Figure 1

Site Location Plan

john newton & partners
jnpgroup
Consulting Engineers

Project:
317 Finchley Road

Project No:
M41506

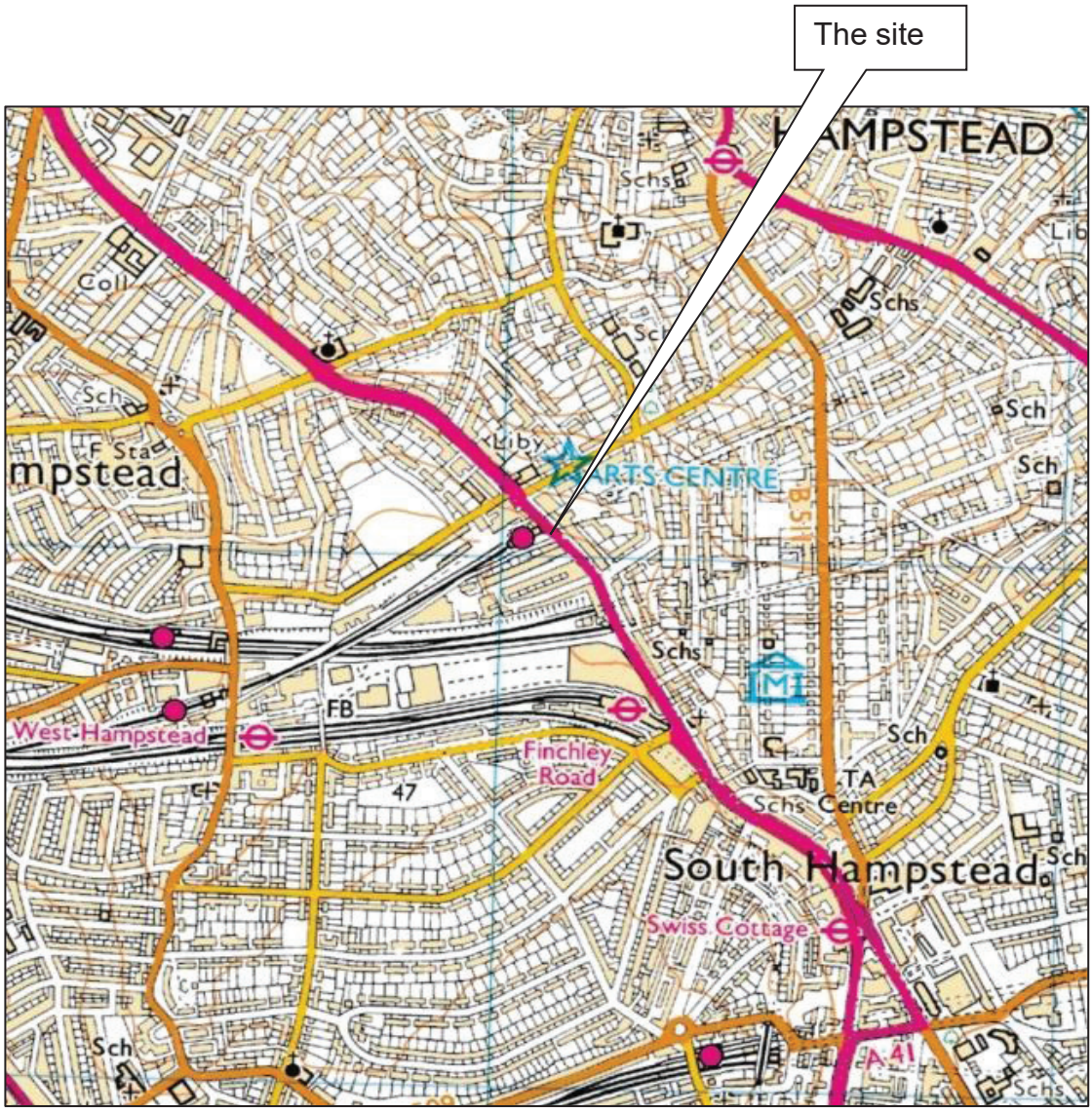

Figure 2

SPT / Depth Relationship

john newton & partners
jnpgroup
Consulting Engineers

Project:
317 Finchley Road

Project No:
M41506

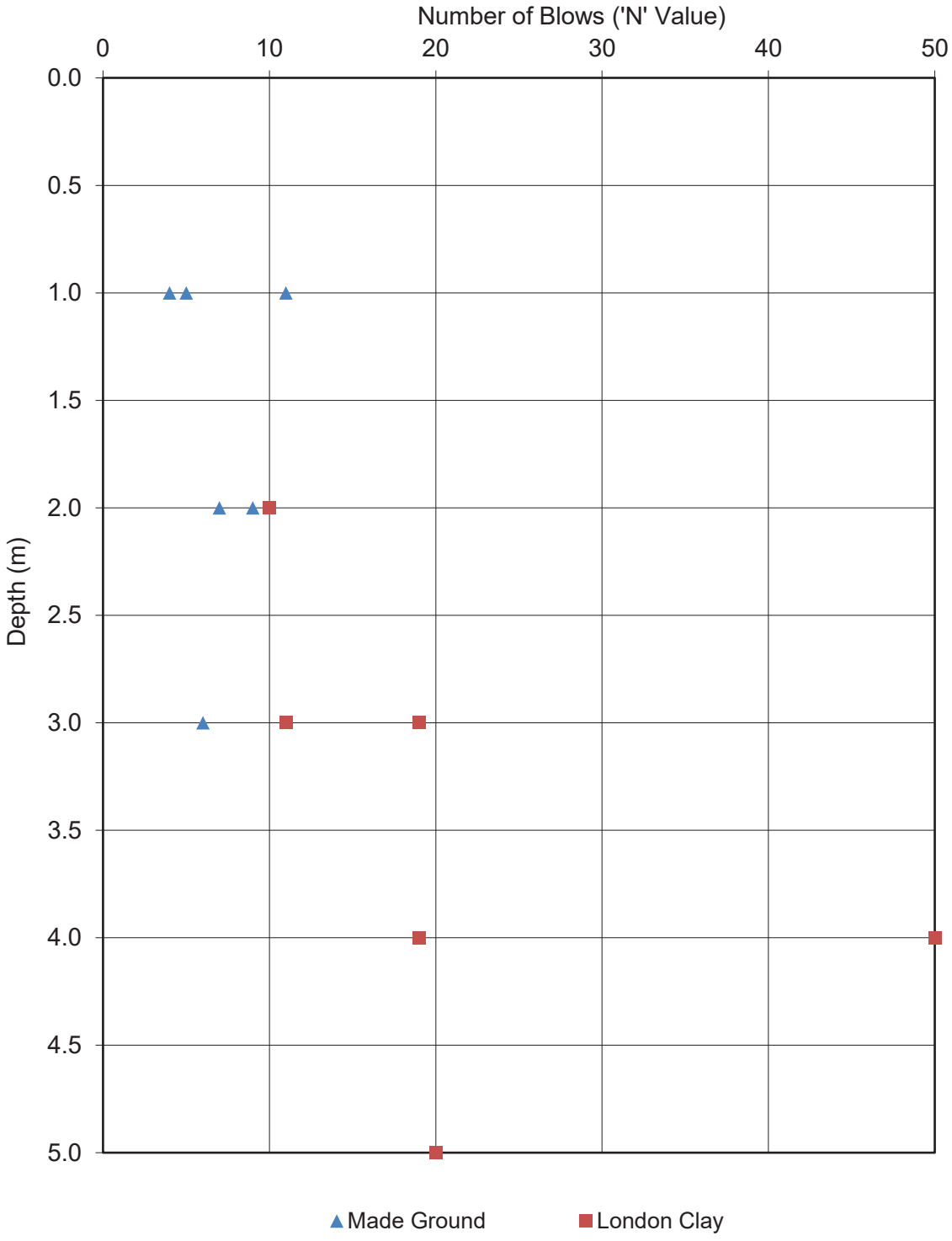

Figure 3

Undrained Shear Strength / Depth Relationship

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Project:
317 Finchley Road

Project No:
M41506

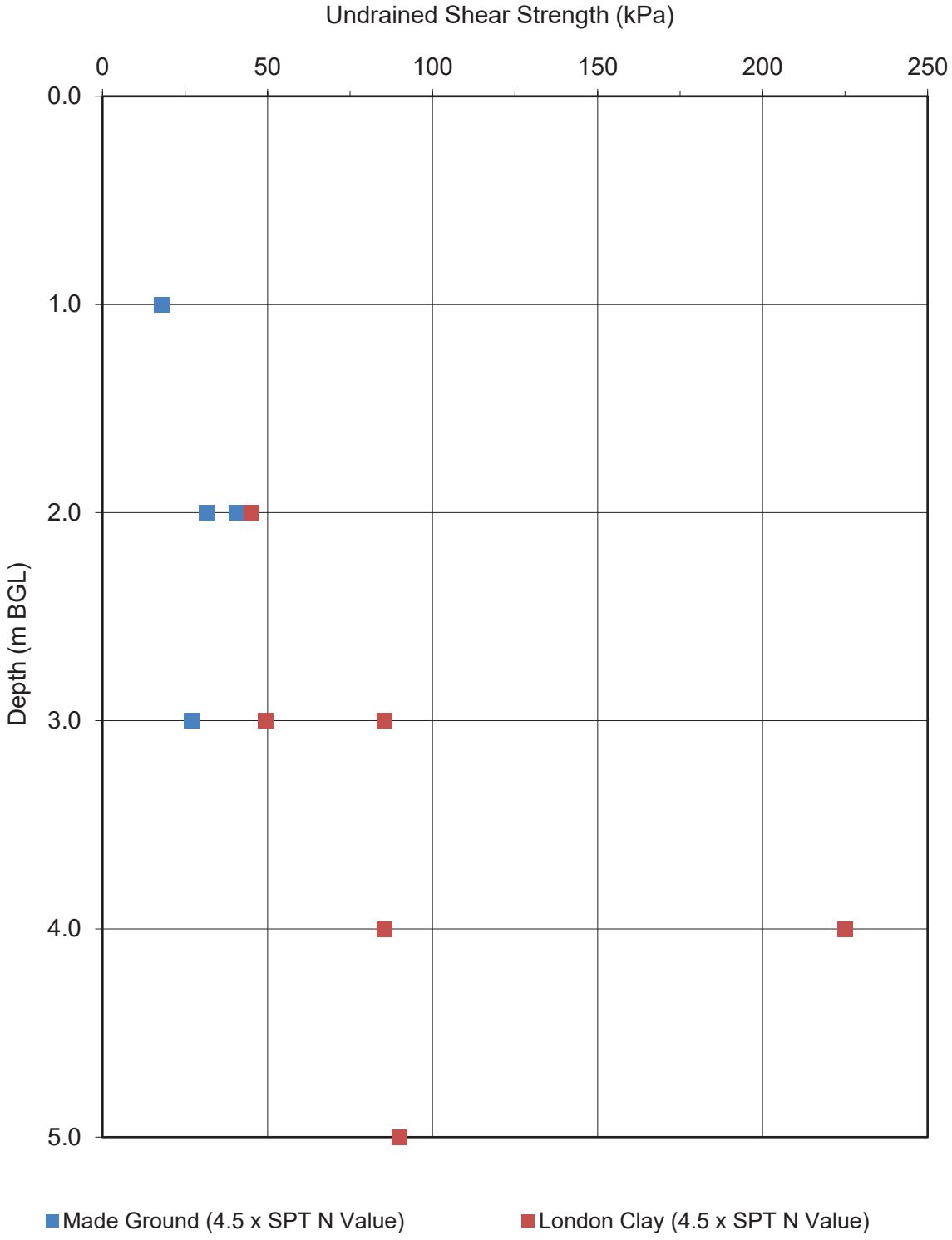


Figure 4

Plasticity Index Chart

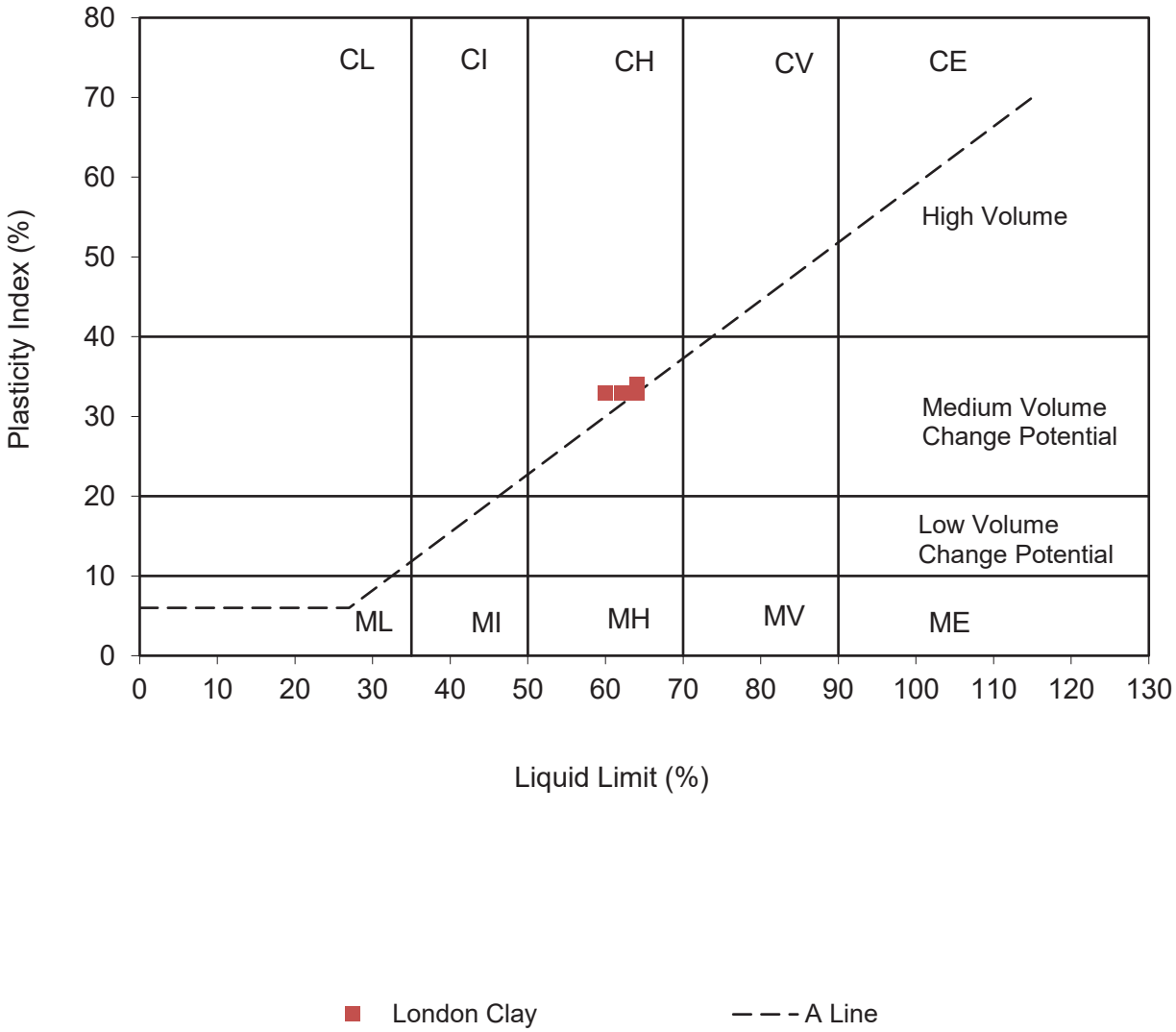
john newton & partners
jnpgroup
Consulting Engineers

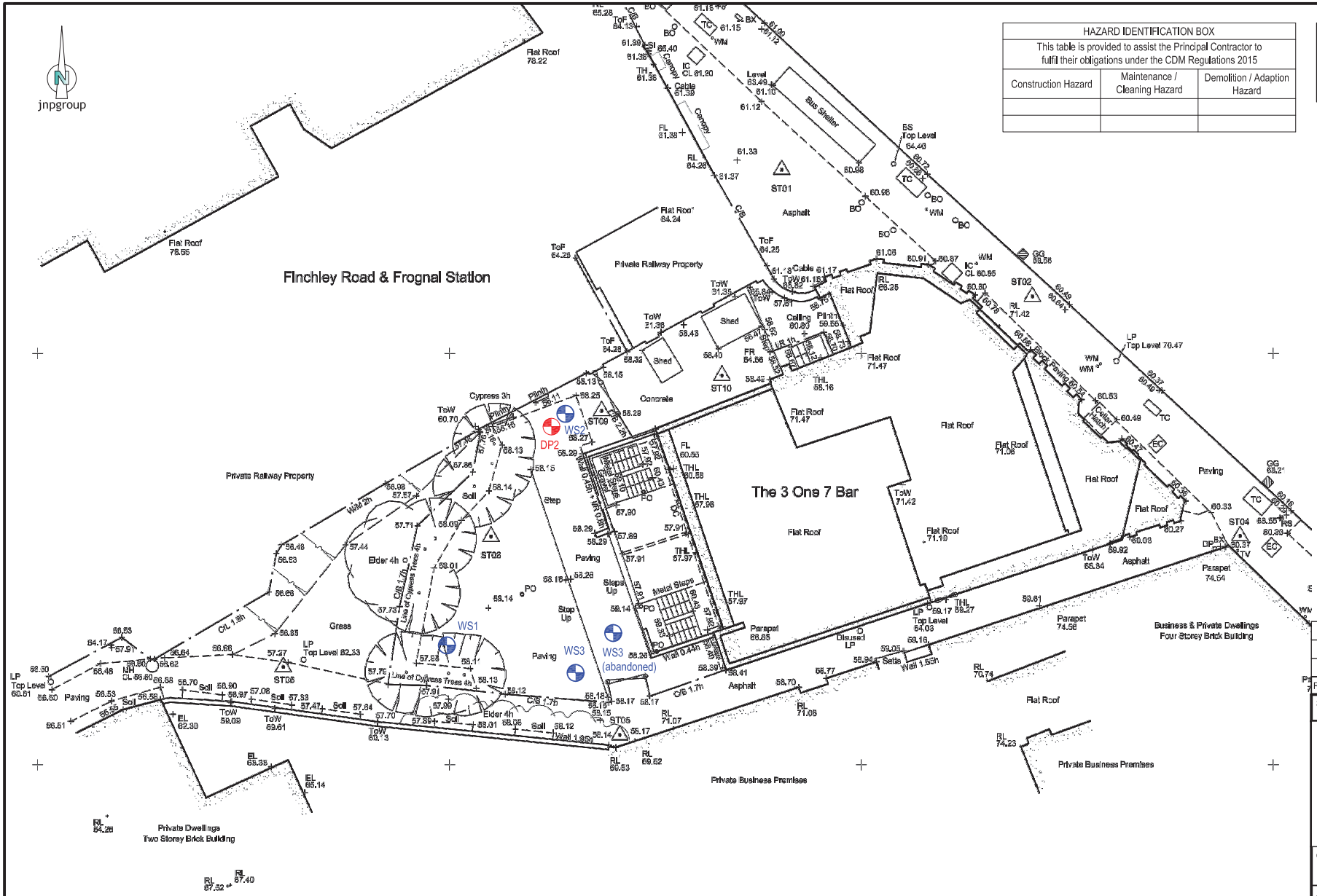
Project:
317 Finchley Road

Project No:
M41506

Key:
C Clay M Silt

L Low plasticity
I Intermediate plasticity
H High plasticity
V Very high plasticity
E Extremely high plasticity





HAZARD IDENTIFICATION BOX		
This table is provided to assist the Principal Contractor to fulfil their obligations under the CDM Regulations 2015		
Construction Hazard	Maintenance / Cleaning Hazard	Demolition / Adaption Hazard

Health and Safety Note:
The details on this drawing have been prepared on the assumption that a competent contractor will be carrying out the works. If the contractor(s) considers that there is insufficient Health and Safety Information on this drawing, this should immediately be brought to the attention of the designer.

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Legend

- Dynamic probe location
- Windowless sampler borehole

Rev.	Date	Amendment	By	Chk.

Status: Information

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Client: 317 Finchley Road Ltd.

Job: 317 Finchley Road
West Hampstead

Title: Exploratory Hole Location Plan

Scale NTS @ A3 | Date December 2015

Drawn By CW | Eng. Check HI | Tech. Check HI

Drawing No. M41506 D301 | Rev. -

CHLEY ROAD
CATION DOCUMENT

Appendix E

Groundsure Report

APPENDIX E – SITE INVESTIGATION REPORT

GROUND INVESTIGATION REPORT
GEOENVIRONMENTAL INVESTIGATION
AND INTERPRETATIVE REPORT
ON LAND AT
317 FINCHLEY ROAD
LONDON

Prepared for: -

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February 2016
Ref: F0390 IW (GSI548) GI Report LB AB 180216

Quality Assurance	
Report Title	Ground Investigation Report, Geoenvironmental Site Investigation, and Interpretative Report on land at 317 Finchley Road, London
Report Reference	F0390 IW (GSI548) GI Report LB AB 180216
Version	Revision A
Status	Draft
Client	Aden Build
Issue Date	February 2016
Revision Date	-
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LIST OF ACRONYMS

Acronym	Meaning
BGS	British Geological Survey
BH	Borehole
CDM	Construction Design and Management
CL:AIRE	Contaminated Land: Applications In Real Environments
CLR	Contaminated Land Report
COSHH	Control Of Substances Hazardous to Health
CSM	Conceptual Site Model
DCP	Dynamic Cone Penetrometer
DEFRA	Department for Environment Foods and Rural Affairs
DP	Dynamic Probe
DOE	Department Of Environment
DWS	Drinking Water Standard
EA	Environment agency
EQS	Environmental Quality Standard
GAC	Generic Acceptance Criteria
HP	Hand Pit
HA	Hand Auger
LQM	Land Quality Management
mbgl	Meters Below Ground Level
MP	Mackintosh Probe
NGR	National Grid Reference
OS	Ordnance Survey
SGV	Soil Guideline Value
SSV	Soil Screening Value
WSV	Water Screening Value
SPOSH	Significant Possibility of Significant Harm
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
TP	Trial Pit
TT	Trial Trench
WS	Windowless Sample / Window Sample

1.0 INTRODUCTION

1.1 Instruction

