



UK-LON-KGX1  
GOOGLE INC  
16-21 Stables Street  
London, N1C 4AB  
TEL: +44 (0)203 6642000

#### NOTES

1. DONOT SCALE FROM THE DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES (MM) AND ALL LEVELS ARE IN METRES (M) UNLESS NOTED OTHERWISE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, STANDARDS, DRAWINGS AND SPECIFICATIONS.
4. FOR DETAILS OF MOVEMENTS AND TOLERANCE ALLOWANCES REFER TO THE RELEVANT SPECIFICATIONS.
5. FOR GENERAL ARRANGEMENTS REFER TO AKTI DRAWINGS - KXC-A-001-S-AKT-10-20010.
6. FOR CROSS SECTIONS REFER TO AKTI DRAWINGS - KXC-A-001-S-AKT-10-20010.
7. FOR MEMBER SCHEDULES REFER TO AKTI DRAWINGS - KXC-A-001-S-AKT-10-20010.
8. FOR LOADING INFORMATION REFER TO AKTI DRAWINGS - KXC-A-001-S-AKT-10-20010.

SOIL PROFILES ON THIS DRAWING ARE INDICATIVE ONLY

#### KEY:

ASSUMED PROPRIETARY LOCATION (ANCHOR) IS TO BE LOADED WITH SUBSTRUCTURE

TL DI  
TL PD  
TL PD

P3 27.01.17 STAGES ISSUE  
P2 03.10.16 NETWORK RAIL ISSUE  
P1 23.08.16 ISSUE FOR INFORMATION

DATE: 27.01.17

BY: [Signature]

CHECKED BY: [Signature]

DATE: 27.01.17

BY: [Signature]

CHECKED BY: [Signature]

DATE: 27.01.17

BY: [Signature]

CHECKED BY: [Signature]

DATE: 27.01.17

BY: [Signature]

CHECKED BY: [Signature]

DATE: 27.01.17

BY: [Signature]

CHECKED BY: [Signature]

DATE: 27.01.17

BY: [Signature]

CHECKED BY: [Signature]

DATE: 27.01.17

BY: [Signature]

CHECKED BY: [Signature]

DATE: 27.01.17

BY: [Signature]

CHECKED BY: [Signature]

DATE: 27.01.17

BY: [Signature]

CHECKED BY: [Signature]

DATE: 27.01.17

BY: [Signature]

CHECKED BY: [Signature]

DATE: 27.01.17

BY: [Signature]

CHECKED BY: [Signature]

DATE: 27.01.17

BY: [Signature]

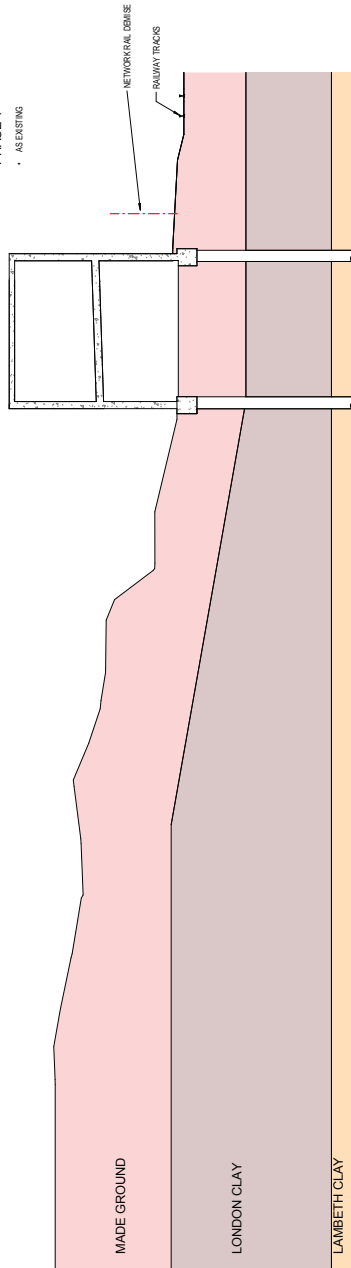
CHECKED BY: [Signature]

DATE: 27.01.17

BY: [Signature]

#### PHASE 1

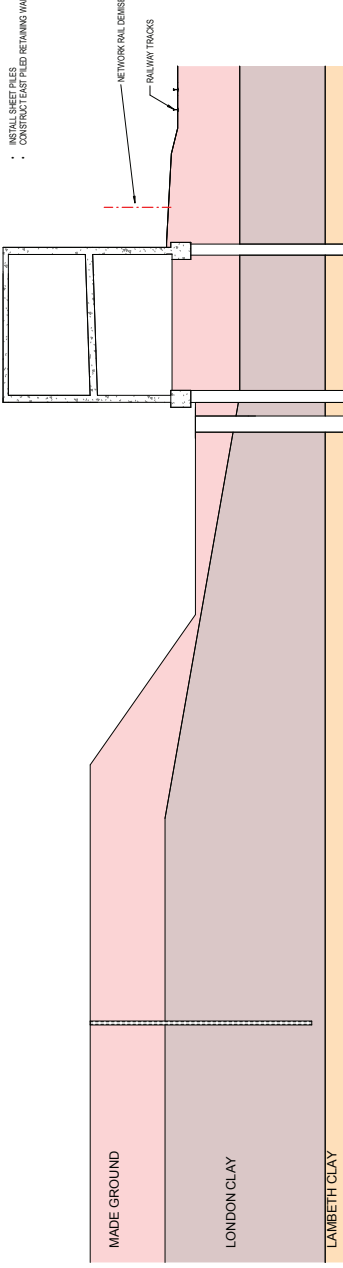
- AS EXISTING



PHASE 1  
1:200

#### PHASE 2

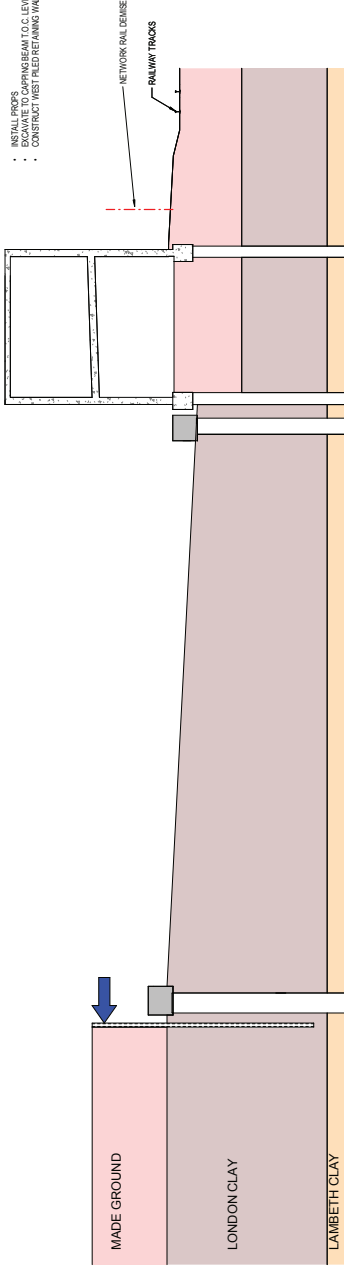
- INSTALL SHEET PILES
- CONSTRUCT EAST PILED RETAINING WALL



PHASE 2  
1:200

#### PHASE 3

- INSTALL PROPS
- EXCAVATE TO CARPINS BEAM TO C LEVEL
- CONSTRUCT WEST PILED RETAINING WALL



PHASE 3  
1:200

STAGE 3

SUBSTRUCTURE  
CONSTRUCTION  
SEQUENCE SHEET 1

KXC-A-001-S-AKT-11-20010

P3

GC

TL

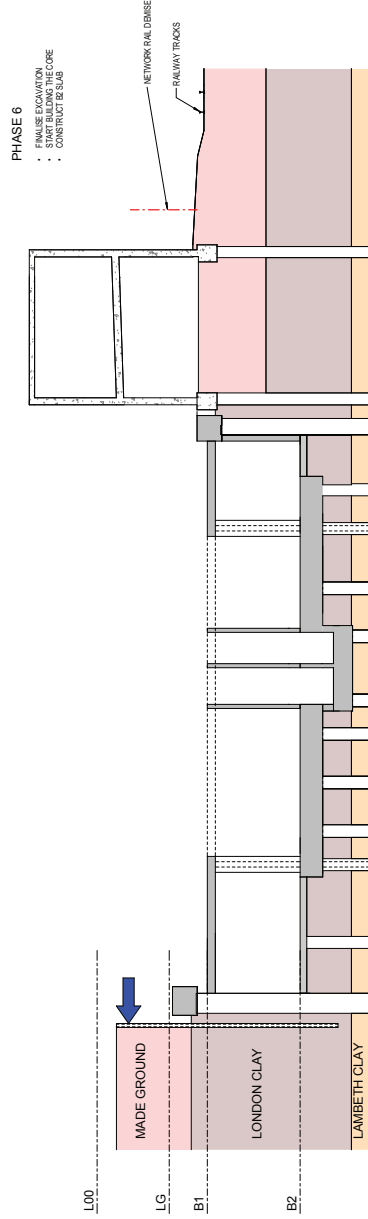
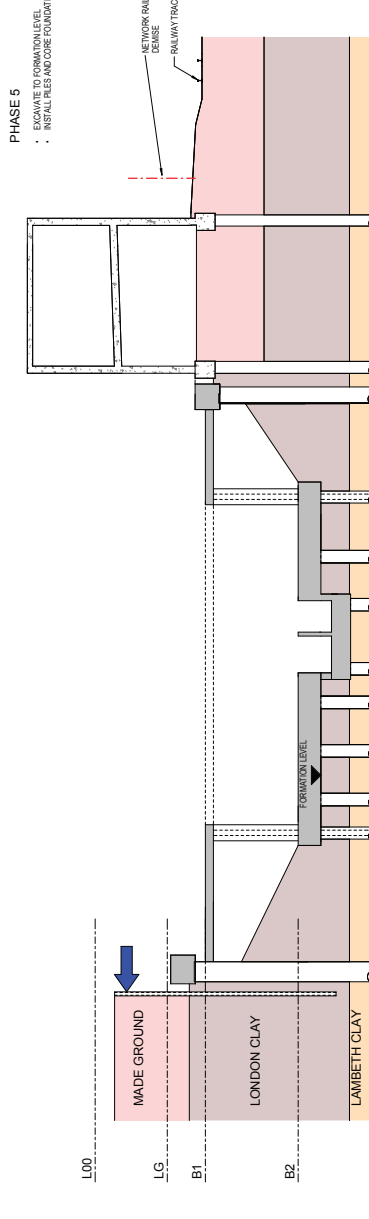
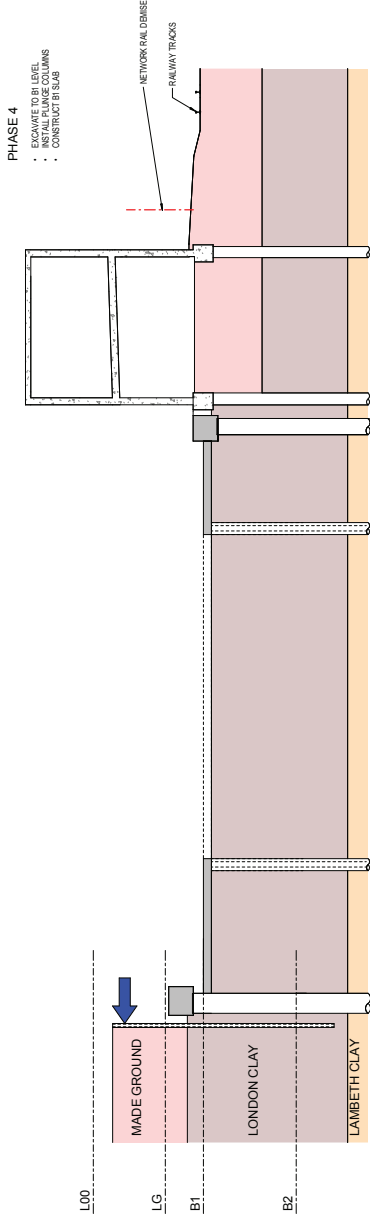
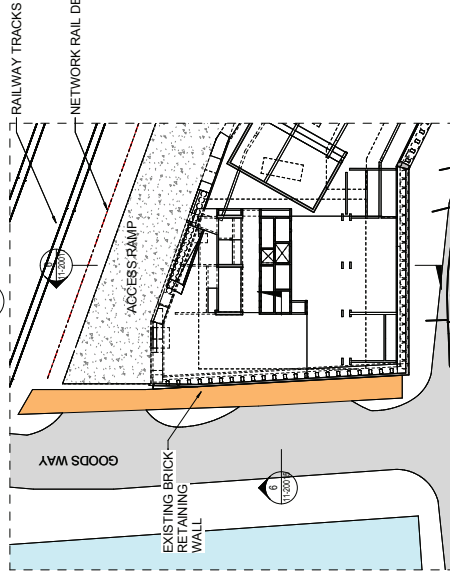
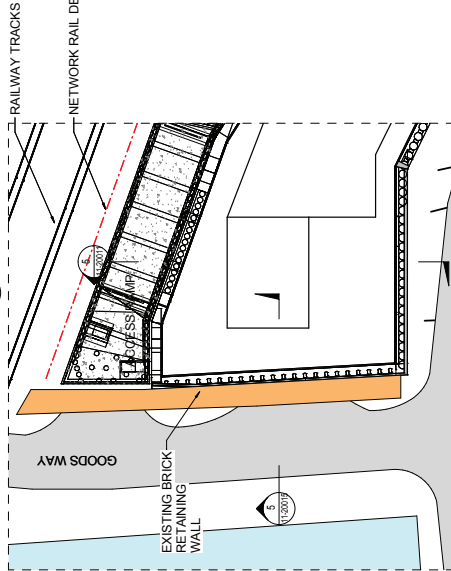
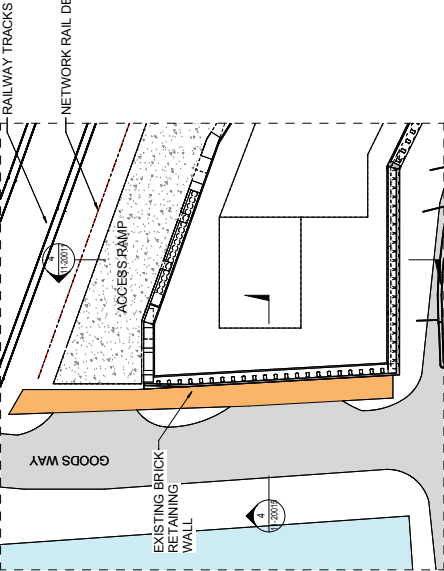
A1

