Brown 2 Green

Geotechnical and Geo-environmental Consultants

GEOTECHNICAL SITE INVESTIGATION REPORT

4A GLENMORE ROAD BELSIZE PARK LONDON

Reference Number 1118/Rpt 1v1
August 2013

Prepared for
Mr G Hammond
4A Glenmore Road
Belsize Park
London
NW3 4DB

By

Brown 2 Green Associates Ltd
45 Audley Road
Saffron Walden
Essex
CB11 3HD

Tel: 01799 528588
Web address: www.brown2green.co.uk

Client	Mr G Hammond
Client Address	4A Glenmore Road Belsize Park London NW3 4DB
Report Title	Geotechnical Site Investigation Report, 4A Glenmore Road, Belsize Park, London
Reference Number	1118/Rpt 1v1
Version	Final
Date	August 2013

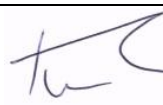
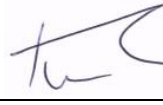
Prepared By	Philip Miles BSc, MSc, C Geol (Director)	
Reviewed By	Eileen Miles Dip (Open), Cert (Open) (Director)	
Approved By	Philip Miles BSc, MSc, C Geol (Director)	

TABLE OF CONTENTS

FIGURES

APPENDICES

1 INTRODUCTION

1.1 Background

Brown 2 Green Associates Ltd have been commissioned by CAR Ltd on behalf of Mr G Hammond to undertake a geotechnical site investigation at 4A Glenmore Road, Belsize Park, London. The site location is presented in Figure 1.

1.2 Proposed Development

It is proposed to construct a basement beneath the existing building on the site. The proposed development is shown on drawings prepared by Moreno Masey Architecture Studios. The proposed development layout is presented in Figure 2.

1.3 Objectives

The objective of the work is to provide geotechnical recommendations in relation to foundation design.

1.4 Limitations and Constraints of the Study

Access considerations, the presence of services and the activities being carried out on the site limited the positions where sampling locations could be installed and the techniques that could be used.

This report presents an interpretation of the geotechnical information established by excavation, observation and testing. It should be noted that when investigating, or developing land it is important to recognise that sub-surface conditions may vary spatially and also with time. Groundwater conditions are dependent on seasonal and other factors. Consequently there may be conditions present not revealed by this investigation. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site.

This investigation has been undertaken to provide a characterisation of the existing sub-surface geotechnical characteristics and make up and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget.

2 SITE DESCRIPTION

2.1 Site Descriptions and Observations

The site is a three storey mid -terrace house, with a small cellar. The floor of the cellar is approximately 1.8m below the ground floor level. At the rear of the house there is a small court yard garden. A 10m high sycamore and other shrubs are present adjacent to the property boundary.

It is understood the property was constructed between 1890 and 1910.

2.2 Geology

The British Geological Survey website indicates that the site is underlain by the following geology:

Drift/Solid	Geological Unit	Description
Drift	None Present	
Solid	London Clay	Firm to stiff grey silty clay

During the drilling of the borehole, no groundwater was identified.

3 SITE INVESTIGATION

3.1 Exploratory Fieldwork

One borehole (BH1) was drilled using a window sample drilling rig on 30th July 2013 to a maximum depth of 5.05m below surface. During the drilling of the boreholes hand held shear vane tests were completed at 1.0m intervals. On completion of the drilling a piezometer was installed within the borehole. In addition, four foundation pits were attempted to expose the existing foundations. Foundation pit FP1 was located within the court-yard garden. Foundation pit FP2 was located at the front of the house and was abandoned due to the presence of a sewer pipe running along the front of the house. Foundation pits FP3 and FP3a were located in the cellar. FT3 was abandoned due to the presence of a sewer pipe that ran from the rear to the front of the house. On completion of the drilling a piezometer was installed in the borehole.

The sampling locations are illustrated in Figure 3.

During the site works recovered soils were geologically logged by an experienced Geo-environmental Engineer. The geological logs are presented in Appendix I. Disturbed samples for geotechnical testing were obtained.

3.2 Laboratory Analysis

Selected soil samples were submitted for geotechnical testing. The following tests were completed:

- Moisture Content;
- Atterburg Limits and
- pH and SO4.

The laboratory results are presented in Appendix II.

4 RESULTS

4.1 Ground Conditions

The geological logs are presented in Appendix I.

The borehole indicates the concrete hardstanding is underlain by 0.6m of made ground consisting of clay with brick and ash. The made ground is underlain by London Clay consisting of firm to very stiff brown silty clay. Selenite crystals were noted at depth.

Soil Density

The density of the underlying soils has been assessed using a shear vane. This shows the London Clay to be firm to very stiff with a cohesion ranging from 65 kPa at 1.0m below ground level to 170 kPa at 5.0m bgl.

4.2 Groundwater Conditions

No groundwater was identified during the drilling of the window sample hole.

It should be noted that groundwater levels can fluctuate seasonally and therefore, may be encountered at higher or lower elevations than those recorded in this site investigation.

4.3 Geotechnical Laboratory Results

The geotechnical testing of the samples was undertaken by Geo-synthetics and Steel Laboratories Ltd under UKAS accreditation. The test certificates are included in Appendix II.

5 GEOTECHNICAL ASSESSMENT

5.1 Proposed Development

The proposed development comprises a terraced residential development. The building comprises three storey above ground and with an existing cellar and a full height basement proposed encompassing the existing basement and extending to the front of the building and a new terrace area in front of the existing building. Structural loadings are not known but for assessment purposes a wall loading of 50kN/m run is assumed.

Given the nature of the proposed development it is considered that the structure meets the criteria of Geotechnical Category 1 of Euro Code 7.

Given the nature of the development it is considered that acceptable risk from settlement is a total settlement value of 25mm.

5.2 Site Preparation

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the Specification for Highway Works. This should include:

- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill; and,
- Existing services should be diverted and replaced with suitable compacted engineering fill if required, or dropped to below the proposed level of the basement if suitable drainage runs and flows can be maintained and thereby allowing construction.
- Buried structures have been encountered associated with the services. Where these are encountered they should be diverted and excavated from below the proposed development foot print with the resulting void backfilled.

