Geotechnical Interpretative Report

Site: 118 Walton Street, London, SW3 2JJ
Client: Callum Denmark
Date: 29th February 2016
Our Ref: GEO/5537 Rev1
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## EXECUTIVE SUMMARY

<table>
<thead>
<tr>
<th>Item</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>118 Walton Street, London, SW3 2JJ.</td>
</tr>
<tr>
<td>Ground Conditions</td>
<td>The current work encountered Made Ground to a maximum depth of 5.40m below existing ground level, undertaken by Kempton Park Gravel. The Kempton Park Gravel extended to the full depth of the deepest borehole (BH1 – 10m), the London Clay was not encountered throughout the investigation.</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Groundwater was not encountered during the investigation. Stand pipes were installed in both boreholes to monitor the presence of groundwater within the Kempton Park Gravels. The shallowest groundwater reading was recorded from the standpipe in BH1 at a depth of 7.49m below ground level.</td>
</tr>
<tr>
<td>Roots</td>
<td>No Roots were found during the investigation.</td>
</tr>
<tr>
<td>Foundations</td>
<td>It is understood from the architectural drawings that the basement structure will be excavated a further storey below the current partial basement and will be set at a depth of approximately 5.00-6.00m below existing ground level. At this depth the basement slab would be set within the ‘medium dense’ Kempton Park Gravel Formation. The soil at this depth is considered to be adequate founding conditions subject to appropriate foundation design. Based on results of the in-situ and laboratory testing, in conjunction with empirical correlations (Peck et al. 1967) an angle of shearing resistance of 32° can be adopted. It is recommended that an allowable bearing pressure not exceeding 900kPa is adopted for foundation design, at which settlements are expected to be within normal acceptable tolerances.</td>
</tr>
<tr>
<td>Buried Concrete</td>
<td>Chemical testing has been carried out to determine the nature of the soils in the context of the durability of buried concrete. Based on the available test data the soluble sulphate content of the soils is noted to be variable and ranges between 64 and 110 mg/l (measured as soluble SO₄) with a pH ranging from 6.8 to 9.0. Taking the worst case data, the soils are classified as DS-1 in accordance with BRE guidance (Ref 5) with a corresponding ACEC class of AC-1.</td>
</tr>
<tr>
<td>Swelling/Shrinking</td>
<td>The natural granular material in which the foundation will be set would be classified as being non-shrinkable in accordance with the National House Building Councils (NHBC) classification system given in Part 4 of their standards (Ref 4). The deeper underlying London Clay has been confirmed to possess a high volume change potential.</td>
</tr>
<tr>
<td>Foundation and Service Excavations</td>
<td>Due to the granular nature of the Made Ground and Kempton Park Gravels all excavations will require full support against collapse of sides and a contingency for this should be allowed at this stage. This support must be installed as the excavations progress in order to minimise ground movements alongside the proposed basement.</td>
</tr>
<tr>
<td>Ground Gas</td>
<td>During the return groundwater/ground gas monitoring visit on 9th September 2015, BH1 recordings showed the maximum concentration of methane was recorded at 0.1%v/v and the maximum carbon dioxide concentration was recorded at 2.1%v/v. A maximum flow rate of 0.2 l/hr was recorded. The GSV values of methane and carbon dioxide were both recorded as 0.0 l/hr. On the return visit on the 10th October 2015 the maximum concentration of methane was recorded as 0.0l/hr in both BH1 and BH2. The maximum carbon dioxide concentration was 1.8%v/v for BH1 and 0.1%v/v for BH2. A maximum flow rate of 0.5 l/hr was recorded in BH1 and 0.4 l/hr was recorded in BH2. The GSV values for methane was 0.0l/hr for both boreholes. The GSV values for Carbon dioxide was 0.0090 l/hr for BH1 and 0.0004 l/hr for BH2. Therefore the site is classified as Characteristic Situation 1, under the modified Wilson and Card classification methodology as detailed in CIRIA Publication C665 (Ref. 6).</td>
</tr>
<tr>
<td>Recommendations for further work</td>
<td>Prior to or as part of the final design stage it is recommended that a full Ground Movement Analysis for the project be undertaken in order to assess the impact of the proposed new development on the adjacent properties during both temporary and permanent works, together with recommending in detail on heave protection measures related to the anticipated stress changes. A Basement Impact Assessment should also be considered in order to fully understand the hydrogeological regime at the site and the impact that basement construction may have. Any planning requirements of London Borough of Kensington and Chelsea will need to be followed regarding basement construction.</td>
</tr>
</tbody>
</table>
1.0 INTRODUCTION

1.1 This report has been prepared by Chelmer Site Investigation Laboratories Limited (CSI) to the instructions of Katrine Bradley Designs, on behalf of the Client.

1.2 The Client for the project was Mr Callum Denmark.

1.3 The site address is 118 Walton Street, London, SW3 2JJ and is located at approximate Ordnance Survey grid reference 527357E, 178941N. At the time of the investigation No. 118 Walton Street was found to comprise a two storey terraced house with a partial one storey basement. The property was vacant and empty at the time of the investigation. No. 118 looks onto Walton Street situated within the London Borough of South Kensington. A small garden is present to the rear of the property.

1.4 It is understood that the development will comprise a new single storey basement, constructed below the existing building and basement footprint, and partially extending under the rear garden. Proposed drawings (AL.30 – AL.37 1:100@A3) has been appended to this report.

1.5 This Intrusive site investigation has been commissioned to provide information on the sub-soil conditions of the site in order to support basement design and assessment of other relevant geotechnical and ground engineering aspects of the proposed development.

1.6 In addition to the site investigation, a limited groundwater/ground gas monitoring survey was also carried out using monitoring standpipes installed during the current investigation in boreholes BH1 and BH2.

1.7 This report presents a summary of the site investigation work carried out and discusses the findings.
2.0 **SUMMARY OF FIELDWORK EXECUTED**

2.1 All fieldwork was executed in general accordance with applicable British Standards and accepted industry good practice (Ref. 1).

2.2 The borehole locations were chosen by the Client/Structural Engineer and are indicated on the appended *Sketch Fieldwork Location Plan*.

2.3 Fieldwork was undertaken on 6th July 2015 to 7th July 2015 and comprised the following elements:

* **C.f.a. Boreholes**

2.4 Two c.f.a. boreholes (BH1-BH2) were undertaken across the site at the locations indicated on the *Sketch Fieldwork Location Plan*. Borehole BH1 was undertaken in the centre of the rear garden. The second borehole was undertaken in the light well located at the front of the property.

2.5 Discrete disturbed samples were taken from the boreholes at regular depth intervals as the borehole was advanced, within each stratum and when a change of stratum was encountered.