3933

09/27/16

1:200

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100



NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES (MM) AND ALL LEVELS ARE IN METRES (M) UNLESS NOTED OTHERWISE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL SPECIFICATIONS, CONTRACT AND BUSINESS ARRANGEMENTS AND SPECIFICATIONS.
4. FOR DETAILS OF MOVEMENTS AND TOLERANCE ALLOWANCES REFER TO THE DRAWINGS.
5. FOR GENERAL ARRANGEMENTS REFER TO AKTI DRAWINGS - KXC-A-001-S-AKT-10-20011.
6. FOR CROSS SECTIONS REFER TO AKTI DRAWINGS - KXC-A-001-S-AKT-10-20011.
7. FOR MEMBER SCHEDULES REFER TO AKTI DRAWINGS - KXC-A-001-S-AKT-10-20011.
8. FOR LOADING INFORMATION REFER TO AKTI DRAWINGS - KXC-A-001-S-AKT-10-20011.

SOIL PROFILES ON THIS DRAWING ARE INDICATIVE ONLY

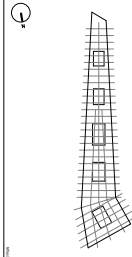
KEY:

- EXCAVATE TO FORMATION LEVEL
- INSTALL PILES AND CORE FOUNDATION

P3 27.01.17 STAGES ISSUE  
P2 03.10.16 NETWORK RAIL ISSUE  
P1 23.08.16 SUBMIT FOR INFORMATION



Consulting Structural and Civil Engineers  
100 St. John Street  
London EC1M 4EH  
T: +44 (0)20 7250 5555  
F: +44 (0)20 7250 5555  
E: info@akti.co.uk  
W: www.akti.co.uk



STAGE 3

SUBSTRUCTURE CONSTRUCTION SEQUENCE SHEET 2

KXC-A-001-S-AKT-11-20011

P3



UK-LON-KGX1

GOOGLE INC  
16-21 Stable Street  
London, N1C 4AB  
TEL: +44 (0)203 6640200

## NOTES

- DO NOT SCALE FROM THIS DRAWING.  
ALL DIMENSIONS ARE IN MILLIMETERS (mm) AND ALL LEVELS ARE  
TO FINISH UNLESS OTHERWISE NOTED.  
THIS DRAWING IS TO BE USED IN CONJUNCTION WITH ALL  
RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND  
SPECIFICATIONS.  
FOR DETAILS OF MOVEMENTS AND TOLERANCE ALLOWANCES  
REFER TO ARCHITECTS DRAWINGS KAC-A001-S&K-10-8000 -  
KAC-A001-S&K-10-80001  
FOR GENERAL ARRANGEMENTS REFER TO ARCHT. DRAWINGS -  
KAC-A001-S&K-10-000010 - KAC-A001-S&K-00-11233  
KAC-A001-S&K-10-0000101 - KAC-A001-S&K-10-0000102  
FOR CROSS SECTIONS REFER TO ARCHT. DRAWINGS  
KAC-A001-S&K-10-0000103 - KAC-A001-S&K-10-0000104  
FOR NUMBER SCHEDULES REFER TO ARCHT. DRAWINGS  
KAC-A001-S&K-10-0000105 & 000101  
FOR LOADING INFORMATION REFER TO ARCHT. DRAWINGS  
KAC-A001-S&K-10-0000050 - KAC-A001-S&K-20-11250

SOIL PROFILES ON THIS DRAWING ARE  
INDICATIVE ONLY

KEY:

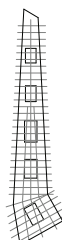
↓  
ASSUMED PROP LOCATION (ANCHOR  
PREFERRED BUT TO BE AGREED WITH  
SUBCONTRACTOR)

	TL	DI
3 27.01.17 STAGE 3 ISSUE	TL	PO
2 03.10.16 NETWORK RAIL ISSUE	TL	PO
1 23.09.16 ISSUED FOR INFORMATION	TL	PO

[illegible]

Consulting Structural and Civil Engineers  
100 St. John Street  
London EC1M 4EH  
T +44 (0)20 7250 7777  
F +44 (0)20 7250 5555  
E [info@skt-uk.com](mailto:info@skt-uk.com)  
W [www.skt-uk.com](http://www.skt-uk.com)

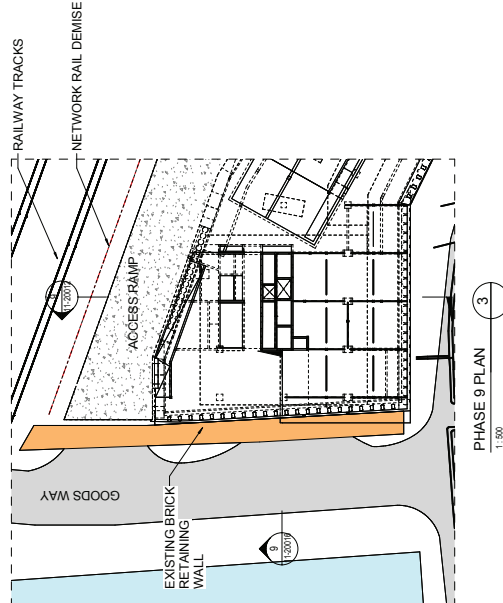
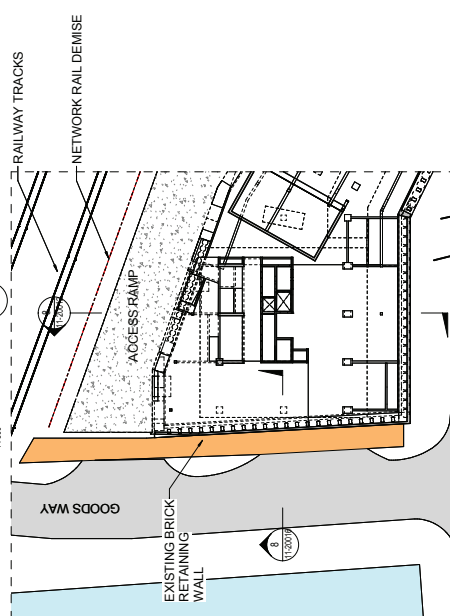
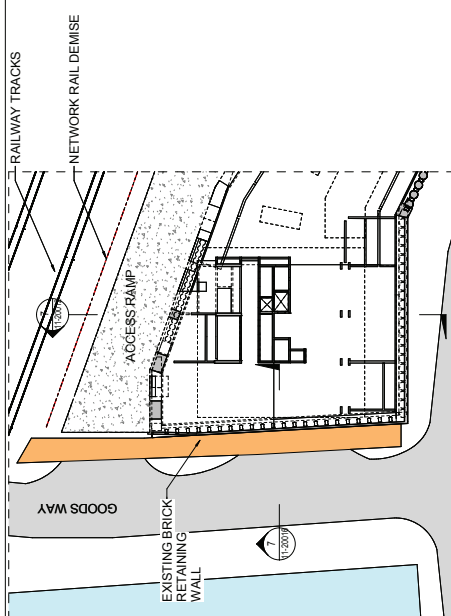
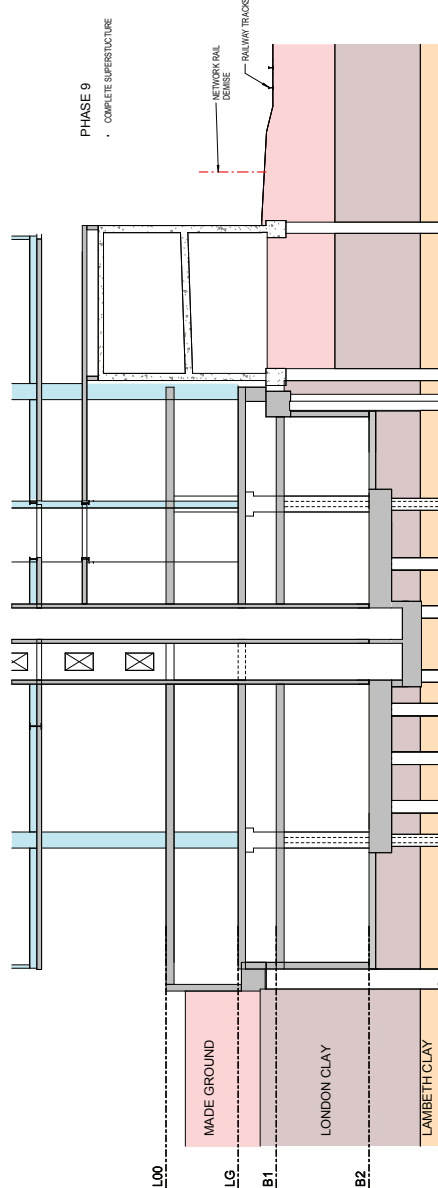
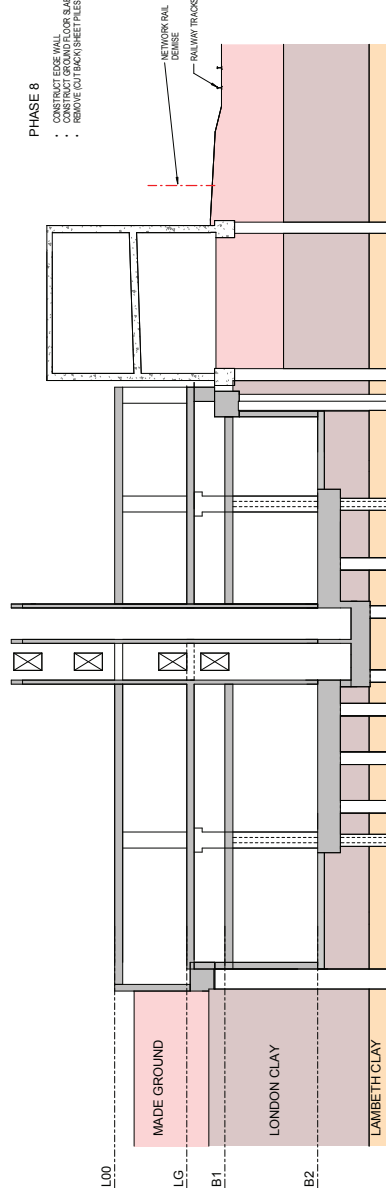
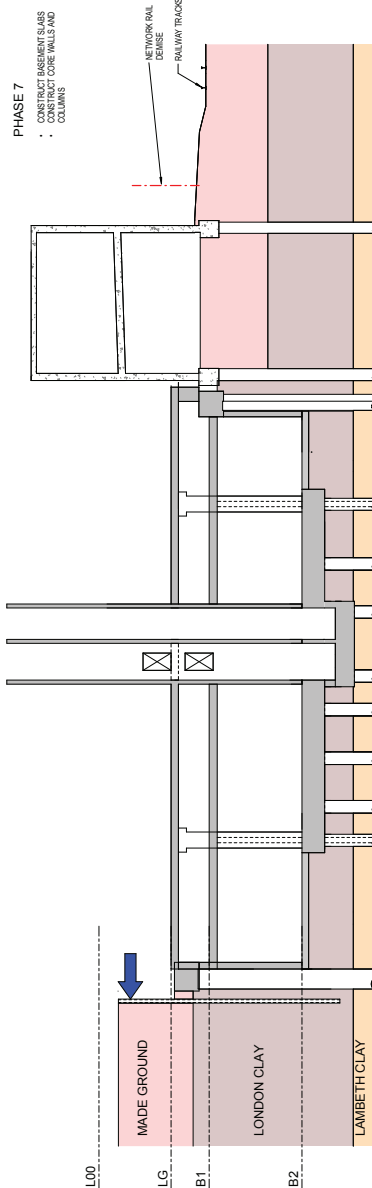
C

