326 KENSAL ROAD
LONDON W10

Phase 2
Geoenvironmental Investigation

Client
Resolution Property Limited

Agent
Heyne Tillett Steel

Report No. 4336-2 v3
May 2018
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Procedural Notes

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A Figures
B Borehole and Trial Records
C Laboratory Test Results
Synopsis

An investigation has been carried out on land currently occupied by No. 326 Kensal Road on the instructions of Heyne Tillett Steel, Consulting Engineers to Resolution Property Limited. A Phase I Environmental Assessment\(^1\) has been prepared for the site and should be read in conjunction with this report. No other intrusive investigations have been undertaken at the site that we are aware of.

The purpose of the investigation was to determine the ground conditions and to provide recommendations in respect of foundation design and other geoenvironmental matters for the proposed mixed use redevelopment.

Three boreholes and four trial pits were carried out, supported by a programme of in situ and laboratory testing.

Piled foundations are envisioned for the redevelopment and appropriate design data is provided. Chemical analysis revealed insufficient contamination to affect the development.

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\(^1\) Report No. 4336-1 v2 Phase I Environmental Assessment. 326 Kensal Road, London W10. AP Geotechnics Ltd., 27 January 2016
1

Site description

The area under investigation is an ‘L’ shaped portion of land extending to some 0.25 hectares located between Kensal Road and the Grand Union Canal Paddington Branch. The site is currently occupied by the Saga Centre on the western portion whilst The Old Gramophone Works covers the remainder. The current general arrangement is given at Figure 1 at Appendix A.

A full site description is available in the Phase 1 report to which the reader is referred.

2

Development proposals

It is intended to undertake significant remodelling of the site which includes demolishing the collection of buildings to the rear of the Saga Centre. A basement (double height in part) is proposed under the entirety of the site comprising The Old Gramophone Works and the demolished buildings; a part basement exists under the Saga Centre and will be retained. The Saga Centre will be extended to 5 storeys for commercial space whilst The Old Gramophone Works and the demolished buildings will be extended to 6 storeys to provide commercial with residential above.

The basement proposals are shown on Figure 2 of Appendix A. Figure 3 is a section through the western part of the site (Saga Centre) whilst Figure 4 is a section showing the proposals for The Old Gramophone Works (OGW).
3

Geology

Published records of the British Geological Survey (BGS) indicate the site to lie on London Clay. No superficial deposits are mapped at the subject site.

4

Field work

The extent of the field work was specified by the Consulting Engineer and comprised three boreholes drilled by light percussive techniques to depths of 10, 20 & 25 m. In addition, four hand dug trial pits were carried out to ascertain the depth and type of the existing foundations. Five trial pits were originally specified but TP4 could not be undertaken due to its location. Trial Pit 1 was started by hand in the small 'terrace' at the rear of the OGW but the buried structures were too deep for hand excavation without shoring. Trial Pit 1 was therefore moved slightly east and was excavated by machine in the far north east corner of the OGW. The location of all exploratory points is shown on Figure 1 at Appendix A.

Representative soil samples were recovered from the boreholes and trial pits for subsequent laboratory examination and testing; whilst Standard Penetration Tests (SPT) were carried out as appropriate. Details of the strata encountered are provided on the Borehole and Trial Pit Records at Appendix B; together with particulars of the samples recovered, groundwater observations and SPT results. The profile of SPT with depth is also presented at Figure 5 of Appendix A.

A schematic section of the existing foundations are available with the Trial Pit Records at Appendix B.
Standpipes were installed in BHs 1 & 3 to allow monitoring of groundwater levels. The results are discussed in Section 6.2.

5 Laboratory testing

The following laboratory tests were conducted on soil samples recovered during the field work:

- Natural moisture content: to assess the in situ condition of the soil.
- Liquid and Plastic Limits: to classify cohesive soil into behavioural groups.
- Unconsolidated undrained triaxial compression: to determine the shear strength of cohesive material and thus to assess its load bearing capacity.
- One-dimensional consolidation: to determine the deformation characteristics of clay under applied loading and unloading.
- Swelling pressure: to ascertain the pressures induced by the excavation for the basement.
- Soluble sulphate and pH value: for the specification of buried concrete.
- Contamination: chemical analyses to detect the presence of contaminants as indicated by the Phase 1 Assessment, viz:-
  Organic: Petroleum hydrocarbons (TPH), polyaromatic hydrocarbons (PAH) and phenols.
  Others: Asbestos screen and Waste Acceptance Criteria (WAC) full solid waste suite and 2 stage leachate suite.
Results of these tests are presented at Appendix C and the variation of shear strength with depth is shown at Figure 6 of Appendix A.

