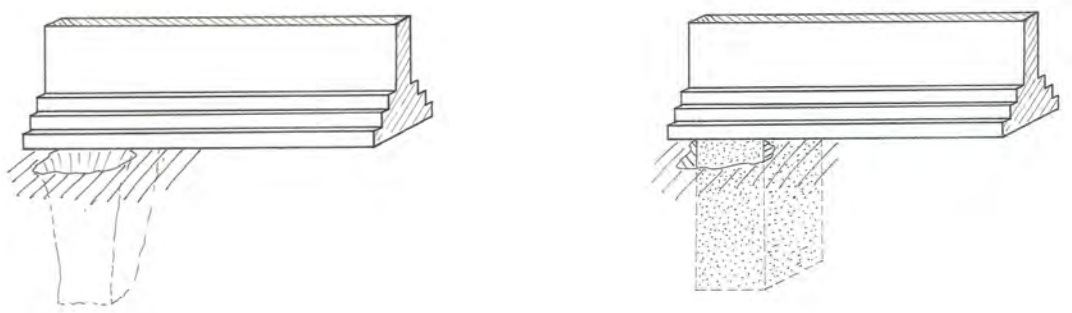
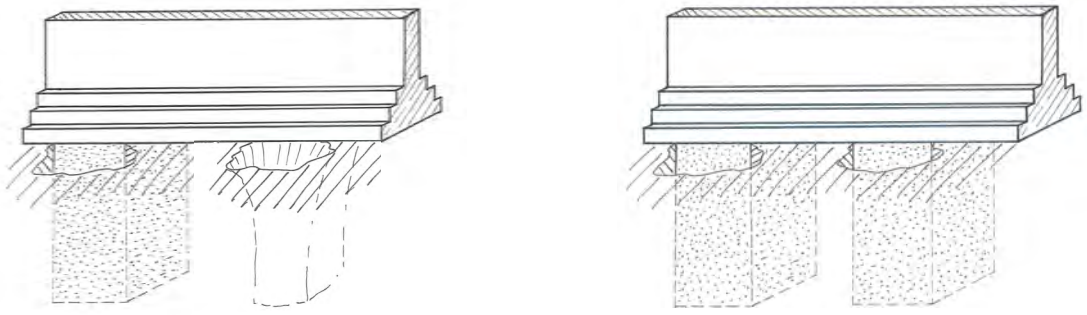
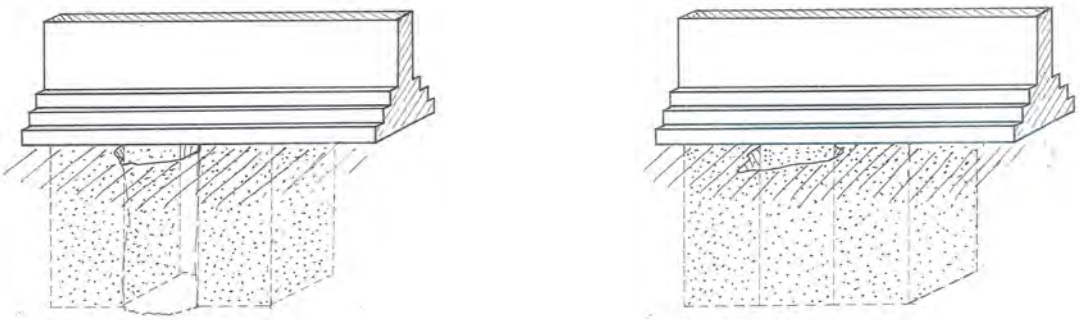
Stage 2a: excavation and concreting of initial section



Stage 2b: excavation and concreting of another section, not adjacent to first one



Stage 2c: excavation and concreting of an intermediate section, to form contiguous rows of underpin



Indicative, schematic sketches only.
Actual dimensions are likely to vary.
Not to scale.

Camden Geological, Hydrogeological and Hydrological Study

Underpinning construction sequence with 'hit and miss' pattern

213923

FIGURE 20

Site Analytical Services Ltd.

Site Investigations, Analytical & Environmental Chemists, Laboratory Testing Services.

Units 14 + 15, River Road Business Park,
33 River Road, Barking, Essex IG11 0EA

Tel: 020 8594 8134
Fax: 020 8594 8072
E-Mail: services@siteanalytical.co.uk

Directors: J. S. Warren, M.R.S.C., P. C. Warren, J. I. Pattinson, BSc (Hons). MSc
Consultants: G. Evans, BSc., M.Sc., P.G. Dip., FGS., MIEnvSc. A. J. Kingston, BSc C.Eng. MIMM
F. J. Gibbs, F.I.B.M.S. F.I.F.S.T., F.R.S.H. K. J. Blanchette

Your Ref:

Our Ref: **12/19433**
July 2012

3 TRINITY CLOSE, WILLOUGHBY ROAD

HAMPSTEAD, LONDON, NW3 1RP

REPORT ON A GROUND INVESTIGATION

Prepared for

Ms Sinha & Mr Bradbury

Reg Office: Units 14 + 15, River Road Business Park,
33 River Road, Barking, Essex IG11 0EA
Business Reg. No. 2255616

Ref: 12/19433
July 2012

Report on a Ground Investigation

At

3 Trinity Close, Willoughby Road, Hampstead, London, NW3 1RP

For

Ms Sinha and Mr Bradbury

1.0 INTRODUCTION

At the request of Building Doctors, Architects to Ms Sinha and Mr Bradbury, a ground investigation was carried out in connection with a proposed basement development at the above site.

The information was required for the design and construction of foundations and infrastructure for the proposed development. A study to assess whether any remediation was required for the protection of the end-user from the presence of potential contamination within the soils encountered was outside the scope of the present investigation.

The recommendations and comments given in this report are based on the ground conditions encountered in the exploratory holes made during the investigation and the results of the tests made in the field and the laboratory. It must be noted that there may be special conditions prevailing at the site remote from the exploratory hole locations which have not been disclosed by the investigation and which have not been taken into account in the report. No liability can be accepted for any such conditions.

2.0 THE SITE AND LOCAL GEOLOGY

(National Grid Reference: TQ 266 856)

2.1 General

The site of the proposed development is situated on the west side of Willoughby Road in the Hampstead area of London, NW3 1RP.

The 1:50000 Geological Survey of Great Britain (England and Wales) covering the area indicates the site to be underlain by the Claygate Member resting on the London Clay Formation, although a surface cover of made ground may be expected in an established urban environment.

3.0 SCOPE OF WORK

3.1 General

The scope of the investigation was agreed with the Client's representative and comprised:

- The excavation by hand of five trial pits to depths up to 1.20m below ground level (Trial Pits 1 to 5 inclusive).
- Sampling and in-situ testing as appropriate to the ground conditions encountered in the trial pits.
- Interpretative reporting on foundation options for the proposed building works and infrastructure.
- A study into the possibility of the presence of toxic substances in the soil, together with any remediation required was outside the scope of the present investigation.

3.2 Ground Conditions

The locations of the trial pits are shown on the site sketch plan (Figure 1).

The exploratory holes revealed ground conditions that were generally consistent with the geological records and known history of the area and comprised made ground up to 0.90m in thickness resting on deposits typical of the Claygate Member. The underlying London Clay Formation was not encountered.

For detailed information on the ground conditions encountered in the trial pits, reference should be made to the exploratory hole records presented in Appendix A.

The made ground extended down to depths of between 0.55m and 0.90m below ground level in Trial Pits 2, 3 and 5 and to the full depths of investigation of 0.65m below ground level in Trial Pit 1 and 0.32m below ground level in Trial Pit 4 both of which were terminated on encountering a brick floor. The made ground consisted of a surface layer of stone cobbles set on concrete overlying loose and medium dense clayey silty sand, fine to medium gravel, ashes, glass, clinker and brick and concrete rubble. A large root was encountered at 0.30m below ground level in Trial Pit 3.

Natural soils were encountered below the made ground and consisted of firm to stiff very sandy silty clay being typical of the Claygate Member. These deposits extended to the full depths of investigation of 1.10m, 1.20m and 1.00m below ground level in Trial Pits 2, 3 and 5 respectively.

3.3 Groundwater

Groundwater was not encountered in during the excavations and the material remained essentially dry throughout.

It must be noted that the speed of excavation is such that there may well be insufficient time for light seepages of groundwater to enter the trial pits and hence be detected, particularly within more cohesive soils of low permeability.

Isolated pockets of groundwater may also be present perched within any less permeable material found at shallower depth on other parts of the site especially within the made ground.

It should be noted that the comments on groundwater conditions are based on observations made at the time of the investigation (June 2012) and that changes in the groundwater level could occur due to seasonal effects and also changes in drainage conditions.

3.4 Existing Foundations

Trial Pits 1 to 5 inclusive were made adjacent to existing buildings and walls at the site at the positions shown on the site sketch plan (Figure 1) in order to expose the foundations supporting the structures. Sketches of the foundations exposed in the trial pits are presented as Figures 2 to 7 inclusive.

4.0 IN-SITU AND LABORATORY TESTS

4.1 In-Situ Tests

In essentially cohesive soils, in-situ shear vane tests were made at regular depth intervals in order to assess the undrained shear strength of the materials. The results indicate that the near surface cohesive soils are of a firm to stiff consistency with increasing depth below ground level.

The results of the in-situ tests are shown on the exploratory hole records contained in Appendix A.

4.2 Classification Tests

Atterberg Limit tests were conducted on three samples of cohesive soil taken from the upper cohesive soils present in the trial pits. The results fall into Classes CL/CI and CI according to the British Soil Classification System.

These are fine grained sandy and silty clay soils of low and intermediate plasticity and as such generally have medium bearing and settlement characteristics, have a low permeability and a generally low to medium susceptibility to shrinkage and swelling movements with changes in moisture content, as defined by the NHBC Standards, Chapter 4.2. The results indicated Plasticity Index values between 19% and 25%, with one of the samples being below the lower 20% boundary between soils assessed as being of low swelling and shrinkage potential and those assessed as being of medium swelling and shrinkage potential, with the other two samples lying above this boundary and classifying as being of medium swelling and shrinkage potential.

The test results are given in Table 1, contained in Appendix B.

4.3 Sulphate and pH Analyses

The results of the sulphate and pH analysis made on one natural soil sample recovered at 0.95m below ground level in Trial Pit 2 is presented on Table 2 and show the sample tested to have a water soluble sulphate content of 0.26g/litre associated with a slightly alkaline pH value.

5.0 FOUNDATION DESIGN

5.1 General

It is proposed to construct a subterranean basement below the property. It is envisaged that the excavation for the new basement will be a mixture of secant piled retaining walls and underpinning to the existing walls. Exact details of the structure, layout and loadings were not available at the time of preparation of this report.

5.2 Bearing Capacity

A result of the inherent variability of uncontrolled fill, (Made Ground) is that it is usually unpredictable in terms of bearing capacity and settlement characteristics. Foundations should therefore, be taken through any made ground and either into, or onto a suitable underlying natural strata of adequate bearing characteristics.

In the natural cohesive soils encountered at the site, in-situ shear vane tests were performed in order to assess the undrained shear strength of the material and indicated that the Claygate Member is in a generally firm to stiff consistency.

Table A below details the allowable ground bearing values (kN/m^2) calculated from the in-situ shear vane tests at each trial pit location.

Depth (m/bgl)	Trial Pit 2	Trial Pit 3	Trial Pit 5
0.95	170 kN/m^2		
1.10		190 kN/m^2	
0.80			150 kN/m^2

Table A. Calculated Allowable Net Ground Bearing Values (kN/m^2)

The actual allowable bearing pressure applicable will depend on the form of foundation, its geometry and depth in accordance with classical analytical methods, details of which can be obtained from "Foundation Design and Construction", Seventh Edition, 2001 by M J Tomlinson (see references) or similar texts.

