression strength (equal to twice cohesion) is given on a calibrated scale. The average of a set of three readings shall be recorded.

In common with other hand methods of strength assessment it does not give an accurate indication of bearing capacity in stiff or fissured soils, because of the small test area.

Disturbed Samples

Disturbed samples were taken from exploratory holes in general accordance with BS 5930 [3] and BS EN ISO 22475-1 Ref [9] as required and stored in appropriately labelled containers. Details of the type, size and depth of sample will be recorded within the exploratory hole record. Such samples can be regarded as being between Class 5 up to Class 3 quality depending upon their method of sampling.

Environmental Samples

Environmental samples were taken from the boreholes at regular intervals in the made ground and natural soils as indicated on the exploratory hole logs. The sampling strategy was in general accordance with BS10175 Ref [4] and BS ISO 18400 Refs [10], [11], [12], [13] & [14].

These samples were collected and stored in glass jars or plastic pots and transferred to the laboratory in cool boxes as appropriate to the proposed laboratory testing.

Monitoring Well

A groundwater and/or ground gas monitoring well consists of a perforated pipe, which is installed in the ground. The standpipe is typically 50mm nominal in diameter and is installed in a lined borehole. It is perforated from the base with a sand/gravel surround through the soil horizon of interest to an appropriate depth below ground level. Above this there is a bentonite seal with solid pipework and is provided with an end cap or a gas valve at the top as appropriate.

Gas monitoring is carried out via the gas tap. Water sampling/purging can be undertaken by removing the gas tap and bung.

The well is usually completed at the surface with a flush cast iron cover or raised lockable cover.

Groundwater Monitoring – Dip Meter

The dip meter is used to measure standing water levels within boreholes. The probe is lowered into the borehole until the meter detects the groundwater with an audible ‘beep’. The level is then read from the tape.

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SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Southern Testing Laboratories
Keeble House
Stuart Way
East Grinstead
West Sussex
RH19 4QA

SPT Hammer Ref:	0004
Test Date:	30/09/2017
Report Date:	30/09/2017
File Name:	0004.spt
Test Operator:	NPB

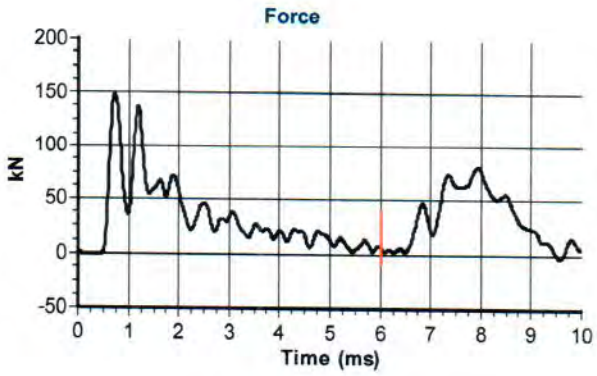
Instrumented Rod Data

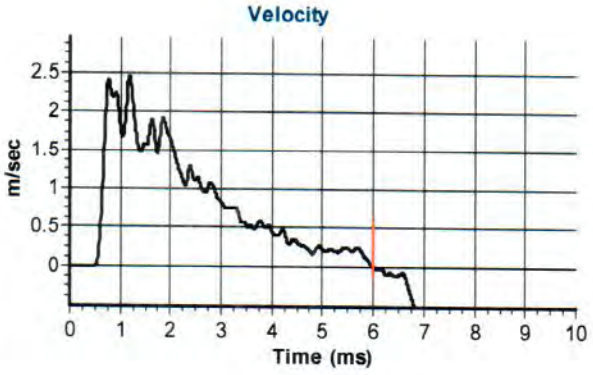
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.0
Assumed Modulus E_a (GPa):	200
Accelerometer No.1:	6458
Accelerometer No.2:	9607