6

Ground conditions

6.1

Stratigraphy

The stratigraphy of the site as revealed by the investigation is described in detail at Appendix B and in general terms hereafter.

6.1.1

Made Ground

Made Ground was encountered in all exploratory locations under a surfacing of concrete or tarmac over concrete and was observed to a maximum depth of 2.60 m in BH3.

The Made Ground encountered comprised both cohesive and granular material, the latter generally comprising fragments of brick, concrete and flint, often in a matrix of silt and sand sized particles. The cohesive Made Ground was represented by a sandy clay with fragments of the same man-made detritus found in the granular portion.

Trial pits 1 and 2 were terminated in Made Ground whilst TP5 was terminated in concrete. The Made Ground in TP1 was odorous and stained with oil.
6.1.2
Superficial deposits

Although not mapped at this location by the BGS, material underlying the Made Ground in BH1 and TP3 is not considered representative of London Clay and has been classed as Superficial deposits for the purposes of this report. The deposit was found to be thin in BH1 where 0.60 m was proved whilst TP3 was terminated in clay at 1.34 m depth. The deposits were represented by a dark grey and brown mottled clay.

6.1.3
London Clay

London Clay was proved beneath the Made Ground/ Superficial Deposits and continued to the limit of investigation of 25 m depth.

The London Clay was initially represented by a brown grey clay which is consistent with the upper, weathered portion of the London Clay and extended to between 7 and 8 m depth. This was underlain by a fissured dark grey clay which is typical of the unweathered material and continued to the limit of investigation.

Triaxial testing indicates the weathered London Clay to be firm to stiff whilst the unweathered portion is stiff to very stiff. An Atterberg Limit performed on a sample of London Clay confirms the very high plasticity expected of this material.

6.2
Groundwater

Boreholes 1 and 2 and trial pits 2 to 5 were dry during drilling/excavation. Borehole 3 recorded a slow seepage at 4.8 m depth which only rose to 4.75 m during the subsequent 20
minute observational pause in drilling. However, the speed of drilling and the use of casing to support the bore may have masked any small inflows and impinged upon the accuracy of the observations. Trial pit 1 recorded water in the Made Ground below 0.64 m depth.

Details of all groundwater observations during drilling/excavation are provided on the appropriate Borehole and Trial Pit Record.

Standpipe readings taken during subsequent monitoring visits recorded the depth to groundwater in BH1 decreasing from 6.40 to 4.66 m whilst water in BH3 rose from 1.66 to 1.54 m depth.

7
Discussion

7.1
General

The site has evidently already carried development and the investigation has revealed Made Ground to be present. It is possible that other pockets of Made Ground may also be present; perhaps deeper, of different character or associated with the remains of construction; even though not detected by this investigation.

All remnants of previous construction should be removed prior to redevelopment to enable the proposals to be constructed without hindrance and to perform satisfactorily.
In view of the proposed double basement, piled foundations are recommended. However, when detailed loadings are known, spread foundations might be possible should loading be appropriate and design information can then be provided.

7.2 Piled foundations

Either driven or bored piles would be suitable in the ground conditions found at this site. However, compared with bored piling, construction of driven piles generates greater noise and vibration which may not be acceptable in this environment. Consideration of the various advantages and disadvantages of the different pile types suggests CFA piles to be preferred. They avoid many of the installation difficulties that would otherwise be experienced; particularly the need for casing through the Made Ground and the need to control groundwater inflows. Piles constructed by CFA means are therefore recommended and parameters for their preliminary design are provided in Tables 1 and 2. The recommendation assumes that suitable access will be available for the necessary plant.

No shaft friction will be generated within 1m of pile cut off level which is assumed to equate to 7 m below Kensal Road.