Foundations would need to be taken deeper where they are within the zones of influence of both the existing trees and any proposed tree planting. The depth of foundation required to avoid the zone likely to be affected by the root systems of trees is shown in the recommendations given in NHBC Standards, Chapter 4.2, April 2003, "Building near Trees" and it is considered that this document is relevant in this situation.

5.3 Excavations

Shallow excavations for the basements and services are likely to require nominal side support in the short term and groundwater is unlikely to be encountered in significant quantities once any accumulated surface water within the made ground has been removed. Deeper and longer excavations below depths of between 0.55m and 0.90m (i.e. immediately below the made ground) may require close side support and some light seepages of groundwater may well be encountered.

No particular difficulties are envisaged in removing such water by conventional internal pumping methods from open sumps.

Normal safety precautions should be taken if excavations are to be entered.

5.4 Chemical Attack on Buried Concrete

The results of the chemical analysis show the natural soil sample tested to have a water soluble sulphate content of 026.g/litre associated with a slightly alkaline pH value.

In these conditions, it is considered that deterioration of buried concrete due to sulphate or acid attack is unlikely to occur. The final design of buried concrete according to Tables C1 and C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-1 conditions.

p.p. SITE ANALYTICAL SERVICES LIMITED

A P Smith BSc (Hons) FGS
Geotechnical Engineer

J I Pattinson BSc. (Hons), MSc.
Senior Geotechnical Engineer

REFERENCES

1. British Standards Institution, 2001. Investigation of Potentially Contaminated Sites - Code of Practice, BS 10175, BSI, London

2. British Standards Institution, 1986. Code of practice for foundations, BS 8004, BSI, London.

3. British Standards Institution, 1990. Methods for test for soils for civil engineering purposes, BS1377, BSI, London

4. British Standards Institution, 2007. Code of Practice for Site Investigations, BS5930, BSI, London

5. Building Research Establishment Special Digest 1, 2005, "Concrete in Aggressive Ground – Third Edition."

6. Driscoll, R (1983) "The influence of vegetation on the shrinking and swelling of clay soils in Great Britain", Geo-technique 33, 93-107

7. Eurocode 1: Actions on structures – BS EN 1991-1-1:2002: General actions – Densities, self weight and imposed loads, BSI, London

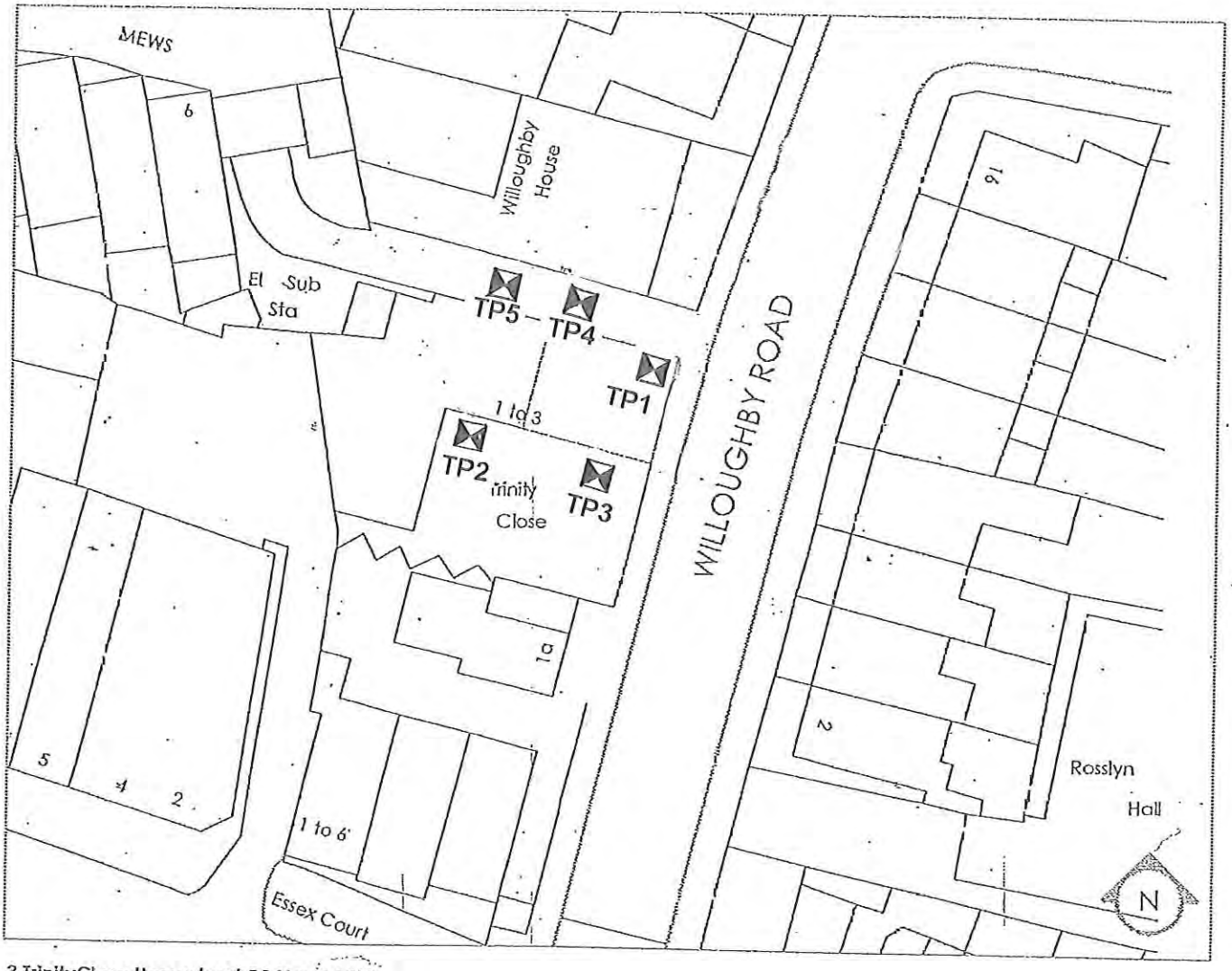
8. NHBC Standards, Chapter 4.1, "Land Quality - managing ground conditions", September 1999.

9. NHBC Standards, Chapter 4.2, "Building near Trees", April 2003.

10. Stroud M.A. and Butler F.G. (1975) Symposium on the Engineering Behaviour of Glacial Materials; the Midland Soil Mechanics and Foundation Engineering Society; pgs 124 et seq.

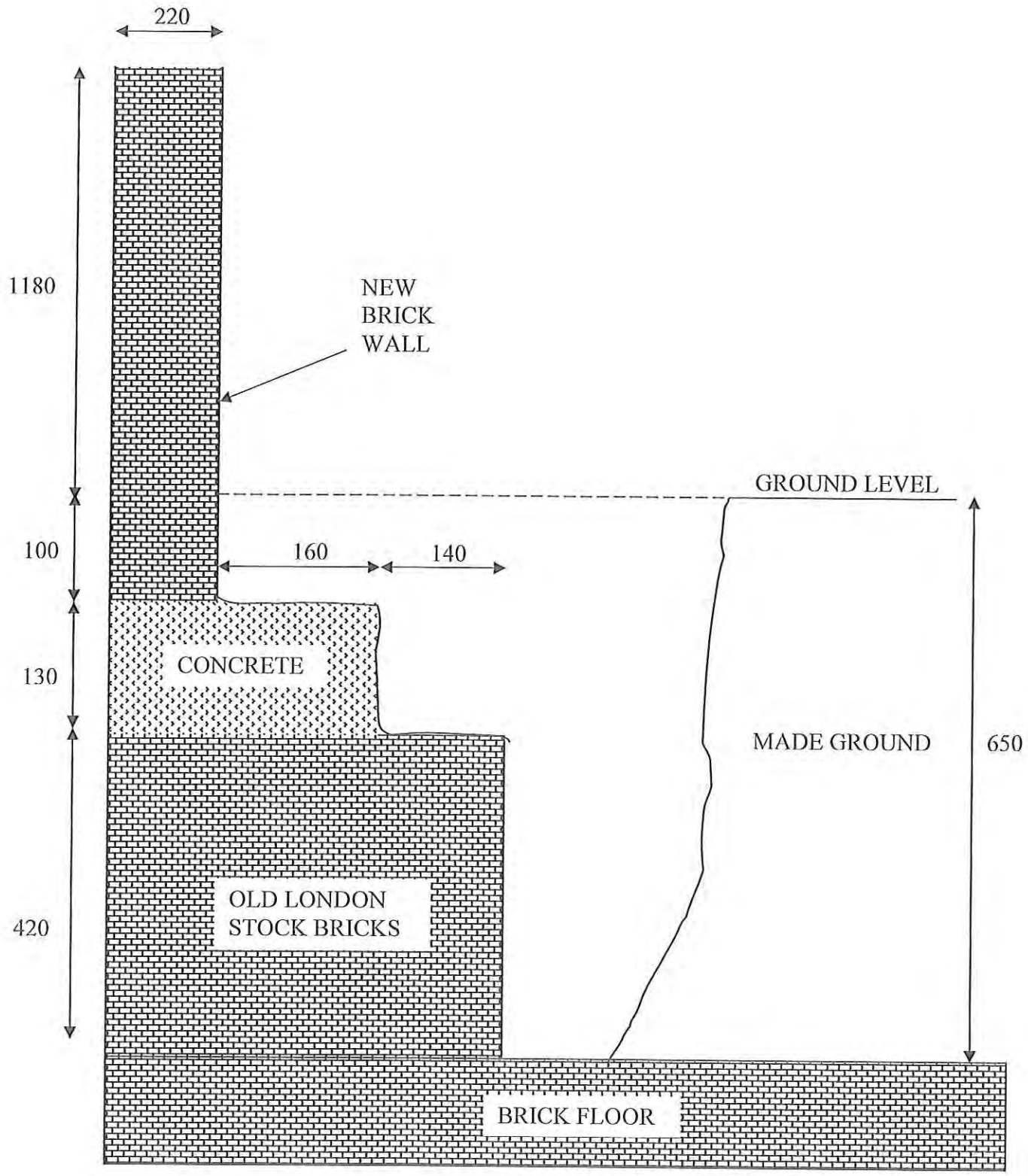
11. Tomlinson, M J, 2001. "Foundation Design and Construction", Seventh Edition, Prentice Hall (ISBN 0-13-031180-4).