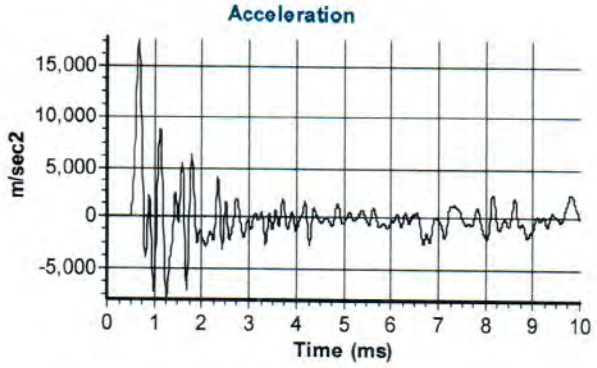
SPT Hammer Information

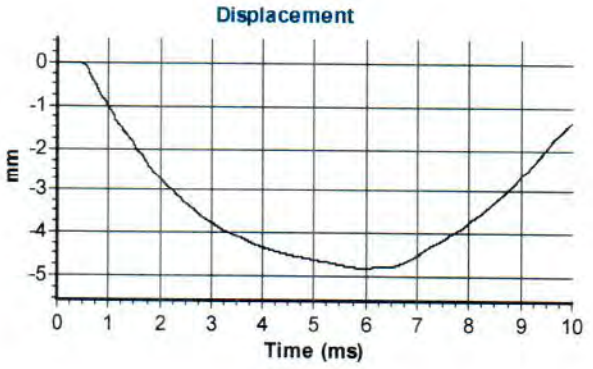
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	14.5

Comments / Location
CHARLWOODS









Calculations

Area of Rod A (mm2):	905
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	283

Energy Ratio E_r (%): **60**

Signed: Neil Burrows
Title: Field Operations Manager

The recommended calibration interval is 12 months

Southern Testing Environmental & Geotechnical ST Consult Environmental & Geotechnical

Project Name: 5 Cleve Road

Location: London, NW6 3RN **Project Number: J13570**

Client: Blackcap Ltd **Engineer: TRL**

STANDARD PENETRATION TEST RESULTS

Location ID	Test Depth (m bgl)	Test Type	Seating Blows/Penetration				Main Test Blows/Penetration								N Value	Reported Result
			SB1	SP1	SB2	SP2	MB1	MP1	MB2	MP2	MB3	MP3	MB4	MP4		
WLS01	2	S	0	75	0	75	0	75	1	75	1	75	2	75	4	N=4 (0,0/0,1,1,2)
WLS01	3	S	1	75	2	75	3	75	3	75	3	75	3	75	12	N=12 (1,2/3,3,3,3)
WLS01	4	S	3	75	3	75	3	75	4	75	4	75	5	75	16	N=16 (3,3/3,4,4,5)
WLS01	5	S	3	75	3	75	3	75	4	75	5	75	5	75	17	N=17 (3,3/3,4,5,5)
WLS01	6	S	3	75	3	75	4	75	4	75	6	75	5	75	19	N=19 (3,3/4,4,6,5)
WLS02	1	S	0	75	1	75	1	75	1	75	1	75	1	75	4	N=4 (0,1/1,1,1,1)
WLS02	2	S	0	75	0	75	1	75	2	75	1	75	2	75	6	N=6 (0,0/1,2,1,2)
WLS02	3	S	1	75	1	75	1	75	2	75	2	75	3	75	8	N=8 (1,1/1,2,2,3)
WLS02	4	S	1	75	2	75	2	75	2	75	3	75	4	75	11	N=11 (1,2/2,2,3,4)
WLS02	5	S	2	75	2	75	2	75	2	75	3	75	4	75	11	N=11 (2,2/2,2,3,4)
WLS02	6	S	2	75	2	75	2	75	3	75	3	75	4	75	12	N=12 (2,2/2,3,3,4)

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APPENDIX C

Geotechnical Laboratory Test Methods and Results

C

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Atterberg and Moisture Content Summary