2.6 Mackintosh Probe tests were also undertaken throughout the boreholes in order to provide additional information on the consistency and strength of the material encountered.

2.7 Upon the completion of BH1 and BH2 combined groundwater/ground gas monitoring standpipes were installed to a depth of 8.2m and 7.0m below ground level respectively.

2.8 Full details of the borehole findings are given on the appended *borehole record sheets*.

* **Trial Pit Excavation**

2.9 Four trial pits were excavated within the confines of the property to examine the current foundations of the property and to inspect the depth and condition of the neighbouring party walls. TP1 was excavated in the rear corner of the property within the bedroom. TP 2 was excavated down the centre of the wall within the kitchen and was used to examine No. 116 party wall and foundations. TP3 was excavated in the corner of the kitchen on the opposing wall to examine the party wall with No. 118. TP4 was excavated in the corner of the vault bordering No. 116.

2.10 Discrete disturbed samples were taken from the underside of the footings from each of the trial pits.

2.11 Macintosh Probe Tests were also undertaken on the material under the footings of the bungalow. This will provided additional information on the consistency and strength of the material the current building is founded on.
2.12 Full details of the trial pit findings are given on the appended trial pit log sheets. The logs provided can be used to understand how the current bungalow foundations will interact with the planned extension foundations.

Groundwater and Ground Gas Monitoring

2.13 Following the initial site work, a further two monitoring visits were undertaken to record groundwater and ground gas conditions using a standpipe installation in BH1 and BH2.

2.14 The barometric pressure was recorded together with the level of Carbon Dioxide, Oxygen and Methane within the borehole (\%v/v). In addition, gas flow measurements were taken (l/min) and the depth to groundwater recorded.

2.15 Full details of the readings are included on the appended Groundwater/Ground Gas Monitoring Record Sheet.
3.0 GEOLOGICAL SETTING

3.1 According to information published by the British Geological Survey (England and Wales, 1:50,000 Sheet E270; South London and BGS online resources) the underlying geology at this site is shown as being Kempton Park Gravel overlying London Clay.

Kempton Park Gravel Formation

3.2 This Devesian aged formation is sand and gravel with local lenses of silt, clay or peat. It generally rests on bedrock geology of London Clay or Lambeth Group. It is typically 6m thick but can be much thicker where infilling deep hollows. It is geographically limited to the Thames Valley and its associated tributaries.

London Clay Formation

3.3 It is inferred that the London Clay Formation was deposited during a period of sea inundation in the area up to 200m in depth. The London Clay can be up to 150m thick beneath south Essex thinning across London to about 90m near Reading. The formation consists of mainly dark blue-grey to brown-grey clay containing variable amounts of fine-grained sand and silt. London Clay generally weathers to an orange-brown colour with pockets of silty fine sand. The formation is particularly susceptible to swelling and shrinking when subjected to moisture content changes and is commonly intensely fissured. In addition, gypsum (selenite) crystals and pyrite nodules are commonly found throughout the formation.

When exposed to the weathering process the upper regions of the London Clay oxidise to brown in colour. It usually contains selenite crystals, often grouped in bands or layers, which are thought to have originated from the decomposition of shell fragments. London Clay contains clay minerals in the form of illite, kaolinite and smectite. The presence of smectite renders the London Clay particularly susceptible to changes in moisture content and is prone to shrinkage and swelling (settlement and heave) caused by alternate wetting and drying near the surface. In addition, weathering and possible slight transportation of semi-frozen material “en-masse” in glacial or peri-glacial regions is believed to have occurred. This action often completely destroys the structure of the material and can involve a serious loss of strength. As the soil composition is derived mostly from materials local to the point of deposition, the lithology can be variable and reflects that of the parent strata.
4.0 SUMMARY OF GROUND CONDITIONS ENCOUNTERED

4.1 Full details of the ground conditions encountered are presented on the borehole records appended to this report and can be summarised as follows:

<table>
<thead>
<tr>
<th>Depth to top of stratum from GL (m bgl)</th>
<th>Depth to base of stratum (m bgl)</th>
<th>Stratum</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>1.10 – 5.40</td>
<td>MADE GROUND: Orange brown slightly sandy fine to coarse gravel with occasional brick and slate fragments.</td>
</tr>
<tr>
<td>2.40</td>
<td>10.00</td>
<td>Kempton Park Gravel Formation - Medium dense, orange brown, very sandy fine to coarse GRAVEL</td>
</tr>
</tbody>
</table>

4.2 It should be noted that the Made Ground depths recorded above are those encountered within the boreholes undertaken during the current work. Owing to the variable nature and unknown provenance of Made Ground it is possible that deeper or more extensive areas of Made Ground may exist at this site which have not been revealed by the current work.

4.3 In-situ testing within the Kempton Park Gravel Formation indicated that the consistency of this material is ‘medium dense’ to the full depth of the boreholes.

4.4 Groundwater was not encountered in the trial pits or within the boreholes at the time of the investigation.

4.5 During the monitoring visit on the 9th September 2015, groundwater level was at 7.49m below ground level in BH1 and the level of peak methane was recorded as 0.1%v/v, the peak level of carbon dioxide was recorded as 2.1% v/v and the flow rate 0.2l/hr. On this occasion it was not possible to take readings from BH2 as a result of a blockage in the standpipe.

A return visit was conducted on the 7th October 2015 to unblock the standpipe in BH2 and to take gas and groundwater measurements from both boreholes. Groundwater level was at 7.64m below ground level in BH1 and BH2 was dry. The peak level of methane was recorded as 0.0%v/v in both boreholes. The peak level of carbon dioxide was 1.8%v/v in BH1 and 0.1%v/v in BH2. Oxygen levels were recorded as 19.2%v/v in BH1 and 21.2%v/v in BH2. The flow was 0.5l/hr in BH1 and 0.4l/hr in BH2.

4.6 No roots were observed in the trial pits or either borehole.
5.0 LABORATORY TESTING

5.1 The following geotechnical laboratory testing has been carried out on samples recovered from the boreholes undertaken at this site.

5.2 Unless otherwise stated, the geotechnical tests have generally been carried out in accordance with applicable British Standard (Ref 2).

5.3 The chemical testing was carried out in accordance with standard industry methods in a UKAS approved laboratory which is also currently accredited in accordance with MCERTS for the majority of its testing. Further information regarding this accreditation is available on request together with a full list of test methods if required.

5.4 pH and Sulphate Tests

The pH and sulphate content has been determined for three samples recovered from the site.

The pH values showed little variation with values ranging from 8.4 to 8.6. Sulphate content, on a 2:1 water:soil extract found to range between 0.03 g/l and 0.23 g/l.

5.5 Particle Size Distributions

The particle size distribution has been determined for four samples of granular soils encountered beneath the site.