1.1.1 GeoCon Site Investigations Ltd (GeoCon) have been commissioned by Aden Build (to be referred to as AB from hereon in) to undertake a combined Geoenvironmental Investigation on Land at 317 Finchley Road, London.

1.1.2 It is understood that a Geoenvironmental Site Investigation is required to assist with a proposed mixed residential and commercial development at the site.

1.2 Scope of Works

1.2.1 The remit and scope of works for the Site Investigation was based on a specification provided by Webb Yates Engineers Ltd and includes the following:

Phase II

- Two cable percussion boreholes to a nominal depth of 30.00mbgl, or refusal.
- Two hand held windowless sample boreholes to a nominal depth of 5.00mbgl or refusal.
- Four hand excavated trial pits to a nominal depth of up to 3.00mbgl.
- Insitu geoenvironmental and geotechnical sampling and in-situ testing.
- Full supervision of all works by engineering geologist including sampling and detailed geotechnical descriptions to BS5930, EN ISO 14688-1 EN ISO 14688-2 and EN ISO 14689 of all strata types encountered within the exploratory holes.
- The installation of one groundwater monitoring standpipe to a nominal depth of 10.00mbgl, with subsequent groundwater monitoring on one occasion.
- A suite of geotechnical laboratory analysis.
- A suite of chemical laboratory analysis
- Production of an interpretative report to provide a Generic Quantitative Risk Assessment (GQRA); for the site, and to provide details of allowable bearing pressures for the soils encountered with subsequent foundation recommendations

1.3 Limitations

1.3.1 The assessment and interpretation of the factual data obtained as part of this Geoenvironmental Site Investigation has been undertaken in accordance with standard consulting practise and with current national and international guidance.

1.3.2 This report presents the observations made during the Geoenvironmental Site Investigation and the factual data obtained. The conclusions and recommendations in this report are limited to those which can be made based on the findings of the survey and information provided by third parties. GeoCon assumes all third party data to be true and correct. No responsibility can be accepted by GeoCon for inaccuracies in the information provided by any other party.

1.3.3 This report is written in the context of an agreed scope of works and should not be used in a different context. Furthermore, new information, improved practises, and changes in legislation may require the reinterpretation of the report in whole or in part after its original issue. GeoCon reserve the right to alter

their conclusions and recommendations in the light of further information that may become available. This report is provided for the sole use of the client and their professional advisers and is confidential to them unless agreed otherwise in writing.

1.3.4 Ground conditions can be variable and change rapidly, especially in areas of Made Ground, however it is assumed that the ground conditions encountered and observed are typical and representative of the site as a whole. Most specifically with regard to this limited investigation, the ground conditions have been determined from a limited number of exploratory holes formed across the site, therefore only a small percentage of the total area of the site has been investigated. Interpolation between exploratory holes has enabled a general picture of the subsurface conditions to be produced. Conclusions drawn from the ground investigation should be read in this context. GeoCon cannot accept responsibility for any situations resulting from locally unforeseen ground conditions occurring between exploratory holes.