Site Analytical Services Ltd.				REF: 12/19433
LOCATION:	3 Trinity Close, Willoughby Road, NW3 1RP			FIG: 1
TITLE:	Site Sketch Plan	DATE:	June 2012	SCALE: NTS



3 TrinityClose Hampstead OS Map 1:1250

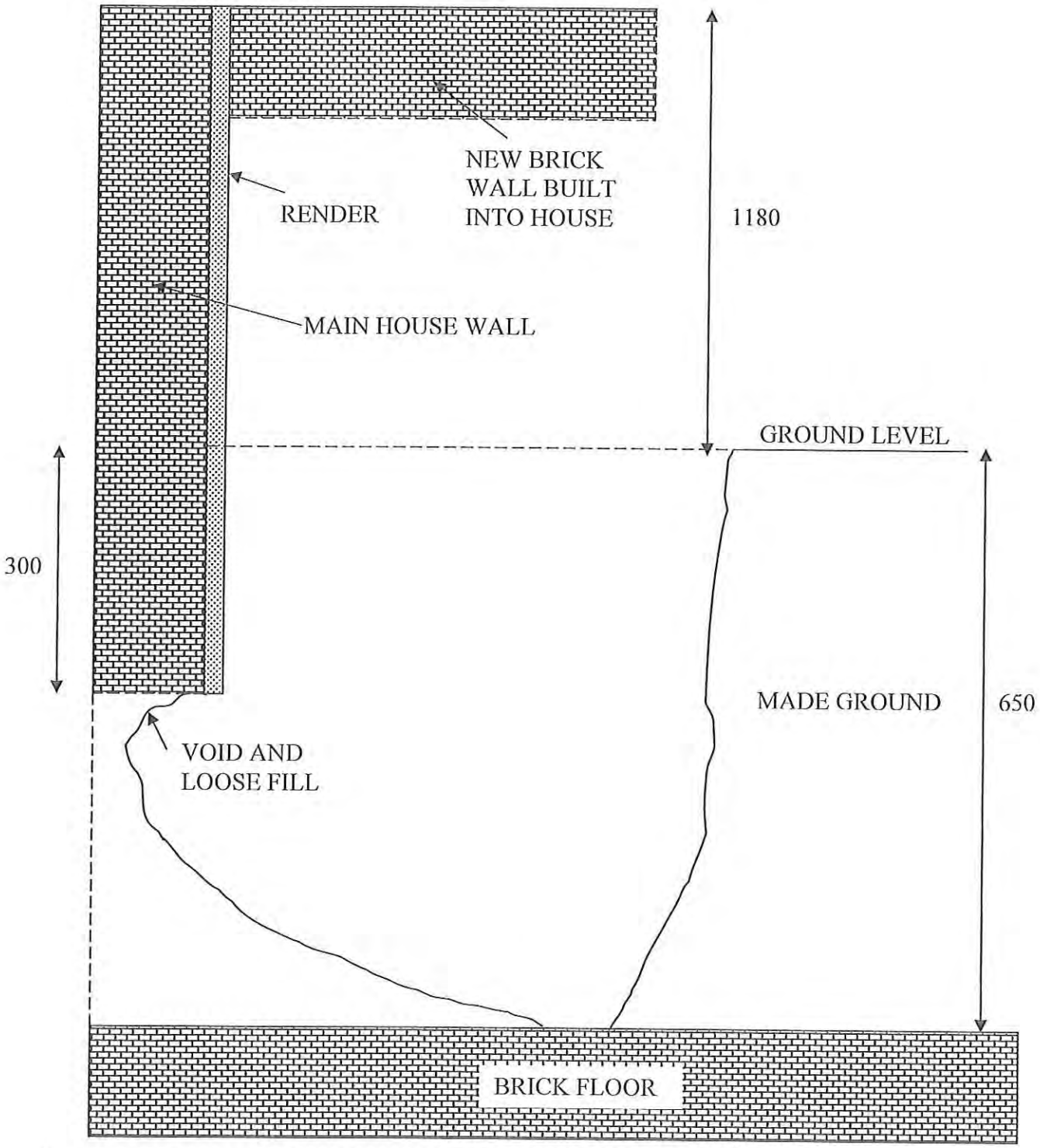
Site Analytical Services Ltd.				REF: 12/19433
LOCATION:	3 Trinity Close, Willoughby Road, NW3 1RP			FIG: 2
TITLE:	Trial Pit 1 – Face A	DATE:	June 2012	SCALE: NTS



END OF TRIAL PIT 1 – FACE A AT 650mm DEPTH

DIMENSIONS IN mm

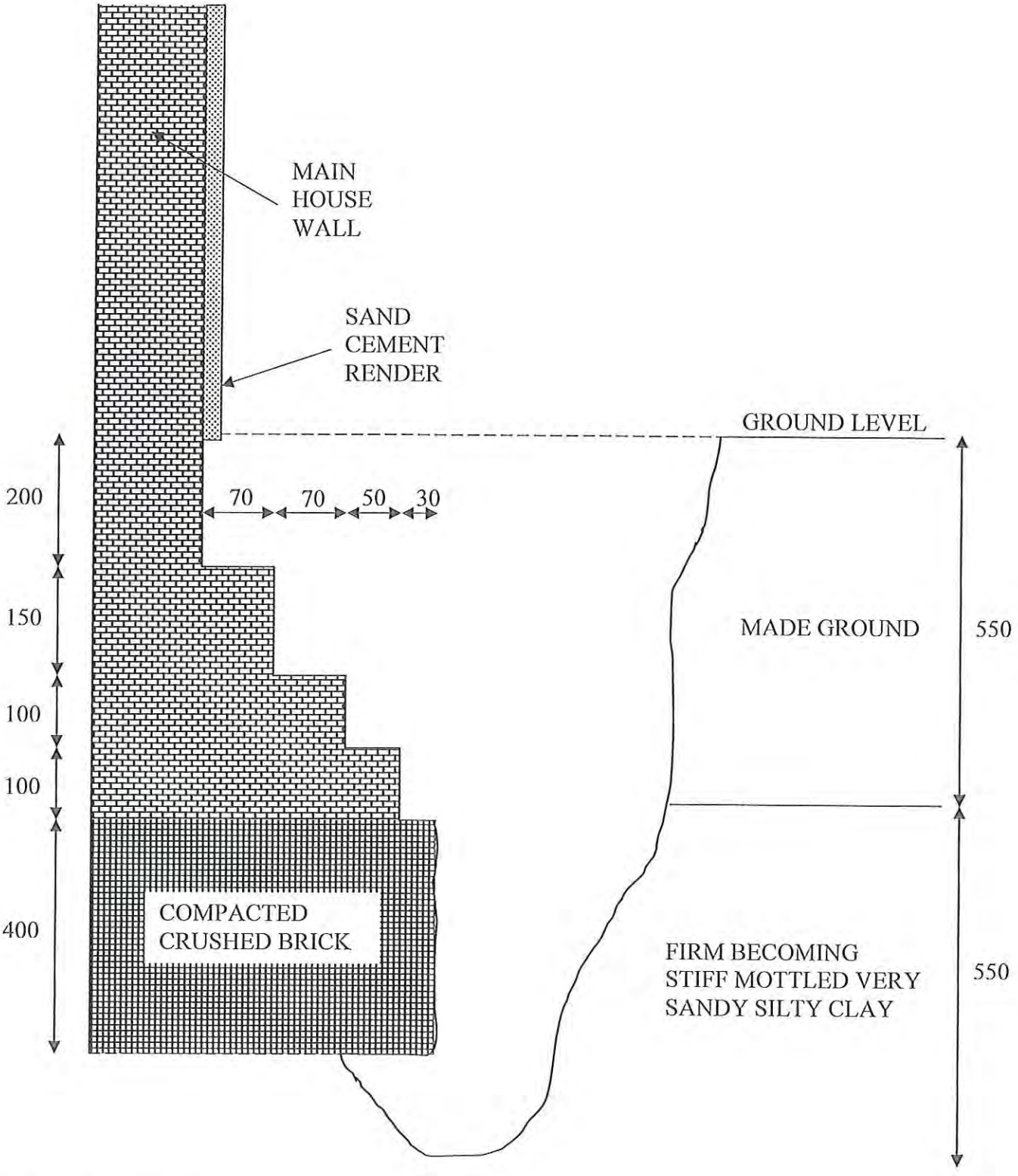
Site Analytical Services Ltd.				REF: 12/19433
LOCATION:	3 Trinity Close, Willoughby Road, NW3 1RP			FIG: 3
TITLE:	Trial Pit 1 – Face B	DATE:	June 2012	SCALE: NTS



END OF TRIAL PIT 1 – FACE B AT 650mm DEPTH

DIMENSIONS IN mm

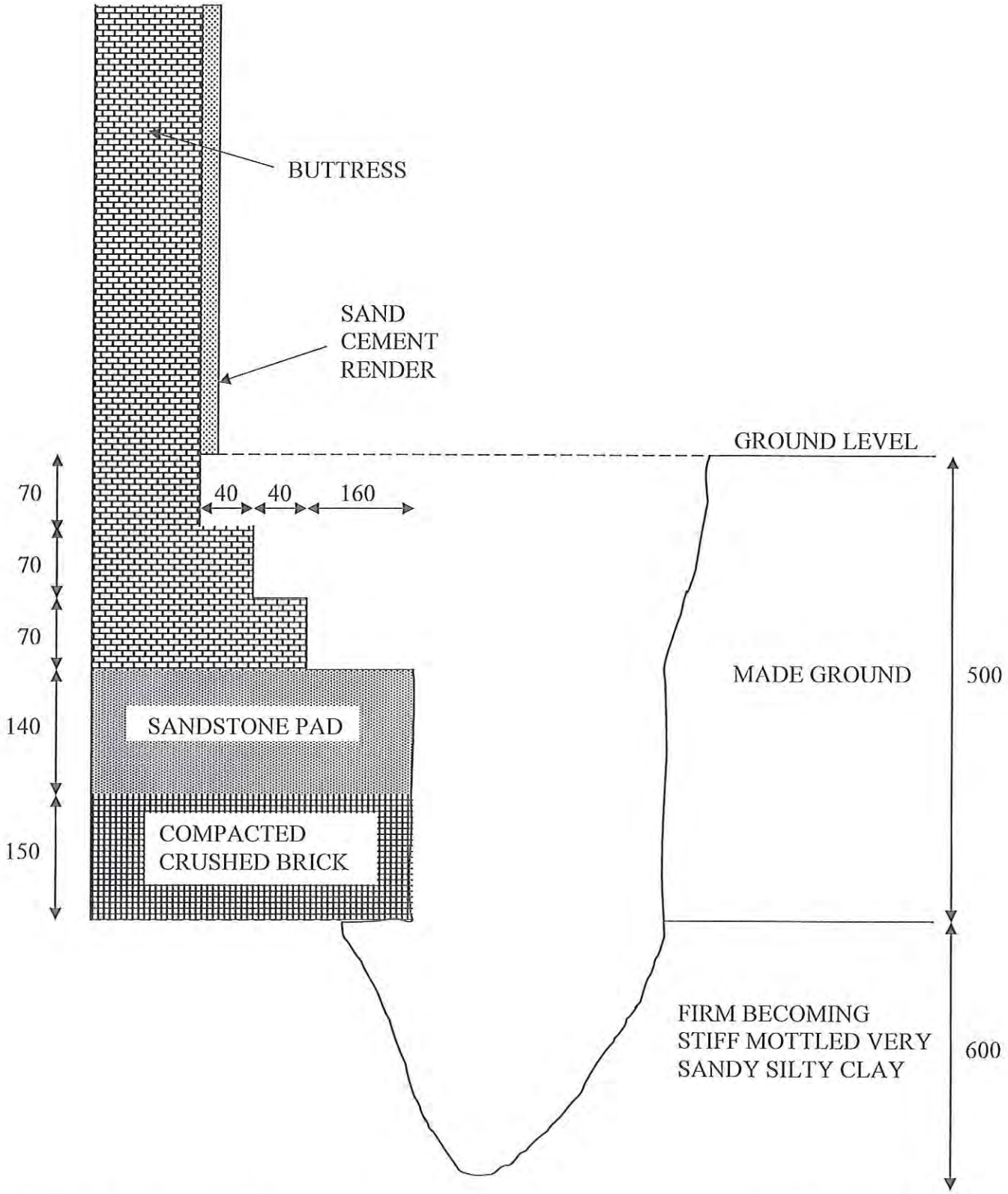
Site Analytical Services Ltd.				REF: 12/19433
LOCATION:	3 Trinity Close, Willoughby Road, NW3 1RP			FIG: 4
TITLE:	Trial Pit 2 – Face A	DATE:	June 2012	SCALE: NTS