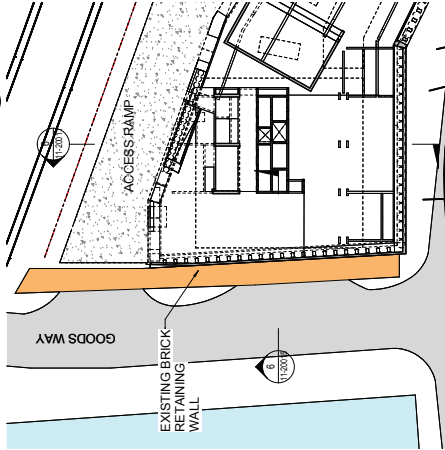
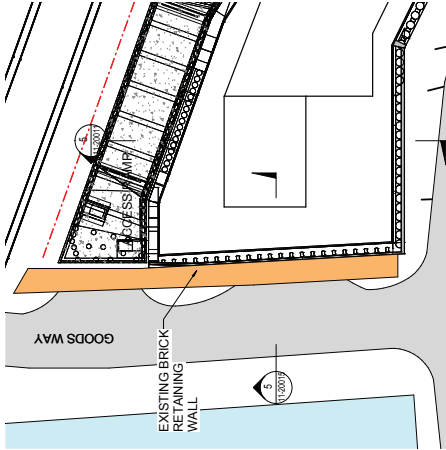
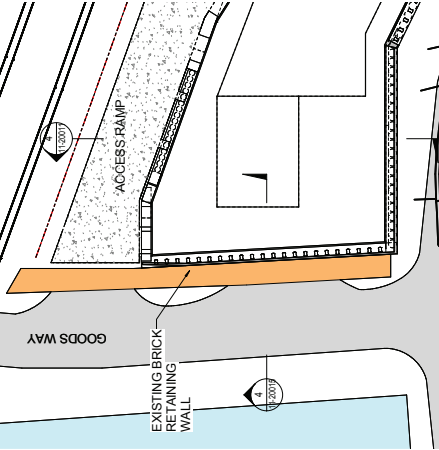


### STAGE 3

**SUBSTRUCTURE  
CONSTRUCTION  
SEQUENCE SHEET 3**

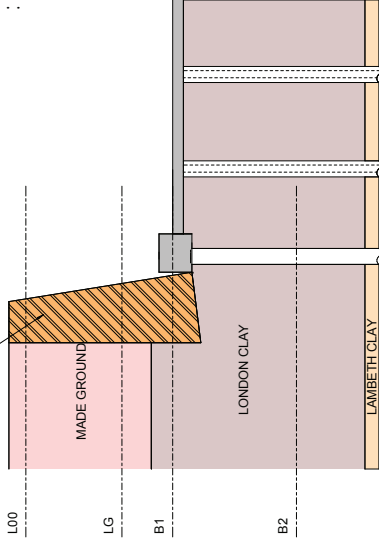
KXC-A-001-S-AKT-11-20012





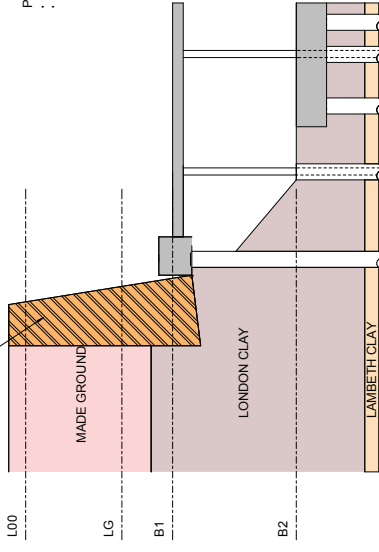
PHASE 4

- CONSTRUCT FIED RETAINING WALL
- INSTALL PLINCE COLUMNS
- BUILD B1 SLAB



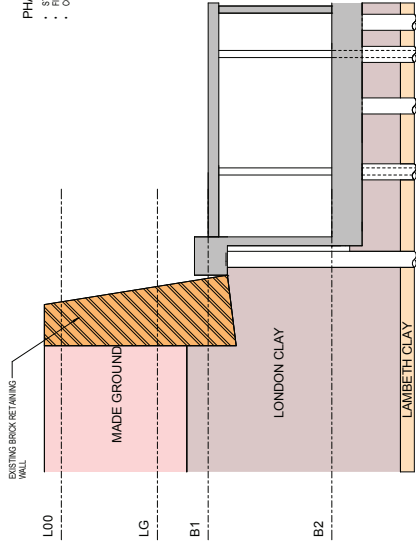
PHASE 5

- EXCAVATE TO FORMATION LEVEL
- INSTALL PILES AND CORE FOUNDATION



PHASE 6

- START BUILDING THE CORE
- FINALISE EXCAVATION
- CONSTRUCT THE SLAB



NOTES

1. DONOT SCALE FROM THE DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES (mm) AND ALL LEVELS ARE IN METRES (m) UNLESS NOTED OTHERWISE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS AND EXISTING DRAWINGS AND SPECIFICATIONS.
4. FOR DETAILS OF MOVEMENTS AND TOLERANCE ALLOWANCES REFER TO THE RELEVANT SPECIFICATIONS.
5. FOR GENERAL ARRANGEMENTS REFER TO AKTII DRAWINGS - KXC-A-001-S-AKT-10-20011.
6. FOR CROSS SECTIONS REFER TO AKTII DRAWINGS - KXC-A-001-S-AKT-10-20011.
7. FOR MEMBER SCHEDULES REFER TO AKTII DRAWINGS - KXC-A-001-S-AKT-10-20011.
8. FOR LOADING INFORMATION REFER TO AKTII DRAWINGS - KXC-A-001-S-AKT-10-20011.

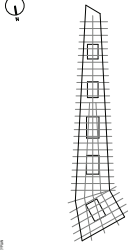
PLEASE NOTE PHASES 1-3 ARE THE SAME AS INDICATED ON AKTII DRAWING KXC-A-001-S-AKT-10-20011

SOIL PROFILES ON THIS DRAWING ARE INDICATIVE ONLY

PHASE 1: 27.01.17 STAGES ISSUE  
PHASE 2: 03.10.19 NETWORK RAIL ISSUE  
PHASE 3: 23.09.19 ISSUE FOR INFORMATION



Consulting Structural and Civil Engineers  
100-101, The Quadrant  
London EC4A 3DF  
T: +44 (0)20 7250 1200  
F: +44 (0)20 7250 1201  
W: www.akt.co.uk



STAGE 3

SUBSTRUCTURE  
CONSTRUCTION  
SEQUENCE SECTION A  
SHEET 1

KXC-A-001-S-AKT-11-20015

P3



## NOTES

1. DON'T SCALE FROM THE DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETERS (MM) AND ALL LEVELS ARE IN METERS (M). UNLESS NOTED OTHERWISE.
3. DIMENSIONS IN PARENTHESES ARE NOT TO SCALE.
4. THE DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. FOR DETAILS OF MOVEMENTS AND TOLERANCE ALLOWANCES REFER TO ARCHITECTS DRAWINGS: A-C-A-S-KT-10-08000 - A-C-A-S-KT-10-10001
6. FOR GENERAL ARRANGEMENTS REFER TO ARCHITECTS DRAWINGS: A-C-A-S-KT-10-00010 - A-C-A-S-KT-10-00123
7. FOR CROSS SECTIONS REFER TO ARCHITECTS DRAWINGS: A-C-A-S-KT-10-00124 - A-C-A-S-KT-10-00222
8. FOR MEMBER SCHEDULES REFER TO ARCHITECTS DRAWINGS: A-C-A-S-KT-10-001010 - A-C-A-S-KT-10-001011
9. FOR LOADING INFORMATION REFER TO ARCHITECTS DRAWINGS: A-C-A-S-KT-10-00600 - A-C-A-S-KT-10-001250

PLEASE NOTE PHASES 1-3 ARE THE SAME AS INDICATED ON AKTII DRAWING KKXC-A-001-S-AKT-M3-11-20010

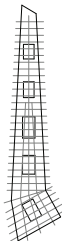
SOIL PROFILES ON THIS DRAWING ARE  
INDICATIVE ONLY

P3	27.01.17	STAGE 3 ISSUE	TL	DI
P2	03.10.16	NETWORK RAIL ISSUE	TL	PO
P1	23.09.16	ISSUED FOR INFORMATION	TL	PO

[illegible]

Consulting Structural and Civil Engineers  
100 St. John Street  
London EC1M 4EH  
T +44 (0)20 7250 7777  
F +44 (0)20 7250 5555  
E [info@askt.uk.com](mailto:info@askt.uk.com)  
W [www.askt-uk.com](http://www.askt-uk.com)

100



### STAGE 3

**SUBSTRUCTURE  
CONSTRUCTION  
SEQUENCE SECTION A**

**SHEET 2**

Project No. 39333

As indicated

Sheet A1

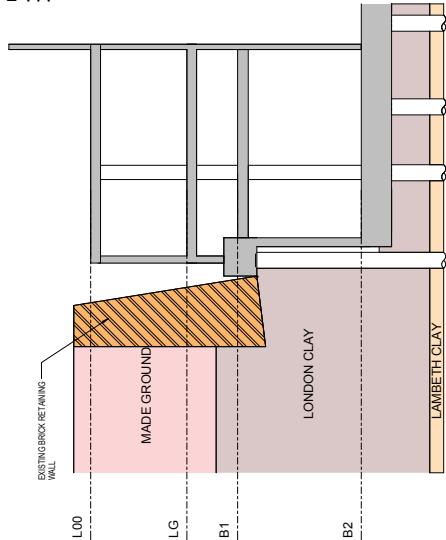
TL

1 of 1

KXKC-A-001-S-AKT-11-20016 P3

## PHASE 7

- CONSTRUCT EDGE WALL
- CONSTRUCT BASEMENT SLABS
- CONSTRUCT CORE WALLS AND COLUMNS

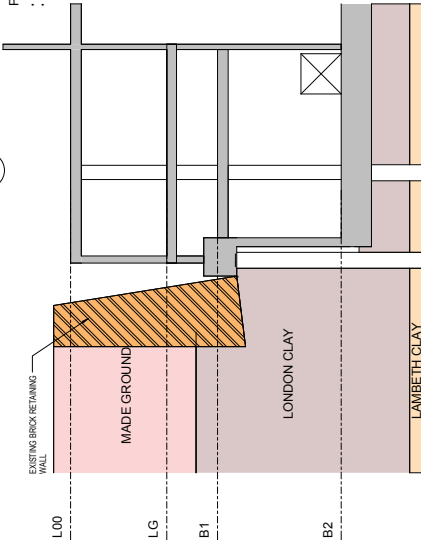


SECTION A PHASE 7  
11-20012  
7  
1 : 150

)

## PHASE 8

- CONSTRUCT EDGE WALLS  
CONSTRUCT GROUND FLOOR SLAB

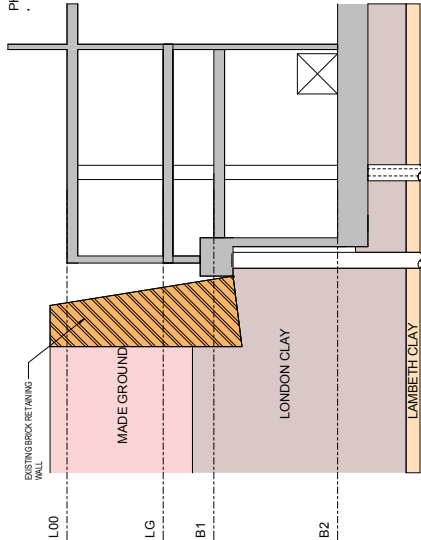


SECTION A PHASE 8  
11-20012  
8  
1 : 150

)