Table 1: Design parameters for CFA piles - Shaft friction

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Typical depth, m</th>
<th>Ultimate unit shaft friction</th>
</tr>
</thead>
<tbody>
<tr>
<td>All material</td>
<td>0.0 - 7.0</td>
<td>Ignore</td>
</tr>
<tr>
<td>London Clay</td>
<td>7.0 - 25.0</td>
<td>Increases linearly from 60 to 110 kPa</td>
</tr>
</tbody>
</table>

Table 1 has been derived in conjunction with an adhesion factor of 0.6 in the London Clay.
Table 2: Design parameters for CFA piles - End bearing capacity

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Typical depth, m</th>
<th>Ultimate unit end bearing capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>London Clay</td>
<td>15.0 - 25.0</td>
<td>Increases linearly from 1190 to 2620 kPa</td>
</tr>
</tbody>
</table>

Factors of safety must be applied to derive the allowable working load from the ultimate values given in the tables. Unless successful load tests indicate a lower value may be adopted, a factor of 3 on both shaft friction and end bearing is recommended.

As an example, the tables predict that a single pile of 450 mm diameter installed to 20.0 m depth will have an allowable working load of approximately 540 kN. Alternatively, a 600 mm diameter pile, bored to the same depth would have an allowable load capacity of about 750 kN. Total settlement of such piles is not expected to exceed about 5 - 10 mm as the working load will be carried wholly in shaft friction.

Evidently it would be possible to utilise other pile types and different geometries. Further advice could be given on the load capacity for any other configuration which may be under consideration.

The actual load capacity achieved in practice depends upon the precise installation procedures. Advice should therefore be sought from specialist contractors to verify the load capacity and settlement characteristics of their particular piles in the ground conditions revealed by this investigation.
7.3
Excavations

7.3.1
Stability

All material likely to be encountered in general construction activities should be regarded as unstable. Some apparent stability may be present immediately on excavation, especially where there is a high clay content, but this must not be relied upon. All excavations should therefore be supported at all times unless battered to a safe angle of repose.

Provision of adequate support is especially important for the safety of personnel when required to work in or close to excavations. Particular care should be exercised where excavations are close to existing structures including highways to ensure they do not experience any loss of support. Temporary and permanent works should be designed to resist the additional lateral earth pressures arising from any superimposed loads in addition to those generated by the soil itself, without significant deformation.

Sheet piling or a secant wall are both possible geotechnical solutions for the temporary works. A contiguous piled wall is not recommended due to the presence of water at shallow depth.

7.3.2
Retaining walls

Lateral earth pressures will act upon the basement walls and both temporary and permanent works should be designed to accommodate the lateral earth pressures without significant deformation, and also any increase that may result from nearby superimposed loadings.
Lateral earth pressures may be calculated in conjunction with the parameters of Table 3.

**Table 3: Material parameters in terms of effective stress**

<table>
<thead>
<tr>
<th>Material</th>
<th>Bulk density Mg/m³</th>
<th>Effective cohesion</th>
<th>Effective angle of internal shearing resistance, degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Made Ground</td>
<td>1.8</td>
<td>0</td>
<td>20*</td>
</tr>
<tr>
<td>London Clay</td>
<td>2.0</td>
<td>0</td>
<td>22*</td>
</tr>
</tbody>
</table>

* based on engineering assessment

### 7.3.3

**Groundwater**

The two sets of standpipe readings indicate that water was at some 1.5 to 4.6 m depth and is therefore within the depth of construction.

The chosen method of excavation support will extend down into the London Clay for both support and to lengthen the flow path for groundwater. Once complete, the basement area can be pumped out (if required) prior to excavation. Some residual inflows can be expected, but these should be able to be controlled by conventional pumping from shallow sumps. The amount of pumping will depend upon the water tightness of the walls but generally results in low rates of groundwater ingress.

No attempt should be made to lower the general groundwater level as the cone of depression will extend beyond the site boundaries and may well induce excessive settlement in surrounding property or other structures.
The basement should be tanked to ensure it is watertight and designed to withstand hydrostatic uplift forces. It should be noted that these may exceed the dead load of the structure during the early phases of construction.

Reference to ‘The Lost Rivers of London’ indicates that the site is not located on an historic water course.

7.3.4
Soil swelling

Excavation of the new basement will reduce the vertical stress that acts upon the soil and thus generate swelling at formation level. Swelling has two distinct phases; elastic recovery which will take place immediately the load is removed followed by long term swelling at decreasing rate over the ensuing years. The elastic component will be removed during final trimming of the excavation and is thus likely to be unnoticed.

