Geotechnical, Hydrological and Hydrogeological Assessment

of proposed development at

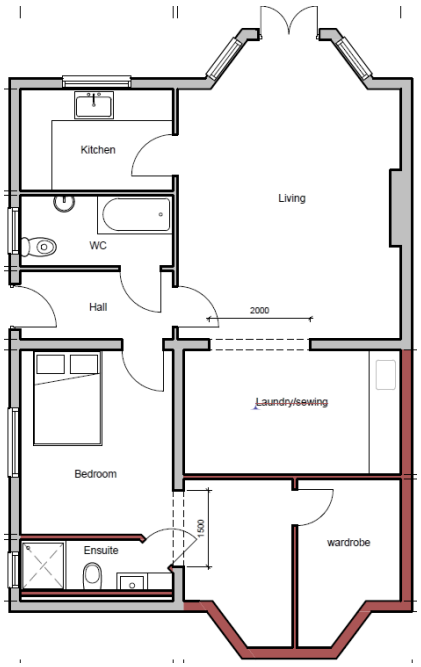
No 27a Lambolle Road,
Camden,
London,
NW3 4HS

for

Mr Brad Fishman

LBH4352bia Ver 1.1

October 2015



LBH WEMBLEY

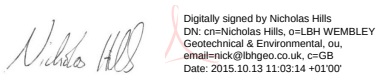
Geotechnical & Environmental

Project No: LBH4352

Report Ref: LBH4352geo Ver 1.1

Date: 13th October 2015

Report prepared by:



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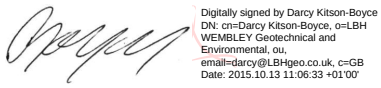

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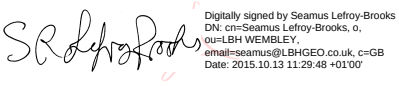

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Contents

Foreword-Guidance Notes

GENERAL

This report has been prepared for a specific client and to meet a specific brief. The preparation of this report may have been affected by limitations of scope, resources or time scale required by the client. Should any part of this report be relied on by a third party, that party does so wholly at its own risk and LBH WEMBLEY Geotechnical & Environmental disclaims any liability to such parties.

The observations and conclusions described in this report are based solely upon the agreed scope of work. LBH WEMBLEY Geotechnical & Environmental has not performed any observations, investigations, studies or testing not specifically set out in the agreed scope of work and cannot accept any liability for the existence of any condition, the discovery of which would require performance of services beyond the agreed scope of work.

CONTAMINATION

Unless detailed in the report, no contamination investigation has been undertaken and no consideration has been given to any special measures that may be necessary in connection with possible contamination. Unless specifically commented upon, no approach has been made to the Local Authority or Environment Agency in order to establish any further information or requirements that may affect this site. These further investigations must be made, for example, to establish whether there is a risk of gaseous or liquid migration towards or away from the site. LBH WEMBLEY Geotechnical & Environmental can accept no responsibility for any claims resulting from the presence of Asbestos, Japanese Knot-Weed, Radioactivity or Unexploded Ordinance at this site.

VALIDITY

Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances shall be at the client's sole and own risk. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should therefore not be relied upon in the future.

THIRD PARTY INFORMATION

The report may present an opinion on the disposition, configuration and composition of soils, strata and any contamination within or near the site based upon information received from third parties. However, no liability can be accepted for any inaccuracies or omissions in that information.

DRAWINGS

Any plans or drawings provided in this report are not meant to be an accurate base plan, but are used to present the general relative locations of features on, and surrounding, the site.

Introduction

1.1 Background

It is proposed to develop this site through the excavation of additional basement space at the existing basement level. An existing basement underlies approximately three quarters of the building footprint, with the remaining (northern) quarter currently unexcavated.

1.2 Brief

LBH WEMBLEY Geotechnical & Environmental have been appointed to undertake a Basement Impact Assessment (BIA) for submission to London Borough of Camden in order to support a planning application for the proposed development. This report set out the geotechnical, hydrological and hydrogeological information that has been collected to inform the assessment.

2. The Site

2.1 Site Location

The site is situated on the lower southern slopes of Hampstead Hill approximately 400m south of Rosslyn Hill. The site may also be located approximately by postcode NW3 4HS or by National Grid Reference 527270,184625.

2.2 Site Description

The property is rectangular plot, measuring approximately 45m long by 10m wide and is occupied by a three-storey brick-built semi-detached house with a partial single-storey basement, and associated rear garden and front patio/parking area. The basement flat is designated as No. 27a Lambolle Road.