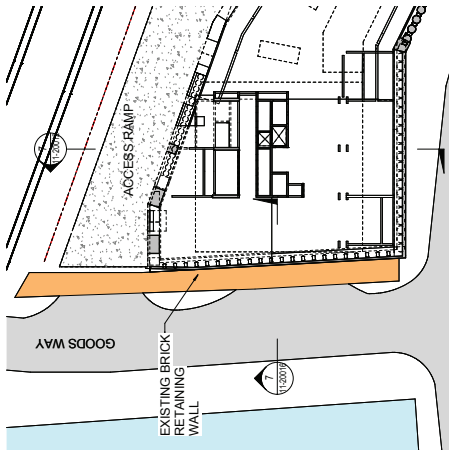
## HASE 9

- COMPLETE SUPERSTRUCTURE



SECTION A PHASE 9  
11-20012  
9  
1:150

○

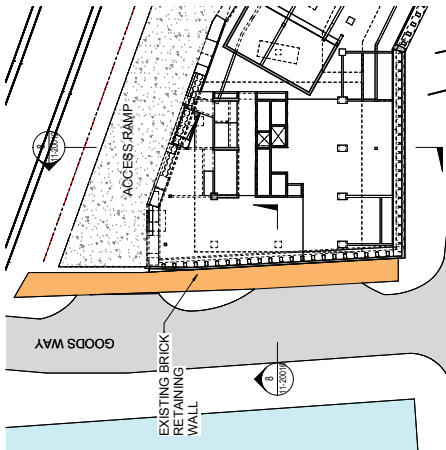


PHASE 7 PLAN

1

1:500

1

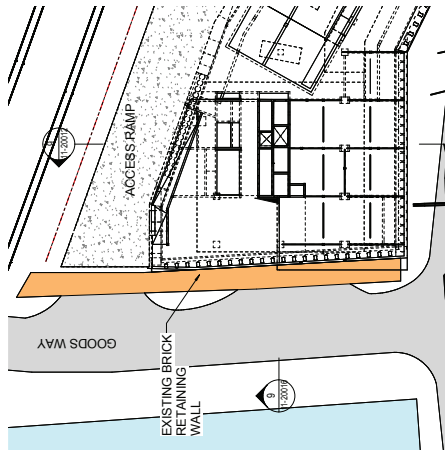


PHASE 8 PLAN

1:500

2

○



PHASE 9 PLAN

1 : 500

3

○

## **Appendix B**

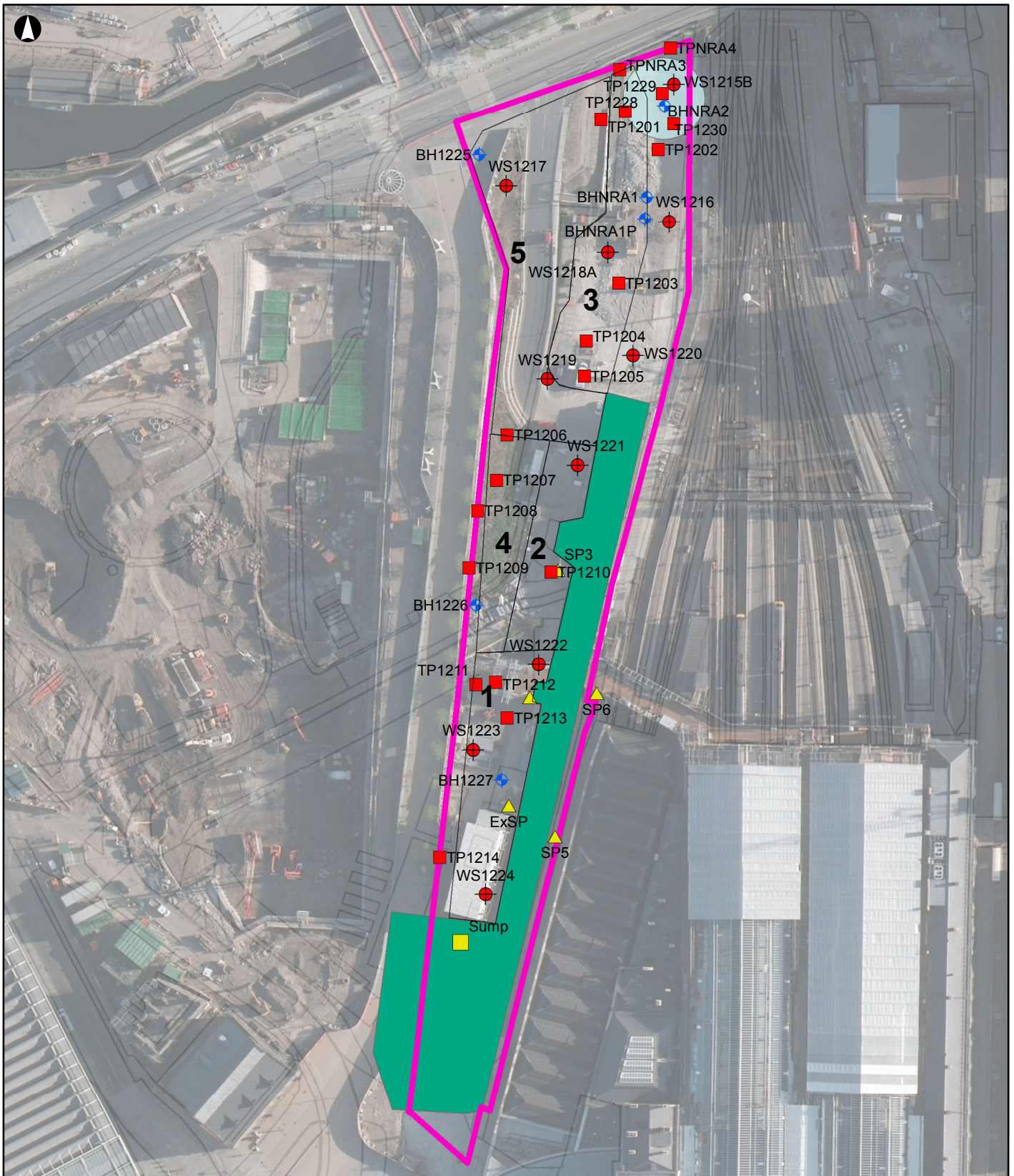
### **Ground Investigation Information**

## **B1 BNL 2012 Ground Investigation**

---

### **B1.1 Plan of 2012 GI Locations**





### Legend

- + BNL 2012 BH locations
- BNL 2012 TP locations
- BNL 2012 WS locations
- ▲ Previous shallow groundwater stand pipe
- Existing sump in basement
- Zone A Development Boundary
- historic turn table
- Shared Service Yard and Access Ramp (South)

©Copyright Information

P3	05/06/2013	EF	RO	RO
Issue	Date	By	Chkd	Appd

# ARUP

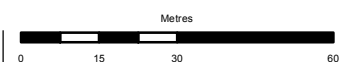
13 Fitzroy Street  
London W1T 4BQ  
Tel +44 20 7636 1531 Fax +44 20 7580 3924  
www.arup.com

Client

Kings Cross Central Limited Partnership

Job Title

Zone A - Reserved Matters ERP



### BNL 2012 Zone A GI Exploratory Hole Location Plan

Scale at A4

1:1,450

Job No

219902-00

Drawing Status

Issue

Drawing No

Figure B1

Issue

P1



## B1.2 Summary stratigraphy and field observations

Table B1 below summarises the stratigraphy and soil descriptions as recorded on the logs of the ground investigation works within Sub-Area 5. There were no observations of contamination recorded on the logs of these exploration positions except in trial pit TP1201, where black hydrocarbon staining and a strong hydrocarbon odour was noted in a 0.1m thick layer of made Ground immediately overlying the London Clay surface.

Table B1 Summary stratigraphy and field observations

Stratum	Approx. Top of Stratum (mOD)	Approx. Thickness of Stratum (m)	Description
<b>Made Ground</b>	25.6 to 17	0.6 to 6.4	Locally heterogeneous material. Often firm, friable, dark brown, fine to coarse sandy, silty clays with some to much angular to rounded fine to coarse gravel of mainly brick with concrete, coal, flint, wood and tile. Occasional rootlets. Made Ground is predominately sand and gravel hardcore and sub-base type material. No visual or olfactory contamination noted at investigation locations, except in TP 1201
<b>London Clay</b>	12.36 to 19.7	19.73 to 15.25	Firm, fissured, brown, occasionally mottled, light grey clay. At depth: firm to stiff, grey-brown, mottled blue, extremely closely fissured clay. Occasional bioturbation and partings (<1mm) of yellow brown fine sand/silt.
<b>Lambeth Group Not proven in this area</b>	Rest of Zone A -4.7 to -9.81	Rest of Zone A 11.9 to 15.6	Very stiff multicoloured silty sandy clay with layers of fine, medium sand.
<b>Thanet Sands Not proven in this area</b>	Rest of Zone A -19.9 to -21.5	Rest of Zone A 3.50 to 5.7	Very dense green silty sand with some gravel.
<b>Upper Chalk Not proven in this area</b>	Rest of Zone A -24.51 to -27.3	Unproven at site	Abundant angular to subangular fine to coarse gravel or black flint.

## **B1.3 Logs of boreholes and trial pit in Sub-Area 5**



## Key to Site Investigation Records

Project: King's Cross Zone A – Tranche 1A and 2

Project I.D.: GTS-12-161

Client: BAM Nuttall Limited

### ***In Situ Testing & Observations***

PID Photo Ionisation Detection test, reported in ppm.

S or C Standard Penetration Test as BS EN 1997-2 (2007) . Uncorrected test result shown on the log at the relevant depth. S – split spoon or C – solid cone.

HV Hand vane test, shear strength reported in kPa.

PP Pocket penetrometer test, shear strength reported in kPa.



Groundwater strike



Level to which groundwater has risen after the specified time. (Nominal 20 minutes).

### ***Sampling***

D Small disturbed sample, around 1kg.

B Bulk disturbed sample, around 5kg.

C Core undisturbed sample.

W Water sample.

ES Environmental soil sample, in more than one container if appropriate.

UT Undisturbed driven thinwall tube sample. Nominal 100mm diameter and 450mm length in CP boreholes. The number of blows taken to drive the sample tube the full length is reported on the log sheet at the appropriate depth along with the percentage recovery. The U100 thinwall has an edge taper angle of 5 degrees, area ratio of 14.97 and an internal diameter of 104mm, which complies with BS EN ISO 22475-1 (2006), for a thin wall open drive sampler.

### ***Geological Abbreviations***

Dm Structureless CHALK. Matrix supported.



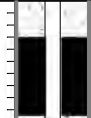
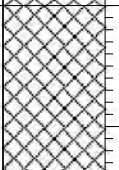
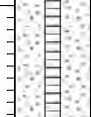
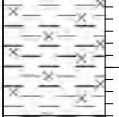

Dc Structureless CHALK. Clast supported.

AZCL Assessed Zone of Core Loss

### ***General Comments***

1. Soil samples have been described in accordance with BS EN ISO 14688-2(2002), BS EN ISO 14688-2(2004) and BS5930:2007 'Code of practice for site investigation' – Section 6.

2. Electronic data provided in relation to this project has been produced using the Association of Geotechnical & Geoenvironmental Specialists (AGS) data transfer format, with specific reference to their publication 'Electronic Transfer of Geotechnical and Geoenvironmental Data Edition 3.1, 2004 including addendum May 2005'. All legend and backfill codes are as per this document.

 <b>GROUND TECHNOLOGY</b> Maple Road, Kings Lynn Norfolk, PE34 3AF Tel: 01553 817657 www.groundtechnology.co.uk			<b>Borehole Record</b>				<b>BH1225</b>		Sheet 1 of 1			
<b>Client :</b> BAM Nuttall Limited			<b>Project:</b> Kings Cross Zone A_Tranche 2  <b>Project ID:</b> GTS-12-161				<b>Ground Level:</b> 25.063mAOD <b>Coordinates:</b> 530188.37E 183410.40N					
Description			Legend	Depth (m)	O.D. Level (m)	Sample Test		SPT/CPT		Remarks and Test Results		Installations
						Type	Depth (m)	Casing Depth (m)	Water Depth (m)	SPT/HV/PP (Recovery)	PID (ppm)	
MADE GROUND: Asphalt over reddish grey silty fine to coarse SAND and GRAVEL. No visual or olfactory evidence of contamination.				0.05	25.01	ES1	0.30-0.40				0.70	
MADE GROUND: Brown silty gravelly fine to medium SAND. Gravel is angular to subangular fine to coarse limestone. No visual or olfactory evidence of contamination.				0.60	24.46	B1	0.60-1.00				0.10	
MADE GROUND: Dark brown silty gravelly fine to medium SAND. Gravel is angular to subangular fine to coarse brick and concrete. Some clay pockets. No visual or olfactory evidence of contamination.				1.50	23.56	B2	1.50-2.00				0.10	
MADE GROUND: Firm greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse brick and concrete. A little plastic and wood. No visual or olfactory evidence of contamination.						ES4	2.60-2.70				0.00	
						B3	3.00-3.50				0.20	
MADE GROUND: Brownish grey slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine to medium brick and concrete. Some clay pockets. No visual or olfactory evidence of contamination.				5.00	20.06	B4	5.00-5.40				0.20	
						ES6	5.00-5.10				0.20	
						B5	6.00-6.30				0.20	
Stiff closely fissured thinly bedded greyish brown silty CLAY. A little yellowish brown silt veining. (LONDON CLAY). No visual or olfactory evidence of contamination.				6.40	18.66	B6	6.40-6.80				0.70	
						ES8	6.60-6.80				0.40	
Borehole Complete at 7.40 m				7.40	17.66	ES9	7.30					
Water Level Observations												
Hole Diameter Detail			Chiseling Details			Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)	
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)							
150	7.40	1.50				No Groundwater Encountered						
<b>Dates:</b> 18/09/2012 <b>Plant:</b> Dando 2000 <b>Drilled By:</b> A. Elshof <b>Logged By:</b> J. Tomalin <b>Checked By:</b> P. Lewin						<b>Remarks:</b> 1. Starter pit dug from GL to 1.20mbgl. 2. 63mm HDPE Standpipe installed to 6.50mbgl. Hole finished with flush cover and dual gas taps. 3. Hole backfilled with concrete from GL to 0.30mbgl, bentonite pellets from 0.30m to 0.90mbgl, gravel from 0.90m to 6.50mbgl and bentonite pellets from 6.50m to 7.40mbgl.						



