GROUND INVESTIGATION REPORT
GEOTECHNICAL SITE INVESTIGATION AND FACTUAL REPORT
OF LAND AT
29 SYDNEY STREET
CHELSEA
LONDON
SW3 6PU

Prepared for: -

Dick Whittington Design and Build Ltd.
2 Sharpitter Cottages,
Salcombe,
Devon,
TQ8 8LW

GeoCon Site Investigations Ltd
Suite 2 Marple House,
39 Stockport Road,
Marple
Stockport
SK6 6BD

January 2018
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Written by	*Joe Tant* For and on behalf of GeoCon Site Investigations Ltd Dr. Joe Tant M.EarthSci. (Hons) Engineering Geologist
Reviewed by	*Ian Walker* For and on behalf of GeoCon Site Investigations Ltd Ian Walker B.Sc. (Hons) F.G.S Director
Authorised by	*Ian Walker* For and on behalf of GeoCon Site Investigations Ltd Ian Walker B.Sc. (Hons) F.G.S Director

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From herein after GeoCon Site Investigations Ltd will be referred to as GeoCon.

GeoCon Offices:

Manchester (Head Office)
Suite 2 Marple House
39 Stockport Road
Marple
Stockport
SK6 6BD
Tel: 0844 504 3901

Birmingham
2nd Floor,
Quayside Tower,
Broad Street,
Birmingham.
B1 2HF
Tel: 0844 504 6901

London (East)
Fortis House
160 London Rd,
Barking
London
IG11 8BB
Tel: 0844 504 7901

Newcastle-Upon-Tyne:
The Axis Building,
Maingate, Kingsway North,
Team Valley,
Gateshead,
NE11 0NQ
Tel: 0844 504 7981

Bristol:
2430 / 2440
The Quadrant,
Almondsbury,
Bristol,
BS32 4AQ
Tel: 0844 504 9208

London (West)
Building 3 Chiswick Park,
566 Chiswick High Road,
Chiswick,
London,
W4 5YA
Tel: 0844 504 4901

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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 (to be referred to as GeoCon from hereon in) have been commissioned by Dick Whittington Design and Build Ltd. (to be referred to as DWDB from hereon in) to undertake a Geotechncial Site Investigation on Land at 29 Sydney Street, Chelsea, London.

1.1.2 This report is provided to assist with a planning application for a proposed new residential development at the site, and to and to identify the ground conditions and provide details of their engineering properties in order to facilitate foundation and basement design for the proposed development.

1.1.3 GeoCon have not been commissioned to undertake a Phase I Preliminary Risk Assessment, and have not been provide with any third party reports.

1.2 Scope of Works

- One day's restricted access window sampling at approximately one location to a nominal depth of up to 5.00 mbgl or refusal.
- Insitu geotechnical 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.
- Production of a factual report.

1.3 Limitations

1.3.1 The assessment and interpretation of the factual data obtained as part of this 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 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 at land 29 Sydney Street, Chelsea, London, at approximate National Grid Reference NGR: 527035:178464 (centre of the site).

2.1.2 A site location plan is presented as Drawing No. GSI0910/01 in Appendix A.

2.2 Site Description

2.2.1 The site is a rectangular shaped piece of land adjacent Sydney Street, and is currently occupied by a residential property.

2.2.2 The site is situated within an existing residential area, and is bound by Stewart's Grove to the west, Sydney Street to the east, and residential properties to the north and south, with neighbouring residential and commercial properties beyond.

2.2.3 The topography of the site is generally flat.

2.2.4 Access to the site is via Stewart's Grove from the west.

2.3 Site Usage

2.3.1 GeoCon has not been commissioned to carry out a Phase I PRA; neither has GeoCon been provided with a previous Phase I PRA. Therefore, little is known about the historical site usage.

2.4 Future Site Usage

2.4.1 It is currently proposed to construct a basement under the western section of the site.

2.5 Surrounding Area

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

2.5.2 The topography of the surrounding area is generally flat.

2.6 Statutory Services

2.6.1 GeoCon have not been provided with buried service location plans at this stage.

2.7 Site Reconnaissance

2.7.1 A site walkover was carried out on 17th January 2018. 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 on 17th January 2018.

3.1.2 The specification and scope of works for the ground investigation has been provided by the client

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 specification and scope of works for the ground investigation has been provided by DWDB.

3.1.6 The actual ground investigation comprised the formation of:

- One days windowless sampling at three locations using a restricted access rig.
- Insitu geotechnical 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.
- Production of a factual report.

3.1.7 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.

3.1.8 The locations of the exploratory holes were specified by GeoCon and were positioned to gain key information beneath the site in relation to the proposed development.

3.1.9 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.