END OF TRIAL PIT 2 – FACE A AT 1100mm DEPTH

DIMENSIONS IN mm

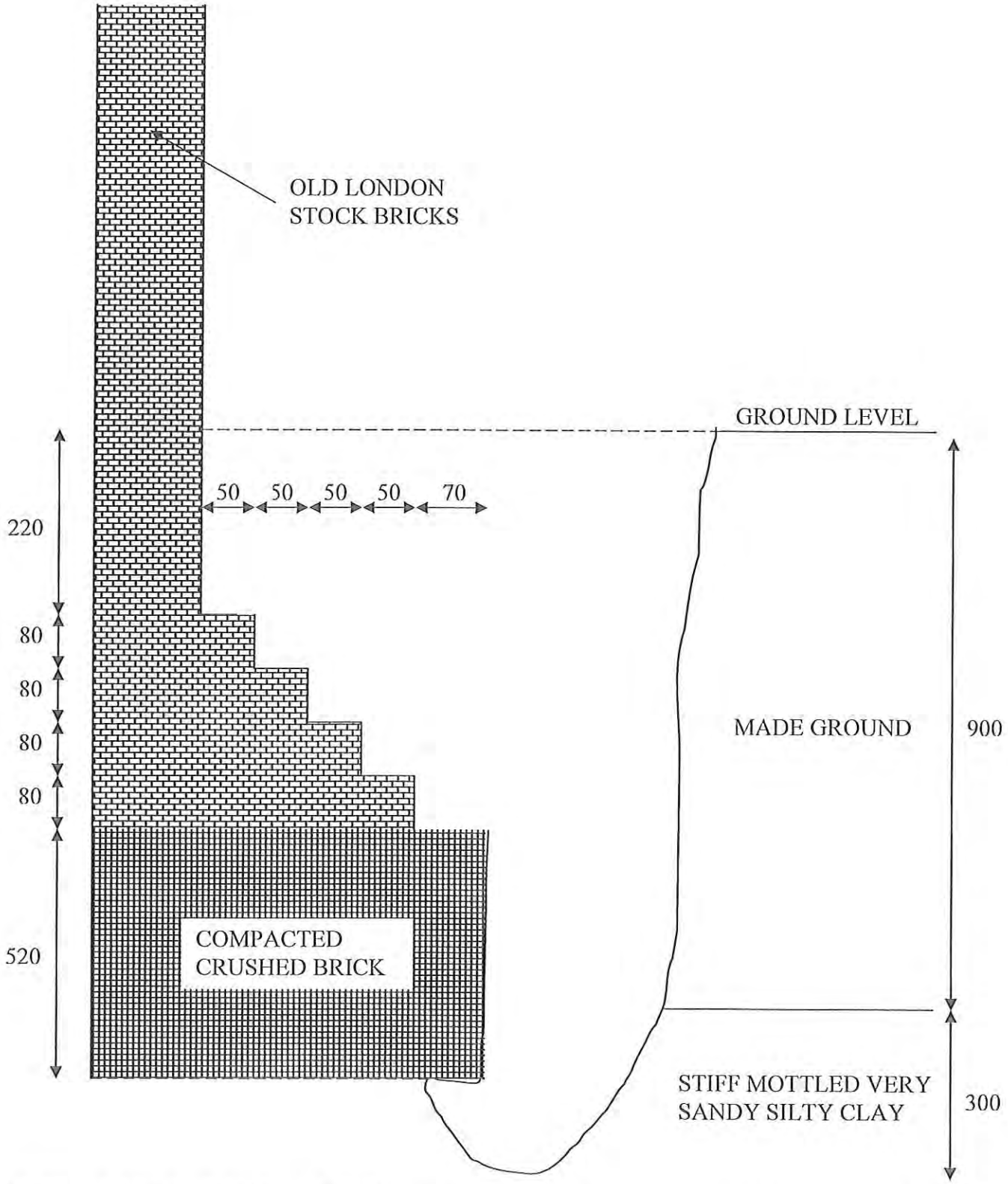
Site Analytical Services Ltd.				REF: 12/19433
LOCATION:	3 Trinity Close, Willoughby Road, NW3 1RP			FIG: 5
TITLE:	Trial Pit 2 – Face B	DATE:	June 2012	SCALE: NTS



END OF TRIAL PIT 2 – FACE B AT 1100mm DEPTH

DIMENSIONS IN mm

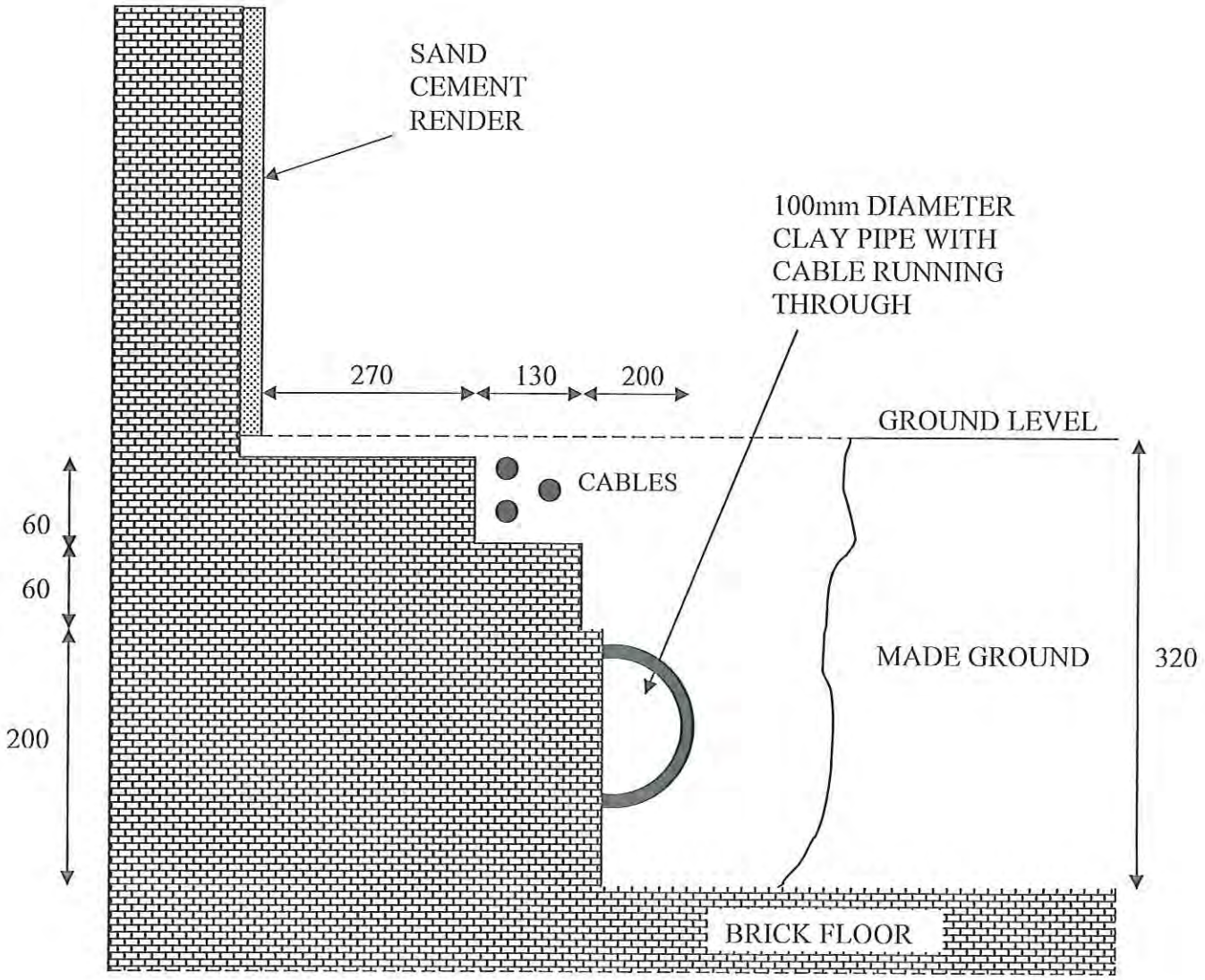
Site Analytical Services Ltd.				REF: 12/19433
LOCATION:	3 Trinity Close, Willoughby Road, NW3 1RP			FIG: 6
TITLE:	Trial Pit 3	DATE:	June 2012	SCALE: NTS



END OF TRIAL PIT 3 AT 1200mm DEPTH

DIMENSIONS IN mm

Site Analytical Services Ltd.				REF: 12/19433
LOCATION:	3 Trinity Close, Willoughby Road, NW3 1RP			FIG: 7
TITLE:	Trial Pit 4	DATE:	June 2012	SCALE: NTS

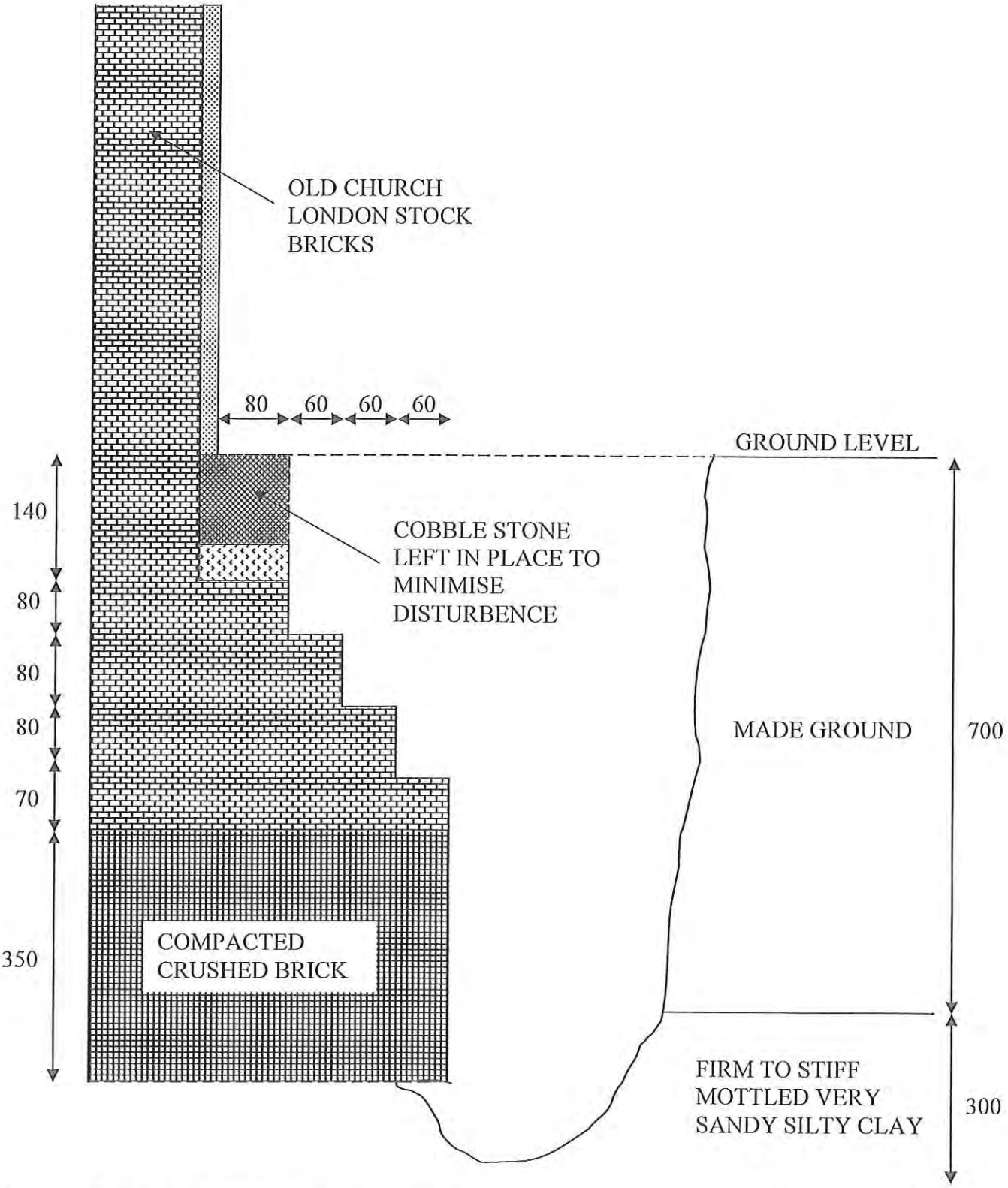


NOTE: TRIAL PIT ABANDONED TO PREVENT DISRUPTION DUE TO SIZE OF BRICKWORK AND CABLES

END OF TRIAL PIT 4 AT 320mm DEPTH

DIMENSIONS IN mm

Site Analytical Services Ltd.				REF: 12/19433
LOCATION:	3 Trinity Close, Willoughby Road, NW3 1RP			FIG: 8
TITLE:	Trial Pit 5	DATE:	June 2012	SCALE: NTS



END OF TRIAL PIT 5 AT 1000mm DEPTH

DIMENSIONS IN mm

APPENDIX `A'

Borehole / Trial Pit Logs

Site Analytical Services Ltd.