**GROUND TECHNOLOGY**  
 Maple Road, Kings Lynn  
 Norfolk, PE34 3AF  
 Tel: 01553 817657  
 www.groundtechnology.co.uk

## Window Sample Record

**WS1217**

Sheet 1 of 1

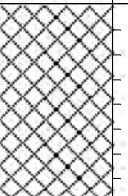
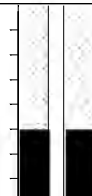
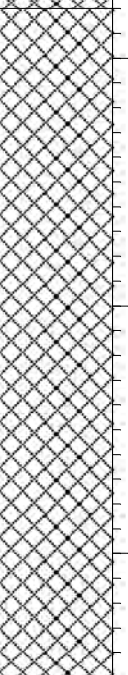
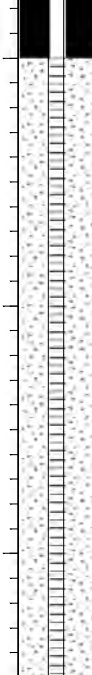
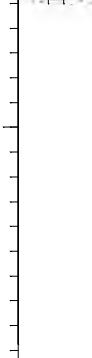
Project: Kings Cross Zone A\_Tranche 2

Project ID: GTS-12-161

Client: BAM Nuttall Limited

Engineer: AMEC (E&I) UK Limited

Ground Level: 23.226mAOD  
 Coordinates: 530195.72E  
 183402.11N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test		Remarks and Test Results	PID (ppm)	Installations			
				Type	Depth (m)						
MADE GROUND: Brownish grey silty fine to coarse SAND and GRAVEL. Gravel is angular fine to coarse flint, brick and concrete. Approximately 10% cobbles. No visual or olfactory evidence of contamination.		0.80	22.43	B3	0.00-0.50		0.10				
				ES1	0.30-0.40						
MADE GROUND: Very stiff brownish grey slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse concrete, brick, flint, granite and asphalt. No visual or olfactory evidence of contamination.		0.80	22.43	ES2 B4	0.80-1.00 0.80-1.20		0.10				
				ES3 L6	1.20-1.30 1.20-2.00						
...from 1.30mbgl stiff									L7	2.00-3.00	0.20
									ES4	2.20	
				B9	3.00-3.50		0.10				
				ES5	3.20-3.30						
...at 3.50m Concrete obstruction. Window Sample Complete at 3.50 m		3.50	19.73								

### Water Level Observations

Drive Records			Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
Diameter (mm)	To (m)	Recovery (%)						
112	2.00	100		No Groundwater Encountered				
112	3.00	95						

Date: 18/09/2012  
 Plant: Dando Terrier  
 Drilled By: L. Evans  
 Logged By: J. Tomalin  
 Checked By: P. Lewin

Remarks: 1. Starter pit dug to 1.20mbgl.  
 2. 63mm HDPE standpipe installed to 3.50mbgl. Hole finished with two gas taps and flush cover.  
 3. Hole backfilled with concrete from GL to 0.50mbgl, bentonite pellets from 0.50m to 1.00mbgl and gravel from 1.00m to 3.50mbgl. 4. Borehole terminated at 3.50mbgl on concrete obstruction.





**GROUND TECHNOLOGY**  
Maple Road, Kings Lynn  
Norfolk, PE34 3AF  
Tel: 01553 817657  
www.groundtechnology.co.uk

## Window Sample Record

**WS1219**

Sheet 1 of 1

Project: Kings Cross Zone A\_Tranche 2

Project ID: GTS-12-161

Client: BAM Nuttall Limited

Engineer: AMEC (E&I) UK Limited

Ground Level: 17.436mAOD  
Coordinates: 530206.77E  
183350.25N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test		Remarks and Test Results PID (ppm)	Installations
				Type	Depth (m)		
MADE GROUND: Asphalt.		0.35	17.09	ES1	0.40-0.60	0.40	
MADE GROUND: brown slightly silty gravelly fine to coarse SAND. Gravel is angular fine to coarse brick concrete flint and tarmac. No visual or olfactory evidence of contamination.		0.60	16.84	ES2	0.70-0.80	0.20	
Stiff very closely fissured brown with a little grey CLAY, with some roots and rootlets. A little sandy gypsum crystals. No visual or olfactory evidence of contamination.				ES3	1.50-1.60	0.10	
From 1.70m bgl becoming very stiff.		2.00	15.44				
Window Sample Complete at 2.00 m							

### Water Level Observations

Drive Records			Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
Diameter (mm)	To (m)	Recovery (%)						
87	2.00	100		No Groundwater Encountered				

Date: 18/09/2012  
Plant: Dando Terrier  
Drilled By: L. Evans  
Logged By: J. Tomalin  
Checked By: P. Lewin

Remarks: 1. Starter pit dug from GL to 1.20mbgl.  
2. 63mm HDPE standpipe installed to 0.70mbgl. Hole finished with flush cover and dual gas taps.  
3. Hole backfilled with concrete from GL to 0.30mbgl, gravel from 0.30m to 0.70mbgl and bentonite pellets from 0.70m to 2.00mbgl.



GROUND TECHNOLOGY  
Maple Road, Kings Lynn  
Norfolk, PE34 3AF  
Tel: 01553 817657  
www.groundtechnology.co.uk

## Trial Pit Record

# TP1201

Sheet 1 of 1

Project: Kings Cross Zone A - Tranche 1  
Project ID: GTS-12-146

Client: BAM Nuttall Limited

Engineer: AMEC (E&I) UK Limited

Ground Level: 16.739mAOD  
Coordinates: 30244.61E  
83423.18N

Orientation of Trial Pit: - N/S

Length: 2.00 Width: 1.80 Depth: 2.20

Sample / Test

Remarks  
and  
Test Results

### Description

Legend

Depth  
(m)

O.D.  
Level

Water

Type

Depth  
(m)

PID  
(ppm)

MADE GROUND: Brown/grey gravelly slightly silty SAND. Gravel is fine to coarse subangular to subrounded flint, coarse railway ballast, rare clinker and concrete. No visual or olfactory evidence of contamination.

MADE GROUND: Orange gravelly SAND lense. Two redundant cables (50mm diameter) at 1.00m bgl. No visual or olfactory evidence of contamination.

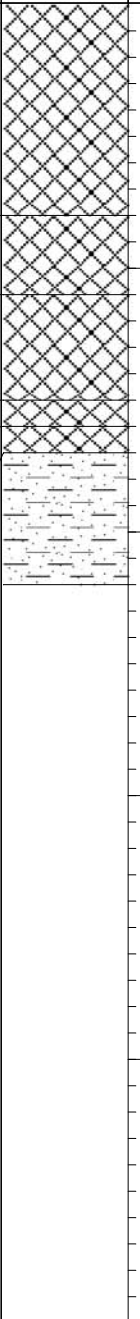
MADE GROUND: Black/dark grey clinker, ash, coal and metal fragments. Clay drainage pipe at 1.20m bgl.

MADE GROUND: Black clinker and soft CLAY.

MADE GROUND: Very soft dark grey CLAY with black hydrocarbon staining. Strong hydrocarbon odour.

Firm light brown and yellow/orange mottled sandy CLAY. No visual or olfactory evidence of contamination. [LONDON CLAY FORMATION]

End of Trial Pit at 2.20 m



ES1

0.50-0.80

0.00

0.80

15.94

1.10

15.64

ES2

1.10-1.20

1.00

1.50

15.24

1.60

15.14

ES3

1.60-1.70

7.40

1.70

15.04

W4

1.80

15.00

ES5

2.10-2.20

0.00

14.54

Date: 09/07/2012  
Plant: 360 Excavator  
Logged By: B. Beaton AMEC  
Checked By: P. Lewin

### Water Level Observations

Date

Water Strike (m)

Standing Time (Mins)

Standing Level (m)

09/07/2012

1.60

10

1.90

Groundwater Remarks: Groundwater encountered at 1.60mbgl.

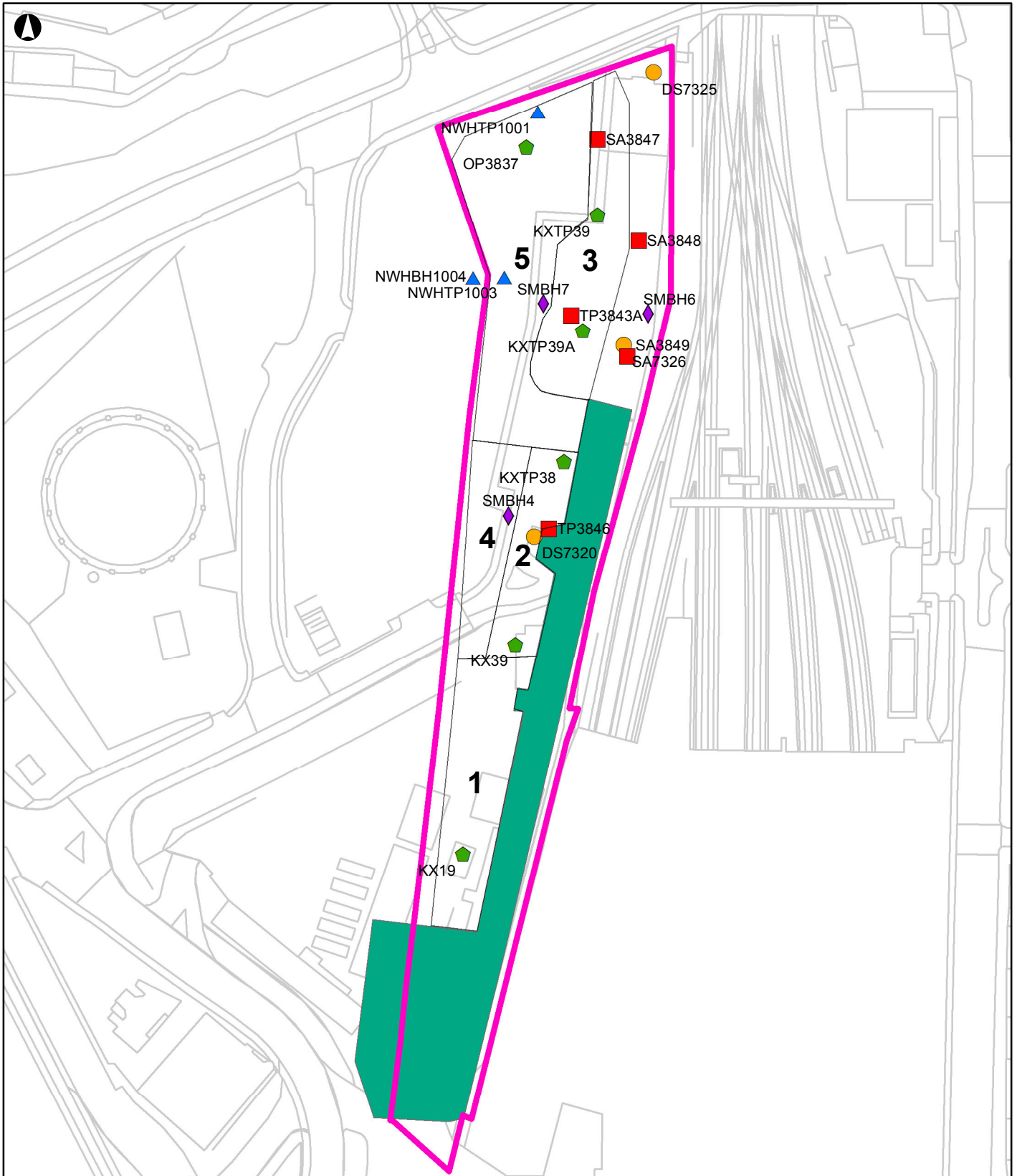
Remarks: 1. PID Headspace Test completed on 60ml Jar Sample - not bag method.  
2. Perched groundwater sampled. Hydrocarbon odour and free product observed on surface.  
3. Trial pit backfilled with arisings on completion.