3.1.10 All access permissions were arranged by DWDB prior to the ground investigation commencing.

3.1.11 An exploratory hole location plan is presented in Appendix A as drawing number GSI0912/02.

3.2 Windowless Sample Boreholes

3.2.1 Three windowless sample boreholes were drilled at the site using a restricted access windowless sample rig to gain an understanding of the existing ground conditions beneath the site. The boreholes were drilled to depths of between 2.45 and 4.42 mbgl and were all terminated on refusal within the compacted gravels beneath the site.

3.2.2 The windowless sample boreholes have been referenced WS01 to WS03.

3.2.3 Insitu Standard Penetration Tests were carried out at 1.00 m intervals in all boreholes where available to collate strength information for the soils beneath the site.

3.2.4 All windowless sample borehole logs are presented in Appendix B.

3.3 Insitu Testing

3.3.1 The geotechnical insitu testing regime comprised of the following:

- SPT's taken within the windowless sample boreholes taken at 1.00 m intervals.

3.4 Installations and Backfill

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

3.5 Groundwater

3.5.1 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.

3.6 Groundwater Monitoring

3.6.1 GeoCon have not been commissioned to undertake any groundwater monitoring at this stage.

4.0 GROUND CONDITIONS

4.1 Published Geology

4.1.1 The British Geological Survey (BGS) Map Sheet 270 south London, Solid and Drift Edition, and the BGS Online Open Geoscience shows the site to be underlain by the following geological succession outlined below in Table 4.1: Geology.

Table 4.1: Geology

Geology	Description /strata
Artificial	None Recorded
Superficial	Kempton Park Gravel Member
Bedrock	London Clay Formation

4.1.2 There are no artificial deposits indicated underlying the site.

4.1.3 The superficial geology at the site is shown to be the Kempton Park Gravel Member which are generally described as *'Sand and gravel, locally with lenses of silt, clay or peat'* (BGS general description).

4.1.4 The bedrock geology at the site is shown to be rocks of the London Clay Formation which are 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'* (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 deposits of the Kempton Park Gravel Member.

4.2.2 The general ground conditions encountered have been summarised below:

4.2.3 Detailed strata descriptions are presented on the LLAMAR borehole logs presented in Appendix.

4.2.4 The general ground conditions encountered have been summarised below.

4.3 Made Ground

4.3.1 Made ground was encountered in all exploratory hole locations from ground level to depths of between, 1.45 and 3.40 mbgl.

4.3.2 The made ground generally comprised hardstanding overlying layers of granular and cohesive made ground materials.

<u>Hardstanding:</u>

4.3.3 Hardstanding comprising concrete was encountered on all exploratory hole locations from ground level to a maximum depth of 0.15 mbgl.

<u>Granular Made Ground:</u>

4.3.4 Granular made ground materials were encountered in all LLAMAR boreholes beneath the hardstanding to depths of between 0.30 mbgl and 0.50 mbgl; and comprised very gravelly sand with fragments of brick, glass, sandstone, flint and concrete.

<u>Cohesive Made Ground:</u>

4.3.5 Cohesive made ground materials were encountered in all LLAMAR boreholes beneath the granular made ground of between 1.45 mbgl and 3.40 mbgl; and comprised slightly to very sandy slightly to very gravelly clay with fragments of brick, flint, sandstone, coal, concrete, mudstone, quartz, and plastic.

4.4 Superficial Deposits (Kempton Park Gravel Member)

4.4.1 Materials considered to represent Kempton Park Gravel Member were encountered in all exploratory hole locations directly beneath the made ground and were proven to a maximum depth of 4.20 mbgl.

4.4.2 The Kempton Park Gravel Member deposits comprised loose to very dense very gravelly sand; sandy gravel; and soft to firm sandy slightly gravelly clay. Gravel is of coal and flint.

4.5 Bedrock (London Clay Formation)

4.5.1 Bedrock was not encountered during this ground investigation.

4.6 Groundwater

4.6.1 Groundwater was not encountered during the site investigation.

4.7 Obstructions

4.7.1 No obstructions were encountered during this ground investigation, however all windowless sample boreholes refused at shallow depths within the Kempton Park Gravel Member deposits beneath the site.

4.8 Contamination

4.8.1 No visual or olfactory evidence of contamination was encountered or observed during this ground investigation, 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 that a basement is to be installed at the site.

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	2 – 17	All locations
Tidal Flat Deposits	14 – >50	All locations

NR = Not Recorded In This Strata

6.0 OTHER POTENTIAL DEVELOPMENT CONSIDERATIONS

6.1 Waste Soils Characterisation

6.1.1 Any excavation works may potentially produce waste soils for which appropriate waste management will be required. Any off-site disposal of soil requires careful management and due consideration of appropriate legislation, guidance and Duty of Care responsibilities.

6.1.2 Waste Acceptance Criteria (WAC) testing should be carried out on samples of any materials requiring disposal from site. The results of the WAC testing should be presented to the landfill operator for their confirmation of waste category.