5.3 Foundation Conditions and Bearing Capacity

General

General ground conditions comprise Made Ground to 0.60m bgl over firm becoming stiff very silty CLAY. The ground conditions surrounding the existing foundations comprised Made Ground to in excess of 1.3m bgl. This Made Ground is likely to be associated with the construction of the existing foundations. A number of services were located in front of the building and underneath the basement. Made Ground was encountered below the basement level to 0.20m below basement floor layer. The Made Ground below the existing basement was underlain by firm silty CLAY.

Groundwater was not encountered.

The base of the existing foundations to the rear of the building were not proved as the foundations stepped out further than 300mm. The foundation depth was in excess of 1.30m bgl.

The foundation for the basement was proved at to a depth of 0.44m below basement level and stepped out three times with a maximum width of 0.26m.

Foundations

Basement Construction

It is understood that the basement will be constructed to depth of 2.58m bgl with a floor construction up to 0.30m thick below. Based on the findings of the ground investigation it is considered that at an allowable bearing pressure of 100kN/m^2 with less than 25mm settlement can be achieved at 3.00m bgl

Heave

Heave on the basement floor slab from the underlying clay is not considered a significant risk, given the distance of the existing trees to the proposed extension. The resulting excavation will result in up to 10mm uplift of the basement formation. Suitable reinforcement will be required in the basement floor slab.

5.4 Ground Floor Slabs

It is considered that a ground bearing floor slab may be used for the basement and should be designed in accordance with a poor formation condition. Ground bearing floor slabs could be used for the ground floor level. However the NHBC recommendations should be followed for medium shrinkage soils for the design of floor slabs with a minimum void thickness of 100mm.

5.5 Pavement Construction

An assessment of the likely California Bearing Ratio (CBR) has been assessed from the following sources:

- Description of the material;
- Guidance given in Interim Advice Note 73/06.

Based on this it is considered that a CBR of 3% is used. Based on the plasticity data it is considered that soils are not frost susceptible in accordance with Road Note 29.

5.6 Concrete Durability

Based upon the ground conditions encountered it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1 in accordance with the recommendations provided in BRE Special Digest 1 (2005).

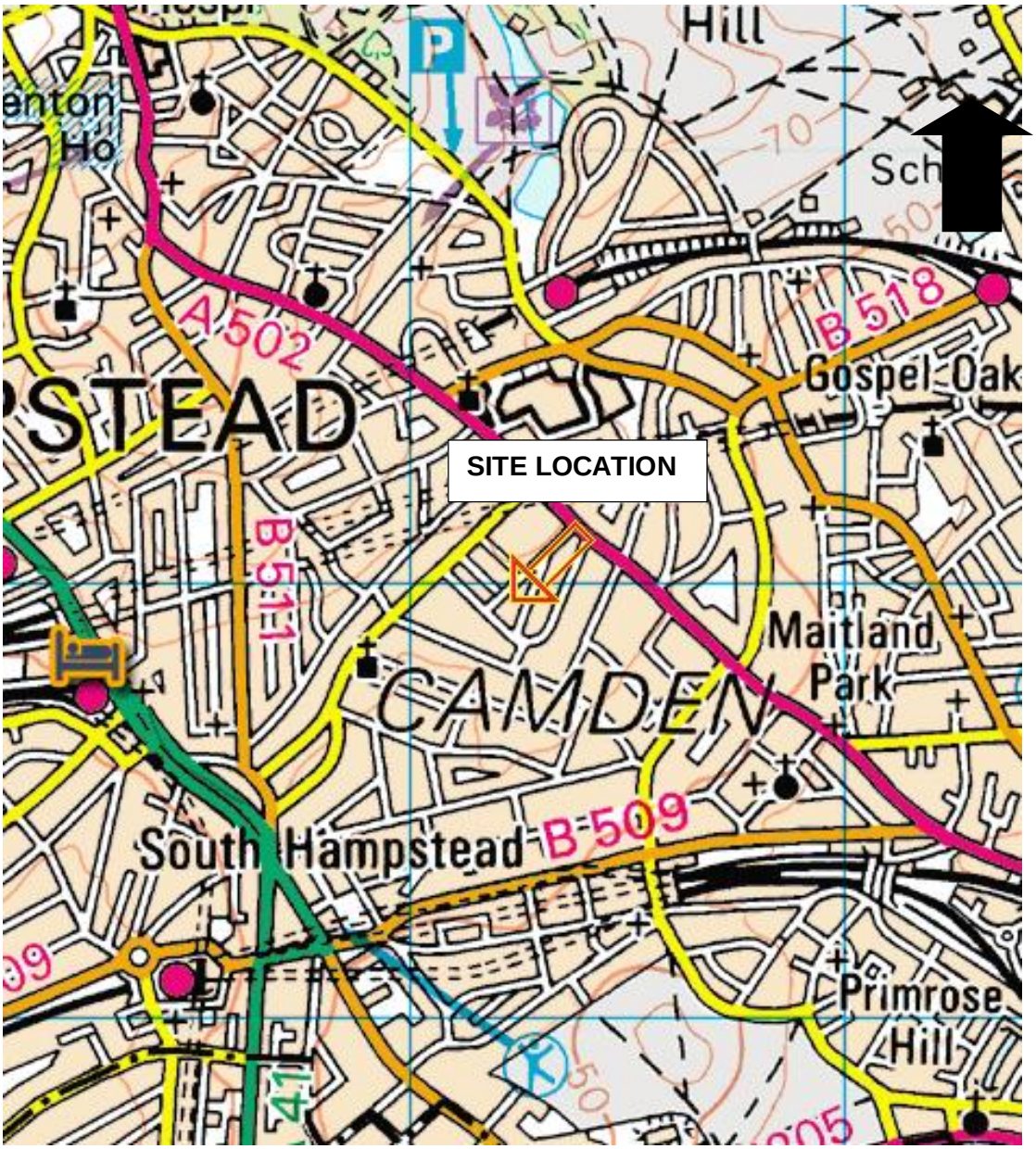
5.7 Excavations

Site observations indicated that excavations should be feasible however surface concrete and numerous services have been encountered within the proposed footprint of the extension and proposed basement which results in deeper Made Ground. Due to the presence of potential looser Made Ground surrounding the existing foundations and services it is likely that support will be required to foundation excavations.

5.8 Re-Use of Materials

Based on the soil description it is considered that the soils are too variable for re-use as engineered fill.