Site 3 TRINITY CLOSE, WILLOUGHBY ROAD, HAMPSTEAD, LONDON, NW3 1RP			**Trial Pit Number** TP1
Excavation Method HAND EXCAVATION	**Dimensions** 800 X 800	**Ground Level (mOD)**	**Client** MS SINHA AND MR BRADBURY	**Job Number** 1219433
	Location TQ 266 856	**Dates** 22/06/2012	**Engineer** BUILDING DOCTOR ARCHITECTS	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.25	D1				(0.65)	MADE GROUND - dark grey brown clayey silty sand, fine gravel, ashes, glass and crushed concrete		
0.50	D2		22/06/2012:DRY		0.65	Brick floor encountered at 0.65m depth		
						Complete at 0.65m		

Plan

Remarks

D = Disturbed Sample
Trial pit abandoned at 0.65m depth on Clients instructions
For details of foundations exposed see sketches
Groundwater was not encountered during excavation

Scale (approx)	Logged By	Figure No.
1:25	JIP	1219433.TP1

Site Analytical Services Ltd.

Site 3 TRINITY CLOSE, WILLOUGHBY ROAD, HAMPSTEAD, LONDON, NW3 1RP			**Trial Pit Number** TP2
Excavation Method HAND EXCAVATION	**Dimensions** 800 X 800	**Ground Level (mOD)**	**Client** MS SINHA AND MR BRADBURY	**Job Number** 1219433
	Location TQ 266 856	**Dates** 22/06/2012	**Engineer** BUILDING DOCTOR ARCHITECTS	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	MADE GROUND - stone cobbles set in concrete		
					0.20			
0.25	D1				(0.15)	MADE GROUND - crushed brick and concrete rubble		
					0.35			
					(0.20)	MADE GROUND - loose red crushed brick rubble		
0.50	D2				0.55			
						Firm becoming stiff mottled brown, orange brown and grey very sandy silty CLAY		
0.75	D3				(0.55)			
0.95	V1 87							
0.95	D4							
					1.10			
			22/06/2012:DRY					
						Complete at 1.10m		

Plan

Remarks

Groundwater was not encountered during excavation
For details of foundations exposed see sketches
V = Vane Test - Result in kPa
D = Disturbed Sample

Scale (approx)	Logged By	Figure No.
1:25	JIP	1219433.TP2

Site Analytical Services Ltd.

Site 3 TRINITY CLOSE, WILLOUGHBY ROAD, HAMPSTEAD, LONDON, NW3 1RP			**Trial Pit Number** TP3
Excavation Method HAND EXCAVATION	**Dimensions** 800 X 800	**Ground Level (mOD)**	**Client** MS SINHA AND MR BRADBURY	**Job Number** 1219433
	Location TQ 266 856	**Dates** 22/06/2012	**Engineer** BUILDING DOCTOR ARCHITECTS	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	MADE GROUND - stone cobbles set in concrete		
					0.20			
0.25	D1					MADE GROUND - medium dense grey brown clayey silty sand, fine gravel, ashes, clinker and brick rubble; large root at 0.30m depth		
0.30	R1							
0.50	D2				(0.70)			
0.75	D3							
					0.90			
					(0.30)	Stiff mottled brown, orange brown and grey very sandy silty CLAY		
1.10	V1 96							
1.10	D4		22/06/2012:DRY		1.20			
						Complete at 1.20m		

Plan

Remarks

D = Disturbed Sample, R = Root Sample
V = Vane Test - Result in kPa
For details of foundations exposed see sketch
Groundwater was not encountered during excavation

Scale (approx)	Logged By	Figure No.
1:25	JIP	1219433.TP3

Site Analytical Services Ltd.

Site 3 TRINITY CLOSE, WILLOUGHBY ROAD, HAMPSTEAD, LONDON, NW3 1RP			**Trial Pit Number** TP4
Excavation Method HAND EXCAVATION	**Dimensions** 800 X 800	**Ground Level (mOD)**	**Client** MS SINHA AND MR BRADBURY	**Job Number** 1219433
	Location TQ 266 856	**Dates** 22/06/2012	**Engineer** BUILDING DOCTOR ARCHITECTS	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.05) 0.05	MADE GROUND - concrete		
0.25	D1		22/06/2012:DRY		(0.27) 0.32	MADE GROUND - dark grey brown clayey silty sand, fine gravel, ashes, glass and crushed concrete Brick floor encountered at 0.32m depth		
						Complete at 0.32m		

Plan

Remarks

Groundwater was not encountered during excavation
For details of foundations exposed see sketch
Trial pit abandoned at 0.32m depth on Clients instructions
D = Disturbed Sample

Scale (approx)	Logged By	Figure No.
1:25	JIP	1219433.TP4

Site Analytical Services Ltd.

Site 3 TRINITY CLOSE, WILLOUGHBY ROAD, HAMPSTEAD, LONDON, NW3 1RP			**Trial Pit Number** TP5
Excavation Method HAND EXCAVATION	**Dimensions** 800 X 800	**Ground Level (mOD)**	**Client** MS SINHA AND MR BRADBURY	**Job Number** 1219433
	Location TQ 266 856	**Dates** 22/06/2012	**Engineer** BUILDING DOCTOR ARCHITECTS	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.14) 0.14	MADE GROUND - stone cobbles set in concrete		
					(0.16) 0.30	MADE GROUND - crushed brick and concrete rubble		
0.25	D1					MADE GROUND - loose grey brown clayey silty sand, fine gravel, ashes and crushed brick rubble		
0.50	D2				(0.40) 0.70			
0.80	V1 76					Firm to stiff mottled brown, orange brown and grey very sandy silty CLAY		
0.80	D3				(0.30) 1.00			
			22/06/2012:DRY			Complete at 1.00m		

Plan

Remarks

Groundwater was not encountered during excavation
For details of foundations exposed see sketch
V = Vane Test - Result in kPa
D = Disturbed Sample

Scale (approx)	Logged By	Figure No.
1:25	JIP	1219433.TP5

APPENDIX `B'

Laboratory Test Data

Site Analytical Services Ltd.

Ref: 12/19433

PLASTICITY INDEX & MOISTURE CONTENT DETERMINATIONS

LOCATION 3 Trinity Close, Willoughby Road, Hampstead, London, NW3 1RP

BH/TP No.	Depth m	Natural Moisture %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Passing 425 µm %	Class
TP2	0.75	23	35	16	19	92	CL/CI
TP3	1.10	28	43	18	25	82	CI
TP5	0.80	25	42	19	23	83	CI

Table 1

Site Analytical Services Ltd.

Ref: 12/19433

SULPHATE & pH DETERMINATIONS

LOCATION 3 Trinity Close, Willoughby Road, Hampstead, London, NW3 1RP

BH/TP No.	DEPTH BELOW GL m	SOIL SULPHATES AS SO_4 TOTAL %	SOIL SULPHATES AS SO_4 WATER SOL g/l	WATER SULPHATES AS SO_4 g/l	pH	CLASS	SOIL - 2mm %
TP2	0.95		0.26		8.3	DS-1	100

Classification – Tables C1 and C2 : BRE Special Digest 1 : 2005

Table 2

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon,
Ware, Herts, SG11 1NJ

Telephone : Ware (01920) 822233
Fax: Ware (01920) 822200

17th June 2013

Our Ref : MRS/11500

Ms S.Bradbury
3 Trinity Close
Willoughby Road
London
NW3 1SD

Dear Sirs,

Re: 3 Trinity Close, Willoughby Road, London NW3 1SD : Site Investigation

1.0 Introduction

1.01 In accordance with your instructions, we visited the above site during June 2013.

1.02 The purpose of our visit was to carry out an investigation into the subsoil conditions with a view to foundation design.

1.03 The comments and opinions expressed are based purely on the conditions encountered and the subsequent laboratory testing.

1.04 Therefore, it is possible that some special conditions prevailing on site have not been encountered or taken into account.

1.05 All ground water recordings or their absence relate to short term observations and do not allow for fluctuations due to seasonal or other effects.

2.0 Description of Site

2.01 The site is situated at 3 Trinity Close, Willoughby Road, London NW3 1SD.

2.02 At the time of our visit the site was generally flat.

3.0 Fieldwork

3.01 One borehole was sunk to a maximum depth of 10.00m by means of a window sampler drilling rig.

3.02 The location of the works is indicated on the site plan forming appendix one.

3.03 The various strata and details encountered were noted and are recorded on the borehole logs forming appendix two.

3.04 Insitu strength tests were carried out in the boreholes, the results of which can be seen on the aforementioned logs.

3.05 A full range of samples were recovered as noted and retained for subsequent laboratory testing.

3.06 The location, type and height of any trees should be taken from a survey for later use with NHBC Chapter 4.20, if required.

4.0 Laboratory Testing

4.01 All samples were tested in accordance with BS:1377:1990 Methods of Test for Soils for Civil Engineering purposes.

4.02 Selected samples were tested to determine their atterberg limits, triaxial strength, soluble sulphate content and pH value.

4.03 The results of all laboratory testing are summarised in appendix three.

5.0 Conclusions and Recommendations

5.01 By inspection of the borehole log it can be seen that the subsoil consists of a Granite Cobble Over Concrete to 0.25m where a Soft To Firm Brown Sandy Clay Ash Brick FILL is present to 0.65m above Soft To Firm Becomming Stiffer With Depth Orange Brown to Dark Grey Sandy CLAYS, which are encountered and present to the close of the borehole.

5.02 Water was encountered upon excavation of the boreholes as described on the borehole logs, standing water at 5.67m a standpipe was installed at 6m deep.
Water Levels
3.10m 7/6/13
2.89m 10/6/13

5.03 No significant roots were encountered in the boreholes beyond 0.60m.

5.04 Laboratory testing proved the clays to be of Intermediate to high plasticity (PI=28 - 38%) which indicates a moderate susceptibility to movement associated with moisture content change.

5.05 Triaxial testing proved the CLAYS to have cohesion values between 22 - 101 Kn/m² these values are generally seen to increase with depth.

5.06 Therefore when considering the information available we are of the opinion that a the basement can take the form of a reinforced raft with walls designed to take the pressure of the retained soil.

5.07 Further investigation may be required in order to locate existing foundations within the area of the site which may restrict any future works.

5.08 As the site contains less than 0.50g/L of soluble sulphate it can be categorised as a class 1 site in accordance with BRE Digest, and as such any concrete in contact with the subsoil needs no special precautions.

5.09 Chemical testing is enclosed and the two samples tested are seen to be clean and uncontaminated hence the site can be developed in the conventional manor.

We hope that this is satisfactory, however if you should require any further information, please do not hesitate to contact us.