The property lies on the southern side of Lambolle Road, and is adjoined to the east by No. 25, while to the west No 29 stands beyond an alleyway. To the south the rear garden adjoins the rear garden of No. 67 Lancaster Grove.

Owing to the relative drop in ground level between the font of the property and the rear, the basement opens out onto the rear garden.

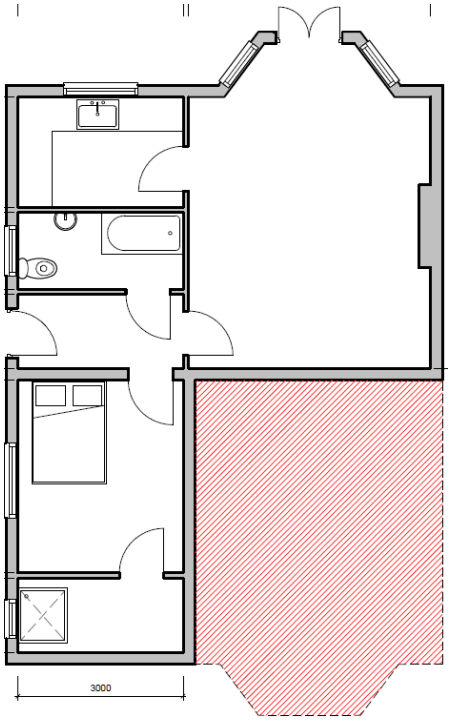
Beyond a patio area, The rear garden is planted with shrubs and semi-mature trees present along both sides of the garden. Mature trees are present at the southern end of the garden of the neighbouring property, No. 25.

Left: Rear elevation of Nos. 27 with 27a at rear garden level

Right: Rear garden of No. 27 showing shrub planting and small trees.

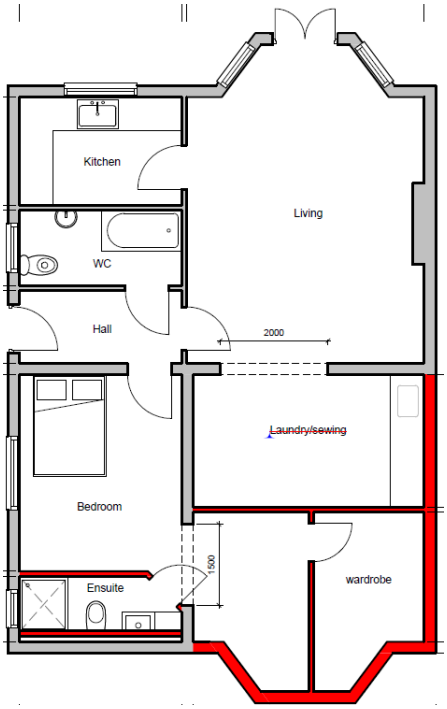
2.3 Proposed Development

It is proposed to extend the existing lower ground floor / basement laterally to create a basement that occupies the footprint of the entire house. This is to be achieved through the excavation of the northern quarter of the footprint to the same levels as the existing basement. This extension will provide additional living and bedroom space.



Left: Drawing of No. 27a showing proposed excavation in red.

Right: Drawing of No. 27a showing the proposed layout following basement excavation.



Desk Study

2.4 Site History

The site remained undeveloped until the late 19th Century, being open land (with cricket fields immediately east of the site) until the laying out of Lambolle Road, Lancaster Grove, Lancaster Road and Belsize Park Gardens in the early 1870s. By the end of the 19th Century many of the existing houses on these roads had been built, however the site itself remained undeveloped until the early 20th Century.

Following the construction of No. 27 prior to WWI the site has remained in essentially its existing configuration, with only minor changes.

2.5 Geological Information

The British Geological Survey (BGS) records that the site is directly underlain by the London Clay.

2.6 Hydrogeological / Hydrological Information

The nearest surface water feature is tributary of the River Tyburn, that is believed to flow some 140m to the north of the site, beneath Belsize Park Gardens. This is likely to have now been culverted.

The London Clay may be regarded as an effectively impermeable unit.

No abstraction permits are recorded within 500m.

3. Ground Investigation

A ground investigation was carried out at No. 27a Lambolle Road on the 7th September 2015. This investigation comprised two dynamic windowless sampler boreholes (WS1 & WS2) to depths of 4m and 4.6m to the rear and the front of the property respectively, supplemented by one heavy dynamic probe (P1) to a depth of 10m, immediately adjacent to WS2. Groundwater monitoring standpipes were installed in each of the boreholes to the full depth.