Hole Stability: Trial pit stable.

## **B2 Pre-2012 Ground investigations**

---

### **B2.1 Plan of ground investigation locations**



### Legend

- ◆ Soil mechanics May 2008
- ▲ Norwest Holst Nov 2008
- ◆ Union Railways 1993
- Union Railways 1996
- Soil Mechanics 1997

Zone A Development Boundary

Shared Service Yard and Access Ramp (South)

©Copyright Information

P1	05/06/2013	EF	RO	RO
Issue	Date	By	Chkd	Appd

# ARUP

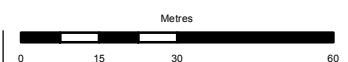
13 Fitzroy Street  
London W1T 4BQ  
Tel +44 20 7636 1531 Fax +44 20 7580 3924  
www.arup.com

Client

**Kings Cross Central Limited Partnership**

Job Title

**Zone A - Reserved Matters ERP**



**Historical exploratory hole locations  
on Zone A excluding the SSY and  
AR(S) footprint**

Scale at A4

**1:1,450**

Job No  
**219902-00**

Drawing Status  
**Issue**

Drawing No  
**Figure B2**

Issue  
**P1**

## B2.2 Logs of boreholes in Sub-Area 5



Contract No.	F15323	Method	Cable Percussion	Coordinates	30201.47 E
Project	Kings Cross Goods Way				83403.44 N
Client	Edmund Nuttall Ltd	Drilling Rig	Dando 150	Ground Level	20.60m AOD
Consultant	Peter Brett Associates LLP	Driller	DJD	Orientation	Vertical
		Logged by	JS	Date Started	31/07/2008
				Date Completed	01/08/2008

PROGRESS						BORING DETAILS			
Date	Time	Hole depth	Casing depth	Water depth	Remarks	Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
31/07/2008	0800	0.00	0.00	DRY	Start of Hole	12.20	12.50	0.75	Chiselling
31/07/2008	1800	7.60	4.00	DRY	End of Shift				
01/08/2008	0800	7.60	4.00	7.40	Start of Shift				
01/08/2008	1800	20.00	4.00	DRY	End of Hole				

CASING				WATER STRIKES							
Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.	Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
250	2.70	250	2.70	31/07/2008		7.00	NR	NR	Seepage	4.00	NS
200	20.00	200	4.00								

GENERAL NOTES		SPT DETAILS				
<p>1: Inspection pit machine dug to 1.20m by Edmund Nuttall Limited.</p> <p>2: Aquifer protection installed from 2.00m to 3.00m.</p> <p>3: CP complete at 20.00m.</p> <p>4: Standpipe installed with slotted section from 3.00m to 6.00m.</p> <p>5: Hole backfilled as follows; from 20.00m to 7.50m with grout, 7.50m to 6.00m with bentonite seal, 6.00m to 3.00m with pea gravel, 3.00m to 0.50m with bentonite seal, and finally from 0.50m to GL with concrete.</p> <p>Stopcock cover installed.</p>		Depth	Type	Incremental blow count/penetration	Casing	Water Depth
		2.20	S	N=8 (1,1,2,2,2,2)	2.20	DRY
		3.30	S	N=13 (1,2,3,2,4,4)	2.70	DRY
		4.50	S	8/90mm	4.00	DRY
		5.20	S	N=16 (3,3,3,4,4,5)	4.00	DRY
		6.20	S	N=20 (2,3,4,5,5,6)	4.00	DRY
		7.60	S	N=17 (2,3,4,4,4,5)	4.00	DRY
		9.00	S	N=21 (2,4,5,5,5,6)	4.10	DRY
		10.50	S	N=20 (3,4,4,5,5,6)	4.00	DRY
		11.90	S	50/185mm (4,4,5,25,20/35mm)	4.00	DRY
		13.50	S	N=31 (4,6,6,7,9,9)	4.00	DRY
		15.00	S	N=29 (5,5,7,7,7,8)	4.00	DRY
		16.50	S	N=32 (5,5,8,8,8,8)	4.00	DRY
		18.00	S	N=33 (4,6,8,8,8,9)	4.00	DRY
		19.50	S	N=37 (5,6,8,8,10,11)	4.00	DRY
		* Seating blows only.				

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.04
Revised	15/08/2007

Contract No.	F15323	Method	Cable Percussion	Coordinates	30201.47 E
Project	Kings Cross Goods Way				83403.44 N
		Drilling Rig	Dando 150	Ground Level	20.60m AOD
Client	Edmund Nuttall Ltd	Driller	DJD	Orientation	Vertical
		Logged by	JS	Date Started	31/07/2008
Consultant	Peter Brett Associates LLP			Date Completed	01/08/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling	SPT N & (U blows)	SPT type & depth	Install- ation
MADE GROUND: Brown to grey slightly sandy silty clay. Occasional gravel size fragments of brick, coal and concrete. Occasional medium gravel size pockets of sand size coal fragments.				ES301 1.00			
Soft light brown mottled grey silty slightly sandy CLAY. Occasional laminations of fine yellow sand. Occasional medium size pockets of grey brown clay. (Weathered LONDON CLAY FORMATION)		2.20	18.40	B1 2.00 - 2.20 ES302 2.00 D2 2.20 B3 2.20 - 2.60 ES303 2.30 U4 2.80 - 3.25	S8 (20)	S 2.20	2.65
Firm, mottled orange brown silty CLAY. Occasional 2mm partings of fine yellow and orange sand. Occasional fine sand size selenite crystals. (Weathered LONDON CLAY FORMATION)		3.25	17.35	D5 3.25 D6 3.30 U7 4.00 - 4.40	S13 (30)	S 3.30	3.75
Moderately strong to strong grey brown silty CLAYSTONE. Recovered as a brownish grey subangular, fine to coarse gravel of silty claystone. Occasional reddish brown staining. (Weathered LONDON CLAY FORMATION).		4.75 4.90	15.85 15.70	D8 4.40 D9 4.50 D10 4.75 U11 4.90 - 5.10 D12 5.10 D13 5.20 U14 5.70 - 6.15	S8/90mm (30)	S 4.50	4.74
Firm, orange, brown and grey silty CLAY. Occasional 1mm partings of fine to coarse yellow sand. Occasional coarse gravel size pockets of selenite crystals and orange sand. (Weathered LONDON CLAY FORMATION)				D15 6.15 D16 6.20 D17 6.70	S20	S 6.20	6.65
Moderately strong, grey to brown CLAYSTONE.		7.00 7.10	13.60 13.50	D18 7.00 U19 7.10 - 7.50	(40)		
Firm to stiff greyish brown locally fissured silty CLAY. Occasional medium sand size selenite crystals. Fissures are randomly orientated with orange staining on surfaces. (Weathered LONDON CLAY FORMATION).				D20 7.50 D21 7.60 D22 8.00 U23 8.50 - 8.90 D24 8.90 D25 9.00 D26 9.50	S17 (30) S21	S 7.60	8.05 9.45

NOTES: All depths in metres, all diameters in millimetres.  
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.08
Revised	29/03/2008

Contract No.	F15323	Method	Cable Percussion	Coordinates	30201.47 E
Project	Kings Cross Goods Way				83403.44 N
Client	Edmund Nuttall Ltd	Drilling Rig	Dando 150	Ground Level	20.60m AOD
Consultant	Peter Brett Associates LLP	Driller	DJD	Orientation	Vertical
		Logged by	JS	Date Started	31/07/2008
				Date Completed	01/08/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling	SPT N & (U blows)	SPT type & depth	Install- ation
Firm to stiff greyish brown locally fissured silty CLAY. Occasional medium sand size selenite crystals. Fissures are randomly orientated with orange staining on surfaces. (Weathered LONDON CLAY FORMATION). --- At 10.45m: With light grey silt filled tubes (<2mm diameter).				U27 10.00 - 10.45 D28 10.45 D29 10.50 D30 11.00 U31 11.50 - 11.85 D32 11.85 D33 11.90	(50) S20	S 10.50 10.95	
Strong grey brown silty CLAYSTONE. Recovered as a brown grey subangular fine to coarse gravel of silty claystone.		12.20	8.40	D34 12.40			
Very stiff very closely fissured dark grey silty CLAY. (LONDON CLAY FORMATION, A2). ---Below 12.50m: Abundant light grey silt filled tubes (<1mm diameter) and occasional medium gravel size pockets of fine to medium grey brown sand.		12.50	8.10	U35 13.00 - 13.45 D36 13.45 D37 13.50 D38 14.00 U39 14.50 - 14.95 D40 14.95 D41 15.00 D42 15.50 U43 16.00 - 16.45 D44 16.45 D45 16.50 D46 17.00 U47 17.50 - 17.90 D48 17.90 D49 18.00	(70) S31	S 13.50 13.95	
---At 14.95m: Sandy with abundant mica and selenite crystals.				D42 15.50 U43 16.00 - 16.45 D44 16.45 D45 16.50 D46 17.00 U47 17.50 - 17.90 D48 17.90 D49 18.00	(65) S29	S 15.00 15.45	
Very stiff dark grey silty CLAY with occasional selenite and mica crystals, rare light grey silt tubes (<2mm diameter). Occasional white shell fragments. (HARWICH FORMATION - SWANSCOMBE MEMBER)		17.90	2.70	D48 17.90 D49 18.00	S33	S 18.00 18.45	
Very stiff dark grey slightly silty, very sandy CLAY with occasional micaceous partings and rare silt tubes (<20mm diameter). Sand is fine to medium. (HARWICH FORMATION - SWANSCOMBE MEMBER)		18.50	2.10	D50 18.50 U51 19.00 - 19.45 D52 19.45 D53 19.50	(70) S37	S 19.50 19.95	

Cable Percussion boring complete at 20.00 m.

NOTES: All depths in metres, all diameters in millimetres.  
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.08
Revised	29/03/2006

Contract No.	F15323	Method	Machine Excavated	Coordinates	30208.99 E
Project	Kings Cross Goods Way				83423.33 N
		Equipment	360 Excavator	Ground Level	22.52m AOD
Client	Edmund Nuttall Ltd			Date Started	08/08/2008
		Logged by	JS	Date Completed	08/08/2008
Consultant	Peter Brett Associates LLP				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling	Remarks
MADE GROUND: Brown slightly clayey very sandy gravel. Sand is fine to coarse. Gravel size fragments are subangular to subrounded fine to coarse of flint, chalk, brick, clinker and concrete. Common cobble size fragments of subangular brick and concrete.				ES1 0.50 D2 0.50 B5 0.80 - 1.20 ES3 1.00 D4 1.00	
MADE GROUND: Black brown sandy gravel. Sand is fine to coarse. Gravel size fragments are subangular to subrounded fine to coarse of clinker, slag and coal.		1.50 1.60 1.70	21.02 20.92 20.82	ES6 1.50 D7 1.50  D8 2.00 ES9 2.00	
MADE GROUND: Brown slightly clayey very sandy gravel. Sand is fine to coarse. Gravel size fragments are subangular to subrounded fine to coarse of flint, chalk, brick, clinker and concrete. Common cobble size fragments of subangular brick and concrete.				D10 2.50 B11 2.50  ES12 3.00 D13 3.00	
Soft brown mottled grey silty CLAY with orange staining. Occasional partings of fine orange sand. (Weathered LONDON CLAY FORMATION). --- At 1.70m: Intact railway sleeper encountered.				D14 3.50   D15 4.00 ES16 4.00	
Trial pit complete at 4.50 m.		4.50	18.02	D17 4.50	

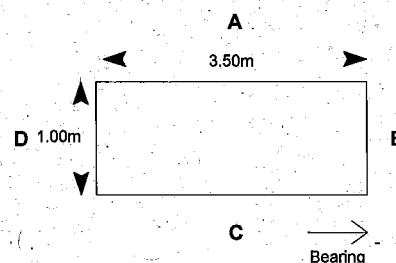
Stability Unstable sides in Made Ground.

Shoring None used.

Groundwater Seepage from 2.4m.  
No standing water.