Yours faithfully,

M. R. Smith M.Sc
Principal Engineer

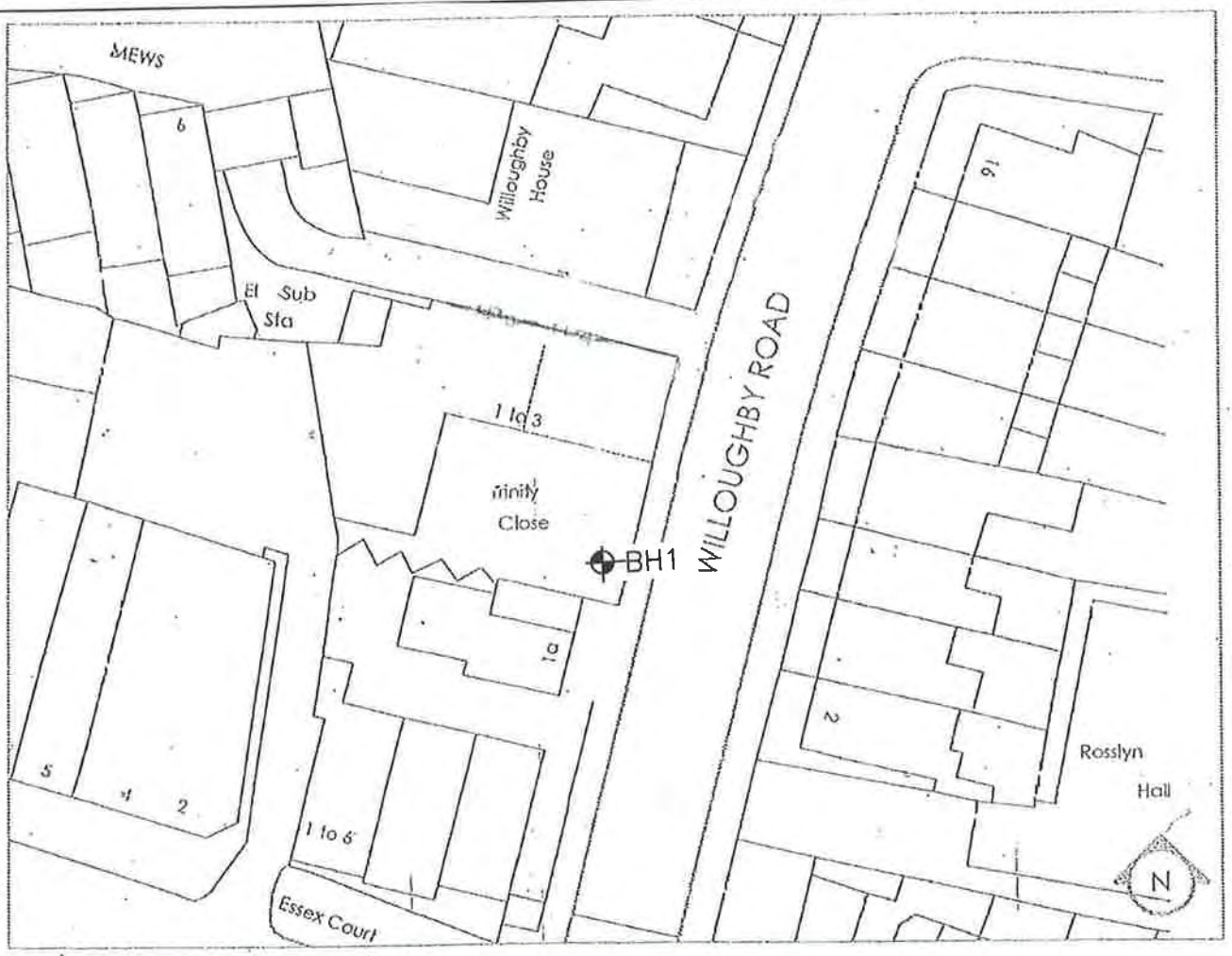
HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, Herts SG11 1NJ
Telephone: Ware (01920) 822233
Fax: Ware (01920) 822200

Appendix No.	1
Sheet No.	1
Job No.	11500
Date	June 2013

3 Trinity Close, Willoughby Road, Hampstead NW3 1RP

Site Plan



3 TrinityClose Hampstead OS Map 1:1250

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, Herts SG11 1NJ
Telephone: Ware (01920) 822233
Fax: Ware (01920) 822200

Appendix No. 2
Sheet No. 1
Job No. 11500
Date June 2013

3 Trinity Close, Willoughby Road, Hamstead, NW3 1RP

Borehole One

Description of Strata	Depth	Reduced Level	Legend	Thickness (m)	Water Level	Samples No.	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	Casing Depth (m)
Granite Cobble	0.10			0.10	Standing Water at 5.67m	1	U	0.00		
Concrete	0.25			0.15						
Soft To Firm Brown Sandy Clay Ash Brick FILL	0.65			0.40						
Soft To Firm Becomming Firm Orange Brown Sandy CLAY	4.30			3.65		2	U	1.00		1.00
						3	U	2.00		
						4	U	3.00		
						5	U	4.00		
Firm To Stiff Dark Grey Sandy CLAY	5.70			1.40		6	U	5.00		
Stiff Dark Grey Sandy CLAY						7	U	6.00		
						8	U	7.00		
						9	U	8.00		
						10	U	9.00		
Borehole Complete At 10.00 M	10.00			4.30						

Remarks:
Standpipe Installed at 6.00m

Scale 1:50

Key : U–Undisturbed Sample (100mm diameter) B –Bulk Sample ▼–Water Struck D –Disturbed Sample ▽–Water Standing W–Water Sample P–Piston Sample N–S.P.T. N–Value V–Vane Strength (kN/m²)

HERTS & ESSEX SITE INVESTIGATIONS

Warren House, Bells Hill, Bishop's Stortford, Herts. CM23 2NN
Telephone: Bishops Stortford (01279) 506725
Fax: Bishops Stortford (01279) 506724

Appendix No. 3
Sheet No. 1
Job No. 11500
Date June 2013

LOCATION 3 Trinity Close, Willoughby Road, Hampstead

LIQUID AND PLASTIC LIMIT TEST RESULTS

Borehole	Depth (m)	Sample	Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Group Symbol	Desiccation Profile	Percentage Retained 425 Micron Sieve (%)
1	1.00	U	30	57	19	38	CH		0
1	3.00	U	32	53	19	34	CH		0
1	5.00	D	29	40	11	29	CI		0
1	8.00	U	23	39	11	28	CI		0

HERTS & ESSEX SITE INVESTIGATIONS

Warren House, Bells Hill, Bishop's Stortford, Herts. CM23 2NN
Telephone: Bishops Stortford (01279) 506725
Fax: Bishops Stortford (01279) 506724

Appendix No. 3
Sheet No. 2
Job No. 11500
Date June 2013

LOCATION 3 Trinity Close, Willoughby Road, Hampstead

UNDRAINED COMPRESSION TEST RESULTS

Borehole	Depth (m)	Sample	Natural Moisture Content (%)	Bulk Density (Mg/m^3)	Lateral Pressure (kN/m^2)	Deviator Stress (kN/m^2)	Apparent Cohesion (kN/m^2)	Angle of Shearing Resistance	Remarks
1	1.00	U	30	1.94	20	44	22		
1	2.00	U	32	1.96	40	64	32		
1	3.00	U	32	1.98	60	88	44		
1	4.00	U	28	2.01	80	89	45		
1	5.00	U	29	2.00	100	108	54		
1	6.00	U	29	2.01	120	114	57		
1	7.00	U	25	2.03	140	166	83		
1	8.00	U	23	2.02	160	173	87		
1	9.00	U	26	2.04	180	202	101		

HERTS & ESSEX SITE INVESTIGATIONS

Warren House, Bells Hill, Bishop's Stortford, Herts. CM23 2NN
Telephone: Bishops Stortford (01279) 506725
Fax: Bishops Stortford (01279) 506724

Appendix No. 3
Sheet No. 3
Job No. 11500
Date June 2013

LOCATION 3 Trinity Close, Willoughby Road, Hampstead

SULPHATE ANALYSIS TEST RESULTS

Borehole	Depth (m)	Sample	Concentrations of Soluble Sulphate			Classification	pH
			Soil		Groundwater		
			Total SO_4 (%)	SO_4 in 2:1 water:soil (g/l)			
1	1.00	U		0.18			7.28
1	3.00	U		0.17			7.56
1	8.00	U		0.08			7.82

Chemtest
The right chemistry to deliver results

Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Herts & Essex Site Investigations
The Old Post Office
Wellpond Green, Standon
Ware, Hertfordshire
SG11 1NJ

FAO Martyn Smith
17 June 2013

Dear Martyn Smith

Test Report Number **232055**
Your Project Reference **11500 - 3 Trinity Close, Willoughby Road, Hempstead**

Please find enclosed the results of analysis for the samples received 11 June 2013.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

Phil Hellier, Director

2183

Notes to accompany report:

- *The sign < means 'less than'*
- *Tests marked 'U' hold UKAS accreditation*
- *Tests marked 'M' hold MCertS (and UKAS) accreditation*
- *Tests marked 'N' do not currently hold UKAS accreditation*
- *Tests marked 'S' were subcontracted to an approved laboratory*
- *n/e means 'not evaluated'*
- *i/s means 'insufficient sample'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are outside of the scope of UKAS accreditation*
- *The results relate only to the items tested*
- *Stones represent the quantity of material removed prior to analysis*
- *All results are expressed on a dry weight basis*
- *The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, phenols*
- *For all other tests the samples were dried at < 37°C prior to analysis*
- *Uncertainties of measurement for the determinands tested are available upon request*
- *Soil descriptions, including colour and texture, are beyond the scope of MCertS accreditation*
- *None of the test results included in this report have been recovery corrected*

Herts & Essex Site Investigations
The Old Post Office
Wellpond Green, Standon
Ware, Hertfordshire
SG11 1NJ

FAO Martyn Smith

LABORATORY TEST REPORT

Results of analysis of 2 samples
received 11 June 2013

11500 - 3 Trinity Close, Willoughby Road, Hempstead

Chemtest
The right chemistry to deliver results

Report Date
17 June 2013

Login Batch No					232055	
	Chemtest LIMS ID				AI80545	AI80546
	Sample ID				WS1	WS1
	Sample No				U	U
	Sampling Date				6/6/2013	6/6/2013
	Depth				0.50m	1.20m
	Matrix				*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*		
2030	Moisture		%	n/a	21	20
	Stones content (>50mm)		%	n/a	<0.02	<0.02
2040	Soil colour			M	brown	brown
	Soil texture			M	clay	clay
	Other material			M	stones	none
2010	pH			M	9.0	8.3
2020	Electrical Conductivity (2:1)	EC	µS cm-¹	N	300	250
2300	Cyanide (free)	57125	mg kg-¹	M	<0.5	<0.5
	Cyanide (total)	57125	mg kg-¹	M	<0.5	<0.5
2625	Organic matter		%	M	1.3	0.53
2120	Boron (hot water soluble)	7440428	mg kg-¹	M	0.4	<0.4
	Sulfate (2:1 water soluble) as SO4	14808798	g l-¹	M	<0.01	<0.01
2490	Chromium (hexavalent)	18540299	mg kg-¹	N	<0.5	<0.5
2430	Sulfate (total) as SO4	14808798	%	M	0.07	<0.01
2450	Arsenic	7440382	mg kg-¹	M	22	12
	Cadmium	7440439	mg kg-¹	M	<0.10	<0.10
	Chromium	7440473	mg kg-¹	M	35	34
	Copper	7440508	mg kg-¹	M	35	13
	Mercury	7439976	mg kg-¹	M	0.44	<0.10
	Nickel	7440020	mg kg-¹	M	15	16
	Lead	7439921	mg kg-¹	M	88	25
	Zinc	7440666	mg kg-¹	M	45	41
2700	Naphthalene	91203	mg kg-¹	M	< 0.1	< 0.1
	Acenaphthylene	208968	mg kg-¹	M	< 0.1	< 0.1