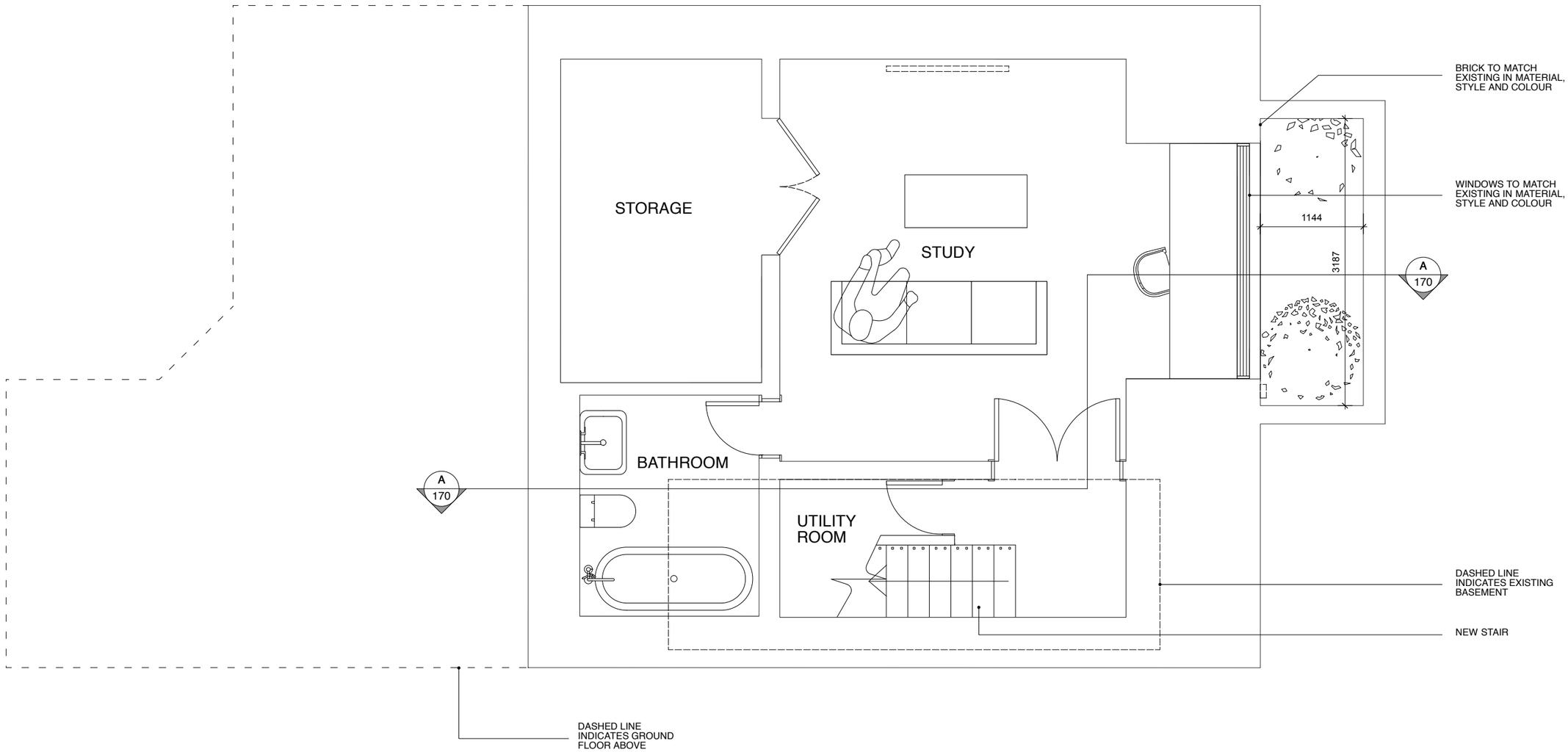
FIGURES



Project Number: 1118	Project: 4A Glenmore Road, Belsize Park, London	Scale: NTS
Figure 1	**Site Location Plan**	Brown 2 Green