1.3.5 In addition, subsurface conditions including contaminant concentrations and groundwater levels may vary spatially with time. This factor should be given due consideration in the event that the information contained within this report is used after any significant period of time has elapsed.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

2.1.1 The site is located on land at 317 Finchley Road, London at approximate National Grid Reference NGR: 526071:185031 (centre of the site).

2.1.2 A site location plan is presented as Drawing No. GSI0548/01 in Appendix A.

2.2 Site Description

2.2.1 The site is an irregular shaped piece of land with an approximate area of 0.06Ha.

2.2.2 The site is currently occupied by a derelict public house with basement area in the east with yard area (former bear garden) in the west.

2.2.3 The topography of the site is generally flat.

2.2.4 The site is bound by Finchley Road to the northeast, a railway line to the northwest, Billy Fury Way to the south, with residential and commercial properties beyond in directions.

2.2.5 Access to the site is via Finchley Road from the east.

2.3 Future Site Usage

2.3.1 It is currently proposed to construct a new mixed residential and commercial development comprising mixed seven and ten storey structure with lower ground floor basement.

2.4 Surrounding Area

2.4.1 The current surrounding land use to the site is generally residential and commercial properties in all directions.

2.4.2 The topography of the surrounding area is generally flat.

2.5 Statutory Services

2.5.1 GeoCon were not provided with copies of the buried service location plans prior to carrying out the works.

2.6 Site Reconnaissance

2.6.1 A site walkover was carried out on January 2016. All details from the site walkover are included in the site description above. There are no further relevant details above those which are already given in this report.

3.0 GROUND INVESTIGATION

3.1 General

3.1.1 The intrusive investigation was carried out between 28th January and 3rd February 2016.

3.1.2 The specification and scope of works for the ground investigation has been provided by Webb Yates and their professional advisers.

3.1.3 The ground investigation has been carried out in accordance with BS5930 and the UK Specification for Ground Investigation Second Edition 2012.

3.1.4 All strata descriptions were undertaken in accordance with BS5930 Amendment 1; EN ISO 14688 -1; EN ISO 14688 -2; and EN ISO 14689.

3.1.5 The ground investigation comprised the formation of:

- Two cable percussion boreholes.
- Two hand held windowless sample boreholes.
- Four hand excavated trial pits.
- Two concrete cored holes.
- Insitu geoenvironmental and geotechnical sampling and in-situ testing.
- Full supervision of all works by engineering geologist including sampling and detailed geotechnical descriptions to BS5930, EN ISO 14688-1 EN ISO 14688-2 and EN ISO 14689 of all strata types encountered within the exploratory holes.
- The installation of one groundwater monitoring standpipe to a nominal depth of 10.00mbgl, with subsequent groundwater monitoring on one occasion.
- A suite of geotechnical laboratory analysis.
- A suite of chemical laboratory analysis
- Production of an interpretative report to provide a Generic Quantitative Risk Assessment (GQRA); for the site, and to provide details of allowable bearing pressures for the soils encountered with subsequent foundation recommendations

3.1.6 The ground investigation was carried out to determine the geotechnical and geoenvironmental properties of the soils and rock beneath the site for a proposed residential development at the site.

3.1.7 The locations of the exploratory holes were specified by Webb Yates and their professional advisers / designers, and were positioned to gain key information beneath the site in relation to the proposed development.

3.1.8 All locations were checked against buried service plans, scanned with a Cable Avoidance Tool (CAT) prior to excavation and marked out by GeoCon on site who were responsible for issuing a permit to dig at each location. All locations were then checked again with a Cable Avoidance Tool (CAT) by GeoCon prior to excavation; each location was then continued by hand down to a minimum of 1.20mbgl to clear each location of any buried services or other.

3.1.9 All access permissions were arranged by Aden Build prior to the ground investigation commencing.

3.1.10 Exploratory hole location plans are presented in Appendix A as drawing number GSI0548/02.

3.2 Cable Percussion Boreholes

3.2.1 Two cable percussion boreholes referenced BH01 and BH02 were drilled at the site using a restricted access rig, to a depth of 30.00mbgl.

3.2.2 The borehole was formed in order to gain an understanding of the geotechnical and geoenvironmental properties of the soils and bedrock beneath the site.

3.2.3 The borehole was formed using a 200mm diameter casing and drill string, which was reduced to 150mm where necessary to enable the target depth to be achieved.

3.2.4 Where an SPT N value refused (defined as >50 blows) was recorded, a period of chiselling (1 hour) was carried out, followed by a second SPT N value recording; subject to the refusal of the second SPT N value, each borehole would be classed as complete and terminated at that point.

3.2.5 The cable percussion borehole logs are presented in Appendix B.

3.3 Windowless Sample Boreholes

3.3.1 A total of two hand held windowless sample boreholes were drilled within the existing basement area of the site using a hand held windowless sampling rig.

3.3.2 The exploratory holes have been referenced WS01 to WS02, and were drilled to depths of between 4.30 and 4.50mbgl and were all terminated on refusal.

3.3.3 All windowless sample borehole logs are presented in Appendix C.

3.4 Hand Excavated Trail Pits

3.4.1 Four hand excavated trial pits were excavated at the site in locations specified by the client referenced HP01 through to HP04, in order to expose the existing foundations used at the site.

3.4.2 The hand pits were excavated to depths of between 0.51 and 2.40mbgl.

3.4.3 All dimension of the exposed foundation were recorded and photographed.

3.4.4 Hand pit logs are presented in Appendix D.

3.4.5 Hand pit sketches and photographs are presented as drawings GSI0548-04 to GSI0548-07 in Appendix E.

3.5 Concrete and Masonry Coring

3.5.1 A total of two core holes were drilled within the existing wall at the location of HP04. Initially it was proposed to excavate through the wall and rebuild upon completion to provide details of the thickness and construction of the wall at this location. However, following discussions between GeoCon and Webb Yates, it was agreed that coring through the wall would be a less disruptive approach and would remove uncertainties surrounding the existing wall and whether or not it is load baring and safe to excavate through.

3.5.2 Details of the coring are given below in Table 3.1: Concrete and Masonry Coring Details.

Table 3.1: Concrete and Masonry Coring Details

Core ID	Details	Length (mm)	Diameter (mm)	Material
CC01	Core through existing foundation	190	100	Concrete
CC02	Core through existing wall	400	100	Concrete

3.5.3 All cores were replaced and sealed with a rapid setting concrete.

3.5.4 Concrete core photographs are presented as drawings GSI0548-08 to GSI0548-09 in Appendix E.

3.6 Sampling and Insitu Testing

3.6.1 The geotechnical and chemical sampling regime and insitu testing regime included the following:

- Environmental samples for subsequent chemical analysis were taken from each strata type, with a minimum of three samples taken from the upper 1.00m, then at 1.00m intervals in made ground with a minimum of one sample from the natural strata.
- Small disturbed samples taken from each strata type and then at 1.00m intervals thereafter.
- Bulk disturbed samples taken at 1.00m intervals to a depth of 5.00mbgl, then 1.50m intervals thereafter
- SPT's within the cable percussion boreholes taken at 1.00m intervals to 5.00mbgl, and 1.50m intervals thereafter. SPT's within the cable percussion boreholes taken at 1.00m intervals.
- In cohesive ground were available, Undisturbed samples (U100's) were taken at alternating with the SPT's at 1.50m intervals within the cable percussion boreholes.

3.6.2 The SPT penetration resistance "N" values are recorded at the corresponding depths on each of the cable percussion borehole logs.

3.6.3 An SPT refusal is defined as 50 blows over the SPT sample range or less; the distance of the SPT samples is recorded with the N value on the cable percussion borehole logs.

3.6.4 Where an SPT N value refusal (defined as >50 blows) was recorded, a period of chiselling (generally between 30 minutes and 1 hour) followed by a second SPT N value refusal, that particular borehole would be terminated.

3.6.5 Soil samples were collected for geotechnical and chemical analysis by the engineering geologist on site based on physical and visual inspection in addition to standard sampling, and were subsequently sampled and transferred to a geotechnical laboratory in prepared bulk bags and plastic tubs.

3.6.6 All samples were stored in pre-chilled cool-boxes prior to immediate dispatch to laboratory.

3.1 Installations and Backfill

3.1.1 One of the cable percussion boreholes were installed with groundwater monitoring standpipes. The details of the groundwater monitoring standpipes are summarised below in Table 3.1: Groundwater Monitoring Standpipe:

3.1.2 Full details of the installations and backfill are presented on the relevant borehole logs.

Table 3.2: Groundwater Monitoring Standpipe

BH ID	Installation Depth (mbgl)	Response Zone (mbgl)	Installation Date	Comments
BH01	10.00	2.00 – 10.00	31/02/2016	NA

3.1.3 All exploratory holes were backfilled with arisings and made level at the surface to a similar condition as prior to the work.

3.2 Groundwater

3.2.1 Where groundwater was encountered a waiting period of 20 minutes was allowed to monitor any change (rise or fall) in the levels of each groundwater strike.

3.3 Laboratory testing

3.3.1 Geotechnical laboratory testing was subsequently carried out on selected samples of soil. Further details of the geotechnical laboratory testing are given within section 5.0 – Geotechnical Testing and Results.

3.3.2 All geotechnical laboratory testing will be scheduled by GeoCon.

3.3.3 Chemical laboratory testing was subsequently carried out on selected samples of soil. Further details of the geotechnical laboratory testing are given within section 7.0 – Geotechnical Testing and Results.

3.3.4 All chemical laboratory testing will be scheduled by GeoCon.

4.0 GROUND CONDITIONS

4.1 Published Geology

4.1.1 The British Geological Survey (BGS) map sheet 256 North London superficial and bedrock, and the BGS Open Geoscience shows the site to be underlain by the geological succession outlined below in Table 4.1: Geology.

Table 4.1: Geology

Geology	Description /strata
Artificial	None recorded
Superficial	None Recorded
Bedrock	London Clay Formation

4.1.2 There are no known artificial deposits indicated underlying the site.

4.1.3 There are no known superficial deposits indicated underlying the site.

4.1.4 The bedrock geology at the site is shown to be the London Clay Formation, which is generally described as *'bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. It commonly contains thin courses of carbonate concretions ('cementstone nodules') and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of sand, which commonly increase towards the base and towards the top of the formation. At the base, and at some other levels, thin beds of black rounded flint gravel occurs in places. Glauconite is present in some of the sands and in some clay beds, and white mica occurs at some levels'* (BGS general description)

4.2 General

4.2.1 The actual ground conditions encountered across the site were generally uniform and comprised made ground, overlying London clay formation deposits.

4.2.2 The general ground conditions encountered have been summarised below:

4.2.3 Detailed strata descriptions are presented on the cable percussion borehole logs, the windowless sample borehole logs and the hand pit logs presented in Appendix B, C and D respectively.

4.3 Made Ground

4.3.1 Made ground was encountered in all exploratory hole locations from ground level to depths of between 0.20 and 4.70mbgl, and generally comprised a layer of hardstanding overlying varying layers of granular and cohesive made ground.

Hardstanding:

4.3.2 Concrete hardstanding was encountered in all exploratory hole locations comprising grey concrete.

Granular Made Ground:

4.3.3 Granular made ground materials were encountered in BH01, BH02, HP01, and HP02, and generally comprised sandy gravel with fragments of brick and concrete

Cohesive Made Ground:

4.3.4 Cohesive made ground materials were encountered in all exploratory holes with the exception of WS01 and HP01, and generally comprised soft sandy gravelly clay, with fragments of brick and concrete.

4.4 Bedrock (London Clay Formation)

4.4.1 Deposits considered to represent the London clay formation encountered directly beneath the made ground in all exploratory hole locations with the exception of HP02 and HP03, and were proven to a maximum depth of 30.00mbgl.

4.4.2 The London clay formation generally comprised an initial weathered zone comprising frim brown clay, becoming more competent with depth into a stiff grey clay.

4.5 Groundwater

4.5.1 Groundwater was encountered in BH01 only. Further details are as follows:

- BH01 – minor strike at 3.00mbgl rising to 2.60mbgl after 20 minutes;

4.5.2 The remaining locations remained dry during the drilling and excavation works.

4.6 Groundwater Monitoring

4.6.1 A groundwater monitoring regime was carried out at the site to establish the ground water levels beneath the site, which included monitoring on one occasion. The details of the groundwater monitoring regime are presented below in Table 4.2: Groundwater Monitoring Regime.

Table 4.2: Groundwater Monitoring Regime

Date	Visit 1 – 24th February 2016	
Borehole ID	Base of Hole (mbgl)	Standing Water Level (SWL) (mbgl)
BH01	9.70	3.60

4.7 Obstructions

4.7.1 No obstructions were encountered during the ground investigation.

4.8 Contamination

4.8.1 No visual or olfactory evidence of contamination was encountered or observed during this ground investigation with the exception of general made ground materials, in particular no obvious visual or olfactory evidence of mobile contamination was observed during the ground investigation.