The results are presented as grading curves appended to this report.
6.0 DISCUSSION

SUMMARY OF PROPOSED DEVELOPMENT

6.1 As discussed in Section 2 above it is understood that the proposed scheme is for the construction of a new single storey basement below the existing basement which will extend from beneath the light well at the front of the property under the full building footprint and partially under the rear garden. Proposed Architectural Drawings are appended to this report.

6.2 Full details of the proposed construction are not yet developed and it assumed that they will be subject to the findings of this investigation. As a consequence the foundation design discussed below is, by necessity, general in nature and is subject to confirmation following the results of this investigation and further design.

6.3 Should ground conditions during construction be found to differ significantly from those described in our report Chelmer Site Investigation Laboratories Limited should be contacted immediately so that advice and recommendations can be reviewed in the context of actual ground conditions encountered.

BASEMENT FOUNDATIONS & CONSTRUCTION

6.4 It is understood from the architectural drawings that the basement will be constructed using reinforced concrete underpins for existing front and party walls and reinforced concrete retaining wall at the rear of the new basement underneath the garden.

6.5 It is assumed that the basement will be set at a depth of approximately 3.0-4.0m below existing basement level, with the new basement floor therefore being set at approximately 7m below existing ground level. At this depth the new basement floor slab and foundations will be set below the Made Ground which is present across the site and recorded at a depth of 5.40m in BH1. At this depth the basement floor slab and the proposed underpins and retaining wall foundations should be set within the ‘medium dense’ Kempton Park Gravel Formation. The soil at this depth is considered to present adequate founding conditions subject to appropriate foundation design.

6.6 Allowable bearing pressure on an appreciable thickness gravel is dictated more by acceptable settlement than by risk of failure. Moreover at the anticipated founding depth and given the relative density and characteristics of the Kempton Park Gravel at this depth, the anticipated bearing capacity is likely to be well in excess of that required to support the likely foundation loads. This notwithstanding, based on results of the in-situ and laboratory testing in conjunction with empirical correlations (Peck et al. 1967) an angle of internal shearing resistance of 32° can be adopted and assuming a global factor of safety against failure of 3 an allowable bearing pressure of at least 500kPa can be adopted for design purposes.
6.7 At this bearing pressure foundation settlements are expected to be well within normal
tolerance and not exceeding 25mm. The majority of settlement would be ‘short-term’
occurring either during or immediately after the construction period.

6.8 Once the basement construction has been completed, there is always a possibility that
this will act as a local ‘sump’ for surface groundwater and run-off. Therefore, we would
recommend that the basement construction is designed to minimise any ingress of
groundwater. Detailed recommendations for the waterproofing system are beyond the
scope of this report although it is noted that, as a minimum, it would be prudent for the
system to be designed in compliance with the requirements of BS8102:2009.

6.9 It is anticipated that the new basement will be set within the relatively permeable
Kempton Park Gravels; therefore it is considered unlikely that the new basement will
create significant ‘cut off’ obstruction to groundwater flow beneath the site. The new
basement is therefore expected to have a relatively limited effect on the hydrological
regime below this site and the adjacent properties. However, this should be confirmed
by an appropriate desk top study (DTS).

RETAILING STRUCTURES

6.10 The full design of temporary and permanent retaining structures is beyond the scope of
this investigation. Retaining structures and basements should be designed in
accordance with accepted good practice such as that set out within CIRIA guidance
C580 (Ref 3) or similar (e.g. BRE GBG72). The calculation of permanent lateral
pressures against the sides should relate to long-term (effective) stress analysis.

6.11 Based on the findings of the site investigation undertaken the following soil parameters
are recommended for use in the retaining wall design:

<table>
<thead>
<tr>
<th>Made Ground</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk unit weight, $\gamma_b$</td>
<td>18 kN/m$^3$</td>
</tr>
<tr>
<td>Earth pressure coefficient at rest, $K_0$</td>
<td>0.3-0.4</td>
</tr>
<tr>
<td>Undrained shear strength, $S_u$</td>
<td>0</td>
</tr>
<tr>
<td>Effective shear strength, $c'$</td>
<td>0</td>
</tr>
<tr>
<td>Effective angle of internal friction, $\phi'$</td>
<td>20$^\circ$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kempton Park Gravel Formation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk unit weight, $\gamma_b$</td>
<td>19 kN/m$^3$</td>
</tr>
<tr>
<td>Earth pressure coefficient at rest, $K_0$</td>
<td>0</td>
</tr>
<tr>
<td>Undrained shear strength, $S_u$</td>
<td>0</td>
</tr>
<tr>
<td>Effective shear strength, $c'$</td>
<td>0</td>
</tr>
<tr>
<td>Effective angle of internal friction, $\phi'$</td>
<td>31$^\circ$</td>
</tr>
</tbody>
</table>

6.12 Notwithstanding this, allowance should be made for appropriate groundwater control
during construction cognisant of the prevailing site conditions and some form of
dewatering may be needed (e.g. sump pumping).
6.13 Design of the retaining walls should include allowance for groundwater in accordance with accepted good design practice and allowance for hydrostatic forces to both the ground bearing floor slab and retaining walls should be based on site specific hydrological and hydrogeological assessment. In addition the basement design should include appropriate waterproofing systems compliant with current standards and good practice (BS8102:2009 and/or applicable NHBC guidance) compatible with the retaining wall and foundation design.

**ANTICIPATED GROUND MOVEMENTS**

6.14 During excavation of the basement the stress conditions within the soil will be modified and this stress release or 'relaxation' in the ground will inevitably result in ground movement. Lateral stress release in the ground surrounding the excavation by both foundation construction and excavation in front of the retaining structure will manifest itself in lateral and associated vertical ground movement at the edge of excavation and line of foundations/retaining structure and extending back from the edge of the excavation/line of basement wall. The magnitude of lateral and vertical movement and the limit of its extent beyond the excavation will depend on the nature of the soils, the foundation system, and the construction methodology. There is published empirical data available to predict the degree of movement that can be expected (CIRIA C580) (Ref 4).

6.15 Ground movements associated with relatively shallow excavations in granular soils are generally of small magnitude and occur immediately such as they are accommodated within the construction process and their consequence is not usually significant.

6.16 It is important to ensure that the construction sequence and construction method statement (CMS) is developed based on the specific development system proposed and with full recognition of anticipated ground movements as assessed from site specific Ground Movement Analysis (GMA). It is implicit within this that good standards of workmanship will be maintained throughout so as to minimise and otherwise ameliorate the effects of ground movement associated with basement construction. This may include, inter alia, control on underpin installation, sequencing of installation to minimise ground movement, use of necessary temporary support, and adequate control of groundwater.