FIGURE 2

PROPOSED DEVELOPMENT LAYOUT



PROPOSED BASEMENT PLAN

SCALE 1:50@A3

1m 2m

P1 06 09 13 FOR PLANNING

REV DATE NOTES

moreno:masey
architecturestudio

t +44 20 3142 6554
www.mmarchitecturestudio.com

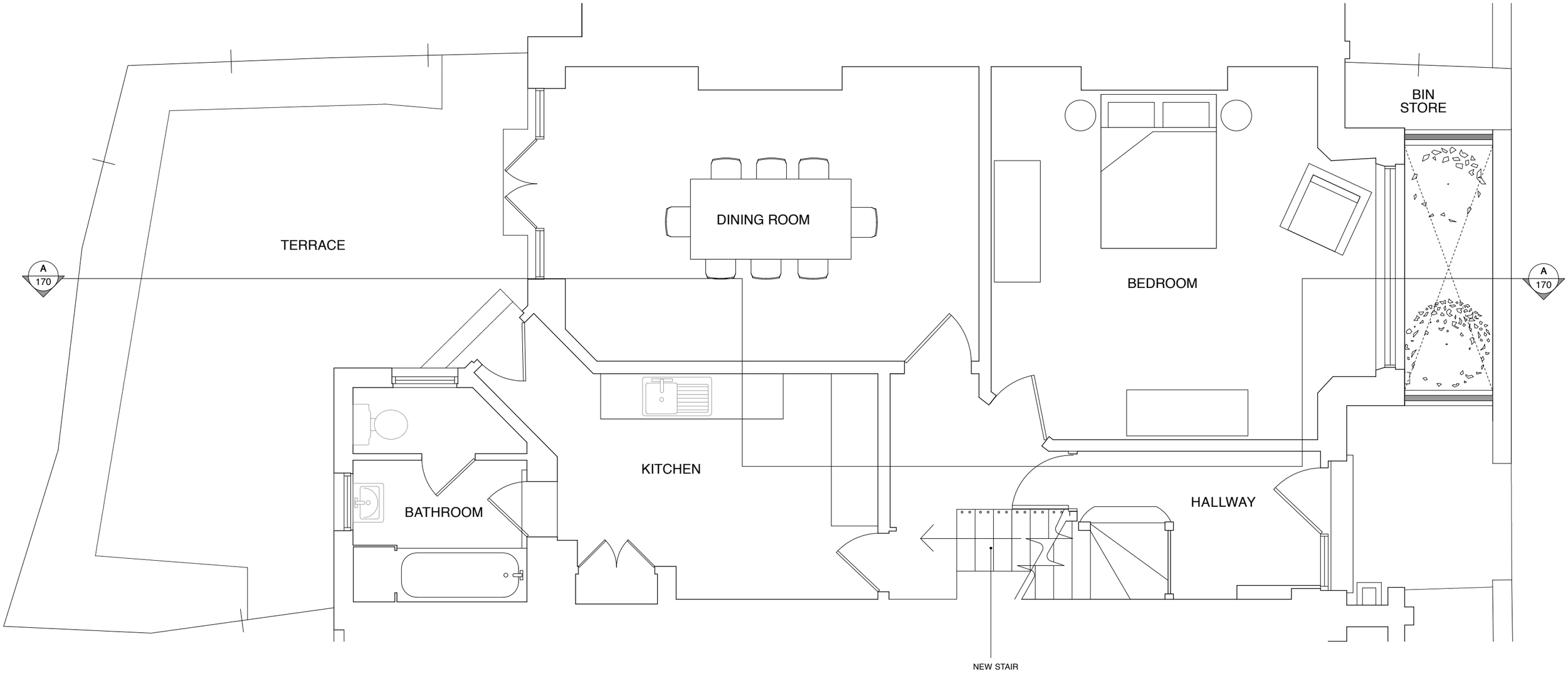
PROJECT
4A GLENMORE ROAD

CLIENT
GARY HAMMOND

DRAWING TITLE
PROPOSED BASEMENT PLAN

SCALE	DATE	DRAWN	CHECK
1:50@A3	27 03 13	VT	RR

PROJECT NO.	DWG NO.	REVISION
13002	1160	**P1**



PROPOSED GROUND FLOOR PLAN
SCALE 1:50@A3

2m
1m
1m
2m

N

P1 06 09 13 FOR PLANNING

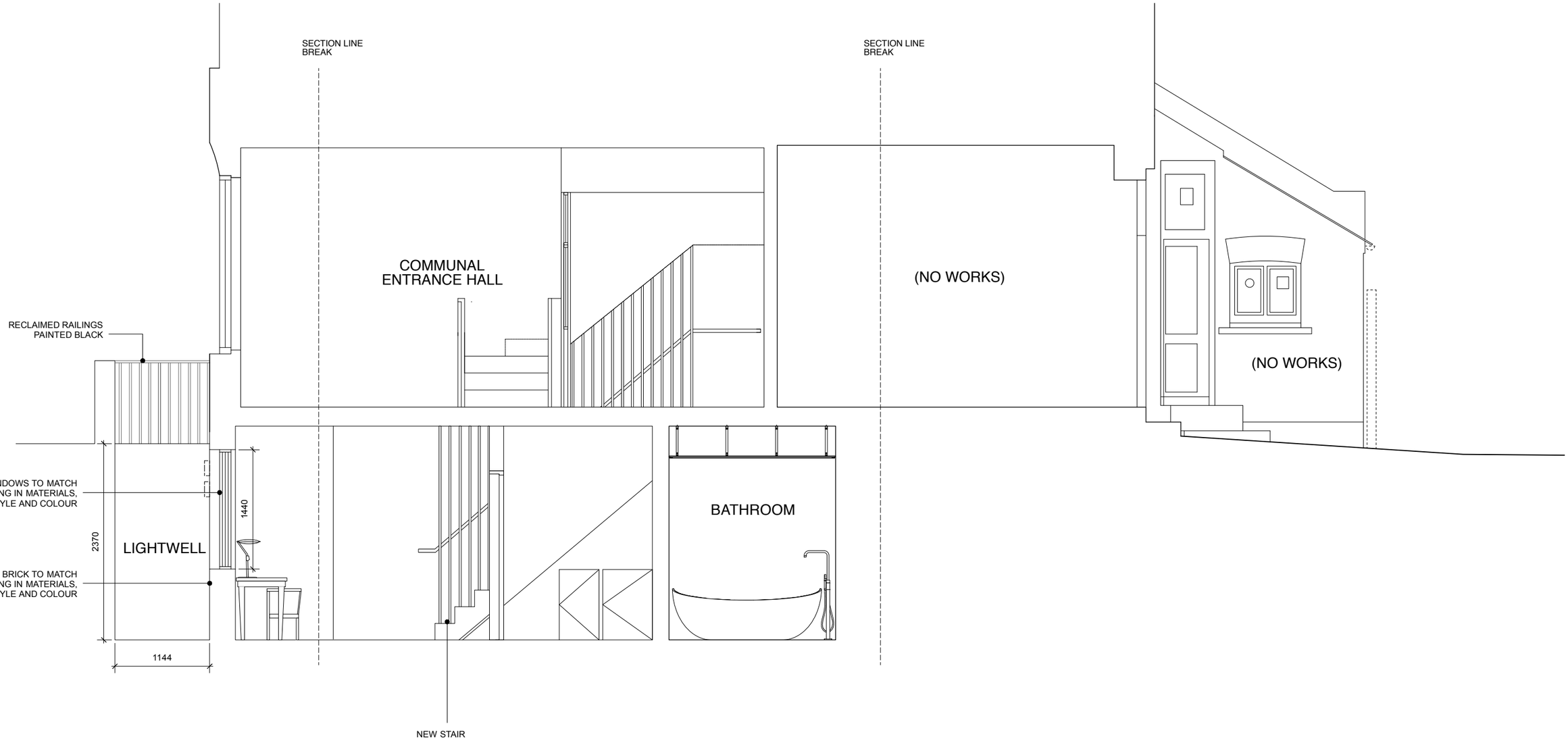
REV	DATE	NOTES

moreno:masey
architecturestudio

t +44 20 3142 6554
www.mmarchitecturestudio.com

PROJECT: 4A GLENMORE ROAD			
CLIENT: GARY HAMMOND			
DRAWING TITLE: PROPOSED GROUND FLOOR PLAN			
SCALE: 1:50@A3	DATE: 27 03 13	DRAWN: VT	CHECK: RR
PROJECT NO.: 13002	DWG NO.: 1161	REVISION: **P1**	