Remarks 1: Trial pit machine excavated to 4.50m by Edmund Nuttall Ltd.  
2: Co-ordinates from northern most corner.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.  
See legend sheet for key to symbols and abbreviations.  
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.05
Revised	15/02/2006

Contract No.	F15323	Method	Machine Excavated	Coordinates	30200.06 E
Project	Kings Cross Goods Way				83379.23 N
		Equipment	360 Excavator	Ground Level	20.44m AOD
Client	Edmund Nuttall Ltd			Date Started	20/08/2008
		Logged by	JM	Date Completed	20/08/2008
Consultant	Peter Brett Associates LLP				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling	Remarks
<b>TOPSOIL:</b> Grass over topsoil.  <b>MADE GROUND:</b> Brown slightly clayey sandy gravel. Sand is fine to coarse. Gravel size fragments are subangular to subrounded, fine to coarse of brick, flint, glass, concrete, pottery and clinker. Occasional cobble size fragments of brick. Rootlets and roots present. — At 0.40m: Two walls at 1.20m and 1.90m from Face D. — At 1.00m: Walls are part of manhole. Drainage pipe (150mm in diameter) at 1.20m.		0.05	20.39	ES1 D2	0.50 0.50
				ES3 D4 B8	1.50 1.50 1.50 - 1.80
<b>MADE GROUND:</b> Brownish orange very closely fissured sandy gravelly clay. Green discolouration along fissure surfaces. Occasional black staining. Sand is fine. Gravel size fragments are subangular to rounded, fine to medium of brick, clinker, flint and chalk.		2.00	18.44	ES5 D6	2.00 2.00
				D7	2.50
<b>MADE GROUND:</b> Firm to stiff, brownish orange very closely fissured sandy CLAY. Green discolouration along partings. Sand is fine, occasionally micaceous. (Weathered LONDON CLAY FORMATION)		2.80	17.64	ES9 D10	3.00 3.00
				ES11	4.00
Trial pit complete at 4.50 m.		4.50	15.94	D12	4.50

**Stability** Inspection pit walls unstable to clay. Walls undercut.

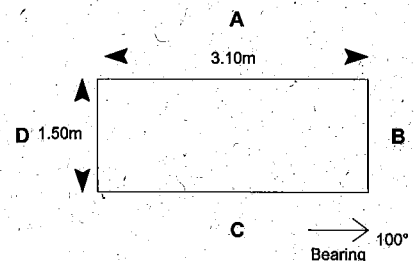
**Shoring** No shoring was utilised during the excavation.

**Groundwater** Groundwater was encountered in the form of seepage at 2.30m.

**Remarks**

- 1: Excavated onto a bank.
- 2: Concrete restricted TP excavation.
- 3: Full depth only reached towards face B.
- 4: Trial pit machine excavated to 4.50m by Edmund Nuttall Ltd.
- 5: Co-ordinates from northern most corner.

**Sketch Plan of Trial Pit**



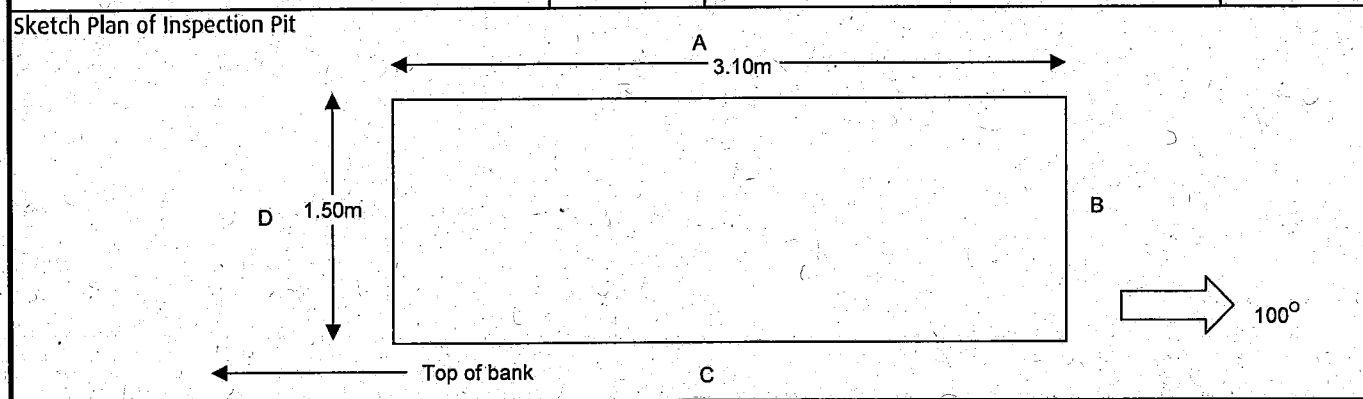
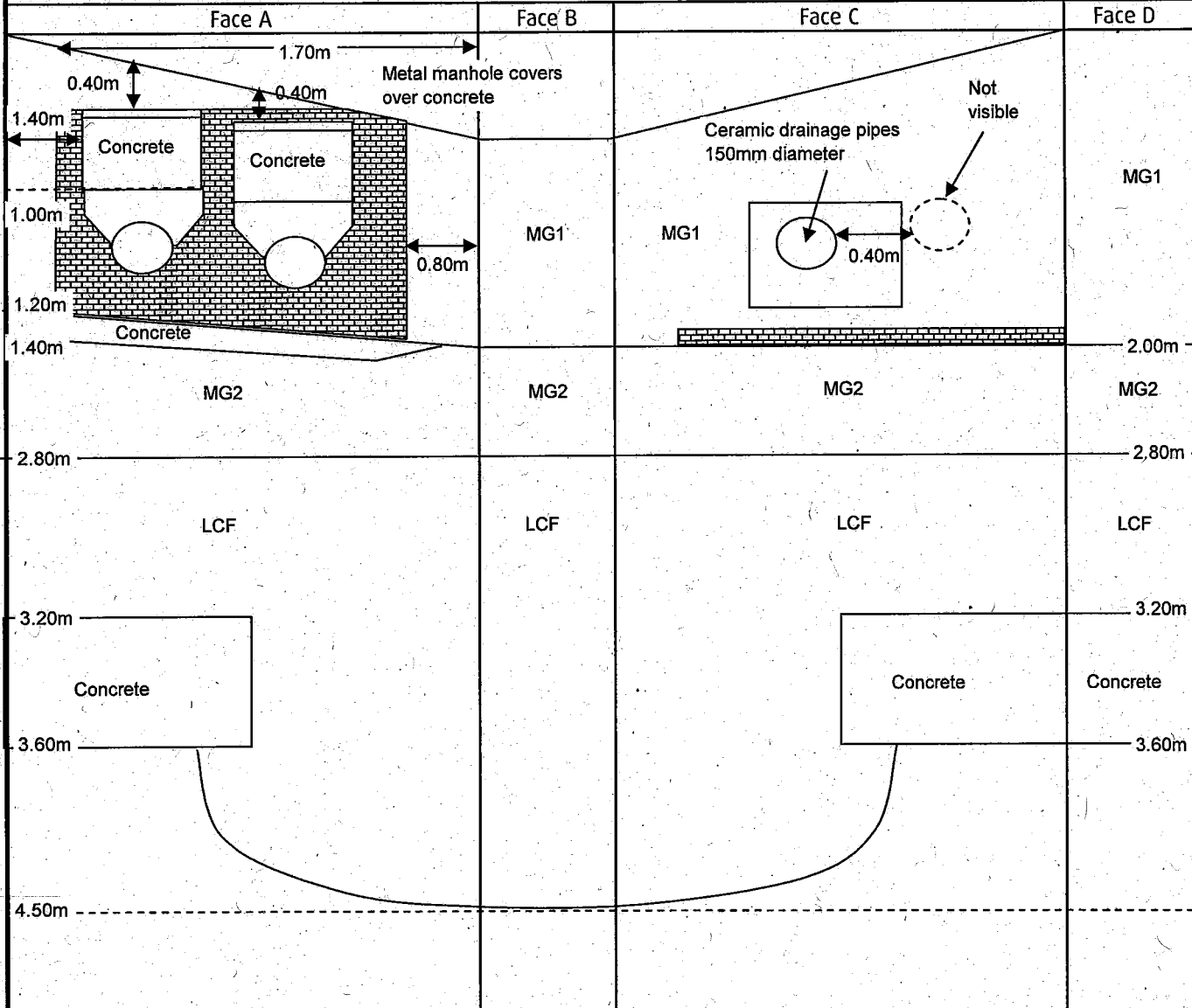
**NOTES:** All depths in metres, all soil strengths in kPa.  
See legend sheet for key to symbols and abbreviations.  
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.05
Revised	15/02/2006



Project Name	Kings Cross Goods Way	Trial Pit/ Inspection Pit/ Observation Pit Sketch	Hole ID
Project No.	F15323		TP1003
Engineer	Peter Brett Associates LLP		Fig no.
Client	Edmund Nuttall Ltd		01

Equipment	M.H.3.6	Method	Machine Excavated
Ground Level	20.441	Coordinates	30200.069, 83379.231



REMARKS - All depths in metres, all soil strengths in kPa, see legend sheet for key to symbols and abbreviations, all bearings given relate to magnetic north, see main log for strata descriptions and sampling details.

Plotted by J. Marks'	Checked by	Approved by	<b>NORWEST HOLST</b> SOIL ENGINEERING
20/08/2008	Date	Date	
Form No. SI IPSA4	Revision No. 1.01	Issue Date 20/01/2006	

# Borehole Log

## PRELIMINARY



Soil Mechanics

<b>Drilled</b> LM <b>Logged</b> RT <b>Checked</b>	<b>Start</b> 28/10/2007 <b>End</b> 02/11/2007	<b>Equipment, Methods and Remarks</b> Dando 3000 Hand dug inspection pit from GL to 1.30m depth. Cable percussive boring from 1.30m to 45.00 m		<b>Depth from</b> 0.00m 3.00m 34.50m	<b>to</b> 3.00m 34.50m 45.00m	<b>Diameter</b> 250mm 200mm 150mm	<b>Casing Depth</b> 2.50m 34.50m 45.00m	<b>Ground Level</b> Coordinates National Grid Chainage
<b>Samples and Tests</b>				<b>Strata</b>				
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
			28/10/2007	0800	(MADE GROUND) Dark grey tarmac.	(0.30)		
0.70 0.70	D 1 ES 2	4 samples taken			(MADE GROUND) Alternating layers of CONCRETE and brown gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of brick, breeze block, concrete and flint. Occasional plant fragments.	(1.00)		
1.50-1.95 1.50-1.95	SPT S D 3	N=14 (2,3/4,3,3,4)	1.50	dry	(MADE GROUND/COHESIVE FILL) Firm brown mottled blue grey orange brown and yellow slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of brick, breeze block, concrete and flint. Occasional plant fragments.	(0.90)		
2.20	D 4					2.20		
2.50-2.95	U 5							
3.00	D 6		28/10/2007 3.00	1800 dry	Firm fissured brown mottled blue grey CLAY. Fissures are extremely closely spaced, randomly orientated and matt. Occasional to frequent pockets (<3mm) of orange brown silt. Rare to occasional fine to medium sand size selenite crystals.			
3.50-3.95	U 7	40 blows	29/10/2007 3.00	0800 dry	(WEATHERED LONDON CLAY FORMATION)	(2.30)		
4.50-4.95 4.50-4.95	SPT S D 8	N=17 (1,3/3,4,5,5)	3.00	dry	3.95 m Pocket of orange fine to medium sand, 1 no. coarse gravel size selenite crystal.	4.50		
5.50-5.95	U 9	40 blows	3.00	dry	Firm becoming stiff fissured dark grey brown CLAY. Fissures are extremely closely spaced, randomly orientated and matt. Occasional to frequent pockets (<3mm) of brown orange silt. Rare to occasional fine to medium sand size selenite crystals.			
6.00	D 10				(WEATHERED LONDON CLAY FORMATION)			
6.50-6.95	U 11	40 blows	3.00	dry		(4.50)		
7.00	D 12							
7.50-7.95 7.50-7.95	SPT S D 13	N=19 (3,4/4,4,5,6)	3.00	dry				
8.50-8.95	U 14	45 blows	3.00	dry				
9.00	D 15							
9.50-9.95	U 16	45 blows	3.00	dry	Very stiff fissured grey CLAY. Fissures are extremely to very closely spaced, randomly orientated and slightly polished. Occasional pockets (<5mm) of lignite. Frequent fine sand size selenite crystals and occasional	9.00		
Depth	Type & No	Records	Date Casing	Time Water	Stratum continues to 15.50 m			
<b>Groundwater Entries</b> No. Struck Post strike behaviour				Depth sealed (m)	<b>Depth Related Remarks *</b> From to (m) 1.50 3.00 Bentonite seal added for clean drilling purposes		Chiselling Depths (m) 8.10 -8.30	Time Tools used 30 mins Chisel
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.				Project Kings Cross Shared Goods Yard	Project No. D7049		Borehole BH7	
Scale 1:50 (c) ESGL www.esgl.co.uk 408.24 12/11/2007 16:06:19				Carried out for Argent Estates Ltd			Sheet 1 of 5	