The magnitude of long term swelling has been assessed from the consolidation test data on the assumption that the same geological factor applies to swelling as it does to consolidation. Published data comparing the results of long term monitoring of basement construction with the magnitude of swelling derived from conventional analysis has indicated that significant swelling only occurs when the reduction in vertical effective stress is more than 20% of the vertical effective stress prior to excavation. This philosophy has been incorporated into the present analysis.

The estimated long term swelling in the London Clay is calculated at some 50 mm in the centre of the excavation with approximately half that amount occurring midway along the sides and one quarter in the corners. A void should therefore be incorporated beneath the
basement slab to allow for the anticipated swelling, or the basement designed to withstand the uplift forces.

Undisturbed samples have been subject to laboratory swelling tests to determine the swelling pressure produced by removal of the soil and saturation with water. The results of the analysis indicate that the swelling pressure is some 50 to 60 % of the weight of the soil removed.

7.4

Contaminant analysis

7.4.1

Solid phase

Contaminant testing was undertaken on selected soil samples and the results compared with the limited number of CLEA\textsuperscript{2} Soil Guideline Values (SGVs) for commercial land use that have been published to date. Where not available from that source, reference has also been made to the LQM/CIEH S4ULs for Human Health Risk Assessment\textsuperscript{3}. Appropriate trigger levels are given with the results at Appendix C.

Analysis for metals and metalloids revealed all determinands to be below the commercial triggers.

No phenols were recorded above the limit of detection for the test of 5 mg/kg.

\textsuperscript{2} The Contaminated Land Exposure Assessment Model, Department for Environment, Food and Rural Affairs, The Environment Agency, R & D Publications SGV I et al., March 2002

\textsuperscript{3} The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, 2015
Analysis for TPH recorded very low levels, even from the odorous material in TP1. A maximum total concentration of 123 mg/kg was recorded in TP1 at 1.5 m depth. None of the LQM GACs were exceeded. Concentrations of BTEX were recorded in both samples analysed but at levels below the relevant triggers. The presence of BTEX is the likely source of the odours noted during the field work.

Five samples were analysed for speciated PAHs, with a maximum of 327 mg/kg total PAH recorded in BH2 at 0.40 m depth. Only dibenzo(ah)anthracene was recorded above the commercial GAC of 3.5 mg/kg with a concentration of 5.4 mg/kg; all other determinands were below the GAC or less than the limit of detection for the test of 0.1 mg/kg.

Analysis for asbestos was carried out on three samples. No asbestos fibres were detected.

Nevertheless, it is recommended that appropriate health and safety precautions, such as detailed in HS(G)66\textsuperscript{4} and elsewhere, should be followed by the construction workforce and others who may come into contact with potentially contaminated soil. They should be agreed with the Health and Safety Executive and are likely to include, but not be restricted to, the following:-

- maintenance of good standards of personal hygiene.
- wearing personal protective clothing that is changed and cleaned frequently to eliminate skin contact.
- prevention of ingestion by using washing and changing facilities at all break times.
- prohibition of eating, drinking or smoking between break times.
- controlling the spread of dust and airborne mists to prevent inhalation.

\textsuperscript{4} Protection of workers and the general public during the development of contaminated land HS(G)66 Health and Safety Executive, 1991
7.4.2
Waste Acceptance Criteria (WAC)

Two samples were subject to the WAC full solid waste suite and the WAC 2 stage leachate suite. The results have been compared to the criteria contained in the Landfill Regulations 2002 as amended and are presented at Appendix D.

Within the solid waste suite, all results were within the Inert Waste Landfill criteria limits. Parameters determined on the compliance leaching test were also predominately within the Inert Waste Landfill criteria limits save for sulphate and total dissolved solids on both samples. The results put the waste into the Stable Non-reactive Hazardous waste in non-hazardous Landfill category.

The contamination test results and the WAC results should be forwarded to the contractor appointed to undertake any spoil removal. Transfer notes and chain of custody sheets should be retained for all arisings removed from site.

7.4.3
Generic quantitative risk assessment

A Generic Quantitative Risk Assessment (GQRA) involves the comparison of contaminant concentrations measured in soil, water or gas at a site with generic assessment criteria. Generic assessment criteria are typically conservative to ensure they are applicable to the majority of sites and normally apply to only a limited number of pollutant linkages.

Various numerical assessment criteria have been used to interpret the chemical test results, as described in Sections 7.4.1 and 7.4.2. These criteria are generally conservative and in the
event they are exceeded a further level of analysis is typically required. In addition, BRE Special Digest 1:2005 has been consulted in regards to buried concrete.