DO NOT SCALE FROM DRAWING, ALL DIMS TO BE CHECKED ON SITE
REPORT OMISSIONS AND DISCREPANCIES TO ARCHITECT IMMEDIATELY



PROPOSED SECTION
SCALE 1:50@A3

2m
1m
1m
2m

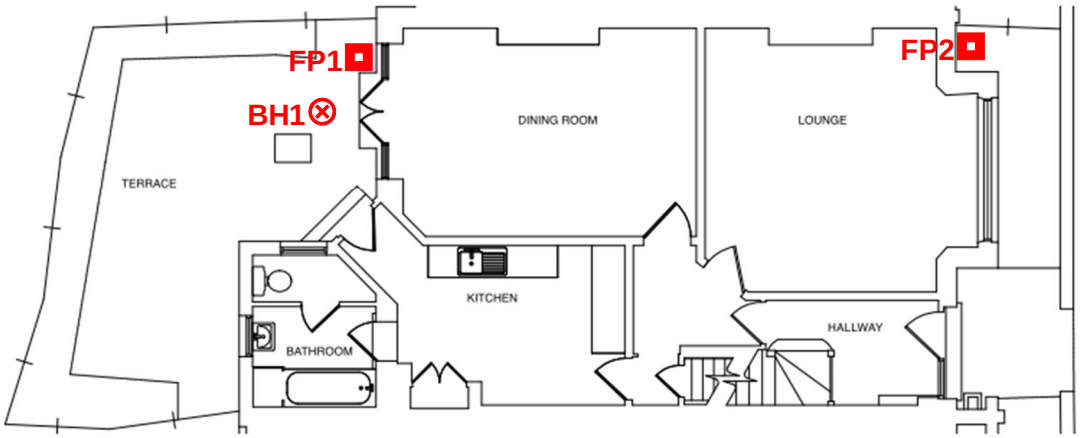
P1 06 08 13 FOR PLANNING

REV	DATE	NOTES

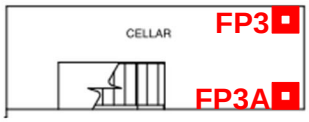
moreno:masey
architecturestudio

t +44 20 3142 6554
www.mmarchitecturestudio.com

PROJECT: 4A GLENMORE ROAD			
CLIENT: GARY HAMMOND			
DRAWING TITLE: PROPOSED SECTION A			
SCALE: 1:50 @ A3	DATE: 06/03/12	DRAWN: VT	CHECK: RR
PROJECT NO.: 13002	DWG NO.: 1170	REVISION: **P1**	



EXISTING GROUND FLOOR PLAN
SCALE 1:50@A1, 1:100@A3



EXISTING BASEMENT PLAN
SCALE 1:50@A1, 1:100@A3

Project Number: 1118	Project: 4A Glenmore Road, Belsize Park, London	Scale: NTS
Figure 3	**Borehole Location Plan**	Brown 2 Green

APPENDIX I

GEOLOGICAL LOGS

Geoprobe Environmental Limited

Brambledown, Blakes Lane, Tadley, Hampshire, RG26 3PU

Borehole No		1	
Contract	Glenmore Road, Belsize Park	Report No	13/119
Client	Brown2green	Ground Level	mOD
Site Address	4A, Glenmore Road, Belsize Park, London	Boring Commenced	30.07.13
		Boring Completed	30.07.13

Type of diameter of boring: Geotool percussive probing/sampling rig: 50 - 80mm diameter

Water Strikes, m		Water levels recorded during boring, m	
1.	None	Date	23.08
2.		Hole Depth	5.05
3.		Casing Depth	0
4.		Water Level	None