The exploratory borehole records and dynamic probe results together with the results of geotechnical laboratory test carried out on selected soil samples are appended, along with a site plan indicating the exploratory positions.

It should be noted that WS1 was commenced approximately at basement floor level and the soils encountered are those upon which the proposed basement will found, whereas WS2 begins at approximately basement ceiling level and is more representative of the material to be excavated.

3.1 Ground Conditions

The ground investigations confirmed the expected general strata comprising a limited thickness of made ground directly overlying the London Clay.

3.2 Made Ground

Made ground was found to be present to a depth of 0.8m below ground level beneath the front driveway, comprising pea gravel over soft brown clayey topsoil with occasional brick fragments and fine rootlets.

The made ground encountered to the rear of the property was limited to the compacted sand that formed the sub-base to the stone paving slabs of the rear patio.

3.3 London Clay

The London Clay was present immediately underlying the made ground. In WS1 the clay was found to be a firm brown-grey clay, initially sandy within the top 0.4m. This material may represent a disturbed zone.

Typical brown weathered London Clay was then found to the full extent of both boreholes. The clay was found to be firm to approximately 1.0m depth, becoming increasingly stiff below this level.

A laboratory index property determination has shown that these clay soils are of high shrinkage potential in terms of the National House Building Council (NHBC) guidelines.

Occasional clusters of selenite crystals were noted in both boreholes.

3.4 Groundwater

No groundwater was encountered during the drilling works and both boreholes were found to be dry at the completion of fieldwork. Both boreholes were monitored a week after their installation and again found to be dry.

4. Geotechnical Assessment

The investigation has encountered a limited thickness of made ground overlying the London Clay. It is inevitable that proposed basement level will lie within the cohesive soils of the London Clay Formation.

4.1 Basement Construction

It is envisaged that the existing walls are to be conventionally underpinned; following which it will be possible to construct the basement by way of forming a rigid “box-type” structure. The applied structural loads would be supported by the underpinning and thickened sections of the basement slab.

4.1.1 Underpinning Excavations

It is envisaged that the London Clay formation will be encountered to the base of all excavations. No groundwater is expected to be encountered.

4.1.2 Retaining Walls

There will be a need to prop the new underpinning in the temporary situation in order to prevent movement of the retained ground and minimise any potential damage. Once the underpinning is completed and the floor slab has been cast and set, the new walls can be designed to be restrained by the structure itself and the temporary propping can be removed.

4.1.3 Basement Waterproofing

Groundwater has not been encountered during the investigation of this site. However, regardless of the apparent absence of groundwater, the basement should be fully waterproofed and designed to withstand hydrostatic pressures in accordance with the guidance provided in BS8102:2009, Code of Practice for the Protection of Below-Ground Structures against Water from the Ground. There is the potential for water to collect around the basement structure in the long term and a design groundwater level at 1m depth is suggested for the purposes of hydrostatic design in order to allow for possible storm run-off or a mains burst causing surface water flooding.

4.1.4 Effect of Trees

The nearest tree to the proposed basement is approximately 5m away, in the road-side corner of the driveway of No. 27. It is not expected that the basement will intrude upon the Root Protection Area of this tree and it is not expected that any degree of desiccation would be encountered at such distances. In any case, the depth of the basement excavation is such that any potentially desiccated soils may be expected to have been by-passed.

4.2 Basement Foundations

It is suggested that the new underpinning and any thickened sections of the basement slab to support the new structural loading may be initially sized on the basis of applying a net allowable bearing pressure of 150 kN/m^2 within the cohesive soils of the London Clay Formation below a depth of 3.5m below the front driveway level.

4.3 Hydrological and Hydrogeological Effects

4.3.1 Impact on Infiltration

The new development will not result in any increase in the hard surfaced or paved areas of the property and hence there should be no effect upon infiltration and no increase in the amount of rainfall or run-off to be collected and discharged.

4.3.2 Impact on Surface Water Flooding and Surface Water Flow

The new development is not expected to have any effect upon surface water flooding or surface water flow, being located entirely beneath the existing building.

4.3.3 Impact on Groundwater Flow

No groundwater has been encountered either within or below the depth of proposed basement within the impermeable London Clay, thus there is not expected to be any impact upon groundwater flow as a result of the construction of the proposals.