All tests undertaken between 11/06/2013 and 17/06/2013

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

Herts & Essex Site Investigations
The Old Post Office
Wellpond Green, Standon
Ware, Hertfordshire
SG11 1NJ

FAO Martyn Smith

LABORATORY TEST REPORT

Results of analysis of 2 samples
received 11 June 2013

11500 - 3 Trinity Close, Willoughby Road, Hempstead

Chemtest
The right chemistry to deliver results

Report Date
17 June 2013

					232055	
					AI80545	AI80546
					WS1	WS1
					U	U
					6/6/2013	6/6/2013
					0.50m	1.20m
					SOIL	*SOIL*
2700	Acenaphthene	83329	mg kg^{-1}	M	< 0.1	< 0.1
	Fluorene	86737	mg kg^{-1}	M	< 0.1	< 0.1
	Phenanthrene	85018	mg kg^{-1}	M	0.25	< 0.1
	Anthracene	120127	mg kg^{-1}	M	0.16	< 0.1
	Fluoranthene	206440	mg kg^{-1}	M	0.25	< 0.1
	Pyrene	129000	mg kg^{-1}	M	0.17	< 0.1
	Benzo[a]anthracene	56553	mg kg^{-1}	M	< 0.1	< 0.1
	Chrysene	218019	mg kg^{-1}	M	< 0.1	< 0.1
	Benzo[b]fluoranthene	205992	mg kg^{-1}	M	< 0.1	< 0.1
	Benzo[k]fluoranthene	207089	mg kg^{-1}	M	< 0.1	< 0.1
	Benzo[a]pyrene	50328	mg kg^{-1}	M	< 0.1	< 0.1
	Dibenzo[a,h]anthracene	53703	mg kg^{-1}	M	< 0.1	< 0.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg^{-1}	M	< 0.1	< 0.1
	Benzo[g,h,i]perylene	191242	mg kg^{-1}	M	< 0.1	< 0.1
	Total (of 16) PAHs		mg kg^{-1}	M	< 2	< 2
2920	Phenols (total)		mg kg^{-1}	N	<0.3	<0.3

All tests undertaken between 11/06/2013 and 17/06/2013

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

Chemtest
The right chemistry to deliver results

Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Herts & Essex Site Investigations
The Old Post Office
Wellpond Green, Standon
Ware, Hertfordshire
SG11 1NJ

FAO Martyn Smith
17 June 2013

Dear Martyn Smith

Test Report Number **232055**
Your Project Reference **11500 - 3 Trinity Close, Willoughby Road, Hempstead**

Please find enclosed the results of analysis for the samples received 11 June 2013.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

Phil Hellier, Director

UKAS TESTING
2183

ISO 14001 sira UKAS ENVIRONMENTAL MANAGEMENT

Notes to accompany report:

- *The in-house procedure is employed to identify materials and fibres in soils*
- *The sample is examined by stereo-binocular and polarised light microscopy*
- *Sample size is reduced by coning and quartering to obtain a representative sub-sample if necessary*
- *The bulk identification is in accordance with the requirements of the analyst guide (HSG 248)*
- *Samples associated with asbestos are retained for six months*
- *The results relate only to the items tested as supplied by the client*
- *Comments or interpretations are beyond the scope of UKAS accreditation*

Herts & Essex Site Investigations
The Old Post Office
Wellpond Green, Standon
Ware, Hertfordshire
SG11 1NJ

FAO Martyn Smith

LABORATORY TEST REPORT
Asbestos in Soils

Chemtest

Results of analysis of 2 samples
received 11 June 2013
11500 - 3 Trinity Close, Willoughby Road, Hempstead

Report Date
17 June 2013

Login Batch No: 232055

Qualitative Results

				SOP 2190	
				ACM Type	Asbestos Identification
Chemtest ID	Sample ID	Sample Desc	Depth (m)		
AI80545	WS1	U	0.50	-	No Asbestos Detected
AI80546	WS1	U	1.20	-	No Asbestos Detected

The detection limit for this method is 0.001%

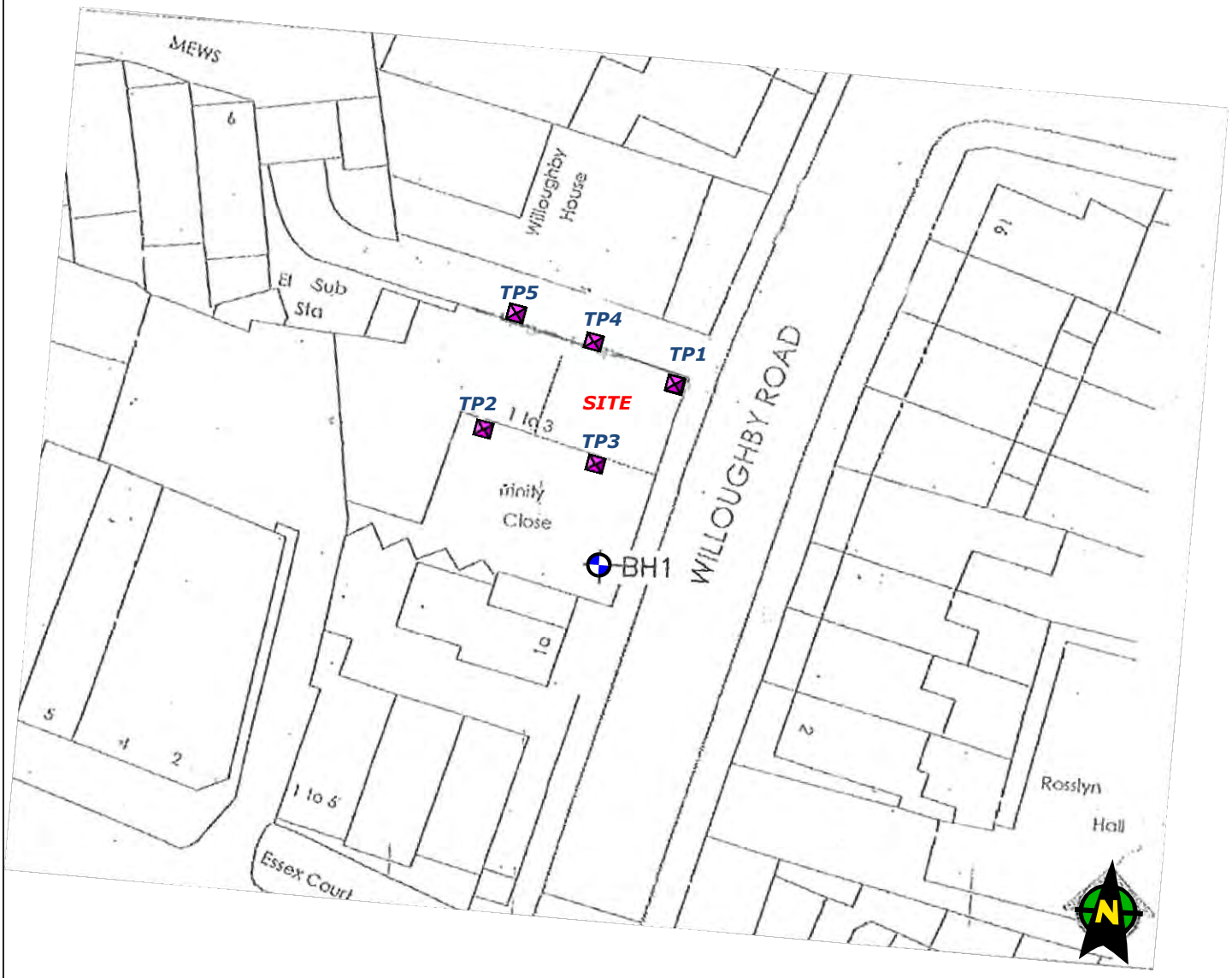
Signed

Albert Vella
Senior Environmental Surveyor

All tests undertaken between 17-Jun-2013 and 17-Jun-2013

Site Location	3 Trinity Close, Willoughby Road, London NW3 1SD	Report No	9481/OT

Site Plan



Herts & Essex borehole [2013]

SAS trial pit [2012]

0 20m

Approx scale

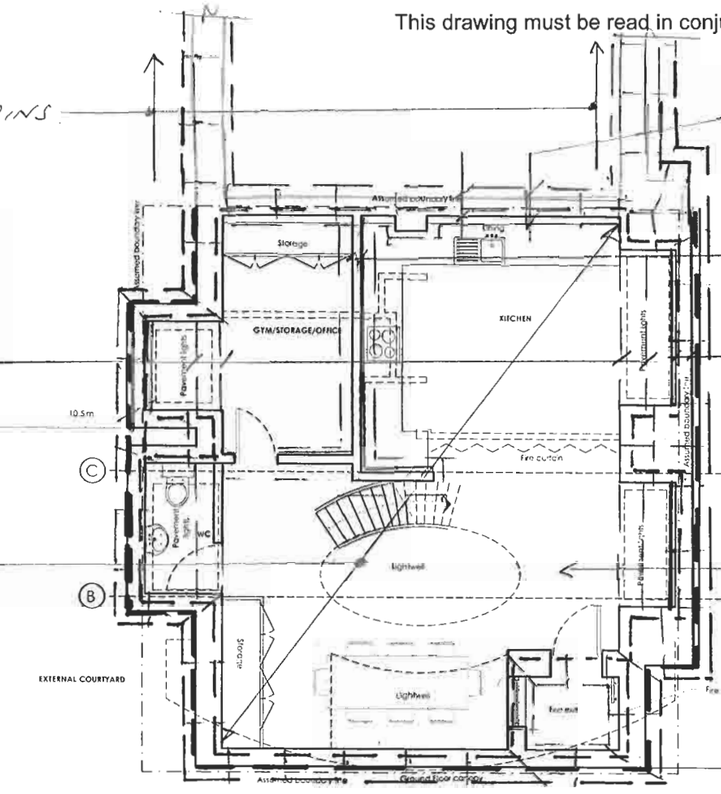
Soil Consultants

This drawing must be read in conjunction with the specification and all other relevant drawings. Do not scale from this drawing.

SCHEME DESIGN ONLY: FINAL DESIGN SUBJECT TO FURTHER INVESTIGATIONS & TEMPORARY WORKS BY CONTRACTOR

MIN. 2No TRANSITION UNDERPINS

MIN 300 thk R.C UNDERPINNED RETAINING WALL FOOTING WIDTH ≥ EXISTING.