BS1377-2 cl.3.2, 3.3, 4.2, 4.3 & BS EN ISO 17892-1

AGS

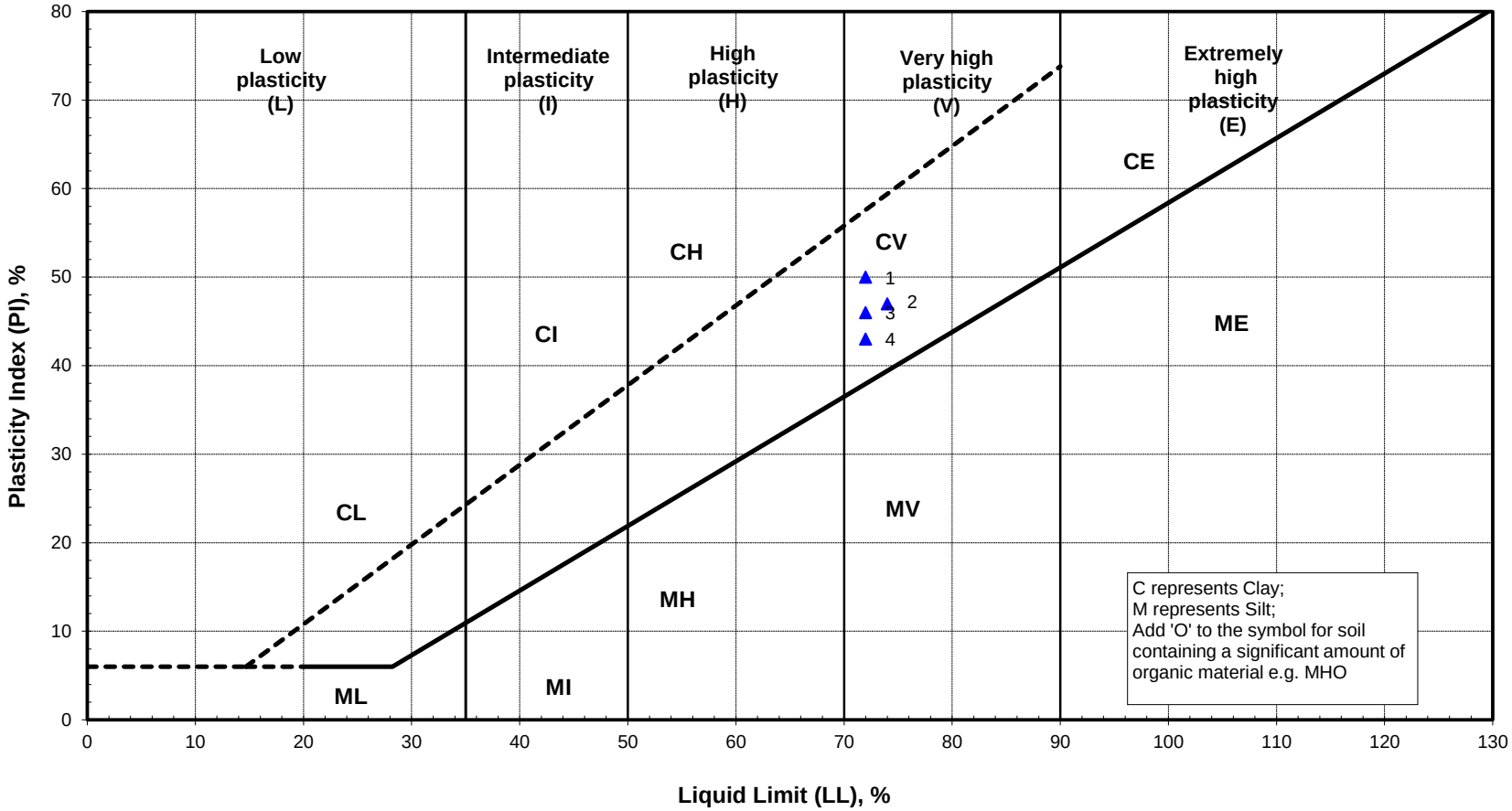
Project Name	5 Cleve Road, London NW6						Project Number		J13570	
Client	Blackcap Limited				PE	TL	Date Issued		09-May-18	
Location	Depth m	Sample Type	Visual Description	Comments	Natural MC %	Liquid Limit %	Plastic Limit %	Plasticity Index	Classi-fication	Passing 425 micron %
WLS01	1.50	D	*Stiff yellow brown CLAY.*		*33*	*72*	*22*	*50*	*CV*	*100*
WLS01	2.50	D	*Stiff light brown CLAY.*		*30*	*74*	*27*	*47*	*CV*	*100*
WLS02	0.50	D			*31*					
WLS02	1.00	D			*30*					
WLS02	1.50	D			*31*					
WLS02	2.00	D	*Stiff brown veined grey CLAY.*		*33*	*72*	*26*	*46*	*CV*	*100*
WLS02	3.50	D			*34*					
WLS02	5.20	D	*Very stiff grey brown CLAY.*		*27*	*72*	*29*	*43*	*CV*	*100*