Laboratory test results for soils are presented at Appendix C along with appropriate trigger levels and the results are discussed in Section 7.4.1.

No metals, metalloids, phenols, non-halogenated hydrocarbons (TPH), BTEX or polycyclic aromatic hydrocarbons (PAH) were recorded above the CLEA SGVs or LQM/CIEH GACs, which have been used as the screening values in the GQRA.

The published SGVs and GAC triggers for commercial use are considered appropriate to this site. No unacceptable risks have been identified by this investigation.

7.5 Further discussion

The Phase I Assessment revealed that the site has been subject to residential, commercial and unknown uses over the course of its development history. Of particular note was the presence of a Paint Works on the 1935 map which became a Gramophone Record Works by 1969. Both of these Works occupied the building known as The Old Gramophone Works. The site was no longer labelled as a Gramophone Record Works by the mapping of 1987 although it is understood that it became a recording studio for Trojan Records.

The risk assessment contained within the Phase I report indicated there to be a medium potential risk of contamination arising from the previous uses of the site. Surrounding uses form a low risk of potential contamination migrating to the subject site. Although potentially contaminative activities have taken place within the vicinity of the subject site, the underlying
London Clay has negligible permeability and is a nonaquifer. The London Clay will severely retard any migration, both laterally and vertically due to its very low permeability and high adsorbancy. Any potential contamination on site is therefore unlikely to migrate off site. Similarly, any off site contamination is unlikely to migrate to the subject site.

Oil filled cables are known to run along the towpath immediately to the north of the site. Odorous and stained material was encountered in TP1 and is considered to be associated with a leak from these cables. Other, localised contamination may be present within the site boundary if the cables have leaked elsewhere. If such material is encountered during redevelopment works it should be stockpiled separately and tested to ensure correct disposal. It is beholden on the owners of the oil filled cables to fix any leaks and remediate any land affected by such leaks.

Whilst it is acknowledged that the Paint Works and Gramophone Works are more likely than not to have caused some localised contamination, the Phase I Risk Assessment and the Phase 2 recommendations are predicated on the proposal to excavate a large basement (see Figure 2), resulting in the removal of all potentially contaminated soils within its footprint. Therefore, there would seem little benefit in testing soils for potential contamination that will be removed from site, as any potential risk that may have been generated from these soils will have been removed, thus removing the risk driver.

On sites with a similar mixed use history a Remedial Action Plan has been produced which outlines the strategies to be employed during the redevelopment works, with particular emphasis paid to potential contamination and we would consider this an appropriate tool to allay the Council’s Environmental Quality Officer’s concerns.
During the course of the development a watching brief shall be maintained under the supervision of the site manager who should be suitably experienced in managing sites that have a potential to be 'contaminated'.

A watching brief consists of a record of any observations of contamination made during the course of development by any member of staff, including contractors and visitors. In addition, a photographic record should be kept of key stages of development including any contamination encountered, formation levels of excavations (including reduced level/mass excavations) and soft landscaping etc. Staff briefings and a discovery strategy will also be outlined.

7.6

Buried concrete

Laboratory tests on soil samples yielded a maximum soluble sulphate concentration of 1.46 g/l which results in a Design Sulphate Class\(^5\) of DS-2.

The groundwater is considered to be mobile and all pH determinations were in excess of 6.5. Therefore the Aggressive Chemical Environment for Concrete, ACEC, is classed as AC-2.

R G Chapman
AP GEOTECHNICS LTD.
May 14 June 2018

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\(^5\) Concrete in aggressive ground. BRE Special Digest 1. Building Research Establishment, 2005
APPENDICES

A  Figures

Figure 1: Site Plan
Figure 2: Basement Plan
Figure 3: Saga Centre Section
Figure 4: The Old Gramophone Works Section
Figure 5: SPT Profile
Figure 6: Shear Strength Profile

B  Borehole and Trial Pit Records

Symbols and Abbreviations
Borehole Records
Trial Pit Records

C  Laboratory Test Results

Summary of Geotechnical Tests
One-dimensional consolidation
Contaminants in Soil
Waste Acceptance Criteria
SPT PROFILE
326 Kensal Road
London W10

SPT N Value

Depth, m

BH1  BH2  BH3
APPENDIX B

BOREHOLE AND TRIAL PIT RECORDS
SYMBOLS and ABBREVIATIONS

Samples

Undisturbed

U Standard open drive "undisturbed"
   102mm dia. in boreholes
   38mm dia. in trial pits, window sampler
   and hand auger