4.4 Foundation Concrete

The results of chemical analyses carried out on selected samples of the soils encountered indicate soluble sulphate concentrations falling within Class DS-2 as defined by BRE Special Digest 1 (2005). The recommendations of that guidance for Class DS-2 sulphate conditions should therefore be followed, assuming an Aggressive Chemical Environment for Concrete (ACEC) site classification of AC-1s for static groundwater.

4.5 Ground Movement Assessment

A key factor in the design of the new basement construction will be the need to preserve the stability of the adjacent buildings and highway at all times, both during excavation and construction and in the permanent situation.

Within the area of the proposed basement, excavation will extend to approximately 3.5m below existing ground level but in view of the relatively small area involved, long term vertical ground heave associated with stress relief is not expected to be substantial.

Following initial structural design and the preparation of a definitive a construction methodology a more detailed ground movement assessment can be performed.

It is not possible to model the vertical and horizontal soil movements that may result from underpinning. Experience indicates that potential movements are very much dependent on workmanship. There will inevitably be a limited extent of settlement of the underpinned wall; but, assuming good workmanship, this vertical settlement can be expected to be less than 5mm.

There is some limited scope for basement heave to occur as a result of the stress relief due overburden removal. This upwards movement may serve to counteract the underpinning settlement described above. However, while some heave movement should be expected in the short term, the weight of the new building foundation loading movement will counteract long term heave movements.

4.5.1 Impact on Host Property

There may be a need to include provision of heave protection beneath the floor in order to protect the floor against possible long term residual heave of the underlying clay.

4.5.2 Impact on Adjacent Property

Consideration should be given to any potential movements that may affect the stability of the neighbouring property.

The adjacent property, No. 25 Lambolle Road, comprises a three storey brick building with a lower ground floor reaching to a similar depth as that of No. 27a, approximately level with the rear garden.

The party wall between Nos. 27 and 25 is already at the depth of the proposed basement along the rear half of its length, thus only the front half requires deepening.

It is assumed that, as shown on the appended drawing from Camden planning application 9100082, (24/01/1991) the remainder of this party wall founds at the same depth as the front wall of the house, approximately within 1m of the surface.

It is expected that No. 25 has the same lower ground floor layout as No. 27a thus the only wall to be affected appears to be the party wall between Nos. 27 and 25 that is expected to be underpinned.

4.5.3 Conclusion

Given an adequate design and construction methodology it is envisaged that the basement construction will have no detrimental impact on the stability of either the host building or the neighbouring structures.

APPENDIX

SITE PLAN SHOWING EXPLORATORY POSITIONS

BOREHOLE LOGS

DYNAMIC PROBE RESULTS

GEOTECHNICAL TEST RESULTS

ENVIROCHECK REPORT (SEPARATE FILE)

PROJECT: No. 27a, Lambolle Road, NW3 4HS
CLIENT: Mr Brad Fishman

LBH4352
27.08.15

SITE PLAN

PROJECT: 27a Lambolle Road, Camden, NW3 4HS | LBH4352

CLIENT: Mr Brad Fishman | 08/09/2015

BOREHOLE WS1

BORING METHOD: Dynamic Windowless Sampler | Date Drilled: 07/09/15

GROUND WATER: No Groundwater Observed

REMARKS: Removed loose stone patio slab prior to commencement.
Hand-dug inspection pit to 1.2m depth.
19mm Standpipe installed to 4.0m depth with a response zone and pea shingle surround 1.00m to 4.60m depth and a bentonite seal from GL to 1.00m depth. Flush metal cover set in concrete surround.

Samples No	Samples Type	Depth m	Tests	Legend	Depth m	Description	Stand-pipe
					0.07	MADE GROUND: Paving slab over compacted sand	
						Firm brown-grey, locally grey CLAY. Initially sandy in top 0.4m, becoming stiff by 0.9m. Contains regular 3mm selenite crystals.	
1	D	1.00				Becoming stiff by 0.9m	
						10mm wide light brown silty sand bed at 1.4m	
2	D	1.70				Contains occassional large (15mm selenite crystal clusters) from 1.6m becoming less common with depth.	
						10mm wide light brown silty sand bed at 2.1m	
3	D	2.40					
4	D	3.00					
5	D	3.50				Becoming very stiff by 3.5m and contains rare small (≤10mm diameter) pockets of coarse sand within which are fine selenite clusters.	
					4.00	Refusal at 4.00m	

U=Undisturbed
B= Bulk
D=Disturbed
W=Water

Sheet No:

PROJECT: 27a Lambolle Road, Camden, NW3 4HS | LBH4352

CLIENT: Mr Brad Fishman | 08/09/2015

BOREHOLE WS2

BORING METHOD: Dynamic Windowless Sampler | Date Drilled: 07/09/15

GROUND WATER: No Groundwater Observed

REMARKS: Hand-dug inspection pit to 1.2m depth. 19mm Standpipe installed to 4.6m depth with a response zone and pea shingle surround 1.00m to 4.60m depth and a bentonite seal from GL to 1.00m depth. Flush metal cover set in concrete surround.