5.0 GEOTECHNICAL TESTING AND RESULTS

5.1 General

5.1.1 This geotechnical investigation was undertaken to provide details of the ground conditions, soils strengths, engineering properties of the soils and rock beneath the site, and subsequent advice on suitable foundation solutions.

5.1.2 At this stage the precise construction details have not been provided to GeoCon, however it is understood existing buildings are to be demolished and the site is to be redeveloped with a mixed seven and ten storey mixed residential and commercial property, with lower ground floor basement.

5.1.3 It should be noted that GeoCon have not been provided with any further details regarding the structural loading at this stage.

5.2 Geotechnical Testing

5.2.1 In-situ Standard Penetration Tests (SPTs) were undertaken in accordance with BS1377 (1990) within the window sample boreholes. A summary of the insitu testing is given below in Table 5.1 Insitu Geotechnical Testing:

Table 5.1: Insitu Geotechnical Testing

Strata	SPT N Value Range	Locations Encountered
Made Ground	7 – 48	All locations
London Clay Formation	20 – >50	All locations except HP02 & HP03

NR = Not Recorded in this Strata

5.2.2 A programme of geotechnical laboratory testing was undertaken in accordance with BS1377 (1990) 'Methods of tests for soils for civil engineering purposes. The geotechnical testing regime has been summarised below in Table 5.2 Geotechnical Laboratory Analysis.

Table 5.2: Geotechnical Laboratory Analysis

BS 1377 Test Number	Test Description	Quantity Analysed
BS 1377 1990: Part 2. Clause 3.2	Moisture content	8
BS 1377 1990: Part 2. Clause 4.3 & 5.3	Atterberg Limits	8
BS 1377 1990: Part 5. Clause 3	One-dimensional Consolidation	8
BS 1377 1990: Part 7. Clause 8	Quick Undrained Triaxial	8
BS 1377 1990: Part 3. Clause 5.3 & BRE CP2/79	BRE SD 1	8 (additional 3 pH & sulphate within chemical testing)

5.2.3 The results of the geotechnical testing are presented in Appendix F. Additional pH & sulphate testing is included within the chemical testing results presented in Appendix G.

Plasticity Index

5.2.4 Atterberg limit testing was carried out on selected samples of cohesive soils taken from the site to establish the plasticity index of the clay beneath the site. The results of this testing is presented below in Table 5.3 Atterberg Limits Testing Results.

Table 5.3: Atterberg Limits Testing Results

Test	Range
Moisture Content (%)	28 – 42
Liquid Limit (%)	63 – 77
Plastic Limit (%)	26 – 37
Plasticity Index (%)	26 – 50
Modified plasticity index (%)	20.28 - 50

5.2.5 Based on these results the clay beneath the site can be classed as intermediate plasticity.

5.2.6 Chapter 4.2 'Building near Trees' of the NHBC standards indicates that from the testing results, the modified plasticity index is between 20.28 and 50% and therefore, the clay beneath the site is of medium to high volume change potential.

BRE SD 1

5.2.7 Eight soil samples were analysed for BRE SD 1 reduced suite to assess the risk to buried concrete at the site, which includes total sulphate, water soluble sulphate, pH and total sulphur. In addition, three water soluble sulphate and pH were analysed on eight with the chemical testing and these results have been included in the assessment below. The results of the testing are summarised below in table 5.4 Summary of BRE SD 1 Results.

Table 5.4: Summary of BRE SD 1 Results

Test	Soil Test - Results Range
Total sulphate (%)	0.27 – 0.43
Water soluble sulphate (mg/l)	20 - 210
Total sulphur (%)	0.11 – 0.21
pH	7.09 – 11.44
Total Potential Sulphate (%)	0.33 – 0.63
Potential amount of Oxidisable Sulphate Present (%)	0.04 – 0.2

5.2.8 Design/mix of buried concrete should be undertaken in accordance with the "Aggressive Chemical Environment for Concrete" (ACEC) classification, of BRE Special Digest 1:2005 (Concrete in Aggressive Ground).

5.2.9 Total potential sulphate has been calculated from the above information and gives a range of between 0.33 and 0.63%.

5.2.10 Oxidisable sulphides have then been calculated in the range of 0.04 and 0.2%.

5.2.11 The above results indicate that pyrite is unlikely to be present within the soils beneath the site.

5.2.12 A review of the pH and sulphate concentrations indicates that all concrete used in the foundations at this site should be designed to "Design Sulphate Class" DS-3, and the "Aggressive Chemical Environment for Concrete" (ACEC) class AC-3.

Triaxial Testing

5.2.13 Eight samples were analysed for Unconsolidated Undrained Triaxial Tests. The results are summarised below in Table 5.5: Triaxial Testing Results.

Table 5.5: Triaxial Testing Results

Test	Range
Moisture content %	27.7 – 41.9
Bulk Density (mg/m^3)	1.91 – 2.04
Dry Density (mg/m^3)	1.36 – 1.59
Shear Strength (kPa)64 -	75 – 515

5.2.14 Moisture content within the London was recorded between 27.7 and 41.9 %.

5.2.15 Bulk Density within the London clay ranges between 1.91 and 2.04 Mg/m^3.

5.2.16 Bulk Density within the London clay ranges between 1.36 and 1.59 Mg/m^3.

5.2.17 Shear strength measurements taken on undisturbed samples of London Clay ranged between 75 and 515 kPa.

One Dimensional Consolidation Testing

5.2.18 Eight samples were analysed for one dimensional consolidation. The results are presented along with the geotechnical testing are presented in Appendix F.

6.0 GEOTECHNICAL ASSESSMENT

6.1 General

6.1.1 It is understood that the proposed development will comprise the demolition of an existing public house and its replacement with a mixed seven and ten storey residential structure, with a lower ground floor basement.

6.1.2 At this stage GeoCon have not been provided with any loadings for the proposed development. Thus the discussion below is of a generalised nature.

6.1.3 The recommendations given below assume that ground levels intended for the redevelopment will be similar to those existing at present. If ground levels are subject to significant change as part of the proposed development, then the recommendations in this report may require reinterpretation.

6.2 Geotechnical Model

6.2.1 Two cable percussion boreholes (BH01 and BH02) were formed at the site and four hand excavated trial pits were also undertaken. Of the hand dug trial pits, HP01 and HP02 were undertaken adjacent to the site boundary, whilst HP03 and HP04 were undertaken within the existing basement area of the former public house that occupies the site.

6.2.2 The ground conditions encountered within the exploratory holes are summarised below in Table 6.1: Summary of Ground Conditions.

Table 6.1: Summary of Ground Conditions

Stratum	Depth Range to Base of Stratum (mbgl) (Thickness Range)	Strength/Consistency	Notes
Topsoil and Made Ground			
Made Ground/Surface Hardstanding	4.40-4.70 (4.40-4.70)	SPT N values in the range 5-48	Stratum comprised interbedded clay and gravel
Natural Strata			
London Clay	30.00m+ (25.60m+)	SPT N values in the range 20 – 50 for 225mm penetration of the sampler. N values showed an overall increase with depth Unconsolidated undrained Triaxial test results indicated Cu values in the range 75kN/m^2-515kN/m^2	Described in the field as initially firm brown laminated clay, becoming stiff grey laminated clay at depths of 7.70 - 9.50mbgl <u>Atterberg& Moisture Content Tests (8 no. samples analysed)</u> Moisture Contents – 28 to 42% Plastic Limits – 27% to 37% Liquid Limits – 63 to 77% Plasticity Indices* - 26 to 50% The Atterberg Limit tests indicate that the clay is of high to very high plasticity and of medium to high volume change potential.

* - Corrected for fines content in accordance with NHBC Chapter 4.2.

6.2.3 An initial water strike was recorded in the Made Ground in BH01 at 3.00mbgl, rising to 2.60mbgl. A standing water level of 3.60mbgl was recorded on the 23rd February 2016 in the standpipe piezometer installed in BH01.

6.3 Foundations

6.3.1 The made ground would not be suitable for the construction of shallow foundations due to the risk of unacceptable total and differential settlement occurring. To remove all the Made Ground, basement

excavations would need to extend to around 5.00m below existing ground level, based on the available borehole information. The London Clay encountered at this depth may be suitable for the construction of spread or raft foundations, with a probable allowable bearing pressure in the region of 150kN/m^2 – 200kN/m^2. This would be subject to confirmation and further assessment, based on foundation sizes and allowable settlement criteria.

6.3.2 If spread / raft foundations are not considered suitable, on the basis of either loads or constructability, then piled foundations would be required.

6.3.3 Piled foundations should be designed by a competent designer, with the design verified on site by means of static pile load tests.

6.3.4 Piling methods would need to be carefully selected to ensure construction does not adversely impact adjacent structures. Of particular concern would be the potential for noise and vibration to affect the nearby Finchley rail station.

6.3.5 Piling platform design should be undertaken in accordance with the procedures given in the BRE publication: Working platforms for tracked plant.

6.3.6 Foundation design would need to take into account heave / shrinkage precautions in accordance with NHBC Standards Chapter 4.2, Building Near Trees.

6.3.7 The basement should be designed to resist flotation, with a design groundwater level equivalent to ground level.

6.4 Floor Slabs

6.4.1 A ground bearing floorslab could be used, following the removal of all the Made Ground, if spread foundations are to be considered. Possible Heave / shrinkage due to the presence of trees would need to be taken into account, in accordance with NHBC Standards Chapter 4.2, Building Near Trees.

6.4.2 If piled foundations are used, then a suspended slab would be required.

6.5 Concrete

6.5.1 A review of the pH and sulphate concentrations indicates that all concrete used in the foundations at this site should be designed to "Design Sulphate Class" DS-3, and the "Aggressive Chemical Environment for Concrete" (ACEC) class AC-3.

6.6 Groundwater and Excavations

6.6.1 Basement excavations would require full support during construction. If this were provided by means of sheet piles or secant piles, then they could be used to provide groundwater cut-off, thus limiting the ingress of groundwater into the excavations. Any remaining groundwater could be dealt with by means of sump pumps. Basal heave is unlikely to be a significant problem for excavations up to 5.00m depth within the London Clay. Advice on groundwater control is given in CIRIA Report No 515.

6.6.2 Excavations should be feasible using conventional plant.

6.6.3 Advice on excavation support is given in CIRIA Report No 97 – Trenching Practice.

6.6.4 Under no circumstances should operatives be allowed to enter unsupported excavations.

6.7 Road Pavement

6.7.1 Any new pavements will require assessment of the existing sub grade in terms of its California Bearing Ratio (CBR) to facilitate the actual pavement design.

6.7.2 It is recommended that CBR testing is carried out at the site along any proposed access roads prior to construction to confirm the CBR design value.

6.8 Sustainable Drainage

6.8.1 In accordance with PPS25 (2007) the Planning Authority are likely to insist that surface water drainage from any new-build or redevelopment complies with current design practices for Sustainable Urban Drainage (SUD's) with the construction of separate drainage systems for foul and surface water.

6.8.2 Based on the ground conditions encountered it is unlikely that sustainable drainage would be suitable at the site. If sustainable drainage is to be considered, it is recommended that soak-away testing is carried out in accordance with BRE 365 at the site to establish the sites suitability for sustainable drainage.

6.9 Existing Structures

6.9.1 Where relict foundations / structures are present, they would need to be grubbed out within foundation excavations and some pre-boring or digging may be required at pile positions.

7.0 CHEMICAL TESTING AND RESULTS

7.1 General

7.1.1 All samples were sent to a UCAS accredited chemical testing laboratory, and MCERTS were used where available. The analytical strategy focussed on a general suite of potential contaminants and the analytical suites are summarised in Table 7.1 Summary of Chemical Testing Suite below. Chemical results have been screened against current guideline values where applicable for the proposed residential end use.

7.1.2 It should be noted that GeoCon have not been commissioned to carry out a Phase I Preliminary Risk Assessment and have not been provided with a third party report. All chemical testing has been carried out for a generic suite provided by Webb Yates

7.1.3 All chemical results have initially been compared against screening criteria for a residential end use.

7.1.4 All chemical testing results are presented in Appendix G.

Table 7.1: Summary of Chemical Testing Suite

Testing	Comment	No. of soil samples analysed
General metals suite including: Arsenic, cadmium, chromium, copper, cyanide, lead, mercury, nickel, phenol, selenium, zinc, pH, and water soluble sulphate	General analysis of made ground within the area previously not accessible to achieve general site coverage, and targeting former uses on site and off site within influencing distance	3
Speciated PAH	General analysis of made ground within the area previously not accessible to achieve general site coverage, and targeting former uses on site and off site within influencing distance	3

7.2 Groundwater Analysis

7.2.1 No groundwater testing has been carried out as part of this ground investigation based on the scope of works provided by Webb Yates.