T Thin wall open drive

P Piston

CBR CBR mould

L Windowless sampler liner

Disturbed

D Small

B Bulk

W Water

C Contaminants: plastic tub

J Contaminants: brown glass jar

Standpipes

Standpipe tubing

Bentonite seal

Filter medium

Slotted standpipe

Backfilled with risings

Piezometer tip

In situ tests

SPT Standard Penetration Test, open shoe
solid cone

N value is number of blows for 300mm
penetration.
Blow count also given as seating drive
followed by four increments of 75mm.

V ( ) Vane test (c, kPa)

P ( ) Hand penetrometer (c, kg/cm²)

M ( ) Meze probe (CBR %)

Water records

Standing level

Depth encountered

suffix identifies separate strikes
**Boring Method**: Cable Percussion  
**Casing Diameter**: 150mm cased to 3.00m  
**Ground Level (mOD)**:  

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Casing Depth (m)</th>
<th>Water Depth (m)</th>
<th>Field Records</th>
<th>Level (mOD)</th>
<th>Description</th>
<th>Legend</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.30</td>
<td>D1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CONCRETE with ½” re-bar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.60</td>
<td>D2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MADE GROUND: Red brick fragments in a brown sandy clay matrix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td>D3</td>
<td></td>
<td></td>
<td>45 blows</td>
<td></td>
<td>MADE GROUND: Soft to firm dark grey and black slightly sandy clay with fine gravel of flint, brick and occasional ash</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.50</td>
<td>U1</td>
<td></td>
<td></td>
<td>45 blows</td>
<td></td>
<td>Firm dark grey and brown mottled CLAY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.00-3.45</td>
<td>U2</td>
<td></td>
<td></td>
<td>45 blows</td>
<td></td>
<td>Fir to stiff brown grey CLAY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.50</td>
<td>U3</td>
<td></td>
<td></td>
<td>45 blows</td>
<td></td>
<td>Stiff to very stiff dark grey CLAY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.50-6.95</td>
<td>U4</td>
<td></td>
<td></td>
<td>55 blows</td>
<td></td>
<td>Stiff to very stiff dark grey CLAY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.00</td>
<td>U5</td>
<td></td>
<td></td>
<td>70 blows</td>
<td></td>
<td>Stiff to very stiff dark grey CLAY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.50</td>
<td>U6</td>
<td></td>
<td></td>
<td>70 blows</td>
<td></td>
<td>Stiff to very stiff dark grey CLAY</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks**  
0.5 hrs clean up working area  
0.5 hrs erecting haras fencing  
Borehole dry  
Excavating from 0.00m to 1.20m for 1.25 hours.

**Scale (approx)**: 1:50  
**Logged By**: IJS  
**Figure No.**: 4336.BH1
## Borehole BH1 - 326, KENSAL ROAD, LONDON, W10 5BZ

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Casing Diameter</th>
<th>Water Depth (m)</th>
<th>Field Records</th>
<th>Level (mOD)</th>
<th>Depth (m) (Thickness)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00-11.40</td>
<td>U7</td>
<td>150mm cased to 3.00m</td>
<td></td>
<td>75 blows</td>
<td></td>
<td></td>
<td>Stiff to very stiff dark grey CLAY</td>
</tr>
<tr>
<td>11.45</td>
<td>D10</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>...claystone from 10.50m to 10.75m</td>
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<tr>
<td>12.50-12.95</td>
<td>SPT N=26</td>
<td></td>
<td>4.4/5,6,8,7</td>
<td></td>
<td></td>
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<td>...becoming fissured</td>
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<td>14.00-14.45</td>
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<td>75 blows</td>
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<td>14.50</td>
<td>D11</td>
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<td>15.50-15.95</td>
<td>SPT N=30</td>
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<td>3.5/6,7,8,9</td>
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<td>17.00-17.45</td>
<td>U9</td>
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<td>80 blows</td>
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<td>17.50</td>
<td>D12</td>
<td></td>
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<td>(17.30)</td>
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<td>18.50-18.95</td>
<td>SPT N=32</td>
<td></td>
<td>4.6/6,8,9,9</td>
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### Remarks
Chiselling from 10.50m to 10.75m for 0.25 hours.
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<thead>
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<th>Depth (m)</th>
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<th>Casing Diameter</th>
<th>Water Depth (m)</th>
<th>Field Records</th>
<th>Level (mOD)</th>
<th>Description</th>
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<tr>
<td>20.00-20.45</td>
<td>U10</td>
<td>150mm cased to 3.00m</td>
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<td>85 blows</td>
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<td>Stiff to very stiff dark grey CLAY</td>
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<td>20.50</td>
<td>D13</td>
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<tr>
<td>21.50-21.95</td>
<td>SPT N=35</td>
<td></td>
<td>4.7, 7, 8, 10, 10</td>
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<td>...claystone from 22.10m to 22.40m</td>
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<td>23.00-23.45</td>
<td>U11</td>
<td></td>
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<td>90 blows</td>
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<td>4.6, 8, 9, 9, 10</td>
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<td>25.00</td>
<td>D15</td>
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<td>25.00</td>
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<td>Complete at 25.00m</td>
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</table>