Samples No	Samples Type	Depth m	Tests	Legend	Depth m	Description	Stand-pipe
					0.80	MADE GROUND: Pea gravel over soft brown clayey topsoil containing brick fragments.	
						Firm brown-grey, locally grey CLAY. Initially sandy in top 0.4m, becoming stiff by 1.1m. Contains regular 3mm selenite crystals becoming less common with depth.	
6	D	1.30				Occasional sandy laminations from 1.30m	
7	D	1.80					
8	D	2.50					
9	D	3.00				From 3.0m contains common selenite clusters.	
						Becoming stiff at 3.50m	
10	D	3.60					
11	D	4.50					
					4.6	Refusal at 4.60m	

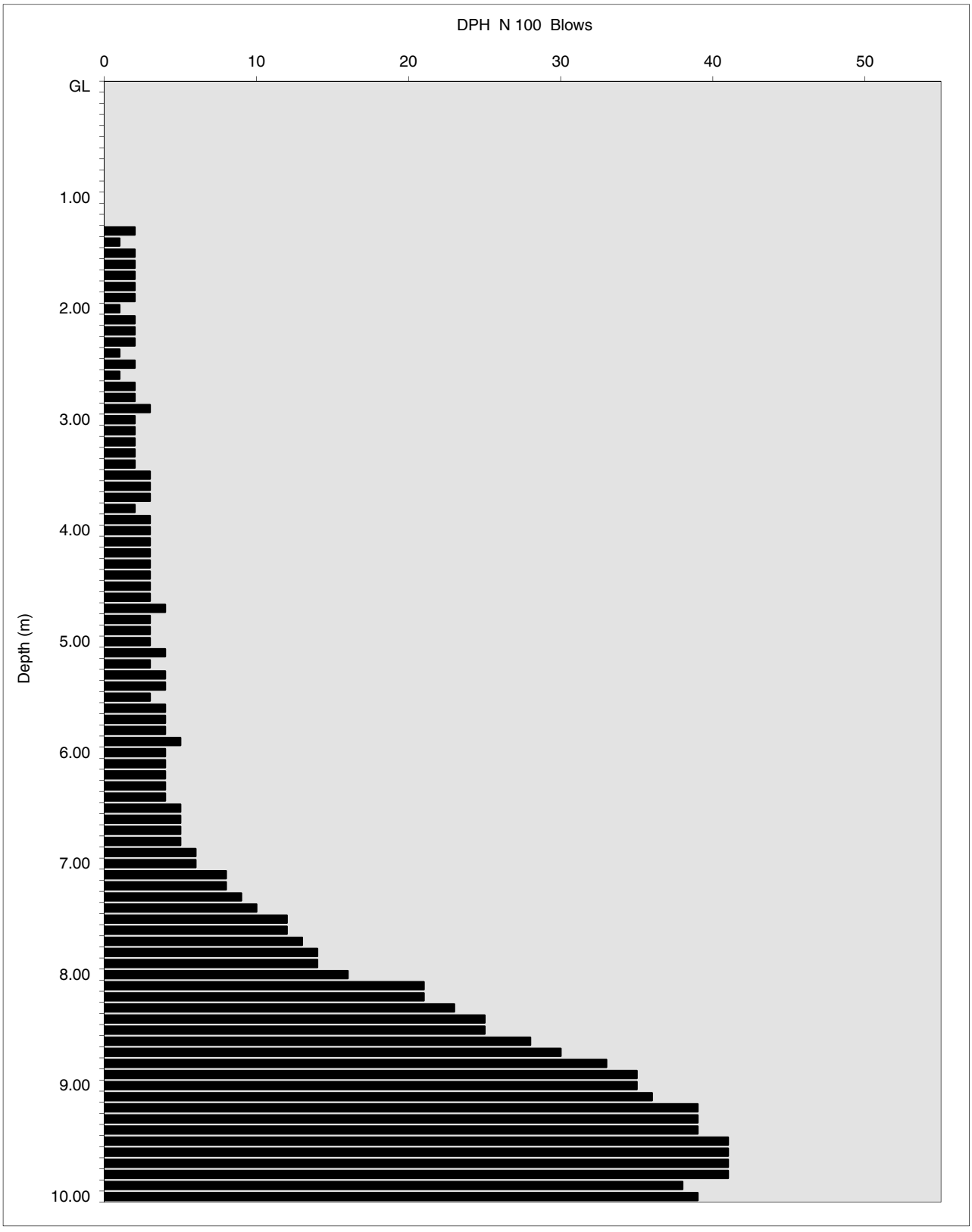
U=Undisturbed
B= Bulk
D=Disturbed
W=Water