Plasticity Chart for Atterberg Limit Tests

Project Name	*5 Cleve Road, London NW6*			**Project Number**	*J13570*
Client Name	*Blackcap Limited*	**PE**	*TL*	**Date Issued**	*09-May-18*

Key

No.	TH No.	Depth
1	WLS01	1.50
2	WLS01	2.50
3	WLS02	2.00
4	WLS02	5.20



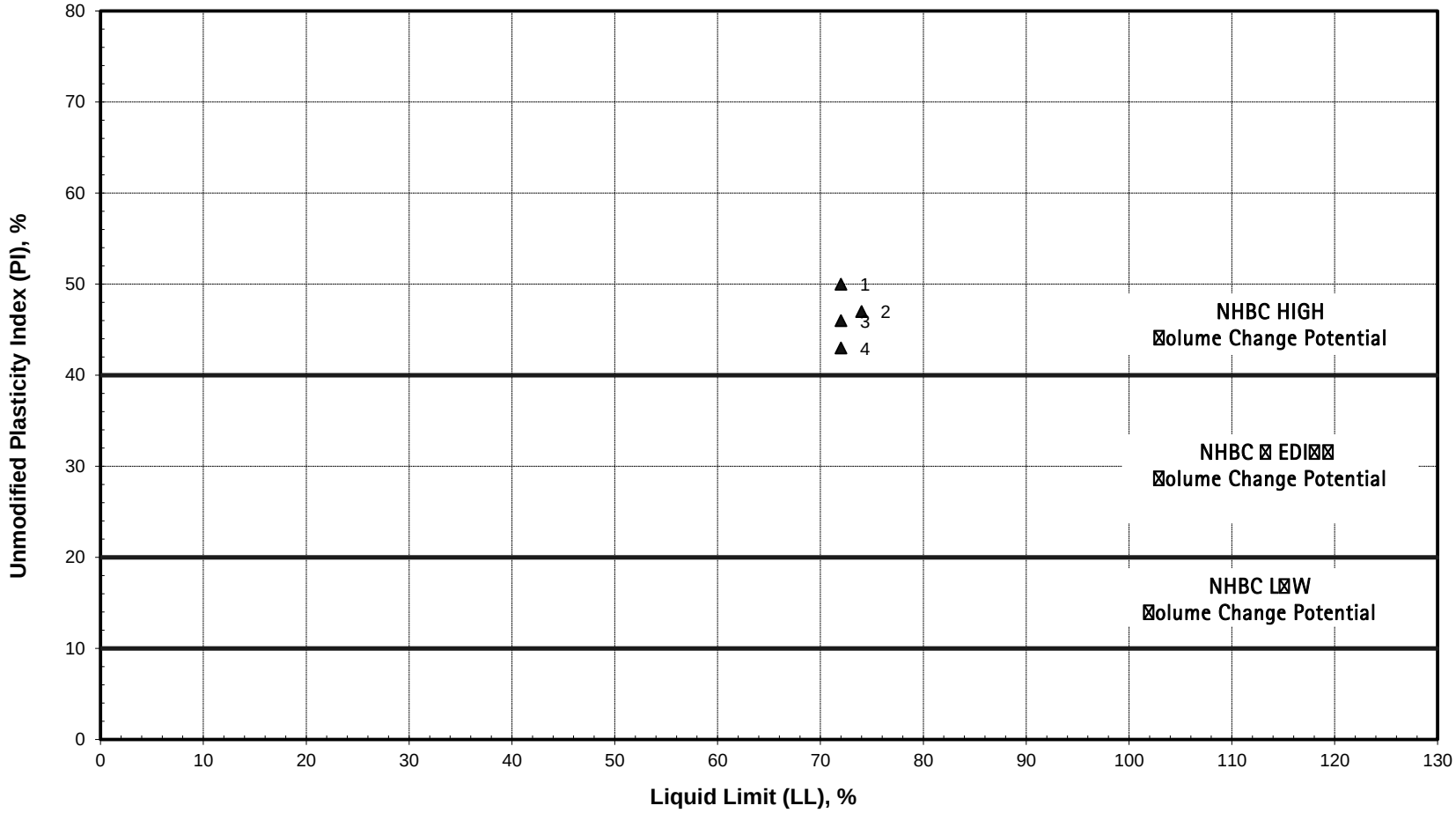
Liquid Limit		**Plastic Limit**		**Plasticity Index**	
Maximum Value	74	Maximum Value	29	Maximum Value	50
Minimum Value	72	Minimum Value	22	Minimum Value	43
Average Value	73	Average Value	26	Average Value	47