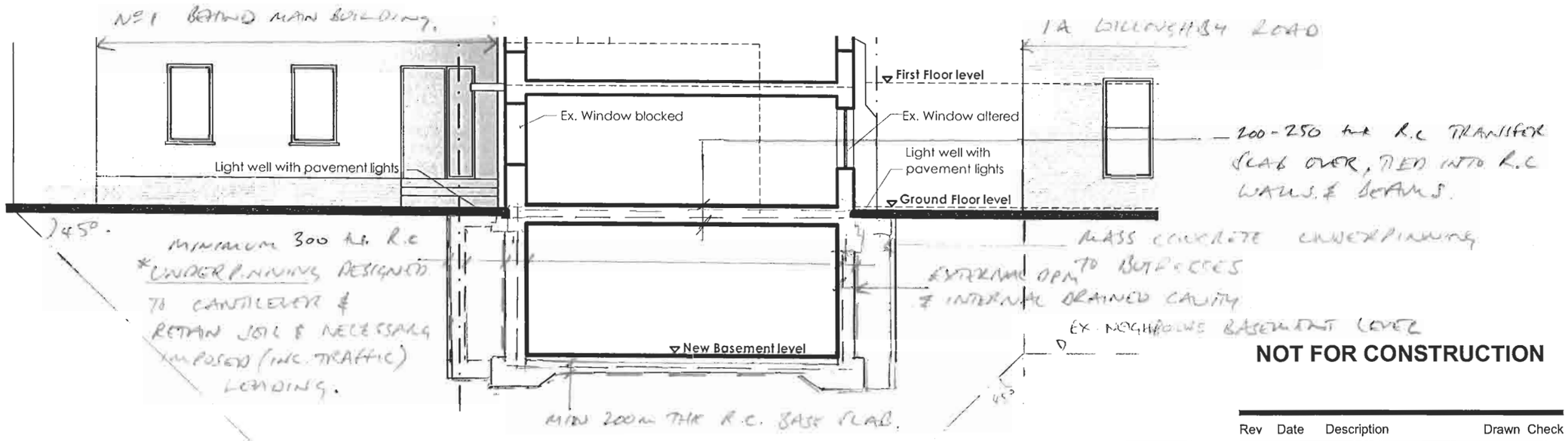
LOAD BEARING INTERNAL PARTITIONS 150mm THICK R.C. WALLS ON SLAB THICKENINGS

MIN 300 thk REINFORCED UNDERPINNING / RETAINING WALL

REINFORCED CONCRETE BEAMS / CONCRETE ENCASED STEELS OVER.

MIN 200 thk R.C. BASE SLAB TIED INTO R.C. RETAINING WALLS DESIGNED TO RESIST PRESSURE FROM LONDON CLAY.

REINFORCED CONCRETE SLAB OVER SUPPORTS STRUCTURE ABOVE & TIES GROUND FLOOR BASE OF WALL TOGETHER DURING CONSTRUCTION & IN PERMANENT CONDITION.



MINIMUM 300 thk R.C *UNDERPINNING DESIGNED TO CANTILEVER & RETAIN SOIL & NECESSARY IMPOSED (INC. TRAFFIC) LOADING.

200-250 thk R.C TRANSFER SLAB OVER, TIED INTO R.C WALLS & BEAMS.

MASS CONCRETE UNDERPINNING

EXTERNAL DPM TO BUTT EDGES & INTERNAL DRAINED CAVITY

MIN 200m THK R.C. BASE SLAB.

* STAGED CONSTRUCTION PROCESS IN MAX. 1000 mm SECTIONS TO AVOID UNDERMINING EXISTING CONSTRUCTION & SURROUNDING TRAFFICKED AREAS

NOT FOR CONSTRUCTION

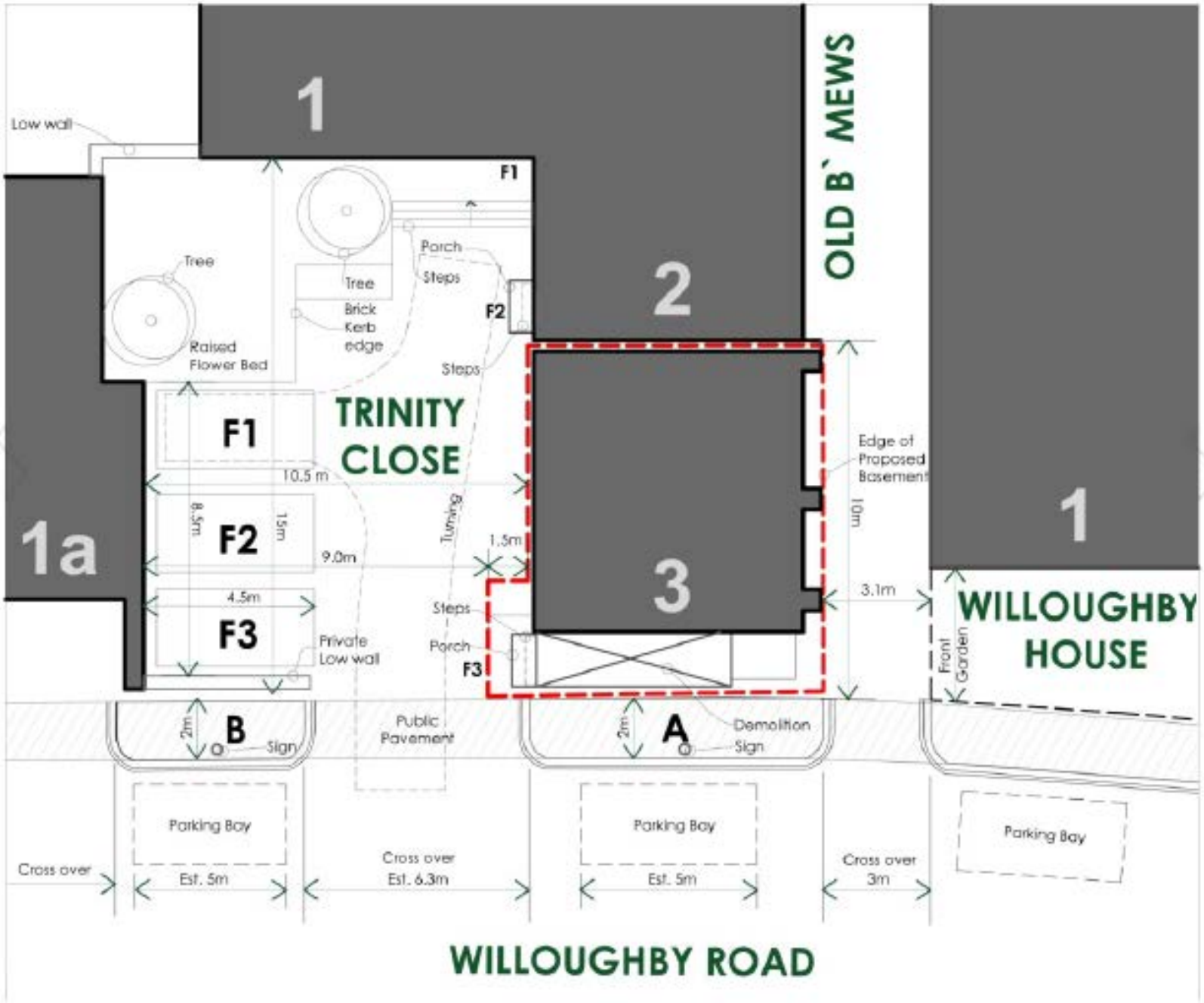
conisbee
Consulting Structural Engineers
Consulting Civil Engineers
1-5 Offord St
London N1 1DH
Tel 020 7700 6666
Fax 020 7700 6686
design@conisbee.co.uk
www.conisbee.co.uk

Project
3 TRINITY CLOSE

Title
STRUCTURAL SCHEME
BASEMENT PLAN & SECTION S'TH-N'TH

Rev	Date	Description	Drawn	Check

Drawing Status: PRELIMINARY
Project No: 120445
Date: JUNE 2012
Drawn: HH
Drawing No: S100
Scale: 1:100@A3
Engineer: HH
Revision: P1



RIBA
Offices:
Limehouse
Enfield
0845 0600 040
architect@building-doctors.com

Disclaimer

Pls. read this drawing alongside the engineer info. & let us know if there's any difference between this & other tender information. It's best to use dimensions shown, as it's not advised to scale from this drawing. All contractors and suppliers should take their own site dims before final manufacture.

date	revision	auth
11.03.2013		MK

client
Mr S. Bradbury
3, Trinity Cl, Willoughby Road, Hampstead

project
3 Trinity Close
NW3 1SD

title
Existing Block Plan with Parking

[X] Draft [X] Planning [ ] B. Control
[ ] Tender [ ] Constr. [ ] Other

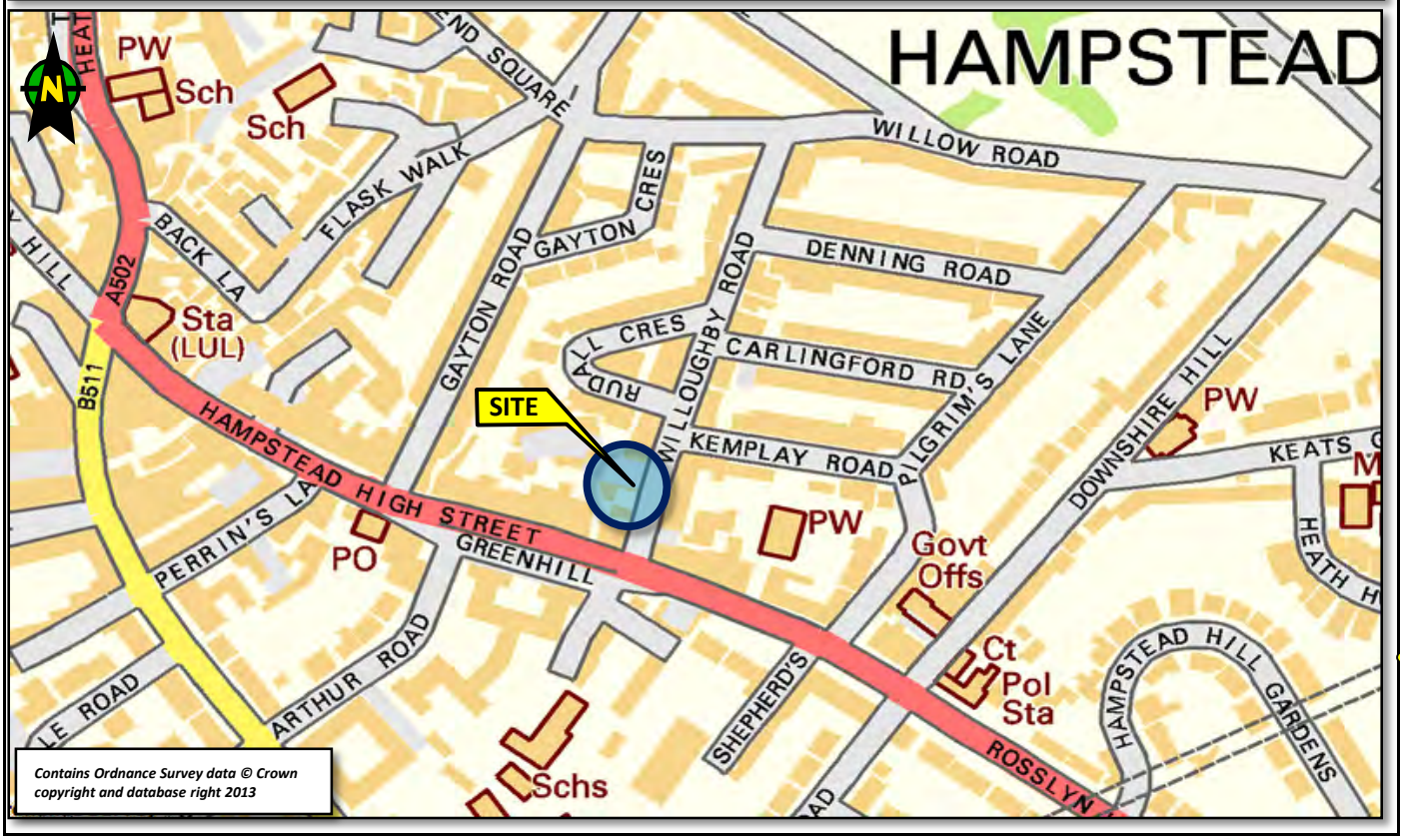
Stage A

no. & rev.
622-EP04

A3

Site Location	3 Trinity Close, Willoughby Road, London NW3 1SD	Report No	9481/OT

Location Map



Approx NGR of site 526675E, 185670N

Soil Consultants