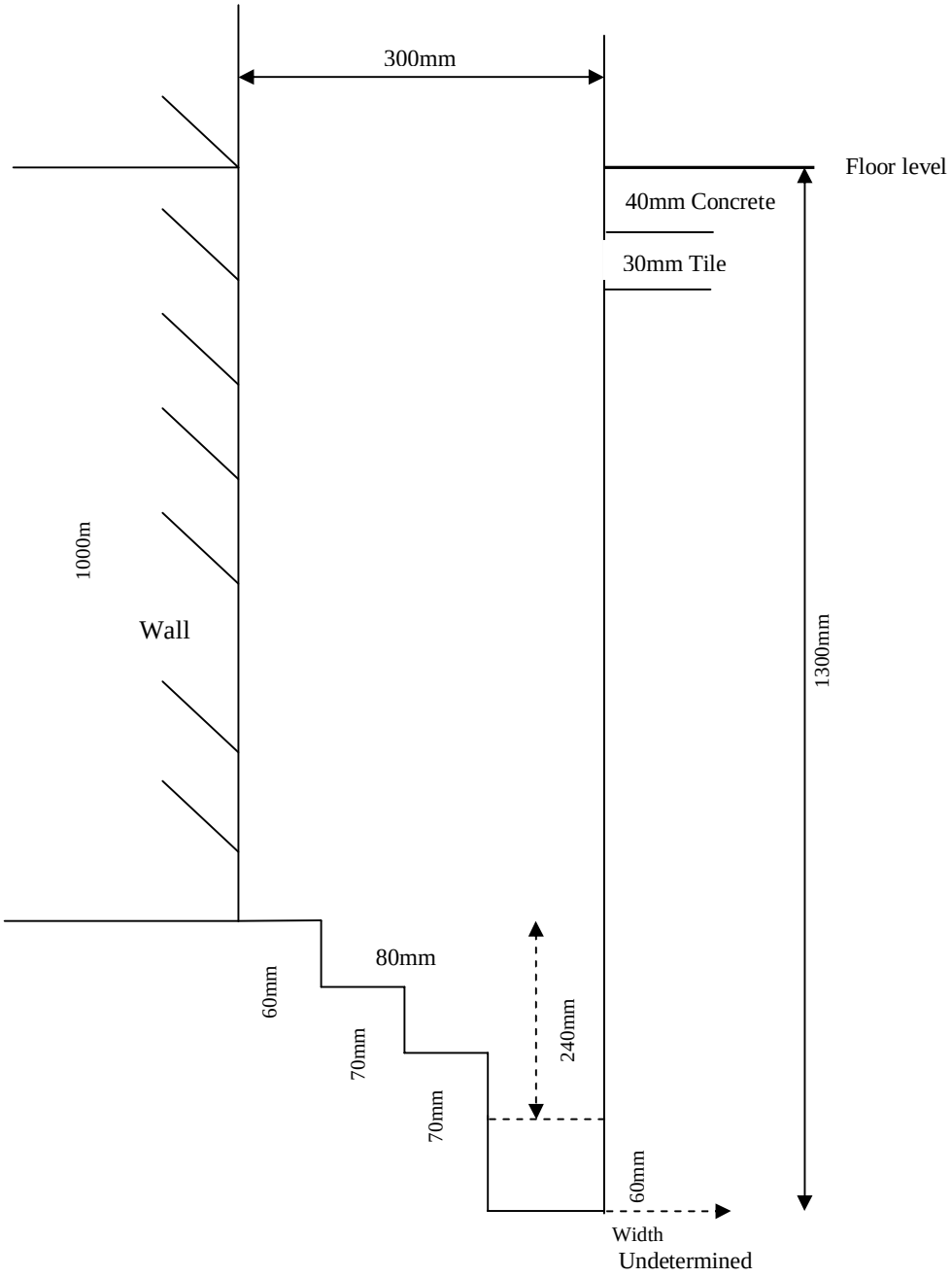
Remarks

Standpipe installed to 5.00m

Samples or tests		Cohesion			Strata Description
Type	Depth, m	kPa	Depth	Legend	
					Made ground (Concrete over clay with brick and ash)
			0.60		
					Firm becoming very stiff brown fissured very silty CLAY with veins of grey clay in upper levels, selenite crystals noted at depth
D	1.00	65			
			1.80		
D	2.00	70			
			2.40		
D	3.00	120			
D	4.00	135			
D	5.00	170			
			5.00		End of hole

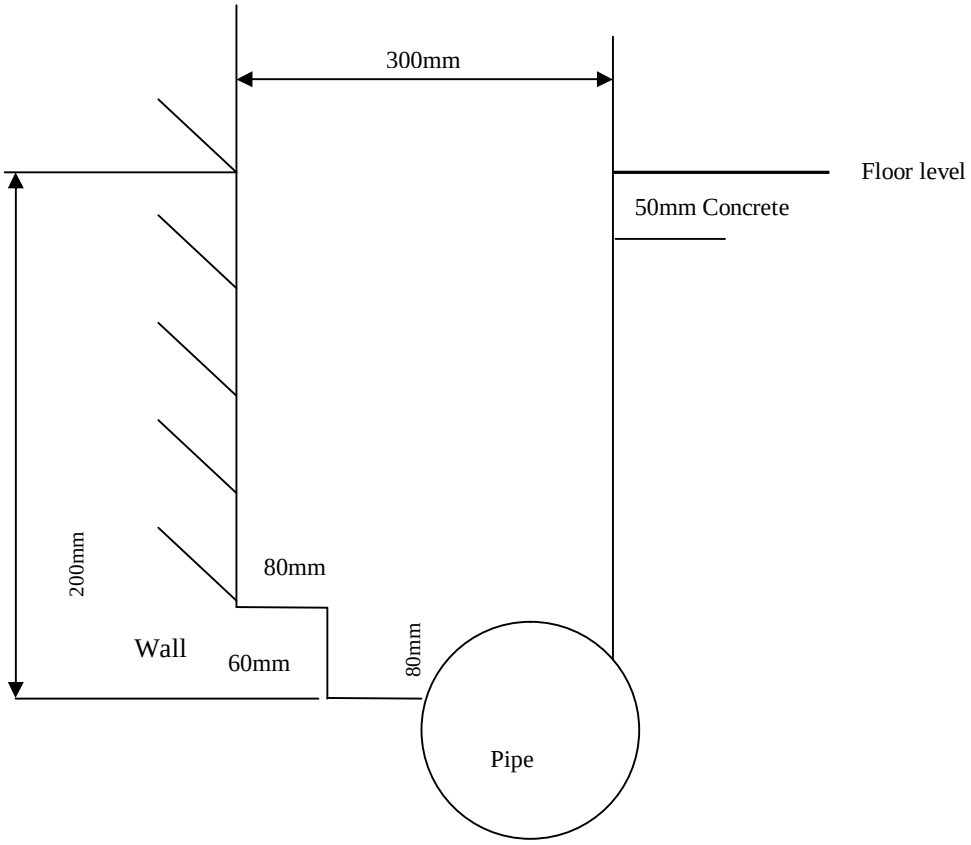
Sampling Code: U- Undisturbed B - Large Distrubed D - Small Disturbed W - Water (U*) Non recovery of Sample