# Borehole Log

## PRELIMINARY



Soil Mechanics

<b>Drilled</b> LM <b>Logged</b> RT <b>Checked</b>	<b>Start</b> 28/10/2007 <b>End</b> 02/11/2007	<b>Equipment, Methods and Remarks</b> Dando 3000 Hand dug inspection pit from GL to 1.30m depth. Cable percussive boring from 1.30m to 45.00 m		<b>Depth from</b> 0.00m 3.00m 34.50m	<b>to</b> 3.00m 34.50m 45.00m	<b>Diameter</b> 250mm 200mm 150mm	<b>Casing Depth</b> 2.50m 34.50m 45.00m	<b>Ground Level</b> - <b>Coordinates</b> - <b>National Grid</b> - <b>Chainage</b> -
<b>Samples and Tests</b>				<b>Strata</b>				
Depth	Type & No	Records	Date Casing	Time Water	Description (Continued from Sheet 1)	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
10.00	D 17				partings of grey fine to medium sand. Occasional pockets (<3mm) of black silt. Occasional to frequent shell fragments (<5mm). (LONDON CLAY FORMATION)			
10.50-10.95	SPT S D 18	N=27 (4,5/5,6,8,8)	3.00	dry				
11.50-11.95	U 19	45 blows 300 mm rec	3.00	dry				
12.00	D 20							
12.50-12.95	U 21	45 blows 430 mm rec	3.00	dry				
13.00	D 22							
13.50-13.95	SPT S D 23	N=34 (4,6/7,8,9,10)	3.00	dry				
14.50-14.95	U 24	50 blows	3.00	dry				
15.00	D 25					14.95-15.00 m Slightly sandy.		
15.50-15.95	U 26	60 blows 300 mm rec	3.00	dry		Stiff to very stiff dark grey sandy CLAY. Sand is fine to medium. Occasional fine gravel size pockets of white fine to medium sand. Occasional lenses (<2mm thick) of grey silt. (LONDON CLAY FORMATION)	15.50	
16.00	D 27							
16.50-16.95	SPT S D 28	N=40 (3,6/7,10,11,12)	3.00	dry		(2.00)		
17.50-17.95	U 29	60 blows 390 mm rec	3.00	dry	Very stiff thinly laminated grey CLAY. Fissures are extremely closely spaced, randomly orientated, smooth and matt. Frequent fine to medium sand size selenite crystals. Occasional lenses (<3mm) of grey silt. Occasional fine gravel size pockets and partings of light grey fine to medium sand. (LONDON CLAY FORMATION)	17.50		
18.00	D 30							
18.50-18.95	U 31	60 blows 350 mm rec	3.00	dry		18.00-18.95 m Recovered as; firm to stiff and sandy with shell fragments (<5mm)		
19.00	D 32							
19.50-19.95	SPT S D 33	N=41 (6,8/9,10,10,12)	3.00	dry		(3.50)		
			29/10/2007 3.00	1800 dry				
Depth	Type & No	Records	Date Casing	Time Water	Stratum continues to 21.00 m			
<b>Groundwater Entries</b> No. Struck Post strike behaviour Depth sealed (m)					<b>Depth Related Remarks *</b> From to (m)		<b>Chiselling</b> Depths (m) Time Tools used	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Kings Cross Shared Goods Yard Project No. D7049 Carried out for Argent Estates Ltd		Borehole <b>BH7</b> Sheet 2 of 5	

Scale 1:50

(c) ESGL www.esgl.co.uk  
408.24 12/11/2007 16:08:25



# Borehole Log

## PRELIMINARY



Soil Mechanics

<b>Drilled</b> LM <b>Logged</b> RT <b>Checked</b>	<b>Start</b> 28/10/2007 <b>End</b> 02/11/2007	<b>Equipment, Methods and Remarks</b> Dando 3000 Hand dug inspection pit from GL to 1.30m depth. Cable percussive boring from 1.30m to 45.00 m		<b>Depth from</b> 0.00m <b>to</b> 3.00m <b>Diameter</b> 250mm <b>Casing Depth</b> 2.50m	<b>Depth from</b> 3.00m <b>to</b> 34.50m <b>Diameter</b> 200mm <b>Casing Depth</b> 34.50m	<b>Depth from</b> 34.50m <b>to</b> 45.00m <b>Diameter</b> 150mm <b>Casing Depth</b> 45.00m	<b>Ground Level</b> - <b>Coordinates</b> - <b>National Grid</b> - <b>Chainage</b>		
<b>Samples and Tests</b>				<b>Strata</b>					
Depth	Type & No	Records	Date Casing	Time Water	Description (Continued from Sheet 2)		Depth, Level/ (Thickness)	Legend	Backfill/ Instruments
20.50-20.95	U 34	70 blows 300 mm rec	30/10/2007 3.00	0800 damp	Very stiff thinly laminated grey CLAY. Fissures are extremely closely spaced, randomly orientated, smooth and matt. Frequent fine to medium sand size selenite crystals. Occasional lenses (<3mm) of grey silt. Occasional fine gravel size pockets and partings of light grey fine to medium sand. (LONDON CLAY FORMATION)		21.00		
21.00	D 35			damp					
21.50-21.95	U 36	70 blows 150 mm rec	3.00	dry	Very stiff fissured multicoloured (blue, red, brown, purple, yellow) CLAY. Fissures are extremely to very closely spaced, randomly orientated and slightly polished. (LAMBETH GROUP)				
22.00	D 37								
22.50-22.95	SPT S D 38	N=45 (5,6/8,10,12,15)	3.00	dry					
23.50-23.95	U 39	100 blows 400 mm rec	3.00	dry					
24.00	D 40								
24.50-24.95	U 41	100 blows 400 mm rec	3.00	dry					
25.00	D 42						(9.50)		
25.50-25.89	SPT S D 43	50 (4,7/10,13,17,10 for 10mm)	3.00	dry					
26.50-26.95	U 44	100 blows 230 mm rec	3.00	dry					
27.00	D 45								
27.50-27.95	U 46	100 blows 200 mm rec	3.00	damp					
28.00	D 47		30/10/2007 3.00	1800 dry					
28.50-28.83	SPT S D 48	50 (8,9/14,16,20 for 30mm)	3.00	dry					
28.50-28.95			31/10/2007 3.00	0800 damp					
29.50-29.95	U 49	100 blows			28.50 m Lenses of light grey, possible calcium carbonate (5mm)				
Depth	Type & No	Records	Date Casing	Time Water	Stratum continues to 30.50 m				
<b>Groundwater Entries</b> No. Struck (m) Post strike behaviour Depth sealed (m)					<b>Depth Related Remarks *</b> From to (m)		<b>Chiselling</b> Depths (m)	Time	Tools used
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Kings Cross Shared Goods Yard Project No. D7049 Carried out for Argent Estates Ltd		Borehole <b>BH7</b> Sheet 3 of 5		

# Borehole Log

**PRELIMINARY**



Soil Mechanics

Drilled LM Logged RT Checked		Start 28/10/2007 End 02/11/2007		Equipment, Methods and Remarks Dando 3000 Hand dug inspection pit from GL to 1.30m depth. Cable percussive boring from 1.30m to 45.00 m		Depth from 0.00m 3.00m 34.50m		to 3.00m 34.50m 45.00m		Diameter 250mm 200mm 150mm		Casing Depth 2.50m 34.50m 45.00m		Ground Level Coordinates National Grid Chainage	
Samples and Tests						Strata									
Depth	Type & No	Records	Date Casing	Time Water	Description (Continued from Sheet 3)	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments							
30.00	D 50				Very stiff fissured multicoloured (blue, red, brown, purple, yellow) CLAY. Fissures are extremely to very closely spaced, randomly orientated and slightly polished. (LAMBETH GROUP)	30.50									
30.50-30.95	U 51	100 blows 200 mm rec	3.00	dry											
31.00	D 52				Very stiff fissured (possibly sheared) multicoloured (blue, red, purple, brown) CLAY. Fissures are very closely spaced, randomly orientated and polished. (LAMBETH GROUP)										
31.50-31.81 31.50-31.95	SPT S D 53	50 (6,10/17,18,15 for 5mm)	3.00	dry											
32.00	D 54														
32.50-32.95	U 55	100 blows 200 mm rec	3.00	dry		(4.00)									
33.00	D 56														
33.50-33.95	U 57	100 blows 250 mm rec	3.00	dry											
34.50-34.88 34.50 34.50-34.95	SPT S D 58 D 59	50 (9,9/11,15,16,8 for 5mm)	31/10/2007 34.50	1800 32.10	Very stiff brown slightly sandy CLAY. Sand is fine. (LAMBETH GROUP).	34.50									
			01/11/2007 34.50	0800 32.10		(1.00)									
35.50-35.81 35.50-35.95	SPT S D 60	50 (8,12/18,22,10 for 5mm)	34.50	32.10	Very stiff blue green sandy CLAY. Sand is fine. (LAMBETH GROUP)	35.50									
						(1.00)									
36.50-36.81 36.50-36.95	SPT S D 61	50 (10,12/15,19,16 for 10mm)	34.50		Very stiff grey sandy CLAY. Sand is fine. (LAMBETH GROUP)	36.50									
						(0.60)									
37.10	D 62					37.10									
37.50-37.67 37.50-37.95	SPT C D 63	50 (19,6 for 5mm/ 32,18 for 10mm)	34.50		Very dense dark green grey slightly sandy GRAVEL. Gravel is subrounded to rounded, fine to coarse of black flint. Sand is fine. Occasional pockets (<20mm) of soft to firm grey sandy clay. (UPNOR FORMATION)										
						(1.40)									
38.50-38.55 38.50-38.95	SPT C D 64	50 (25 for 20mm/50 for 30mm)	34.50		Very dense dark green grey SAND. Sand is fine. (THANET SAND FORMATION)	38.50									
39.50-39.55 39.50-39.95	SPT C D 65	50 (25 for 30mm/50 for 20mm)	34.50												
Depth	Type & No	Records	Date Casing	Time Water	Stratum continues to 42.50 m										
Groundwater Entries					Depth Related Remarks *					Chiselling					
No.	Struck (m)	Post strike behaviour	Depth sealed (m)		From	to (m)	Water added.			Depths (m)	Time	Tools used			
1	34.60	Rose to 32.10 m after 20 minutes. inflow fast	32.10		35.00	42.00									
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Kings Cross Shared Goods Yard					Borehole					
Scale 1:50					Project No. D7049					BH7					
(c) ESGL www.esgl.co.uk 408.24 12/11/2007 18:08:38					Carried out for Argent Estates Ltd					Sheet 4 of 5					



Drilled LM Logged RT Checked		Start 28/10/2007 End 02/11/2007		Equipment, Methods and Remarks Dando 3000 Hand dug inspection pit from GL to 1.30m depth. Cable percussive boring from 1.30m to 45.00 m		Depth from 0.00m to 3.00m 3.00m to 34.50m 34.50m to 45.00m		Diameter 250mm 200mm 150mm		Casing Depth 2.50m 34.50m 45.00m		Ground Level Coordinates National Grid Chalnage	
Samples and Tests						Strata							
Depth		Type & No	Records	Date Casing	Time Water	Description (Continued from Sheet 4)				Depth, Level/ (Thickness)	Legend	Backfill/ Instruments	
40.50-40.55 40.50-40.95		SPT C D 66	50 (25 for 30mm/50 for 20mm)	34.50	0.00	Very dense dark green grey SAND. Sand is fine. (THANET SAND FORMATION)				(4.00)			
41.50-41.57 41.50-41.95		SPT C D 67	50 (25 for 40mm/50 for 30mm)	34.50	0.00	41.50 m Rare rounded medium to coarse gravel of flint.							
42.50 42.50-42.95		SPT C D 68	0	34.50	10.20	Very dense dark grey sandy GRAVEL. Gravel is subangular to rounded, fine to coarse of black flint. Sand is fine. (BULLHEAD BEDS)				42.50  (1.00)			
43.50 43.50-43.95		SPT C D 69	0	34.50	10.20	Moderately weak white CHALK recovered as; light grey sandy gravel of SILT. Gravel is angular to rounded fine to coarse of weak to moderately weak low density white chalk and black flint. Sand is fine. (UPPER CHALK FORMATION).				43.50  (1.50)			
44.50 44.50-44.95		SPT C D 70	0	02/11/2007 34.50	1800 18.10	EXPLORATORY HOLE ENDS AT 45.00 m				45.00			
Depth		Type & No	Records	Date Casing	Time Water								
Groundwater Entries No. Struck Post strike behaviour (m)						Depth sealed (m)		Depth Related Remarks * From to (m)				Chiselling Depths (m) Time Tools used	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project Kings Cross Shared Goods Yard Project No. D7049 Carried out for Argent Estates Ltd				Borehole BH7 Sheet 5 of 5			

## Appendix C

### Unexploded Ordnance Plans

# C1 Risk Map

---