6.2 Imported Fill

6.2.1 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.

6.3 Construction Activities

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

7.0 REFERENCES

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- *Atkins: AtRisk Soil Screening Values and Water Screening Values*
- *Bowles, J. E. (1996): Foundation analysis and design, McGraw-Hill, New York.*
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- *BS 5930: code of Practise for Site Investigation Amendment 2*
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- *BRE 410 (2004): Working platforms for tracked plant: Good practice guide to the design, installation, maintenance and repair of ground-supported working platforms, BRE Press, Garston.*
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- *CIRIA 552: Contaminated Land Risk Assessment; A Guide to Good Practise 2001*
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- *Coal Authority: Coal authority mining report and Cheshire brine subsidence report*
- *Contaminated Land: Applications in Real Environments (CL:AIRE): 'The Soil Generic Assessment Criteria for Human Health Risk Assessment' GAC's.*
- *David Norbury: Soil and Rock Descriptions in Engineering Practise*
- *Department of the Environment: DOE industry profiles*
- *EN ISO 14688-1: Geotechnical investigation and testing -- Identification and classification of soil -- Part 1: Identification and description*
- *EN ISO 14688-2: Geotechnical investigation and testing -- Identification and classification of soil -- Part 2: Principles for a classification*
- *EN ISO 14689: Geotechnical investigation and testing -- Identification and classification of rock -- Part 1: Identification and description*
- *Environment Agency (EA): EA Online & What's in my back yard*
- *Environment Agency (EA): Soil Guideline Values (SGVs)*
- *International Society of Rock Mechanics (ISRM): Commission on Testing Methods (1985) Suggested Method for Determining Point Load Strength, Int. J. Rock Mech. Min. Sci. and Geomech. Abstr. 22, 1985, pp.51-60.*
- *Land Quality Management (LQM): Generic Screening Criteria (GACs)*
- *Landmark: Envirocheck report and Envirocheck analysis online historical mapping tool*
- *Ordnance survey: OS Landranger map for the area; OS open data online mapping tool*
- *Planning Policy 23: Planning and Pollution Control, Office of The Deputy Prime Minister 2004*
- *R&D Publication CLR 8: Assessment of risks to human health from land contamination*
- *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

General Site Location

GEOCON	GeoCon Site Investigations Ltd Suite 2 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** Sydney Street, Chelsea	**DRAWING NO.** GSI0910/01	**SCALE** N.T.S
		TITLE Site Location Plan	**DATE** January 2018	**DRAWN BY** JT

Legend:

⊕ LLAMAR Borehole Location

GeoCon Site Investigations Ltd
Suite 2 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	DRAWING NO.	SCALE
Sydney Street, Chelsea	GSI0910/02	N.T.S
TITLE	**DATE**	**DRAWN BY**
Exploratory Hole Location Plan	January 2018	JT

APPENDIX B

WINDOWLESS SAMPLE BOREHOLE LOGS

GeoCon Site Investigations Ltd
15 Belmont Drive, Marple Bridge, Stockport SK6 5EA.
Tel: 08445043901 Fax: 08445043902
Web: www.geoconsiteinvestigations.com Email: info@geoconsiteinvestigations.com

WINDOWLESS SAMPLE BOREHOLE LOG

Project				WINDOWLESS SAMPLE BOREHOLE No
Sydney Street, Chelsea				**WS01**
Project ID: GSI 0910	Date: 17-01-18 / 17-01-18	Ground Level (m)	Co-Ordinates ()	
Contractor: Dick Whittington Design and Build LTD				Sheet: 1 of 1

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument & Backfill
						0.10	MADE GROUND: CONCRETE.	MG	
						(0.40) 0.50	MADE GROUND: Loose light slightly orangish brown very gravelly SAND. Gravel is of subangular to angular fine to coarse brick, concrete, glass and sandstone.	MG	
1.20		N14				(0.95) 1.45	MADE GROUND: Soft dark brown sandy gravelly CLAY, with brick cobbles. Gravel is of subangular to angular fine to coarse brick, concrete, glass, oyster shells, sandstone and coal.	MG	
						(0.45) 1.90	Loose light orangish brown very gravelly SAND. Gravel is of angular fine to coarse flint and sandstone. (KEMPTON PARK GRAVEL MEMBER)	KPGR	
1.90		N50/ 270 mm				(0.42) 2.32	Black, grey, brown and white sandy GRAVEL. Gravel is of sub-angular medium to coarse flint. (KEMPTON PARK GRAVEL MEMBER)	KPGR	

Boring Progress and Water Observations						Chiselling			Water Added	
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To

GENERAL REMARKS

Location cleared of buried services. No groundwater encountered. Hole terminated at 2.32mbgl due to refusal.