**FOUNDATION AND SERVICE EXCAVATIONS**

6.17 From the evidence of the boreholes and trial pits, all excavations will require full support against collapse of sides and a contingency for this should be allowed at this stage. This support must be installed as the excavations progress in order to minimise ground movements alongside the proposed basement.

6.18 Foundation and service excavations will be within Made Ground and Kempton Park Gravels and normal health and safety considerations need to be met during future groundwork at this site.
No groundwater was encountered in either borehole or any of the trial pits at the time of the investigation. Although there was no water in the boreholes a standpipe was installed in both boreholes to monitor the rise of any groundwater within the Kempton Park Gravels. On returning to the site on 9th September 2015, groundwater was recorded in BH1 at a depth of 7.49m. It is therefore expected that the use of suitably supported ‘open’ excavations with appropriate side support will be adequate, in conjunction with dewatering by sump pumping during the excavations. The advice of a specialist dewatering contractor should be sought to confirm whether other techniques will be required. It is very important that he base of the foundation excavations is kept dry, the foundation base is kept square and that any soft spots are replaced and compacted prior to pouring foundation concrete.

Furthermore we recommend that where groundwater or surface water flows into foundation excavations ‘blinding’ concrete is used at the base of the foundation excavations and that foundation concrete is poured as soon as possible thereafter.

SWELLING AND SHRINKAGE

The natural granular material in which the foundation will be set would be classified as being non-shrinkable’ in accordance with the National House Building Councils (NHBC) classification system given in Part 4 of their standards (Ref.4). The deeper underlying London Clay has been confirmed to possess a ‘high’ volume change potential.

BURIED CONCRETE

Chemical testing has been carried out to determine the nature of the soils in the context of the durability of buried concrete. Based on the available test data the soluble sulphate content of the soils is noted to be variable and ranges between 0.03 and 0.23 g/l (measured as soluble SO\text{4}) with a pH ranging from 8.4 to 8.6. Taking the worst case data, the soils are classified as DS-1 in accordance with BRE guidance (Ref 5) with a corresponding ACEC class of AC-1.

GROUND GAS

Due to the low gas concentrations and in particular the relatively low `measurable flow recorded during the return ground gas monitoring visits, the site is classified as Characteristic Situation 1, under the modified Wilson and Card classification methodology as detailed in CIRIA Publication C665 (Ref. 6). In pursuance of this guidance, no special precautions are required to safeguard the proposed development. However this is based on a single visit and should be agreed with the Local Authority.

RECOMMENDATIONS FOR FURTHER WORK

Prior to or as part of the final design stage it is recommended that a full Ground Movement Analysis for the project be undertaken in order to assess the impact of the proposed new development on the adjacent properties during both temporary and permanent works, together with recommending in detail on heave protection measures.
related to the anticipated stress changes. A Basement Impact Assessment should also be considered in order to fully understand the hydrogeological regime at the site and the impact that basement construction may have. Any planning requirements of London Borough of Kensington and Chelsea will need to be followed regarding basement construction.

Prepared By: Matthew Fisher BSc (Hons)
Engineer Geologist

Reviewed By: Michael Southall BSc., BEng., CEng., MICE
Consultancy Director

End of report

References
4. NHBC (2011) NHBC Standards, Chapter 4.2, Building Near Trees.
a) This report has been prepared for the purpose of providing advice to the client pursuant to its appointment of Chelmer Site Investigation Laboratories Limited (CSI) to act as a consultant.
b) Save for the client no duty is undertaken or warranty or representation made to any party in respect of the opinions, advice, recommendations or conclusions herein set out.
c) All work carried out in preparing this report has used, and is based upon, our professional knowledge and understanding of the current relevant English and European Community standards, approved codes of practice, technology and legislation.
d) Changes in the above may cause the opinion, advice, recommendations or conclusions set out in this report to become inappropriate or incorrect. However, in giving its opinions, advice, recommendations and conclusions, CSI has considered pending changes to environmental legislation and regulations of which it is currently aware. Following delivery of this report, we will have no obligation to advise the client of any such changes, or of their repercussions.
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f) The content of this report represents the professional opinion of experienced environmental consultants. CSI does not provide specialist legal advice and the advice of lawyers may be required.
g) In the Summary and Recommendations sections of this report, CSI has set out our key findings and provided a summary and overview of our advice, opinions and recommendations. However, other parts of this report will often indicate the limitations of the information obtained by CSI and therefore any advice, opinions or recommendations set out in the Executive Summary, Summary and Recommendations sections ought not to be relied upon unless they are considered in the context of the whole report.
h) The assessments made in this report are based on the ground conditions as revealed by walkover survey and/or intrusive investigations, together with the results of any field or laboratory testing or chemical analysis undertaken and other relevant data, which may have been obtained including previous site investigations. In any event, ground contamination often exists as small discrete areas of contamination (hot spots) and there can be no certainty that any or all such areas have been located and/or sampled.
i) There may be special conditions appertaining to the site, which have not been taken into account in the report. The assessment may be subject to amendment in light of additional information becoming available.
j) Where any data supplied by the client or from other sources, including that from previous site investigations, has been used it has been assumed that the information is correct. No responsibility can be accepted by CSI for inaccuracies within the data supplied by other parties.
k) Whilst the report may express an opinion on possible ground conditions between or beyond trial pit or borehole locations, or on the possible presence of features based on either visual, verbal or published evidence this is for guidance only and no liability can be accepted for the accuracy thereof.
l) Comments on groundwater conditions are based on observations made at the time of the investigation unless otherwise stated. Groundwater conditions may vary due to seasonal or other effects.
m) This report is prepared and written in the context of the agreed scope of work and should not be used in a different context. Furthermore, new information, improved practices and changes in legislation may necessitate a reinterpretation of the report in whole or part after its original submission.