NHBC Classification for Volume Change Potential

Project Name	*5 Cleve Road, London NW6*			**Project Number**	*J13570*
Client Name	*Blackcap Limited*	**PE**	*TL*	**Date Issued**	*09-May-18*

Key

No.	TH No.	Depth
1	WLS01	1.50
2	WLS01	2.50
3	WLS02	2.00
4	WLS02	5.20



Liquid Limit		**Plastic Limit**		**Unmodified Plasticity Index**	
Maximum Value	74	Maximum Value	29	Maximum Value	50
Minimum Value	72	Minimum Value	22	Minimum Value	43
Average Value	73	Average Value	26	Average Value	47

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CHEMICAL & ELECTROCHEMICAL TESTING SUMMARY

To BS1377-3 cl 5.6 & 9.5

AGS

Project Name	5 Cleve Road, London NW6						Project Number		J13570	
Client	Blackcap Limited				PE	TL	Date Issued		09-May-18	

TH No.	Depth m	Sample Type	Visual Description	Comments	Passing 2mm %	pH Value	Soil Sulphate 2:1 Water Extract		Groundwater Sulphate	
							g/l SO_3	BRE mg/l SO_4	g/l SO_3	BRE mg/l SO_4
WLS01	1.90	D	*Firm brown CLAY.*		*100*	*7.7*	*0.17*	*202*		
WLS02	1.00	D	*Firm brown speckled black CLAY.*		*100*	*7.7*	*0.42*	*499*		
WLS02	4.50	D	*Stiff brown CLAY.*		*100*	*7.5*	*2.69*	*3226*		