8.0 GENERIC QUANTITATIVE RISK ASSESSMENT (GQRA)

8.1 Criteria for interpretation

8.1.1 The regime for contaminated land was set out in Part IIA of the Environmental Protection Act (EPA) 1990, as inserted by S.57 of The Environment Act 1995 and came into effect in England on 1st April 2000 as The Contaminated Land (England) Regulations 2000 (SI 2000/227). These regulations were subsequently updated with the provision of The Contaminated Land (England) Regulations 2006 (SI 2006/1380), which consolidated the previous regulations and amendments and added in provisions regarding radioactive contaminated land. These regulations came into force on 4th August 2006. This modified the wording for "Contaminated Land" under Part IIA of the EPA. Section 78A (2) defines contaminated land as "land which appears to be in such a condition, by reason of substances in, on or under the land, that:

- significant harm is being caused, or there is a significant possibility of significant harm being caused (SPOSH);

8.2 Human Health Receptors

8.2.1 An initial Generic Quantitative Risk Assessment (GQRA) for human health has been undertaken by comparison of the soil analytical results with published guidance criteria. These can be classified as Generic Assessment Criteria (GAC) and are widely referred to by consultants, Regulatory Authorities and other professionals within the industry and include the following:

- Current published Soil Guideline Values (SGVs) published by the Environmental Agency (EA).
- Land Quality Management (LQM) have published a series of GACs via the CLEA v1.04 software which are applicable to the UK for common determinands. The GAC's can be applied to a wide range of land contamination problems, which can be used as initial screening criteria in order to assess potentially contaminated land.
- ATRISK Soil SSV's (Soil Screening Values) at 1% SOM for a sand soil derived by Atkins in line with the Environment Agency 2009 guidance (SR2, SR3, SR4, SR7) using the CLEA v1.04 and CLEA v1.06 software; and WSV's (Water Screening Values) for Human Health using the RBCA v2.5 software. The modelling inputs were made compliant with the SR3 residential conceptual site model and follow the guidance provided within SR3 where possible.
- Contaminated Land: Applications in Real Environments (CL:AIRE) 'The Soil Generic Assessment Criteria for Human Health Risk Assessment' GAC's via the CLEA v1.06 software (updated version of the v1.04 update after the release of LQM GAC's).

8.2.2 It should be noted that the above guidance criteria is generally restricted with depth i.e. the values quoted with reference to human health are generally only applicable in the top 1.00m of soil and do not (dependant on the conceptual site model and conditions identified on site) necessarily identify significant harm. Further detailed quantitative risk assessment (DQRA) may be required.

8.2.3 A list of the screening criteria used for soils is presented in Appendix H.

8.3 Risks to Human Health

8.3.1 Concentrations of contaminants reported above the screening criteria are presented below in Table 8.1: Exceedances in Screening Values.

Table 8.1: Exceedances in Screening Values

Determinand	No. Of samples analysed	Screening value (mg/kg) (where applicable)	Determinand concentration range (mg/kg)	No of Samples exceeding screening value
Summary of soil results				
Chromium*	3	21	**30 – 46**	**3**
Lead	3	310	**19 - 378**	**1**

BD = Below Detection

NL = No Limit

NGV = No Guideline Screening Value Available

** Assumed value as chromium VI.*

8.3.2 Following the results of the site investigation and above assessment, an updated Conceptual Site Model (CSM) has been produced overleaf as Table 8.1: Updated CSM.

Table 8.2: Updated Conceptual Site Model (CSM)

Potential Sources	Potential Receptor	Potential Pathway	Likelihood	Severity	Significant Pollutant Linkage	Risk Classification	Action / Mitigation
Heavy metals, sulphates and inorganics	Human health animals and plants: Including current site users, future site users, neighbouring residents and constructions workers	Ingestion Inhalation of dust Dermal Contact	Possible	High	Possibly Active	Low to high	Chromium and lead levels recorded on site exceed screening values for a residential end use. However, this is dependent upon a physical pathway existing between the current site soils and future end users of the site post development. Remediation/mitigation required within proposed landscaped areas.
Phytotoxic elements	Plants and vegetation	Plant uptake	Unlikely	High	Considered inactive	Very Low to negligible	Results of the site investigation confirm that all levels of analytes analysed recorded levels below the relevant screening criteria.

8.3.3 A detailed summary and discussion of the updated CSM is given overleaf.

8.3.4 The majority of the chemical determinands analysed recorded levels below the relevant screening criteria for a residential end use with the exception of chromium and lead.

8.3.5 Elevated concentrations of chromium were recorded in all samples analysed at levels of 30mg/kg in to 46mg/kg exceeding the screening criteria of 21mg/kg for a residential end use.

8.3.6 Elevated concentrations of lead were recorded in one samples analysed at levels of 378mg/kg in BH01 at 0.40mbgl, exceeding the screening criteria of 310mg/kg for a residential end use.

8.3.7 In areas that will be covered by hardstanding the pathway for lead and chromium contamination to come into contact with human health receptors will be removed, and thus no viable pollutant linkage will be present.

8.3.8 In areas where landscaping or gardens are proposed as part of the development then these areas will need remedial action undertaking. A suitable remedial option would comprise the placement of a suitable capping layer within landscaped or garden areas comprising 'clean' imported soils. A likely suitable thickness within landscaped areas would be 450mm and within private garden areas where produce may be grown a thickness of 600mm.

8.3.9 It is recommended that any proposed remedial design is agreed with the Local Planning Authority.

8.3.10 Risks to construction workers are considered to be low. All construction workers should wear appropriate Personal Protective Equipment (PPE) including latex gloves and dust masks. Provisions should be made for water on site to 'damp down' any dust in dry conditions.

8.3.11 A watching brief should be maintained during construction to ensure that any unsuitable materials are removed at the time.

8.3.12 Should any erroneous materials or previously unidentified contamination be encountered during construction then further sampling and analysis may be required.

8.4 Risk to Controlled Waters

8.4.1 GeoCon have not been commissioned to assess the risk to controlled waters at this stage based on the scope of works provided.

8.5 Plants and Native grasses

8.5.1 Any plants that may be grown at the site in areas of landscaping may potentially be at risk from phytotoxic elements in any artificial soils beneath the site.

8.5.2 Based on the results of the chemical analysis from this phase of investigation, the risks to plants and native grasses from phytotoxic effects are considered to be very low.

8.6 Buried Services and Utilities

8.6.1 Any organic contamination present in the soils or groundwater beneath the site would pose a risk of premature failure to below ground services via chemical reaction. Based on the chemical analysis carried out during this ground investigation, the risks to buried services and pipelines are considered to be low but possible.

8.6.2 It is the responsibility of the utility providers to confirm the risk status and determine what materials should be used in the provision of any newly proposed buried services and utilities based on the results of the chemical analysis with this report. A copy of this report should therefore be provided to the utility contractors.

8.6.3 It is recommended that prior to the placement of any newly proposed buried services, that adequate testing of the soils of which the pipes / cables will be laid in is carried out to determine the suitability of those soils for the utility providers equipment.

9.0 OTHER POTENTIAL DEVELOPMENT CONSIDERATIONS

9.1 Waste Soils Characterisation

9.1.1 Any excavation works may potentially produce waste soils for which appropriate waste management will be required. Waste soil intended for landfill may require appropriate classification testing prior to disposal. Any off-site disposal of soil requires careful management and due consideration of appropriate legislation, guidance and Duty of Care responsibilities.

9.1.2 Waste Acceptance Criteria (WAC) testing should be been out on samples of any materials that require removal from the site as part of the construction process. The results of the WAC testing results should be presented to the landfill operator for their confirmation.

9.2 Imported Fill

9.2.1 Any imported fill will be subject to specific quality requirements, particularly in any proposed areas of landscaping. Allowance should be made for the testing of imported fill materials prior to emplacement to ensure suitability should the materials be delivered with no testing certification.

9.3 Construction Activities

9.3.1 Due consideration should be given to the suppression of noise, dust and vibration emissions from the site during construction.

10.0 REFERENCES

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- *R&D Publication CLR 10: The Contaminated Land Exposure Model (CLEA)*
- *R&D Publication CLR 11: Model Procedure for the Management of Contaminated Land DEFRA 2004*
- *Stroud M.A: The standard penetration test in insensitive clays, Proceedings of the European Symposium on Penetration Testing, Stockholm, 1975, Vol 2,pp 367 – 75.*
- *UK Specification for Ground Investigation Second Edition 2012*

APPENDIX A

DRAWINGS

N

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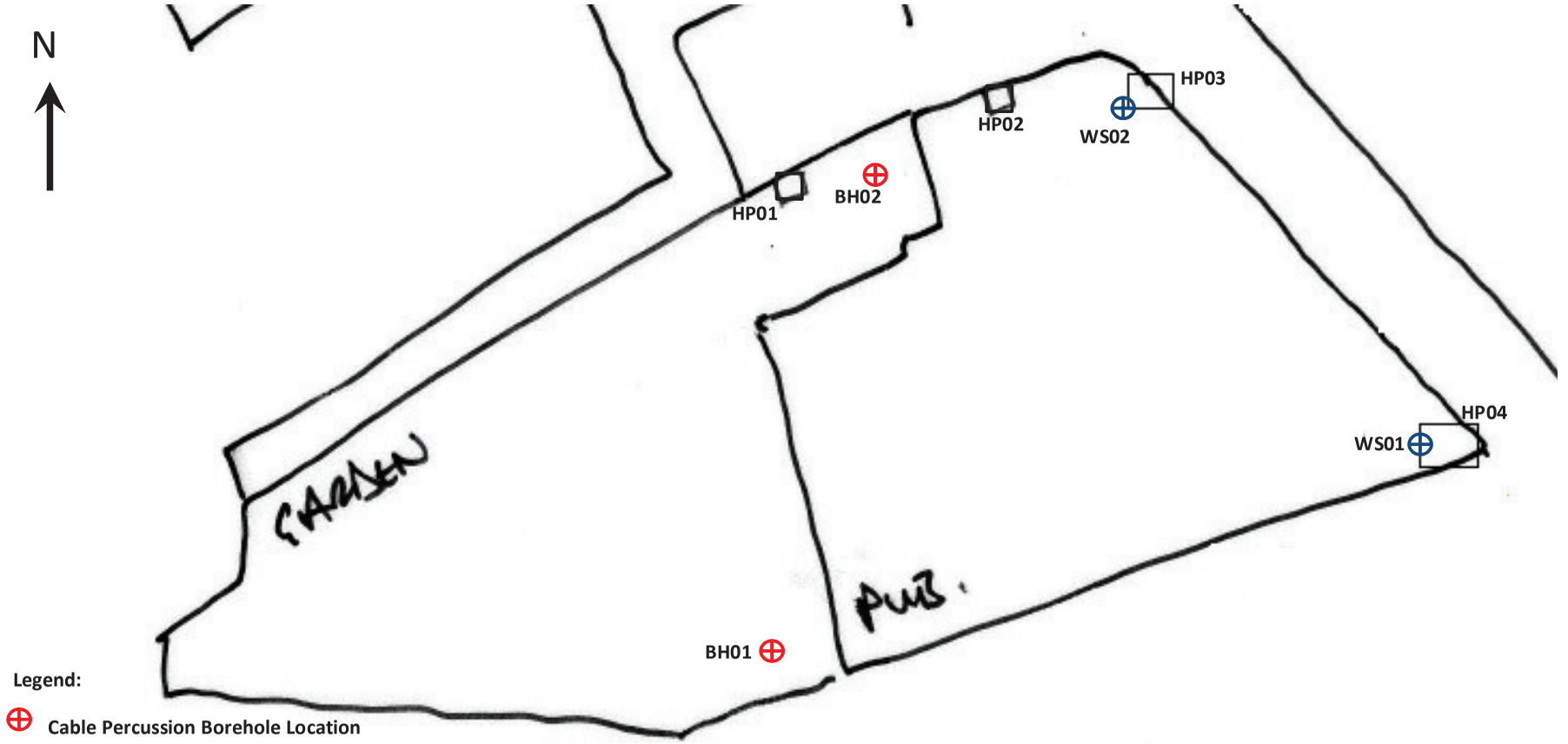
		TITLE Site Location Plan	**DATE** February 2016	**DRAWN BY** IW



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SITE NAME/CONTRACT	DRAWING NO.	SCALE
Finchley Road, London	GSI0548/02	N.T.S
TITLE	**DATE**	**DRAWN BY**
Exploratory Hole Location Plan	February 2016	IW

APPENDIX B

CABLE PERCUSSION BOREHOLE LOGS

LITHOLOGIC SYMBOLS (Unified Soil Classification System)


MADE GROUND: MADE GROUND


CONCRETE: CONCRETE


CLAY: CLAY


CLAY sa: Sandy CLAY

BACKFILL / WELL SYMBOLS


Bentonite Seal: 1 pipe group, 1 pipe


Bentonite: Bottom of hole


Cement Seal: 1 pipe group, 1 pipe


Cement: Bottom of hole


Slotted Pipe: 1 pipe group, 1 pipe


Slough at bottom of hole

SOIL & ROCK DESCRIPTIONS

All soils and rock descriptions were undertaken in accordance with BS5930 Amendment 1; EN ISO 14688 -1; EN ISO 14688 -2; and EN ISO 14689.