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p) This report is issued on the condition that CSI will under no circumstances be liable for any loss arising directly or indirectly from subsequent information arising but not presented or discussed within the current Report.

q) In addition CSI will not be liable for any loss whatsoever arising directly or indirectly from any opinion within this report.
<table>
<thead>
<tr>
<th>Depth Mtrs.</th>
<th>Description of Strata</th>
<th>Thickness</th>
<th>Legend</th>
<th>Test Type</th>
<th>Sample Result</th>
<th>Root Information</th>
<th>Depth to Water</th>
<th>Depth Mtrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>G.L. 0.065</td>
<td>CONCRETE</td>
<td>0.065</td>
<td></td>
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<td></td>
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<td></td>
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</tr>
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<td>0.07</td>
<td>PAVING SLAB</td>
<td>0.005</td>
<td></td>
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<tr>
<td>1.1</td>
<td>MADE GROUND: loose to medium compact, dark brown/black, slightly gravelly very silty fine sand with ash and brick fragments.</td>
<td>1.03</td>
<td>D</td>
<td>M</td>
<td>10 12 12 13</td>
<td>No roots observed.</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.9</td>
<td>MADE GROUND: loose to medium compact, dark brown, sandy fine to coarse gravel with brick fragments.</td>
<td>1.8</td>
<td>D</td>
<td>M</td>
<td>13 12 11 12</td>
<td></td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5</td>
<td>REWORKED GROUND: medium compact, brown, sandy fine to coarse gravel.</td>
<td>0.6</td>
<td>D</td>
<td>M</td>
<td>15 14 15 15</td>
<td></td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4</td>
<td>MADE GROUND: medium compact, dark brown, slightly sandy fine to coarse gravel with occasional brick fragments.</td>
<td>1.9</td>
<td>D</td>
<td>M</td>
<td>13 15 14 14</td>
<td></td>
<td>4.0</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.9</td>
<td>Medium dense, orange brown, very sandy medium to coarse GRAVEL.</td>
<td>1.5</td>
<td>D</td>
<td>M</td>
<td>22 21 23 25</td>
<td></td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>Borehole ends at 10.0m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks: Borehole dry and collapsed at 4.2m on completion.
Standpipe installed to 8.2m.

Key: T.D.T.D. Too Dense to Drive
D Small Disturbed Sample  J Jar Sample
B Bulk Disturbed Sample  V Pilcon Vane (kPa)
U Undisturbed Sample (U100)  M Mackintosh Probe
W Water Sample  N Standard Penetration Test Blow Count
**Description of Strata**

<table>
<thead>
<tr>
<th>Depth Mtrs.</th>
<th>Description of Strata</th>
<th>Thickness</th>
<th>Legend</th>
<th>Sample</th>
<th>Test Type</th>
<th>Root Information</th>
<th>Depth to Water</th>
<th>Depth Mtrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.L.</td>
<td>FLOOR TILES</td>
<td>0.01</td>
<td></td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.01</td>
<td>REINFORCED CONCRETE</td>
<td>0.12</td>
<td>□□□□□□</td>
<td>D</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MADE GROUND: loose, orange brown, slightly sandy fine to coarse gravel with occasional slate fragments.</td>
<td>1.27</td>
<td></td>
<td>D</td>
<td>M</td>
<td>No roots observed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4</td>
<td>Medium dense, orange brown, very sandy fine to medium GRAVEL.</td>
<td>1.0</td>
<td></td>
<td>D</td>
<td>M</td>
<td>10 10 09 10</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>2.4</td>
<td>Medium dense, orange/brown, sandy medium to coarse GRAVEL.</td>
<td>1.5</td>
<td></td>
<td>D</td>
<td>M</td>
<td>15 15 15 15</td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>3.9</td>
<td>Medium dense, orange/brown, sandy fine to coarse GRAVEL.</td>
<td>1.0</td>
<td></td>
<td>D</td>
<td></td>
<td>19</td>
<td></td>
<td>4.0</td>
</tr>
<tr>
<td>4.9</td>
<td>Medium dense, grey/brown, medium to coarse GRAVEL.</td>
<td>1.1</td>
<td></td>
<td>D</td>
<td>M</td>
<td>25 25 25 28</td>
<td></td>
<td>5.0</td>
</tr>
<tr>
<td>6.0</td>
<td>Borehole ends at 6.0m</td>
<td></td>
<td></td>
<td>D</td>
<td>M</td>
<td>28 30 31 33</td>
<td></td>
<td>6.0</td>
</tr>
</tbody>
</table>

**Remarks:**
- Borehole dry and collapsed to 7.0m on completion.
- Standpipe installed to 7.0m.
- No roots observed.

---

**Key:**
- T.D.T.D.: Too Dense to Drive
- D: Small Disturbed Sample
- J: Jar Sample
- B: Bulk Disturbed Sample
- V: Pilcon Vane (kPa)
- U: Undisturbed Sample (U100)
- M: Mackintosh Probe
- W: Water Sample
- N: Standard Penetration Test Blow Count

**Client:** Callum Denmark  
**Site:** 118 Walton Street, London, SW3 2JJ  
**Date:** 06.07.15  
**Boring method:** CFA 100mmØ Secondman
**Client:** Callum Denmark  
**Scale:** N.T.S.  
**Sheet No:** 1 of 1  
**Date:** 06.07.15/07.07.15  
**Location:** 118 Walton Street, London, SW3 2JJ  
**Job No:** 5537  
**Trial Pit No:** 1  
**Weather:** Overcast  
**Excavation Method:** Hand Tools  
**Drawn by:** LS  
**Checked by:** JH

**Remarks:**

- **AS OPPOSITE**  
- **MADE GROUND:** medium compact, orange brown, very sandy fine to coarse gravel with brick fragments.  
  - No roots observed.

- **MADE GROUND:** medium compact, orange brown, slightly sandy fine to coarse gravel with occasional slate fragments.  
  - No roots observed.

**Key:***

- D Small disturbed sample  
- B Bulk disturbed sample  
- J Jar sample  
- V Pilcon Vane (kPa)  
- U Undisturbed sample (U100)  
- M Mackintosh Probe  
- N Standard Penetration Test Blow Count  
- W Water Sample

**Diagram:**

- Floor level
- FLOOR TILES
- CONCRETE
- BRICK CORBEL
- AS OPPOSITE
- MADE GROUND:
  - Medium compact, orange brown, very sandy fine to coarse gravel with brick fragments.
  - No roots observed.
  - Medium compact, orange brown, slightly sandy fine to coarse gravel with occasional slate fragments.
  - No roots observed.
- TP1 ENDS AT 570mm
Made ground: medium compact, orange brown, slightly gravelly fine to coarse sand with occasional brick and slate fragments.

No roots observed.

Made ground: medium compact, orange brown, slightly sandy fine to coarse gravel with occasional slate fragments.

No roots observed.

Diagram:

- Floor level
- F.L. 10
- 130
- 120
- 10
- 770 DM 12
- 70 50
- 320
- 650
- 970
- TP2 ENDS AT 970mm

Remarks:

- AS OPPOSITE
- BRICK CORBEL
- BRICK CORBEL
- FLOOR TILE
- REINFORCED CONCRETE

Key:

- D Small disturbed sample
- B Bulk disturbed sample
- U Undisturbed sample (U100)
- N Standard Penetration Test Blow Count
- J Jar sample
- V Pilcon Vane (kPa)
- M Mackintosh Probe
- W Water Sample
MADE GROUND: medium compact, orange brown, very sandy fine to coarse gravel with occasional slate fragments. No roots observed.

AS OPPOSITE BRICK CORBEL

MADE GROUND: medium compact, orange brown, slightly sandy fine to coarse gravel with occasional slate fragments. No roots observed.