FOUNDATION SECTION
FP1



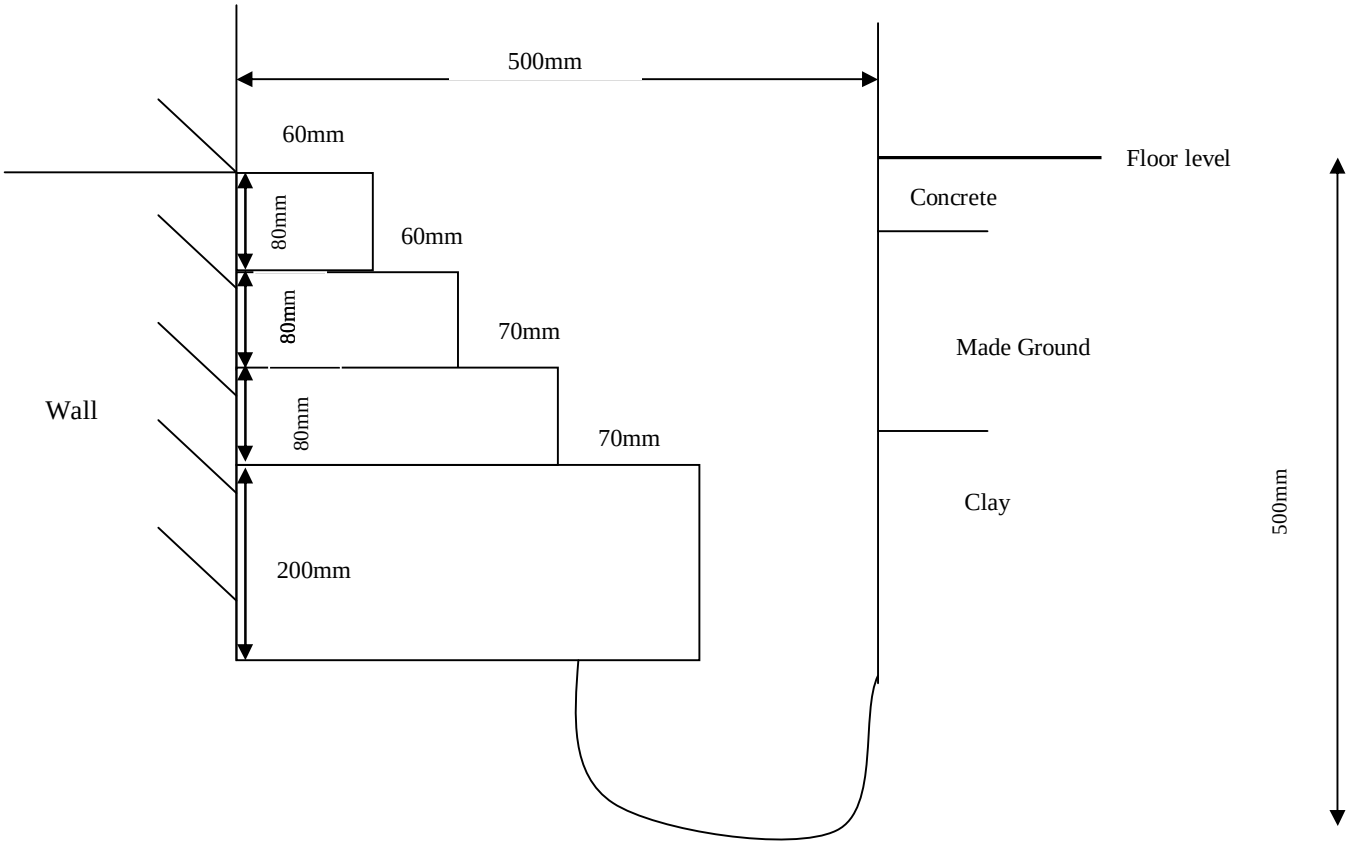
4A GLENMORE ROAD
BELSIZE PARK
LONDON

FOUNDATION SECTION
FP3



4A GLENMORE ROAD
BELSIZE PARK
LONDON

FOUNDATION SECTION
FP3A



4A GLENMORE ROAD
BELSIZE PARK
LONDON

APPENDIX II

LABORATORY REPORTS

Geosynthetics Soil & Steel Laboratories Ltd
Calder Trading Estate, Leeds Road, Bradley, Huddersfield, West Yorkshire HD5 0RS
T: +44 (0)1484 454100 F: +44 (0)1484 454101
E: info@geosynthetics-lab.com W: www.geosynthetics-lab.com

UKAS TESTING 4107

CONFIDENTIAL SOILS TEST REPORT

05 August 2013

FAO Mr Philip Miles
Brown 2 Green Associates Ltd
45 Audley Road
Saffron Walden
CB11 3HD

Tel/Fax: +44 (0) 1799 528 588

Dear Philip,

Thank you for consulting GSSL Ltd for your Geotechnical testing needs. GSSL Ltd is pleased to submit this **final interim** test report for laboratory testing.

Client Ref/Order No: Glenmore Road, Belsize Park

Test Report Number: GS-GG/1161

Contract Reference: Glenmore Road, Belsize Park

Sample ID (s): **See page 2**

Results: Page 3-5

Test(s) Requested;

Determination of Chemical properties of Soil: Water Soluble Sulphate & pH Value	{BS 1377:-3:1990}
Determination of Moisture Content Oven Drying Method	{BS 1377-2:1990 Method 3.2}
Determination of the Liquid Limit – Cone Penetrometer (Definitive Method)	{BS 1377-2:1990 Method 4.3}
Determination of the Plastic Limit, Plasticity Index	{BS 1377-2:1990 Method 5}

If you have any questions or require additional information, then please do not hesitate to contact us.

Yours Sincerely

Tony Dixon
Managing Director

Any opinions and interpretations expressed within this report are outside the scope of our UKAS Accreditation.

Company Registration Number: 4832910 Registered in England and Wales

TEST REPORT

Geosynthetics Soil & Steel Laboratories Ltd
Calder Trading Estate, Leeds Road, Bradley, Huddersfield, West Yorkshire HD5 0RS
T: +44 (0)1484 454100 F: +44 (0)1484 454101
E: info@geosynthetics-lab.com W: www.geosynthetics-lab.com

UKAS TESTING 4107

Summary of laboratory soil descriptions

Contract Ref: Glenmore Road, Belsize Park **Report Ref. No:** GS-GG/1161

Client ID	Depth (m)	Description of Sample
BH1	1.00	Very soft dark brown CLAY
BH1	2.00	Firm to stiff brown CLAY
BH1	3.00	Stiff brown CLAY
BH1	4.00	Stiff brown CLAY
BH1	5.00	Very stiff brown CLAY

Approved Signatory:

Date Reported: 05/08/13

TEST REPORT

Company Registration Number: 4832910 Registered in England and Wales

Geosynthetics Soil & Steel Laboratories Ltd
Calder Trading Estate, Leeds Road, Bradley, Huddersfield, West Yorkshire HD5 0RS
T: +44 (0)1484 454100 F: +44 (0)1484 454101
E: info@geosynthetics-lab.com W: www.geosynthetics-lab.com

UKAS TESTING 4107

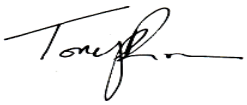
Chemical properties of Soil
Water Soluble Sulphate & Ph Value of Soil.
BS 1377:1990: Part 3 cl.3

Contract Ref: Glenmore Road, Belsize Park **Report Ref. No:** GS-GG/1161

CLIENT ID	DEPTH (m)	*Material passing 2mm BS Test Sieve (% dry mass of original sample)*	*Acid Extractable Sulphate*		*Water Soluble Sulphate 2:1*		*Total Sulphur (%)*	*pH Value*
			Sulphate content as SO_3 of soil passing 2mm BS Test sieve %	*Sulphate content as SO_4 of soil passing 2mm BS Test sieve %*	*Sulphate content as SO_3 of 2:1 soil/water extract (g/l)*	*Sulphate content as SO_4 of 2:1 soil/water extract (g/l)*		
BH1	3.00	100	-	-	0.2	0.3		8.5
BH1	5.00	100	-	-	0.3	0.4	-	8.8

Certification:-
Chemical Analysis – Sample Preparation and testing: In accordance with the methods as detailed in BS1377 : Part 3:1990 Clause 5.2, 5.5,7.2 & 9.
Test results reported herein do not apply to samples other than those supplied. GSSL Ltd neither accepts responsibility for nor makes claim as to the final use & purpose of the materials(s).