ABBREVIATIONS

D	- Small Disturbed Sample	ES	Environmental Sample - Soil
B	- Bulk Disturbed Sample		
BD	- Bulk & Small Disturbed Sample	EW	Environmental Sample - Water
S	- Standard Penetration Test		
U	- Undisturbed Sample		

▽ Water Rise Level after 20 minutes

▼ Water Level at Time of Strike

▼ Water Level After 24 Hours, or as Shown

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KEY TO SYMBOLS

Client: Linea Homes

Project: Finchley Road, London.

Number: GSI 0548

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CABLE PERCUSSION BOREHOLE LOG

Project				BOREHOLE No
Finchley Road, London.				
Project ID: GSI 0548	Date: 28-01-16, 29-01-16	Ground Level (m)	Co-Ordinates ()	**BH01**
Contractor: Aden Build				Sheet: 1 of 2

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument & Backfill
						0.40	MADE GROUND: Grey reinforced CONCRETE.	MG	
0.50	D					1.00	MADE GROUND: Loose brown slightly silty slightly sandy GRAVEL. Gravel is fine to coarse angular brick and concrete.	MG	
1.00	D						MADE GROUND: Firm brown and dark grey slightly sandy gravelly CLAY. Gravel is fine to coarse angular brick and concrete.		
1.00-1.45	SPT	N7							
1.50	D					(1.40)		MG	
2.00	D								
2.00-2.45	SPT	N5	1			2.40			
2.40	D		1				MADE GROUND: Firm brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular brick and concrete.		
3.00	D								
3.00-3.45	SPT	N6				(2.30)		MG	
4.00	D								
4.00-4.45	SPT	N30				4.70			
4.70	D						Firm brown laminated CLAY, with occasional gypsum crystals. (WEATHERED LONDON CLAY FORMATION)		
5.00-5.45	U100	42 blows							
5.50	D								
6.00	D					(3.00)		LC	
6.50	D								
6.50-6.95	SPT	N31							
7.50	D					7.70			
8.00-8.45	U100	49 blows					Stiff blue grey laminated CLAY with occasional gypsum crystals. (LONDON CLAY FORMATION)		
8.50	D								
9.50	D								
9.50-9.95	SPT	N33							
10.50	D								
11.00-11.45	U100	100 blows						LC	
11.50	D								
12.50	D								
13.00	D								
13.00-13.45	SPT	N33							
14.00	D								

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth
			5.00	150.00	

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

Exploratory hole cleared of buried services. Hand pit excavated to 1.20 mbgl. Groundwater encountered at 3.00 mbgl.

All dimensions in metres Scale 1:93.75	Client Linea Homes	Method / Plant Used Dando 100 Resticted Access Rig	Logged By Adam Watts

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CABLE PERCUSSION BOREHOLE LOG

Project				BOREHOLE No
Finchley Road, London.				
Project ID	Date	Ground Level (m)	Co-Ordinates ()	**BH01**
GSI 0548	28-01-16 29-01-16			
Contractor				Sheet
Aden Build				2 of 2

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument & Backfill
15.00 15.00-15.45	D U100	101 blows					Stiff blue grey laminated CLAY with occasional gypsum crystals. (LONDON CLAY FORMATION) *(continued)*		
16.00 16.00-16.45	D SPT	N50/ 250 mm							
17.00	D								
17.50-17.95	U100	120 blows							
18.00	D								
						(22.30)			
19.00 19.00-19.45	D SPT	N43							
20.00	D								
21.00 21.00-21.45	D SPT	N42							
22.00	D							LC	
22.50 22.50-22.95	D SPT	N42							
23.50	D								
24.00 24.00-24.09	D SPT	N50/ 50 mm							
25.00	D								
25.50 25.50-25.95	D SPT	N46							
26.50	D								
27.00-27.45	U100	150 blows							
27.50	D								
28.00	D								
29.00 29.00-29.45	D SPT	N50/ 275 mm							
						30.00			

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

Exploratory hole cleared of buried services. Hand pit excavated to 1.20 mbgl. Groundwater encountered at 3.00 mbgl.

All dimensions in metres Scale 1:93.75	Client Linea Homes	Method / Plant Used Dando 100 Resticted Access Rig	Logged By Adam Watts

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CABLE PERCUSSION BOREHOLE LOG

Project				BOREHOLE No
Finchley Road, London.				
Project ID: GSI 0548	Date: 29-01-16 31-01-16	Ground Level (m)	Co-Ordinates ()	**BH02**
Contractor: Aden Build				Sheet: 1 of 2

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument & Backfill
						0.20	MADE GROUND: Grey CONCRETE.	MG	
0.50	D						MADE GROUND: Loose brown slightly silty slightly sandy GRAVEL. Gravel is fine to coarse angular brick and concrete.		
1.00	D					(1.80)		MG	
1.00-1.45	SPT	N12							
1.50	D					2.00			
2.00	D						MADE GROUND: Soft brown slightly sandy CLAY.		
2.00-2.45	SPT	N48							
2.50	D					(1.50)		MG	
3.00	D								
3.00-3.45	SPT	N7				3.50			
3.50	D						MADE GROUND: Grey GRAVEL. Gravel is coarse angular of mixed lithology.		
3.50-3.95	SPT	N7				(0.90)		MG	
						4.40			
4.40	D						Firm brown laminated CLAY with occasional gypsum crystals. (WEATHERED LONDON CLAY FORMATION)		
4.50-4.95	SPT	N50/ 225 mm							
5.00	D								
5.50-5.95	U100	49 blows							
6.00	D								
7.00	D					(5.10)		LC	
7.00-7.45	SPT	N20							
8.00-8.45	U100	63 blows							
8.50	D								
9.00	D								
9.00-9.45	SPT	N28				9.50			
9.50	D						Stiff grey laminated CLAY with occasional gypsum crystals. (LONDON CLAY FORMATION)		
10.00	D								
10.50-10.95	U100	100 blows							
11.00	D								
12.00	D							LC	
12.00-12.45	SPT	N30							
13.00	D								
13.50	D								
13.50-13.95	SPT	N35							
14.50	D								

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth
			4.00	150.00	

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

Exploratory hole cleared of buried services. Hand pit excavated to 1.20 mbgl. No groundwater encountered.

All dimensions in metres Scale 1:93.75	Client: Linea Homes	Method / Plant Used: Dando 100 Resticted Access Rig	Logged By: Adam Watts

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CABLE PERCUSSION BOREHOLE LOG

Project				BOREHOLE No
Finchley Road, London.				
Project ID: GSI 0548	Date: 29-01-16 31-01-16	Ground Level (m)	Co-Ordinates ()	**BH02**
Contractor: Aden Build				Sheet: 2 of 2

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument & Backfill
15.00-15.45	U100	120 blows					Stiff grey laminated CLAY with occasional gypsum crystals. (LONDON CLAY FORMATION) *(continued)*		
15.50	D								
16.50	D								
16.50-16.95	SPT	N31							
17.50	D								
18.00	D								
18.00-18.45	SPT	N43							
19.00	D								
19.50-19.95	U100	150 blows				(20.50)			
20.00	D								
21.00	D								
21.00-21.45	SPT	N43							
22.00	D							LC	
23.00	D								
23.00-23.45	SPT	N49							
24.00	D								
24.50-24.95	U100	185 blows							
25.00	D								
26.00	D								
26.00-26.45	SPT	N50/ 275 mm							
27.00	D								
27.50	D								
27.50-27.95	SPT	N53							
28.50	D								
29.00	D								
29.00-29.45	SPT	N50/ 225 mm				30.00			

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

Exploratory hole cleared of buried services. Hand pit excavated to 1.20 mbgl. No groundwater encountered.

All dimensions in metres Scale 1:93.75	Client: Linea Homes	Method / Plant Used: Dando 100 Resticted Access Rig	Logged By: Adam Watts

APPENDIX C

WINDOWLESS SAMPLE BOREHOLE LOGS

LITHOLOGIC SYMBOLS (Unified Soil Classification System)


MADE GROUND: MADE GROUND


CONCRETE: CONCRETE


CLAY: CLAY


CLAY sa: Sandy CLAY

BACKFILL / WELL SYMBOLS


Bentonite Seal: 1 pipe group, 1 pipe


Bentonite: Bottom of hole


Cement Seal: 1 pipe group, 1 pipe


Cement: Bottom of hole


Slotted Pipe: 1 pipe group, 1 pipe


Slough at bottom of hole

SOIL & ROCK DESCRIPTIONS

All soils and rock descriptions were undertaken in accordance with BS5930 Amendment 1; EN ISO 14688 -1; EN ISO 14688 -2; and EN ISO 14689.

ABBREVIATIONS

D	- Small Disturbed Sample	ES	Environmental Sample - Soil
B	- Bulk Disturbed Sample		
BD	- Bulk & Small Disturbed Sample	EW	Environmental Sample - Water
S	- Standard Penetration Test		
U	- Undisturbed Sample		

▽ Water Rise Level after 20 minutes

▼ Water Level at Time of Strike

▼ Water Level After 24 Hours, or as Shown

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KEY TO SYMBOLS

Client: Linea Homes

Project: Finchley Road, London.

Number: GSI 0548

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WINDOWLESS SAMPLE BOREHOLE LOG

Project				WINDOWLESS SAMPLE BOREHOLE No
Finchley Road, London.				
Project ID: GSI 0548	Date: 01-02-16 01-02-16	Ground Level (m):	Co-Ordinates ():	**WS01**
Contractor: Aden Build				Sheet: 1 of 1

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument & Backfill
						0.20	MADE GROUND: Dark grey CONCRETE.	MG	
						(2.30)	Firm brown thinly laminated CLAY, with occasional gypsum crystals on laminations. (WEATHERED LONDON CLAY FORMATION)	LC	
1.80-4.10	D					2.50			
						(1.80)	Stiff brown thinly laminated CLAY, with occasional gypsum crystals on laminations. (WEATHERED LONDON CLAY FORMATION)	LC	
						4.30			

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

Exploratory hole cleared of buried services. WS01 drilled from the base of TP04. Hand pit excavated to 0.57 mbgl. Groundwater encountered at 4.10 mbgl.

All dimensions in metres Scale 1:31.25	Client: Linea Homes	Method / Plant Used: Hand Held Window Sampling Equipment	Logged By: Adam Watts

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WINDOWLESS SAMPLE BOREHOLE LOG

Project				WINDOWLESS SAMPLE BOREHOLE No
Finchley Road, London.				
Project ID: GSI 0548	Date: 01-02-16 01-02-16	Ground Level (m):	Co-Ordinates ():	**WS02**
Contractor: Aden Build				Sheet: 1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument & Backfill
						0.20	MADE GROUND: Dark grey CONCRETE.	MG	
						(1.00) 1.20	MADE GROUND: Soft brown slightly sandy CLAY. Occassionally thinly laminated.	MG	
1.50	ES					(1.10) 2.30	MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of brick and concrete.	MG	
2.50-4.50	D					(2.20) 4.50	Firm brown thinly laminated CLAY with occasional gypsum crystals on laminations. (WEATHERED LONDON CLAY FORMATION)	LC	

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

Exploratory hole cleared of buried services. WS02 drilled from the base of TP03. Hand pit excavated to 0.51 mbgl. Groundwater encountered at 4.10 mbgl.

All dimensions in metres Scale 1:31.25	Client: Linea Homes	Method / Plant Used: Hand Held Window Sampling Equipment	Logged By: Adam Watts

APPENDIX D

HAND PIT LOGS

LITHOLOGIC SYMBOLS (Unified Soil Classification System)


MADE GROUND: MADE GROUND


CONCRETE: CONCRETE


CLAY: CLAY


CLAY sa: Sandy CLAY

BACKFILL / WELL SYMBOLS


Bentonite Seal: 1 pipe group, 1 pipe


Bentonite: Bottom of hole


Cement Seal: 1 pipe group, 1 pipe


Cement: Bottom of hole


Slotted Pipe: 1 pipe group, 1 pipe


Slough at bottom of hole

SOIL & ROCK DESCRIPTIONS

All soils and rock descriptions were undertaken in accordance with BS5930 Amendment 1; EN ISO 14688 -1; EN ISO 14688 -2; and EN ISO 14689.