FL
10
130
1070
730
600
120
10

MADE GROUND: medium compact, orange brown, very sandy fine to coarse gravel with occasional slate fragments. No roots observed.

TP3 ENDS AT 1070mm
MADE GROUND: medium compact, orange brown, slightly sandy fine to coarse gravel with occasional slate fragments.
No roots observed.

Remarks: TP4 Complete with underside. Both walls same underside so took same sample.
Laboratory Report

118 Walton Street, London. SW3 2JJ

Client: Callum Denmark
Date: 04-Aug-15
Our Ref: CSI5537
CGL Ref: CGL5537
Content Summary

This report contains all test results as indicated on the test instruction/summary.

CGL Reference : CGL5537
Client Reference : CSI5537
For the attention of : Callum Denmark
This report comprises of the following :
1 Cover Page
   1 Inside Cover/Contents Page
2 Pages of Results
4 Particle Size Distribution - Wet Sieving Charts
4 Pages of BRE SD1 Results
1 Limitations of Report Page

Notes :

General
Please refer to report summary notes for details pertaining to methods undertaken and their subsequent accreditations

Samples were supplied by Chelmer Site Investigations
All tests performed in-house unless otherwise stated

Deviant Samples
Samples were received in suitable containers Yes
A date and time of sampling was provided Yes
Arrived damaged and/or denatured No
### Laboratory Testing Results

**BS 1377 : 1990**

**Job Number :** CGL5537  
**Client :** Callum Denmark  
**Client Reference :** CSIS5537  
**Site Name :** 118 Walton Street, London. SW3 2JJ  
**Date Received :** 24/07/2015  
**Date Testing Started :** 27/07/2015  
**Date Testing Completed :** 04/08/2015  
**Laboratory Used :** Chelmer Geotechnical, CM3 8AB

<table>
<thead>
<tr>
<th>BH/T/P/W/S</th>
<th>Depth (m)</th>
<th>Sample Type</th>
<th>*Moisture Content (%)</th>
<th>*Soil Faction &gt; 0.425mm (%)</th>
<th>*Plastic Limit (%)</th>
<th>*Plastic Index (%)</th>
<th>*Modified Plasticity Index (%)</th>
<th>*Soil Class</th>
<th>Filter Paper Contact Time (h)</th>
<th>*Soil Sample Suction (kPa)</th>
<th>Induced Shear Vane Strength (kPa)</th>
<th>Organic Content (%)</th>
<th>*pH Value</th>
<th>*Sulphate Content (g/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BH1</td>
<td>3.0</td>
<td>D</td>
<td>&lt;5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BH1</td>
<td>5.5</td>
<td>D</td>
<td>&lt;5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes :**  
*UKAS Accredited Tests*

1. **BS 1377 : Part 2 : 1990, Test No 3.2**  
2. **BS 1377 : Part 2 : 1990, Test No 4.4**  
3. **BS 1377 : Part 2 : 1990, Test No 5.3**  
4. **BS 1377 : Part 2 : 1990, Test No 5.4**  
5. **BS 1377 : Part 3 : 1990, Test No 4**  
6. **BS 1377 : Part 3 : 1990, Test No 5.6**  
7. **BS 5930 : 1981 : Figure 31 - Plasticity Chart for the classification of fine soils**  
8. **Values of shear strength were determined in situ by Chelmer Site Investigations using a Pilcon hand vane or Geonor vane (GV).**  
9. **In-house method S9a adapted from BRE IP 4/93**  
10. **BS 1377 : Part 2 : 1990, Test No 5.4**  
11. **BS 1377 : Part 3 : 1990, Test No 5.6**  
12. **BS 1377 : Part 3 : 1990, Test No 5.6**  
13. **In-house method S9a adapted from BRE IP 4/93**  
14. **BRE Special Digest One (Concrete in Aggressive Ground) 2005**

**Key**
- B - Disturbed sample
- S - Bulk sample
- U - U100 (undisturbed sample)
- W - Water sample
- ENP - Essentially Non-Plastic
- U/S - Underside Foundation

**Comments :**

- Values of shear strength were determined in situ by Chelmer Site Investigations using a Pilcon hand vane or Geonor vane (GV).
- In-house method S9a adapted from BRE IP 4/93.

**Technical :** MT  
**Checked By :** MC  
**Date Checked :** 31/07/15

---

**Notes :**
1. **BS 1377 : Part 2 : 1990, Test No 3.2**
2. **BS 1377 : Part 2 : 1990, Test No 4.4**
3. **BS 1377 : Part 2 : 1990, Test No 5.3**
4. **BS 1377 : Part 2 : 1990, Test No 5.4**
5. **BS 1377 : Part 3 : 1990, Test No 4**
6. **BS 1377 : Part 3 : 1990, Test No 5.6**

**Key :**
- B - Disturbed sample
- S - Bulk sample
- U - U100 (undisturbed sample)
- W - Water sample
- ENP - Essentially Non-Plastic
- U/S - Underside Foundation

**Comments :**

- Values of shear strength were determined in situ by Chelmer Site Investigations using a Pilcon hand vane or Geonor vane (GV).
- In-house method S9a adapted from BRE IP 4/93.
### Laboratory Testing Results

**BS 1377 : 1990**

- **Job Number:** CGL5537
- **Client:** Callum Denmark
- **Client Reference:** CSI5537
- **Site Name:** 118 Walton Street, London, SW3 2JJ
- **Date Received:** 24/07/2015
- **Date Testing Started:** 27/07/2015
- **Date Testing Completed:** 04/08/2015
- **Lab Used:** Chelmer Geotechnical, CM3 8AB

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**Notes:**

- [1] BS 1377 : Part 2 : 1990, Test No 3.2
- [2] Estimated if <5%, otherwise measured
- [7] BS 5930 : 1981 : Figure 31 - Plasticity Chart for the classification of fine soils
- [8] BRE Digest 240 : 1993
- [10] BS 1377 : Part 2 : 1990, Test No 5.6
- [14] BRE Special Digest One (Concrete in Aggressive Ground) 2005

---

#### Sample Details

<table>
<thead>
<tr>
<th>Sample Ref</th>
<th>Depth (m)</th>
<th>UID</th>
<th>Sample Type</th>
<th>Moisture Content (%)</th>
<th>*Soil Faction &gt; 0.425mm (%)</th>
<th>Lapid Limit (%)</th>
<th>Plastic Limit (%)</th>
<th>Plasticity Index (%)</th>
<th>*Plasticity Index (%)</th>
<th>Modified Plasticity Index (%)</th>
<th>*Soil Class</th>
<th>Filter Paper Contact Time (h)</th>
<th>*Soil Sample Suction (kPa)</th>
<th>Indsu Shear Vane Strength (kPa)</th>
<th>Organic Content (%)</th>
<th>pH Value</th>
<th>*Sulphate Content (g/l)</th>
<th><strong>Key</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>BH2</td>
<td>0.5</td>
<td>64678</td>
<td>D</td>
<td>&lt;5</td>
<td>1.2 x SO_4</td>
<td>11</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>11</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>11</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Key:**

- B - Disturbed sample
- U - Bulk sample
- U/S - Undisturbed sample
- W - Water sample
- ENP - Essentially Non-Plastic
- W/S - Underside Foundation

---

**Comments:**

- Note that if the SO_4 content falls into the DS-4 or DS-5 class, it would be prudent to consider the sample as falling into the DS-4m or DS-5m class respectively unless water soluble magnesium testing is undertaken to prove otherwise.