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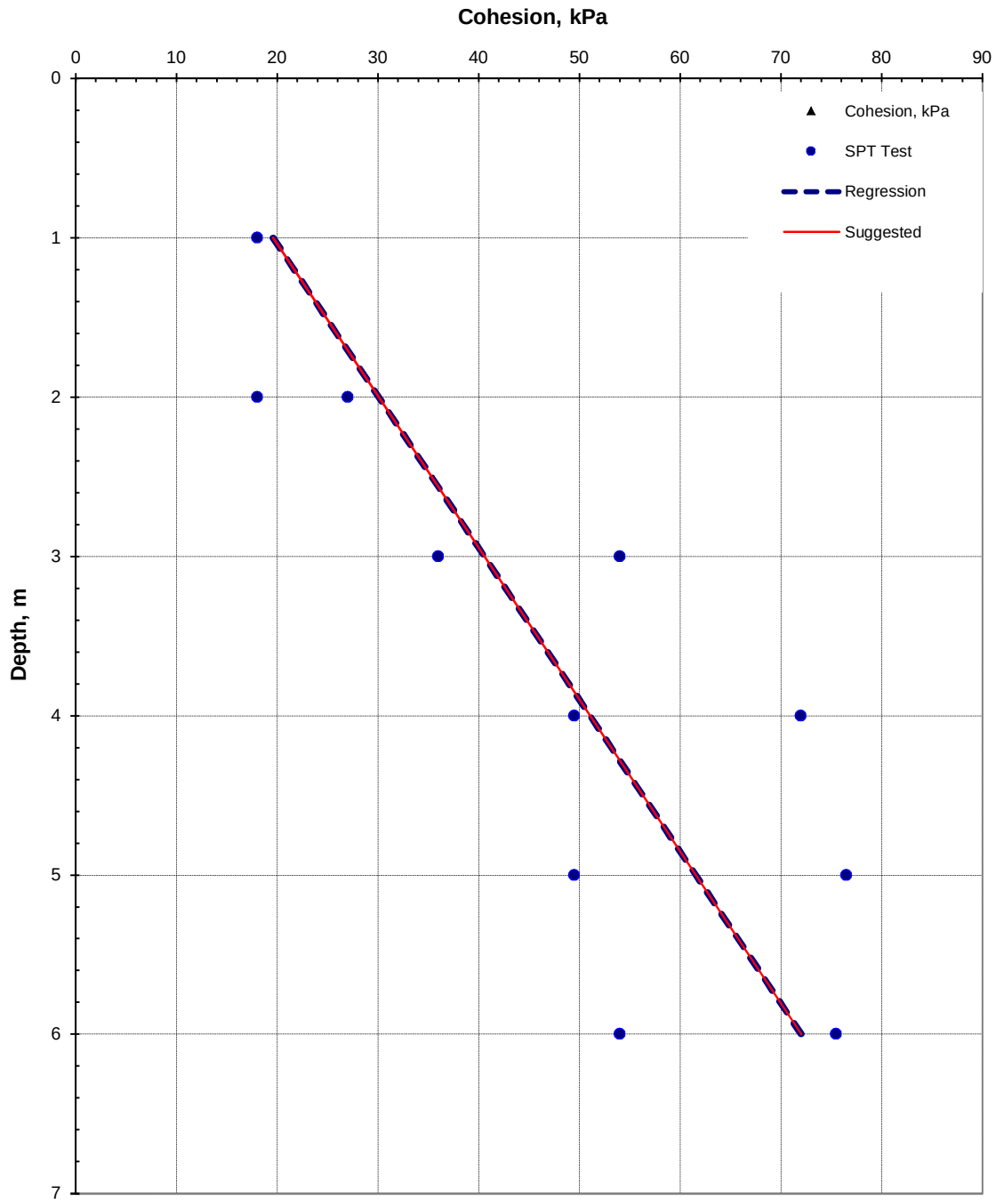
APPENDIX D

Geotechnical Figures and Tables

D

Plot of Cohesion vs Depth



Linear Regression of the Test Results: ***Slope =*** 10.5 ***kPa/m,*** ***Zero intercept =*** 9.1 ***kPa***

Suggested Design Line: ***Slope =*** 10.5 ***kPa/m,*** ***Zero intercept =*** 9.1 ***kPa***

Client:	**Blackcap Limited**	**Site:**	**5 Cleve Road, London**		
Job No:	J13570	**Date:**	23/05/2018	**Figure No:**	3