ABBREVIATIONS

D	- Small Disturbed Sample	ES	Environmental Sample - Soil
B	- Bulk Disturbed Sample		
BD	- Bulk & Small Disturbed Sample	EW	Environmental Sample - Water
S	- Standard Penetration Test		
U	- Undisturbed Sample		

▽ Water Rise Level after 20 minutes

▼ Water Level at Time of Strike

▼ Water Level After 24 Hours, or as Shown

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KEY TO SYMBOLS

Client: Linea Homes

Project: Finchley Road, London.

Number: GSI 0548

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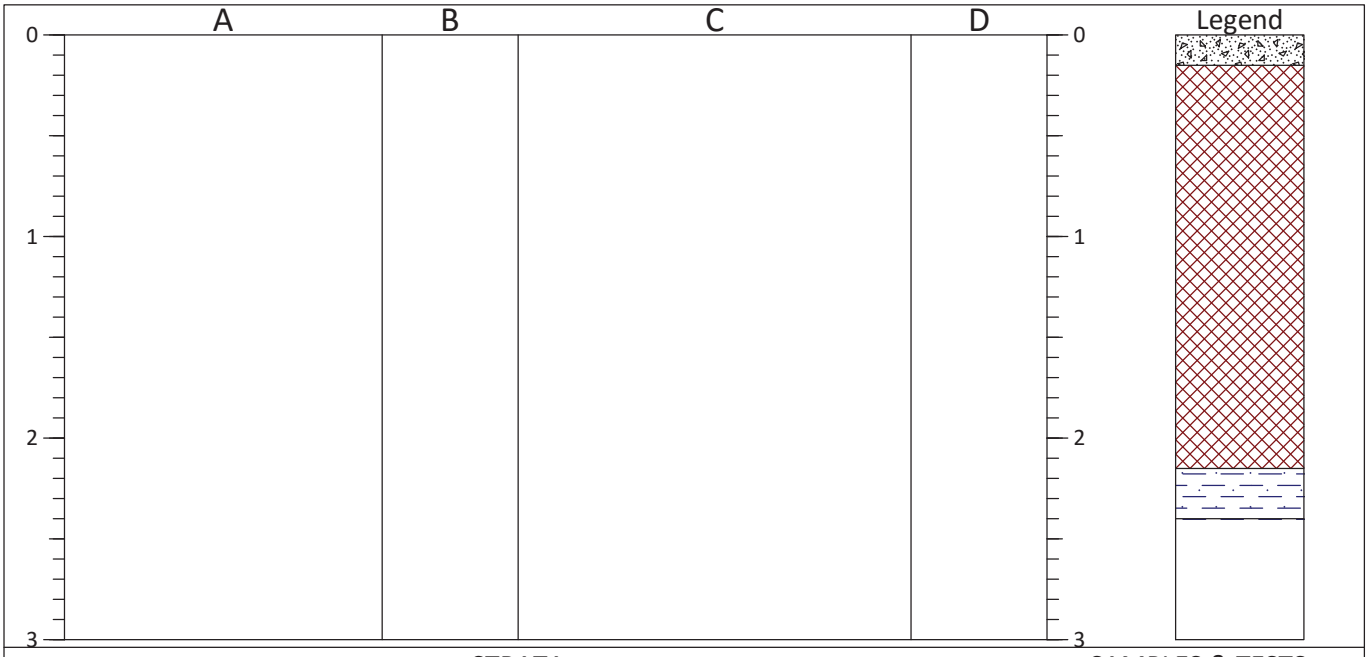
HAND PIT LOG

Project				HAND PIT No
Finchley Road, London.				
Project ID: GSI 0548	Date: 03-02-16 03-02-16	Ground Level (m):	Co-Ordinates ():	**HP01**
Contractor: Aden Build				Sheet: 1 of 1

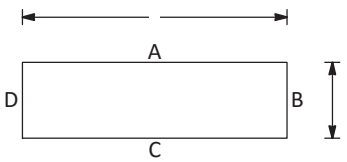


STRATA

SAMPLES & TESTS

Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.15		MADE GROUND: Grey CONCRETE.			
0.15-2.15		MADE GROUND: Grey slightly silty slightly sandy GRAVEL with abundant cobbles and rare boulders. Gravel is angular fine to coarse of brick concrete metal plastic and glass. Cobbles are angular of brick and concrete. Boulders are angular to subangular of concrete and sandstone.			
2.15-2.40		Firm brown laminated CLAY. (WEATHERED LONDON CLAY FORMATION)			

Shoring/Support:
Stability:



GENERAL REMARKS

Exploratory hole cleared of buried services. No groundwater encountered.

All dimensions in metres Scale 1:37.5	Client: Linea Homes	Method / Plant Used: Hand Digging Equipment	Logged By: Adam Watts

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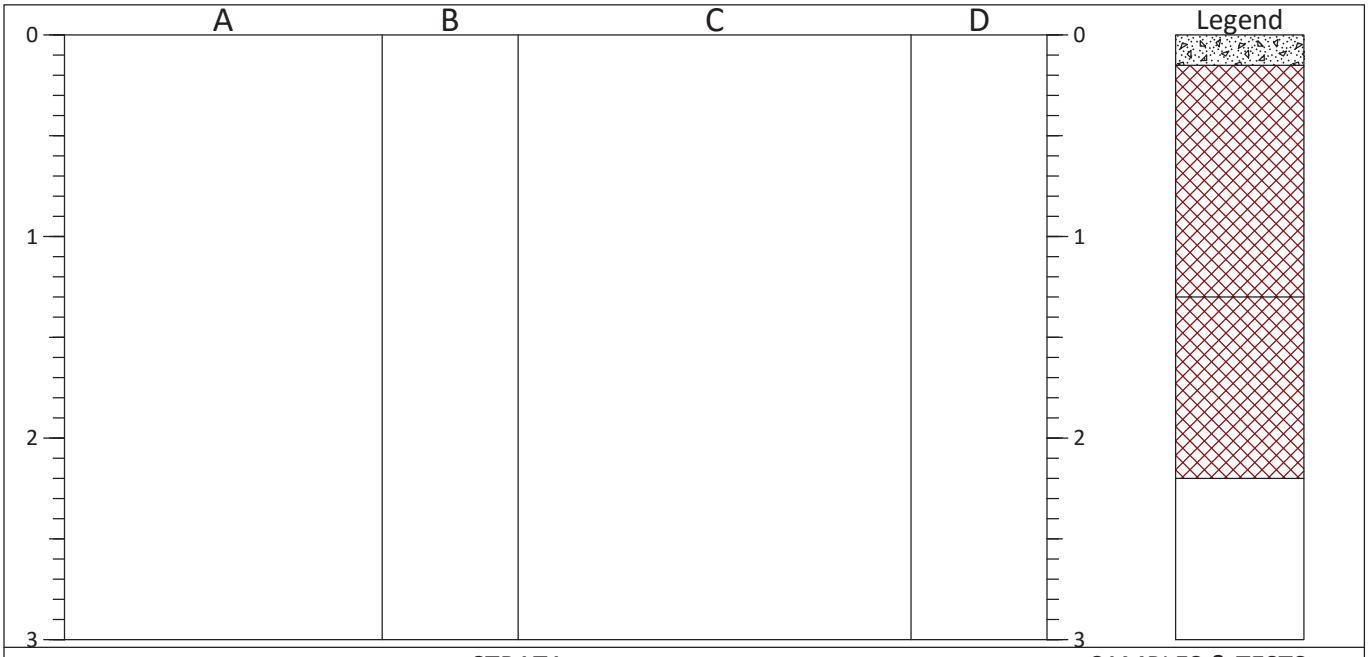
HAND PIT LOG

Project				HAND PIT No
Finchley Road, London.				
Project ID: GSI 0548	Date: 03-02-16 03-02-16	Ground Level (m)	Co-Ordinates ()	**HP02**
Contractor: Aden Build				Sheet: 1 of 1

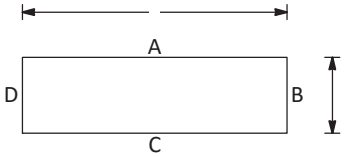


STRATA

SAMPLES & TESTS

Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.15		MADE GROUND: Grey CONCRETE.			
0.15-1.30		MADE GROUND: Grey slightly silty slightly sandy GRAVEL with abundant cobbles. Gravel is angular fine to coarse of brick concrete metal and glass. Cobbles are angular of brick and concrete.			
1.30-2.20		MADE GROUND: Soft grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse of brick and concrete.			

Shoring/Support:
Stability:



GENERAL REMARKS

Exploratory hole cleared of buried services. No groundwater encountered.

All dimensions in metres Scale 1:37.5	Client: Linea Homes	Method / Plant Used: Hand Digging Equipment	Logged By: Adam Watts

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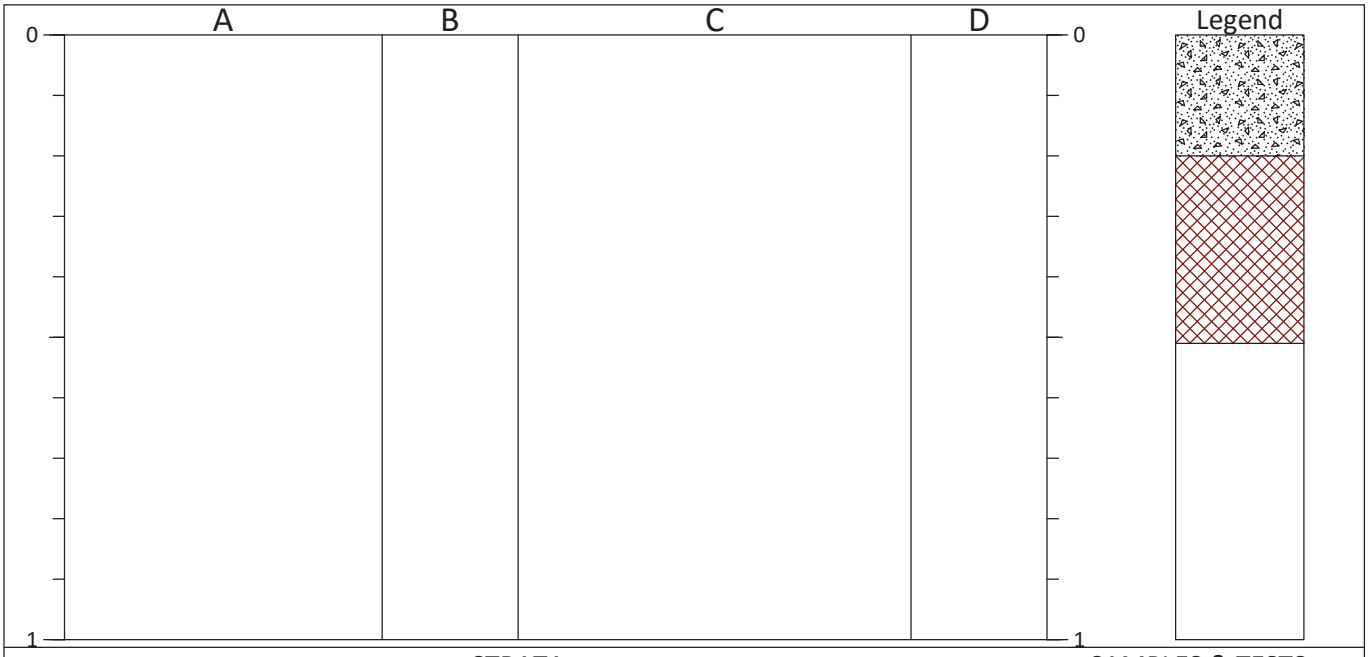
HAND PIT LOG

Project				HAND PIT No
Finchley Road, London.				
Project ID: GSI 0548	Date: 29-01-16 29-01-06	Ground Level (m)	Co-Ordinates ()	**HP03**
Contractor: Aden Build				Sheet: 1 of 1

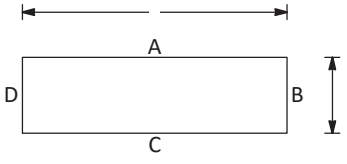


STRATA

SAMPLES & TESTS

Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		MADE GROUND: Grey CONCRETE.			
0.20-0.51		MADE GROUND: Soft brown slightly sandy CLAY. Occassionally thinly laminated. (POSSIBLE REWORKED MATERIAL)			

Shoring/Support:
Stability:



GENERAL REMARKS

Exploratory hole cleared of buried services. No groundwater encountered.