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**Technician:** MT

**Checked By:** MC

**Date Checked:** 31/07/15

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**Chelmer Site Investigations 2014**

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**Q78**

**Rev 4**
PARTICLE SIZE DISTRIBUTION
BS 1377-2:1990

Job Number : CGL5537
Site Name : 118 Walton Street, London, SW3 2JJ
Sample Number : BH1
Depth (m) : 6.00
Sample UID : 64675

Type of Sieving : Washed
Date : 27-Jul-15
Tested By : MT
Laboratory : Chelmer Geotechnical CM3 8AB

Soil Description : Orange brown, very sandy medium to coarse GRAVEL.

<table>
<thead>
<tr>
<th>Sieve Size (mm)</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>90.0</td>
<td>100.0</td>
</tr>
<tr>
<td>75.0</td>
<td>100.0</td>
</tr>
<tr>
<td>63.0</td>
<td>100.0</td>
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<tr>
<td>50.0</td>
<td>100.0</td>
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<tr>
<td>37.5</td>
<td>94.5</td>
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<tr>
<td>28.0</td>
<td>91.8</td>
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<td>28.9</td>
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<td>3.35</td>
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<tr>
<td>2.00</td>
<td>26.0</td>
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<td>1.18</td>
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<td>0.600</td>
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<tr>
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<td>0.300</td>
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<tr>
<td>0.212</td>
<td>6.1</td>
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<tr>
<td>0.150</td>
<td>4.7</td>
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<tr>
<td>0.063</td>
<td>2.8</td>
</tr>
<tr>
<td>0.060</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Calculations :-

\[ f = \left( \frac{M_1 - M_2}{M_1} \right) \times 100 \]

\[ f = \text{Percentage of lines passing 0.063mm} \]

\[ M_1 = \text{Mass of dried test sample before washing (kg)} \]

\[ M_2 = \text{Mass of dried residue retained on the 0.063m (kg)} \]

\[ P = \text{Mass of screened material remaining in the pan (kg)} \]

Comments :-

Checked By :- MC
Date Checked :- 04-Aug-15

G177b
Rev. 5
18/01/15
## PARTICLE SIZE DISTRIBUTION

**BS 1377-2:1990**

**Job Number:** CGL5537  
**Site Name:** 118 Walton Street, London, SW3 2JJ  
**Type of Sieving:** Washed  
**Sample Number:** BH1  
**Soil Description:** Orange brown, very sandy fine to medium GRAVEL.  
**Date:** 27-Jul-15  
**Tested By:** MT  
**Laboratory:** Chelmer Geotechnical CM3 8AB

### Sieve Size (mm) vs. % Passing

<table>
<thead>
<tr>
<th>Sieve Size (mm)</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>100.0</td>
</tr>
<tr>
<td>7.5</td>
<td>100.0</td>
</tr>
<tr>
<td>6.3</td>
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<td>5.0</td>
<td>100.0</td>
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<tr>
<td>3.75</td>
<td>100.0</td>
</tr>
<tr>
<td>2.8</td>
<td>96.7</td>
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<tr>
<td>2.0</td>
<td>94.6</td>
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<tr>
<td>1.4</td>
<td>86.4</td>
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<td>1.0</td>
<td>71.8</td>
</tr>
<tr>
<td>0.6</td>
<td>62.4</td>
</tr>
<tr>
<td>0.5</td>
<td>59.2</td>
</tr>
<tr>
<td>0.335</td>
<td>56.2</td>
</tr>
<tr>
<td>0.200</td>
<td>51.2</td>
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<tr>
<td>0.125</td>
<td>47.0</td>
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<tr>
<td>0.060</td>
<td>36.6</td>
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<tr>
<td>0.045</td>
<td>26.2</td>
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<tr>
<td>0.030</td>
<td>14.4</td>
</tr>
<tr>
<td>0.021</td>
<td>8.3</td>
</tr>
<tr>
<td>0.015</td>
<td>6.0</td>
</tr>
<tr>
<td>0.0063</td>
<td>3.2</td>
</tr>
</tbody>
</table>

### Calculations:

- \( f = \frac{(M_1 - M_2) + P}{M_1} \times 100 \)
- \( f = \frac{100P}{M_1} \) (dry sieving)

- \( f = \) Percentage of lines passing 0.063mm
- \( M_1 = \) Mass of dried test sample before washing (kg)
- \( M_2 = \) Mass of dried residue retained on the 0.063m (kg)
- \( P = \) Mass of screened material remaining in the pan (kg)

### Comments:

- Checks passed.
PARTICLE SIZE DISTRIBUTION
BS 1377-2:1990

Job Number : CGL5537
Site Name : 118 Walton Street, London, SW3 2JJ
Sample Number : BH2
Soil Description : Orange brown, very sandy fine to medium GRAVEL.
Depth (m) : 1.50
Sample UID : 64679

Type of Sieving : Washed
Date : 27-Jul-15
Tested By : MT
Laboratory : Chelmer Geotechnical CM3 8AB

<table>
<thead>
<tr>
<th>Sieve Size (mm)</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>90.0</td>
<td>100.0</td>
</tr>
<tr>
<td>75.0</td>
<td>100.0</td>
</tr>
<tr>
<td>63.0</td>
<td>100.0</td>
</tr>
<tr>
<td>50.0</td>
<td>100.0</td>
</tr>
<tr>
<td>37.5</td>
<td>100.0</td>
</tr>
<tr>
<td>28.0</td>
<td>100.0</td>
</tr>
<tr>
<td>20.0</td>
<td>100.0</td>
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<tr>
<td>14.0</td>
<td>67.3</td>
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<td>10.0</td>
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<td>3.4</td>
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<td>0.063</td>
<td>2.1</td>
</tr>
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Calculations :-

\[ f = \left( \frac{M_t - M_r}{M_t} \right) \times 100 \]
\[ f = \frac{100P}{M_t} \text{ (dry sieving)} \]

Comments :-

Comments:

Checked By :- MC
Date Checked :- 04-Aug-15
PARTICLE SIZE DISTRIBUTION
BS 1377-2:1990

Job Number : CGL5537
Site Name : 118 Walton Street, London, SW3 2JJ
Sample Number : BH2
Depth (m) : 3.50
Sample UID : 64681

Type of Sieving : Washed
Date : 27-Jul-15
Tested By : MT
Laboratory : Chelmer Geotechnical CM3 8AB

Soil Description : Orange brown, sandy medium to coarse GRAVEL.