All dimensions in metres Scale 1:31.25	Client: Dick Whittington Design and Build LTD	Method / Plant Used: Modular 036	Logged By: Hannah Ward

GeoCon Site Investigations Ltd
15 Belmont Drive, Marple Bridge, Stockport SK6 5EA.
Tel: 08445043901 Fax: 08445043902
Web: www.geoconsiteinvestigations.com Email: info@geoconsiteinvestigations.com

WINDOWLESS SAMPLE BOREHOLE LOG

Project				WINDOWLESS SAMPLE BOREHOLE No
Sydney Street, Chelsea				**WS02**
Project ID: GSI 0910	Date: 17-01-18 / 17-01-18	Ground Level (m)	Co-Ordinates ()	
Contractor: Dick Whittington Design and Build LTD				Sheet: 1 of 1

SAMPLES & TESTS				STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument & Backfill
						0.15	MADE GROUND: CONCRETE.	MG	
						(0.30) 0.45	MADE GROUND: Loose light greyish brown very gravelly SAND. Gravel is of subangular fine to coarse concrete, brick, glass, flint and sandstone.	MG	
						(0.55) 1.00	MADE GROUND: Soft dark brown sandy very gravelly CLAY. Gravel is of subangular to angular fine to coarse brick, concrete, flint and sandstone.	MG	
1.00		N4				(0.50) 1.50	MADE GROUND: Soft dark brown mottled light orangish brown slightly sandy gravelly CLAY. Gravel is of subangular fine to coarse plastic, brick, flint and coal.	MG	
						(0.45) 1.95	Soft to firm light orangish brown mottled dark brown slightly sandy slightly gravelly CLAY. Gravel is of subangular fine to coarse coal and flint. (KEMPTON PARK GRAVEL MEMBER)	KPGR	
2.00		N50/ 295 mm				(0.50) 2.45	Black, grey, brown and white sandy GRAVEL. Gravel is of sub-angular medium to coarse flint. (KEMPTON PARK GRAVEL MEMBER)	KPGR	

Boring Progress and Water Observations						Chiselling			Water Added	
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To

GENERAL REMARKS

Location cleared of buried services. No groundwater encountered. Hole terminated at 2.45mbgl due to refusal.

All dimensions in metres Scale 1:31.25	Client: Dick Whittington Design and Build LTD	Method / Plant Used: Modular 036	Logged By: Hannah Ward

GeoCon Site Investigations Ltd
15 Belmont Drive, Marple Bridge, Stockport SK6 5EA.
Tel: 08445043901 Fax: 08445043902
Web: www.geoconsiteinvestigations.com Email: info@geoconsiteinvestigations.com

WINDOWLESS SAMPLE BOREHOLE LOG

Project				WINDOWLESS SAMPLE BOREHOLE No
Sydney Street, Chelsea				**WS03**
Project ID: GSI 0910	Date: 17-01-18 / 17-01-18	Ground Level (m)	Co-Ordinates ()	
Contractor: Dick Whittington Design and Build LTD				Sheet: 1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument & Backfill
						0.10	MADE GROUND: CONCRETE.	MG	
						0.30	MADE GROUND: Loose light orangish brown very gravelly SAND. Gravel is of subangular fine to coarse brick, concrete, glass, flint and sandstone.	MG	
1.00		N2				(1.10) 1.40	MADE GROUND: Soft dark brown very sandy very gravelly CLAY. Gravel is of subangular fine to coarse brick, flint, sandstone and coal.	MG	
						1.60	MADE GROUND: Soft to firm orangish brown mottled dark brown slightly sandy slightly gravelly CLAY. Gravel is of subangular fine to medium concrete, brick, flint and coal.	MG	
2.00		N6				(1.80) 3.40	MADE GROUND: Soft to firm light orangish brown very sandy gravelly CLAY. Gravel is of subrounded to subangular fine to coarse glass, flint, coal, sandstone, mudstone and quartz grains.	MG	
3.00		N17							
4.00		N50/ 270 mm				(0.70) 4.10	Loose light orangish brown mottled yellowish brown very gravelly SAND. Gravel is of angular fine to coarse flint. (KEMPTON PARK GRAVEL MEMBER)	KPGR	
						(0.32) 4.42	Black, grey, brown and white sandy GRAVEL. Gravel is of sub-angular medium to coarse flint. (KEMPTON PARK GRAVEL MEMBER)	KPGR	

Boring Progress and Water Observations						Chiselling			Water Added	
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To

GENERAL REMARKS

Location cleared of buried services. No groundwater encountered. Hole terminated at 4.42mbgl due to refusal.

All dimensions in metres Scale 1:31.25	Client: Dick Whittington Design and Build LTD	Method / Plant Used: Modular 036	Logged By: Hannah Ward