All dimensions in metres Scale 1:12.5	Client: Linea Homes	Method / Plant Used: Hand Digging Equipment	Logged By: Adam Watts

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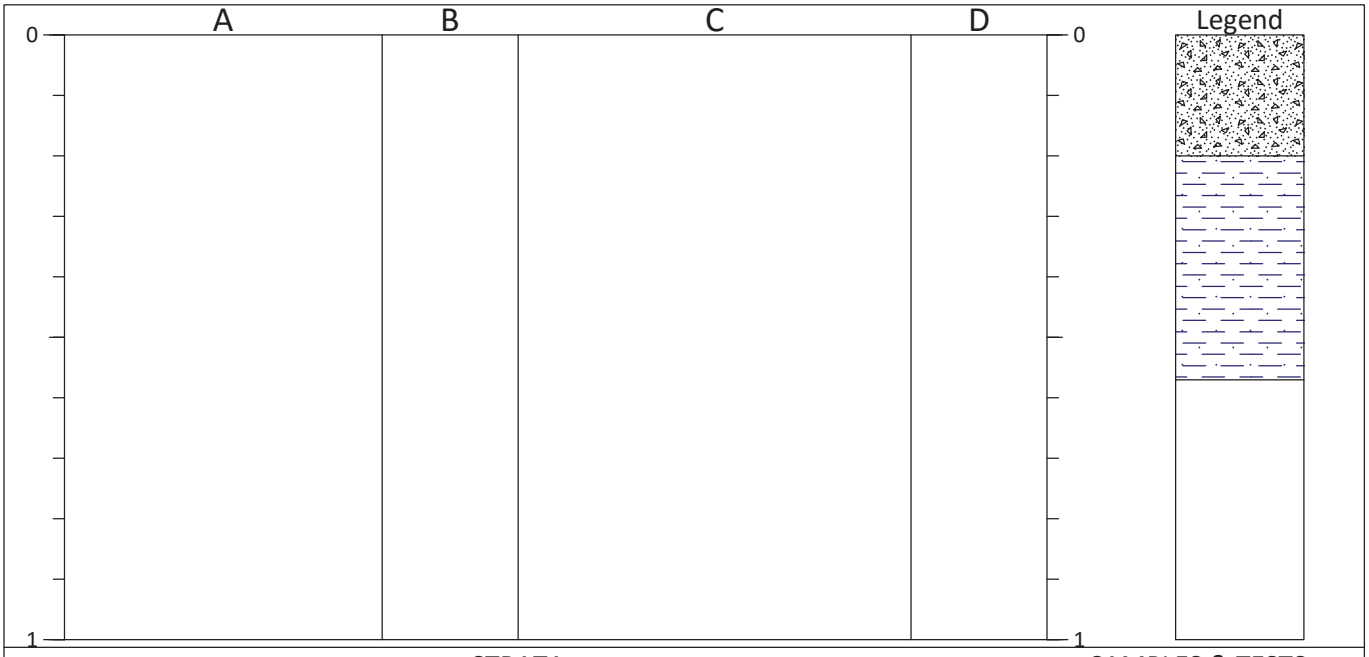
HAND PIT LOG

Project				HAND PIT No
Finchley Road, London.				
Project ID	Date	Ground Level (m)	Co-Ordinates ()	**HP04**
GSI 0548	01-02-16 03-02-16			
Contractor				Sheet
Aden Build				1 of 1

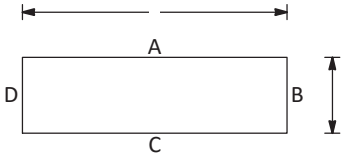


STRATA

SAMPLES & TESTS

Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		MADE GROUND: Dark grey CONCRETE.			
0.20-0.57		Firm brown laminated CLAY. (WEATHERED LONDON CLAY FORMATION)			

Shoring/Support:
Stability:



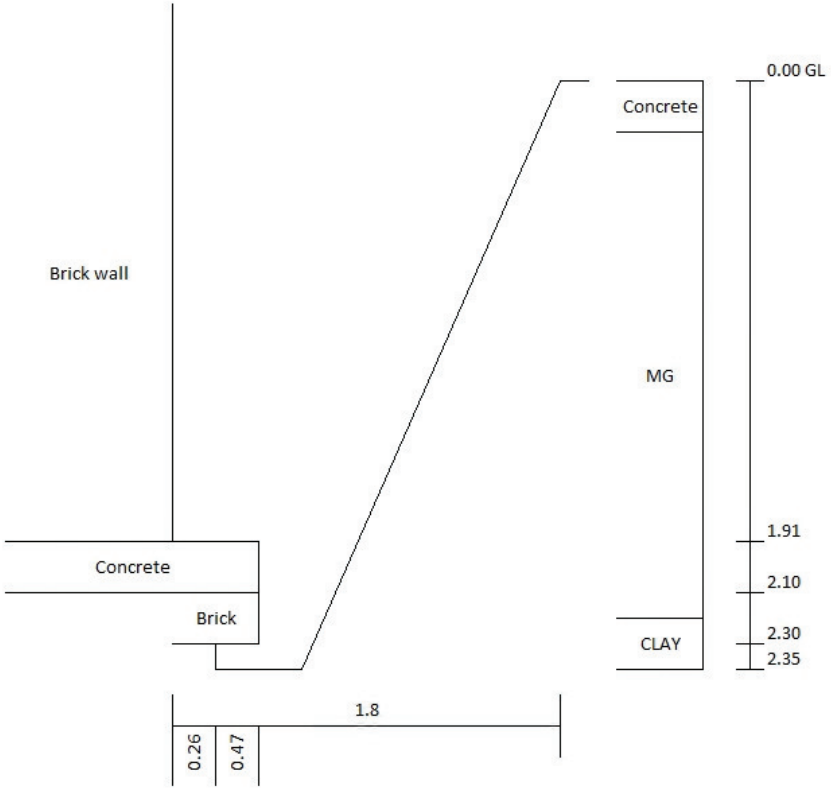
GENERAL REMARKS

Exploratory hole cleared of buried services. No groundwater encountered.

All dimensions in metres Scale 1:12.5	Client Linea Homes	Method / Plant Used Hand Digging Equipment	Logged By Adam Watts

APPENDIX E

HAND PIT SKETCHES AND PHOTOGRAPHS



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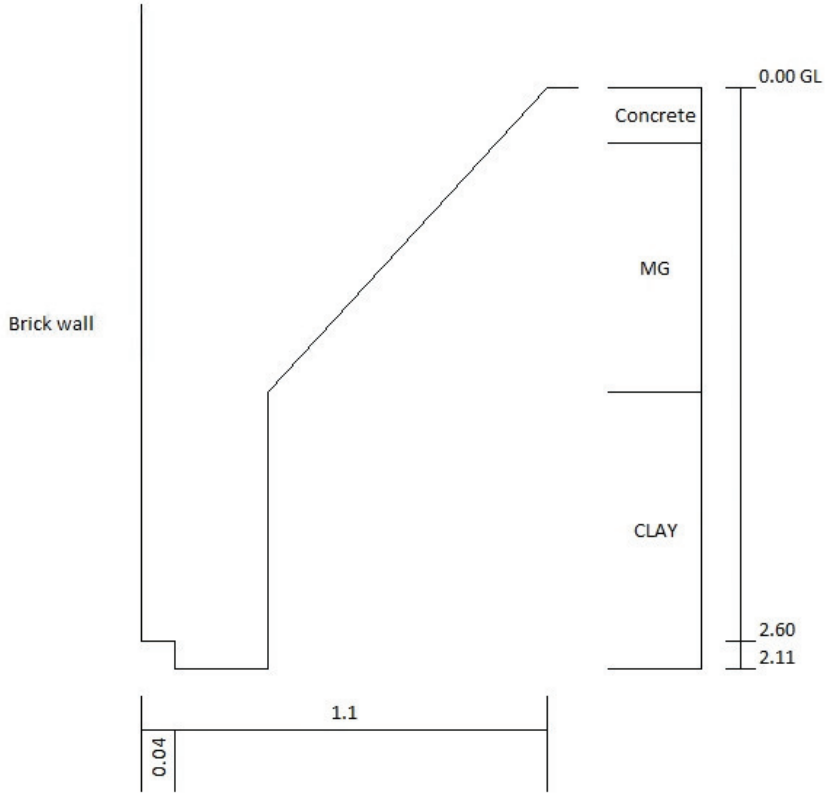
SITE NAME/CONTRACT	DRAWING NO.	SCALE
Finchley Road, London	GSI0548/03	N.T.S
TITLE	**DATE**	**DRAWN BY**
Hand Pit Sketch and Photograph – HP01	February 2016	IW



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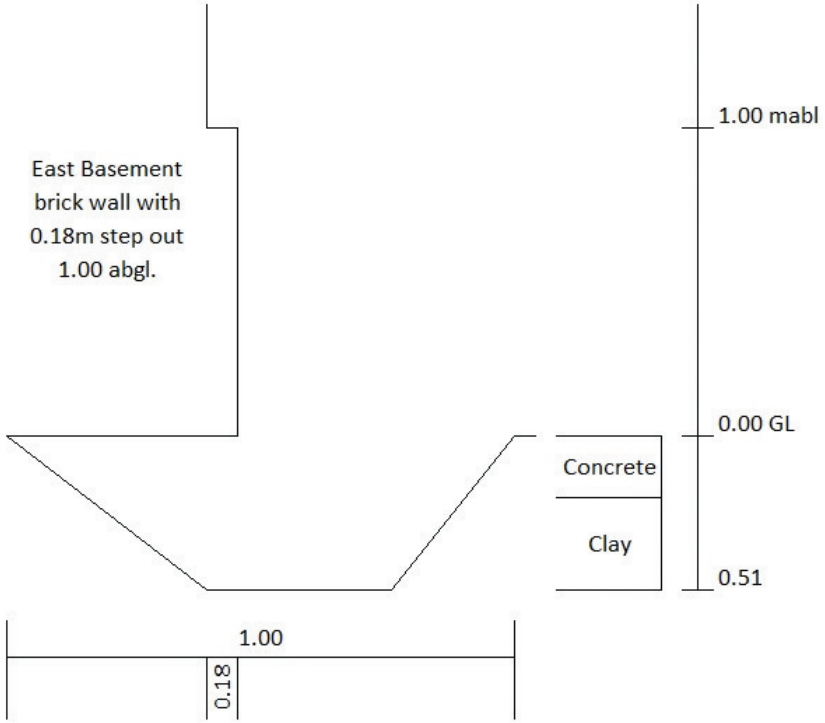
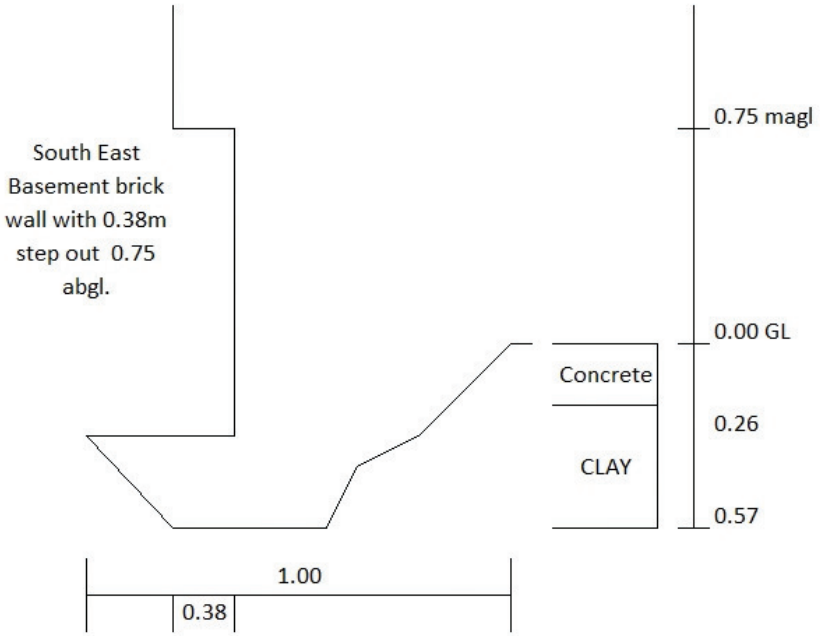
SITE NAME/CONTRACT	DRAWING NO.	SCALE
Finchley Road, London	GSI0548/04	N.T.S
TITLE	**DATE**	**DRAWN BY**
Hand Pit Sketch and Photograph – HP02	February 2016	IW



GEOCON	GeoCon Site Investigations Ltd Suite 8 Marple House, 39 Stockport Road, Marple, Stockport, SK6 6BD. Tel: 0844 504 3901, Fax: 0844 504 3902, Email: info@geoconsiteinvestigations.com Web: www.geoconsiteinvestigations.com	**SITE NAME/CONTRACT** Finchley Road, London	**DRAWING NO.** GSI0548/05	**SCALE** N.T.S
		TITLE Hand Pit Sketch and Photograph – HP03	**DATE** February 2016	**DRAWN BY** IW



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SITE NAME/CONTRACT	DRAWING NO.	SCALE
Finchley Road, London	GSI0548/06	N.T.S
TITLE	**DATE**	**DRAWN BY**
Hand Pit Sketch and Photograph – HP04	February 2016	IW