Calculations :-
\[ f = \frac{(M_1 - M_2) + P}{M_1} \times 100 \]
\[ f = \frac{100P}{M_1} \] (dry sieving)

Comments :-

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<thead>
<tr>
<th>Sieve Size (mm)</th>
<th>% Passing</th>
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<tbody>
<tr>
<td>90.0</td>
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<tr>
<td>75.0</td>
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Checked By :- MC
Date Checked :- 04-Aug-15
Chelmer Site Investigations
Unit 15
East Hanningfield Industrial Estate
CM3 8AB

Analytical Test Report: L15/1507/CSI/001

Your Project Reference: CSI5537
Samples Received on: 29.07.2015

Your Order Number: PO4825
Testing Instruction Received: 29.07.2015

Report Issue Number: 1
Sample Tested: 29.07 to 04.08.2015

Samples Analysed: 3 Soils
Report issued: 04.08.2015

Signed

James Game
Manager - Data Logistics
Nicholls Colton Analytical

Notes:

General
Please refer to Methodologies tab for details pertaining to the analytical methods undertaken.
Samples will be retained for 14 days after issue of this report unless otherwise requested.

Moisture Content was determined in accordance with NGA method statement MS - CL - Sample Prep, oven dried at 105°C.

Soil Content was determined in accordance with NFPA method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

In the exception of Sulfate and Sulfur which are crushed over the 2mm test sieve, concentrations are reported as a percentage mass of the dry soil passing the 10mm BS test sieve. As received samples have been corrected for moisture content, but not stone content.

Samples were supplied by customer.

Deviating Samples
Samples received in suitable containers
A date and time of sampling were provided
Sample handling times were exceeded prior to analysis of determinants
Where samples do not meet one or more of the above criteria they will be closed as deviant, this means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Accreditation Key
UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited
### Analytical Test Results - BRE Suite

<table>
<thead>
<tr>
<th>NCA Reference</th>
<th>15-21042</th>
<th>15-21043</th>
<th>15-21044</th>
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<tbody>
<tr>
<td>Client Sample Reference</td>
<td>BH1</td>
<td>BH1</td>
<td>BH1</td>
</tr>
<tr>
<td>Client Sample Location</td>
<td>64672</td>
<td>64676</td>
<td>64680</td>
</tr>
<tr>
<td>Depth (m)</td>
<td>1.00</td>
<td>8.00</td>
<td>2.00</td>
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<tr>
<td>Date of Sampling</td>
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<td>Time of Sampling</td>
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<td>AM</td>
<td>AM</td>
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<tr>
<td>Sample Matrix</td>
<td>Sand</td>
<td>Sand</td>
<td>Sand</td>
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<tr>
<td><strong>Determinant</strong></td>
<td><strong>Units</strong></td>
<td><strong>Accreditation</strong></td>
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<tr>
<td>Water soluble sulphate</td>
<td>(mg/l)</td>
<td>u</td>
<td>110</td>
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<tr>
<td>Acid Soluble Sulphate</td>
<td>(%)</td>
<td>u</td>
<td>0.08</td>
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<tr>
<td>Total Sulphur</td>
<td>(%)</td>
<td>u</td>
<td>0.04</td>
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<tr>
<td><strong>pH Value</strong></td>
<td>pH Units</td>
<td>MCERTS</td>
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### Sample Descriptions

<table>
<thead>
<tr>
<th>NCA Reference</th>
<th>Client Sample Reference</th>
<th>Sample Location</th>
<th>Description</th>
<th>% Passing 2mm BS test sieve</th>
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<tr>
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<td>64672</td>
<td>Dark brown silty sandy gravelly sand.</td>
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<td>15-21043</td>
<td>BH1</td>
<td>64676</td>
<td>Orange/brown gravelly sand.</td>
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<tr>
<td>15-21044</td>
<td>BH1</td>
<td>64680</td>
<td>Orange/brown gravelly sand.</td>
<td>18</td>
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### Analysis Methodologies

<table>
<thead>
<tr>
<th>Matrix</th>
<th>Determinant</th>
<th>Sample condition for analysis</th>
<th>Test Method used</th>
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<tbody>
<tr>
<td>Soil</td>
<td>pH</td>
<td>As Received</td>
<td>In house method statement - MS - Cl - pH (Soil)</td>
</tr>
<tr>
<td>Soil</td>
<td>Sulphate</td>
<td>Air Dried</td>
<td>In house method statement - MS - Cl - Anions (Aquakem)</td>
</tr>
<tr>
<td>Soil</td>
<td>Acid Sulphate</td>
<td>Air Dried</td>
<td>In house method statement - MS - Cl - BRE</td>
</tr>
<tr>
<td>Soil</td>
<td>Total Sulphur</td>
<td>Air Dried</td>
<td>In house method statement - MS - Cl - BRE</td>
</tr>
</tbody>
</table>
This report is personal to the client, confidential and non assignable. It is issued with no admission of liability to any third party.

This report shall not be reproduced, except in full, without the written approval of Chelmer Site Investigations Laboratories Ltd.

Where our involvement consists exclusively of testing samples, the results and comments (if provided) relate only to the samples tested.

Any samples that are deemed to be subject to deviation will be recorded as such within the test summary.
Notes: On site tree identification for guidance only. Not authenticated.
Notes: On site tree identification for guidance only. Not authenticated.

Key:
- Tree/Shrub
- Borehole
- Trial Pit
- Gully
- Tree Stump
- Rain Water/Soil Pipe
- Manhole

Client: Callum Denmark
Location: 118 Walton Street, London, SW3 2JJ
Job No: 5537
Scale: N.T.S.
Sheet: 2 of 2
Date: 06.07.15/07.07.15
Weather: Overcast
Drawn by: LS
Checked by: JH
1 RAISED GROUND FLOOR PLAN - AS PROPOSED
Scale: 1:100@A3  1:50@A1

2 FIRST FLOOR PLAN - AS PROPOSED
Scale: 1:100@A3  1:50@A1
1. SECOND FLOOR PLAN - AS PROPOSED
   Scale: 1:100@A3  1:50@A1

2. ROOF PLAN - AS PROPOSED
   Scale: 1:100@A3  1:50@A1