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APPENDIX E

Contamination Laboratory Test Methods and Results

E

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Concept Life Sciences

Certificate of Analysis

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Report Number: 732323-1

Date of Report: 09-May-2018

Customer: Southern Testing Laboratories
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RH19 4QA

Customer Contact: Mr Tom Lees

Customer Job Reference: J13570
Customer Purchase Order: J13570_1 Tom
Customer Site Reference: 5 Cleve Road, London NW6
Date Job Received at Concept: 26-Apr-2018
Date Analysis Started: 26-Apr-2018
Date Analysis Completed: 09-May-2018

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Christopher Payne
Customer Service Advisor

Issued by :
Christopher Payne
Customer Service Advisor

Concept Reference: 732323
Project Site: 5 Cleve Road, London NW6
Customer Reference: J13570

Soil Analysed as Soil
STL Key Contamintion Suite

					Concept Reference	**732323 001**	**732323 002**	**732323 003**
					Customer Sample Reference	**WLS01 @ 1.00m**	**WLS02 @ 0.10m**	**WLS02 @ 1.00m**
					Date Sampled	**20-APR-2018**	**20-APR-2018**	**20-APR-2018**
					Matrix Class	**Clay**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Arsenic	T257	A40	2	mg/kg	**17**	**12**	**12**
Cadmium	T257	A40	0.1	mg/kg	**0.2**	**0.1**	<0.1
Chromium	T257	A40	0.5	mg/kg	**27**	**12**	**39**
Copper	T257	A40	2	mg/kg	**42**	**20**	**24**
Lead	T257	A40	2	mg/kg	**1200**	**38**	**15**
Mercury	T245	A40	1.0	mg/kg	**1.8**	<1.0	<1.0
Nickel	T257	A40	0.5	mg/kg	**20**	**8.7**	**37**
Selenium	T257	A40	3	mg/kg	<3	<3	<3
Zinc	T257	A40	2	mg/kg	**170**	**67**	**61**
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected	Asbestos not detected
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1
pH	T7	A40			**8.9**	**8.3**	**7.9**
Soil Organic Matter	T287	A40	0.1	%	**3.3**	**8.3**	**0.5**
(Water Soluble) SO4-- expressed as SO4	T242	A40	0.01	g/l	**0.09**	**0.09**	**0.55**
Sulphide	T4	A40	10	mg/kg	<10	<10	<10
Fraction Organic Carbon - F(oc)	T917	AR	0.001		**0.019**	**0.048**	**0.003**
TPH (C6-C10)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C10-C40)	T219	AR	10	mg/kg	**27**	**62**	<10
Cyanide(Total)	T921	AR	1	mg/kg	<1	<1	<1
Phenols(Mono)	T921	AR	1	mg/kg	<1	<1	<1
Moisture @105C	T162	AR	0.1	%	**22**	**36**	**23**
Retained on 2mm	T2	A40	0.1	%	**4.7**	**3.3**	**2.5**

Concept Reference: 732323
Project Site: 5 Cleve Road, London NW6
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Soil Analysed as Soil
Total and Speciated USEPA16 PAH (SE) (MCERTS)

					Concept Reference	**732323 001**	**732323 002**	**732323 003**
					Customer Sample Reference	**WLS01 @ 1.00m**	**WLS02 @ 0.10m**	**WLS02 @ 1.00m**
					Date Sampled	**20-APR-2018**	**20-APR-2018**	**20-APR-2018**
					Matrix Class	**Clay**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Naphthalene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	**0.3**	<0.1	<0.1
Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	T16	AR	0.1	mg/kg	**0.6**	<0.1	<0.1
Pyrene	T16	AR	0.1	mg/kg	**0.5**	<0.1	<0.1
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	**0.2**	<0.1	<0.1
Chrysene	T16	AR	0.1	mg/kg	**0.2**	<0.1	<0.1
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	**0.2**	<0.1	<0.1
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	**0.2**	<0.1	<0.1
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	**0.2**	<0.1	<0.1
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	**0.1**	<0.1	<0.1
PAH(total)	T16	AR	0.1	mg/kg	**2.4**	<0.1	<0.1