Sheet No:

PROJECT:	27a Lambolle Road, Camden, NW3 4HS	**DYNAMIC PROBE RESULTS**
CLIENT:	Mr Brad Fishman	

Probe No: 1

Date: 08/09/2015



Remarks : Apparatus BS1377:Part 9:1990 - DPH.

Project No	**LBH WEMBLEY Geotechnical & Environmental**
LBH4352	

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD

Telephone:- 01327 860947/860060 Fax:- 01327 860430 Email: groundtech@listersgeotechnics.co.uk

PROJECT INFORMATION	
Site Location:-	27a Lambolle Road, Camden, NW3 4HS
Client Reference:-	LBH4352
Date Samples Received:-	10th September 2015
Date Testing Completed:-	17th September 2015

The results relate only to the samples tested

SAMPLE INFORMATION

Laboratory Tests Undertaken:-

TEST TYPE	TEST METHOD	TESTED
Natural Moisture Contents (MC%)	(BS 1377:Part 2:1990 Clause 3.2)	✓
Liquid Limits (%)	(BS 1377:Part 2:1990 Clause 4.3)	✓
Plastic Limits (%)	(BS 1377:Part 2:1990 Clause 5.3)	✓
Plasticity Index (%)	(BS 1377:Part 2:1990 Clause 5.4)	✓
Linear Shrinkage (%)	(BS 1377:Part 2:1990 Clause 6.5)	
PSD - Wet Sieving	(BS 1377:Part 2:1990 Clause 9.2)	
Engineering Sample Descriptions	(BS 5930 : Section 6)	
Passing 425/63 (μm)	-	✓
Hydrometer	(BS 1377:Part 2:1990 Clause 9.5)	
Loss on Ignition (%)	-	
Soil Suctions (kPa)	BRE Digest IP 4/93, 1993	
Bulk Density (Mg/m^3)	(BS 1377:Part 2:1990 Clause 7.2)	
Strength Tests	(BS 1377:Part 7:1990 Clause 8 & 9)	
Soluble Sulphate Content (SO^4g/l)	(BS 1377:Part 3:1990 Clause 5.3)	✓
pH value	(BS 1377:Part 3:1990 Clause 9.4)	✓
California Bearing Ratios (CBR)	(BS 1377:Part 4:1990 Clause 7)	
Compaction Tests	(BS 1377:Part 4:1990 Clauses 3.0-3.6)	

Laboratory testing in accord with BS EN ISO/IEC 17025-2000 and Quality Management in accord with ISO 9001

Signed on behalf of GroundTech Laboratories:-_____ **Technical Signatory**

Quality Assured to ISO 9001

GEOTECHNICAL LABORATORY TEST RESULTS

Project Ref: 15.09.011

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD
Telephone: 01327 860947/860060 Fax: 01327 860430 Email: groundtech@listersgeotechnics.co.uk

Quality Assured to ISO 9001

SAMPLES				CLASSIFICATION TESTS							CLASSIFICATION TESTS							STRENGTH TESTS					CHEMICAL TESTS	
Test Location	Sample Type	Sample Depth -m	Test Type	MC %	LL %	PL %	PI %	Passing 425 µm %	Modified PI %	Class	Passing 63 µm %	MC/ LL	PL+ 2%	Liquidity Index	Loss on Ignition %	Soil Suction kPa	Bulk Density Mg/m3	Test Type	Cell Pressure kN/m2	Deviator Stress kN/m2	Apparent Cohesion kN/m2	ϕ	pH Value	Soluble Sulphate Content SO4 g/l
WS 1	D	1.00	PI/63	31	74	25	49	100	49	CV	96	0.42	27	0.12									7.2	0.63
	D	1.70	PI/63	31	68	24	44	100	44	CH	93	0.46	26	0.16										
WS 2	D	1.30																					7.7	0.04
	D	1.80	PI/63	30	71	23	48	100	48	CV	94	0.42	25	0.15										
	D	2.50																					7.6	0.04
	D	3.00	PI/63	31	69	25	44	100	44	CH	95	0.45	27	0.14										