Approved Signatory:



Date Reported: 05/08/13

TEST REPORT

Company Registration Number: 4832910 Registered in England and Wales

Geosynthetics Soil & Steel Laboratories Ltd
Calder Trading Estate, Leeds Road, Bradley, Huddersfield, West Yorkshire HD5 0RS
T: +44 (0)1484 454100 F: +44 (0)1484 454101
E: info@geosynthetics-lab.com W: www.geosynthetics-lab.com

UKAS TESTING 4107

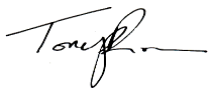
Determination of Moisture Content & Atterberg Limits

Contract Ref: Glenmore Road, Belsize Park **Report Ref. No:** GS-GG/1161
Sample Preparation: Specimens taken from their Wet State

Client ID	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index %	% Passing 425µm test sieve	Remarks
BH1	1.00	32.5	-	-	-	-	-
BH1	2.00	31.4	56	26	30	99.0	High Plasticity CH
BH1	3.00	29.9	-	-	-	-	-
BH1	4.00	29.0	-	-	-	-	-
BH1	5.00	26.8	-	-	-	-	-

Certification:-
Sample Preparation: In accordance with BS 1377-1 & 2 :1990. Moisture Content, Liquid Limit & Plastic Limit were determined in accordance with BS 1377-2: 1990 Method 3.2, 4.3 & 5. Test results reported herein do not apply to samples other than those supplied. GSSL Ltd neither accepts responsibility for nor makes claim as to the final use & purpose of the materials(s).

Approved Signatory:



Date Reported: 05/08/13

TEST REPORT

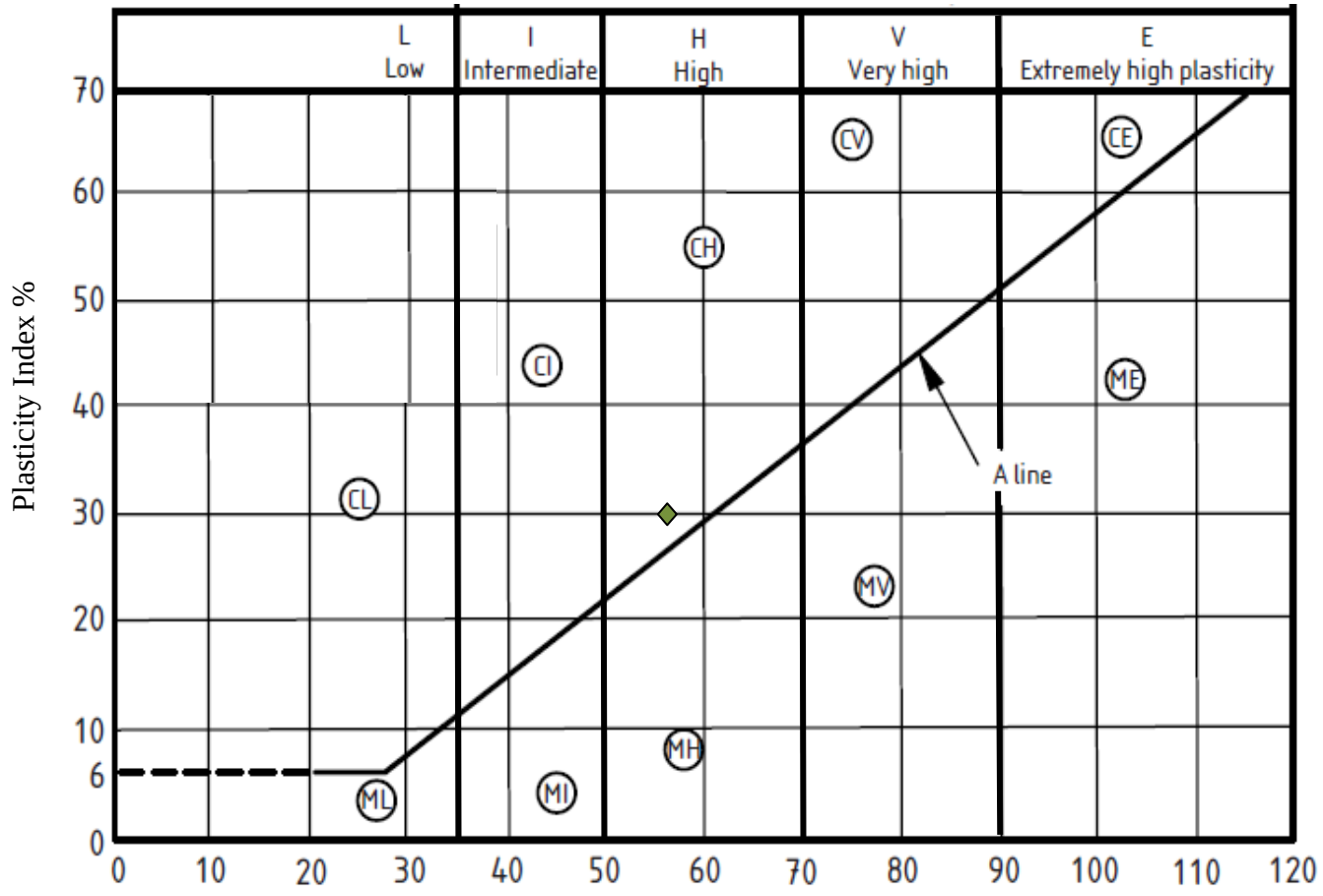
Company Registration Number: 4832910 Registered in England and Wales

Geosynthetics Soil & Steel Laboratories Ltd
Calder Trading Estate, Leeds Road, Bradley, Huddersfield, West Yorkshire HD5 0RS
T: +44 (0)1484 454100 F: +44 (0)1484 454101
E: info@geosynthetics-lab.com W: www.geosynthetics-lab.com

UKAS TESTING 4107

Plasticity Chart for Casagrande Classification (BS5930: 1999+A2: 2010)

Contract Ref: Glenmore Road, Belsize Park **Report Ref. No:** GS-GG/1161



Approved Signatory:

Date Reported: 05/08/13

TEST REPORT

Company Registration Number: 4832910 Registered in England and Wales