Index to symbols used in 732323-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Retained on 2mm is removed before analysis
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis
Asbestos subcontracted to REC Limited

Method Index

Value	Description
T287	Calc TOC/0.58
T2	Grav
T7	Probe
T4	Colorimetry
T245	ICP/OES (Aqua Regia Extraction)
T257	ICP/OES (SIM) (Aqua Regia Extraction)
T54	GC/MS (Headspace)
T162	Grav (1 Dec) (105 C)
T921	Colorimetry (CF) (MCERT)
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T917	OX/IR (SE)
T6	ICP/OES
T27	PLM
T16	GC/MS
T219	GC/FID (SE)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T257	A40	2	mg/kg	M	001-003
Cadmium	T257	A40	0.1	mg/kg	M	001-003
Chromium	T257	A40	0.5	mg/kg	M	001-003
Copper	T257	A40	2	mg/kg	M	001-003
Lead	T257	A40	2	mg/kg	M	001-003
Mercury	T245	A40	1.0	mg/kg	U	001-003
Nickel	T257	A40	0.5	mg/kg	M	001-003
Selenium	T257	A40	3	mg/kg	U	001-003
Zinc	T257	A40	2	mg/kg	M	001-003
Asbestos ID	T27	A40			SU	001-003
Chromium VI	T6	A40	1	mg/kg	N	001-003
pH	T7	A40			M	001-003
Soil Organic Matter	T287	A40	0.1	%	N	001-003
(Water Soluble) SO4-- expressed as SO4	T242	A40	0.01	g/l	M	001-003
Sulphide	T4	A40	10	mg/kg	N	001-003
Fraction Organic Carbon - F(oc)	T917	AR	0.001		N	001-003
TPH (C6-C10)	T54	AR	0.010	mg/kg	N	001-003
TPH (C10-C40)	T219	AR	10	mg/kg	M	001-003
Cyanide(Total)	T921	AR	1	mg/kg	M	001-003
Phenols(Mono)	T921	AR	1	mg/kg	M	001-003
Moisture @105C	T162	AR	0.1	%	N	001-003
Retained on 2mm	T2	A40	0.1	%	N	001-003
Naphthalene	T16	AR	0.1	mg/kg	U	001-003
Acenaphthylene	T16	AR	0.1	mg/kg	U	001-003
Acenaphthene	T16	AR	0.1	mg/kg	M	001-003
Fluorene	T16	AR	0.1	mg/kg	M	001-003
Phenanthrene	T16	AR	0.1	mg/kg	U	001-003
Anthracene	T16	AR	0.1	mg/kg	M	001-003
Fluoranthene	T16	AR	0.1	mg/kg	N	001-003

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Pyrene	T16	AR	0.1	mg/kg	N	001-003
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	M	001-003
Chrysene	T16	AR	0.1	mg/kg	M	001-003
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	001-003
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	N	001-003
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	M	001-003
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	M	001-003
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	M	001-003
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	M	001-003
PAH(total)	T16	AR	0.1	mg/kg	U	001-003

Southern Testing
Environmental & Geotechnical

ST Consult
Environmental & Geotechnical

APPENDIX F

Photographs

F

TP01 (foundation inspection pit).

TP01 (foundation inspection pit).

TP01 (foundation inspection pit).

TP04 (foundation inspection pit).

TP02 (foundation inspection pit). Note roots.

TP03 (foundation inspection pit).

TP03 (foundation inspection pit).

Read garden, looking away from house.

Rear elevation of 5 Cleve Road.

Mature trees in garden, and neighbouring building (to west).

Adjacent building (to east).

Neighbouring building (to west).

Southern Testing
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