Symbols:

U	Undisturbed Sample	R	Remoulded	PI	Plasticity Index	T	Triaxial Undrained	L	100mm specimen
D	Disturbed Sample	63	Passing 63µm	F	Filter Paper Suction Tests	M	Multistage Triaxial	S	38mm specimen
B	Bulk Sample	H	Hydrometer	CC	Continuous Core	HP	Hand Penetrometer		
W	Water Sample	PSD	Wet Sieving			V	Vane Test		

LABORATORY TEST RESULTS

Project Reference
15.09.011

GroundTech Laboratories

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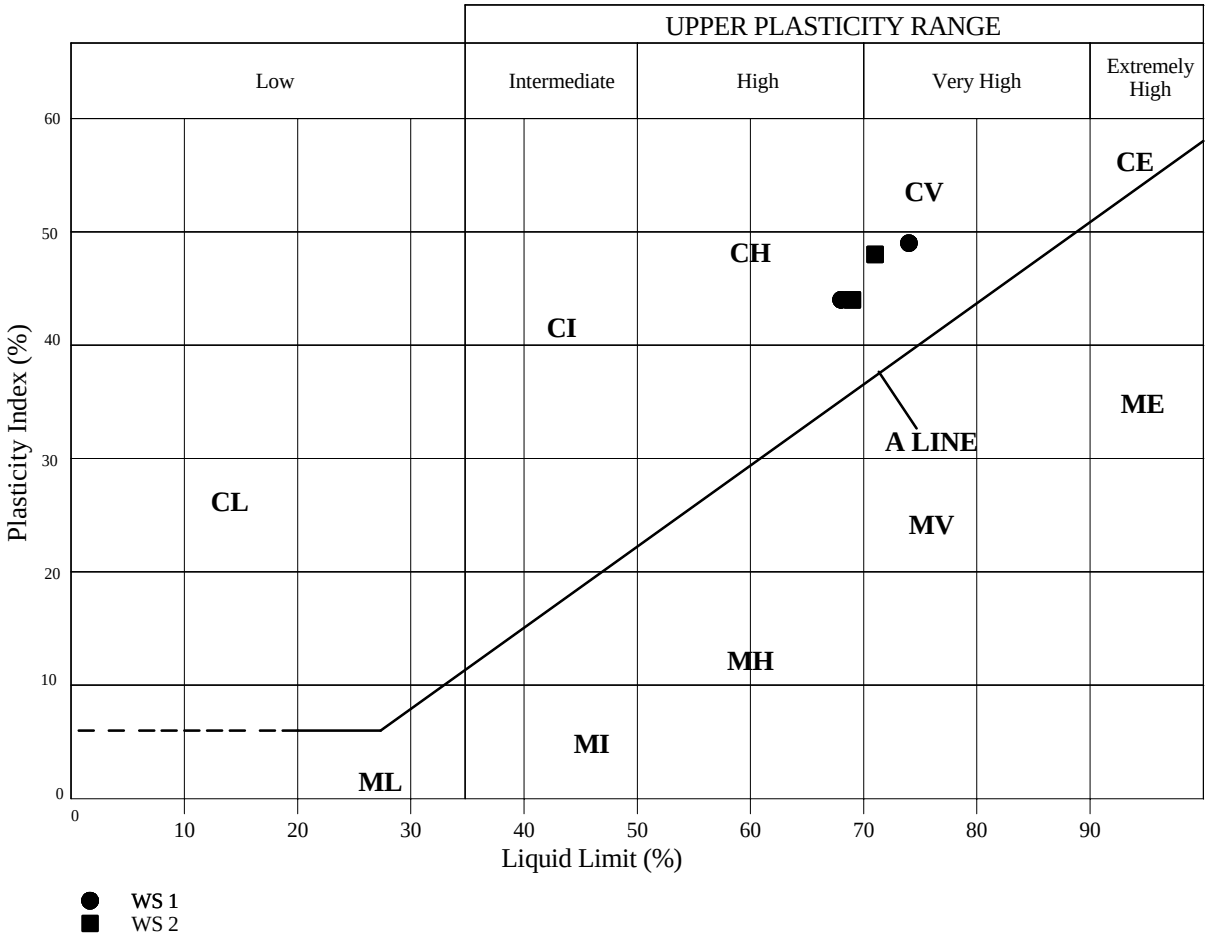
Telephone:- 01327 860947/860060 Fax:- 01327 860430

Quality Assured to ISO9001

Site: 27a Lambolle Road, Camden NW3 4HS



PLASTICITY CHART

Lab. Ref. 15.09.011

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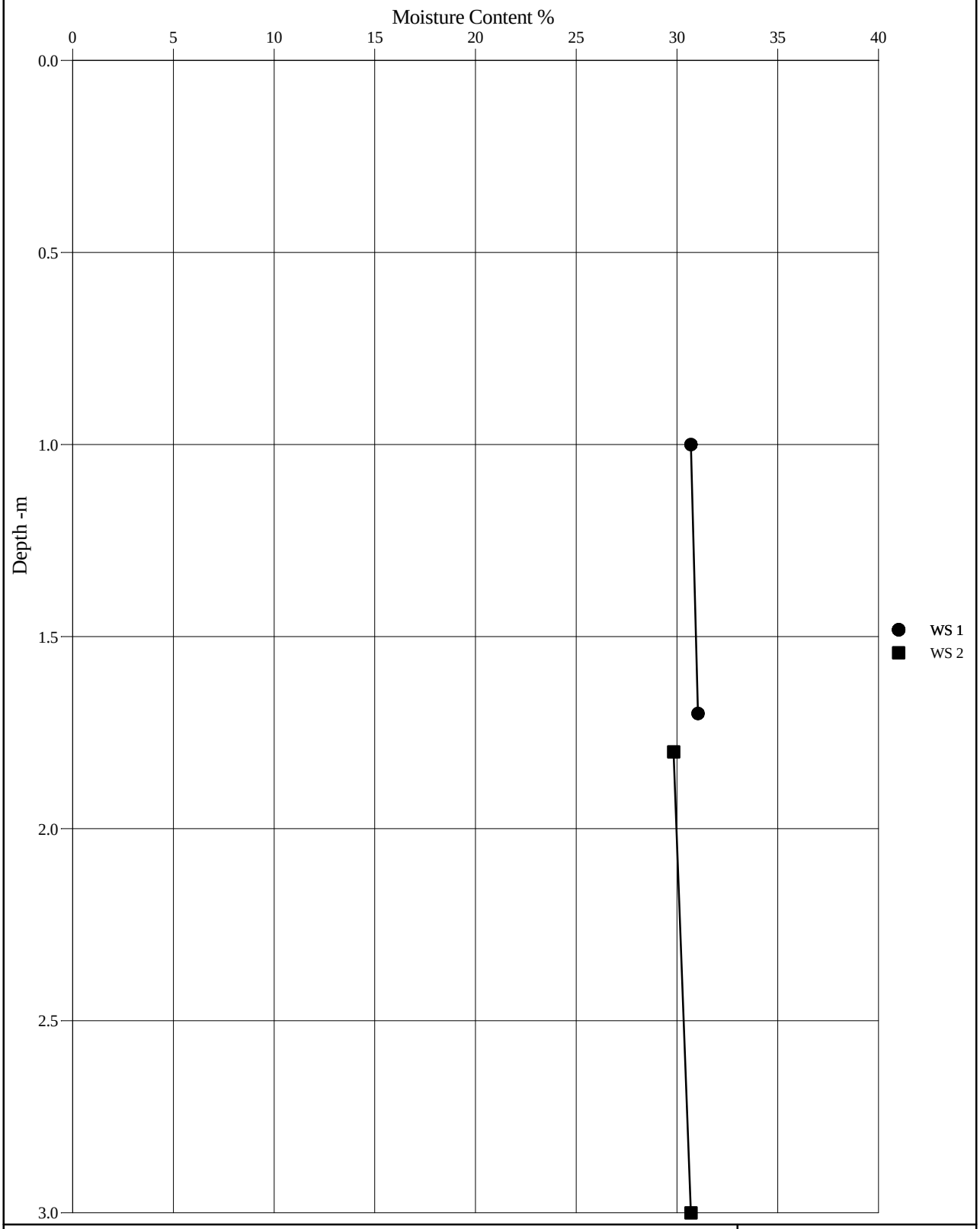

MOISTURE CONTENT v DEPTH

Lab Ref. 15.09.011