Remarks:
Chiselling from 22.10m to 22.40m for 0.25 hours.
### Boring Method
- Cable Percussion

### Casing Diameter
- 150mm cased to 1.50m

### Ground Level (mOD)

### Client
- Resolution Property Limited

### Location
- See site plan

### Dates
- 30/06/2015 - 01/07/2015

### Engineer
- Heyne Tillett Steel

### Sheet
- 1/1

### Depth (m) | Sample / Tests | Casing Depth (m) | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend |
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<td>0.40</td>
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<td></td>
<td></td>
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<td>TARMAC</td>
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<tr>
<td>0.40</td>
<td>D2</td>
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<td></td>
<td></td>
<td>MADE GROUND: Crushed aggregate</td>
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<td>0.40</td>
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<td></td>
<td></td>
<td>50 blows</td>
<td>(0.05)</td>
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<td>MADE GROUND: Soft to firm dark grey and black slightly handy clay with fine gravel of flint, brick and occasional ash</td>
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</tr>
<tr>
<td>4.00</td>
<td>D5</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>CONCRETE</td>
<td></td>
</tr>
<tr>
<td>4.00</td>
<td>D7</td>
<td></td>
<td></td>
<td></td>
<td>(5.95)</td>
<td></td>
<td>MADE GROUND: Concrete rubble</td>
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<tr>
<td>7.30</td>
<td>D7</td>
<td></td>
<td></td>
<td></td>
<td>7.20</td>
<td>Stiff fissured dark grey CLAY</td>
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</table>

### Remarks
- Borehole dry and backfilled with arisings
- 1 hr waiting to gety onto BH position due to parked vans
- 0.5 hrs erecting heras fencing
- 0.25 hrs reinstalling
- Chiselling from 0.60m to 0.85m for 0.25 hours. Chiselling from 0.85m to 1.25m for 0.75 hours. Excavating from 0.00m to 0.85m for 0.5 hours.

### Scale (approx)
- 1:50

### Figure No.
- 4336.BH2

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### Boring Method
Cable Percussion

### Casing Diameter
150mm cased to 3.00m

### Ground Level (mOD)

### Location
See site plan

### Dates
02/07/2015

### Client
Resolution Property Limited

### Engineer
Heyne Tillet Steel

### Sheet
1/2

<table>
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<th>Depth (m)</th>
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<th>Water Depth (m)</th>
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<th>Level (mOD)</th>
<th>Depth (m) (Thickness)</th>
<th>Description</th>
<th>Legend</th>
<th>Unit</th>
<th>Instr</th>
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<tr>
<td>0.50</td>
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<tr>
<td>1.30-1.75</td>
<td>SPT(C) N=20</td>
<td>4.6/3,7,7,3</td>
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<td>(1.90)</td>
<td>MADE GROUND: Bricks and brick fragments in a matrix of silts and sand sized particles with voids</td>
<td>CONCRETE</td>
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<td>2.30-2.75</td>
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<td>2.2/2,3,3,2</td>
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<td>(0.40)</td>
<td>MADE GROUND: Soft brown grey sandy clay with brick fragments</td>
<td>CONCRETE</td>
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<tr>
<td>2.80</td>
<td>D3</td>
<td></td>
<td></td>
<td>45 blows</td>
<td></td>
<td></td>
<td>Firm to stiff brown grey CLAY</td>
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<tr>
<td>3.00-3.45</td>
<td>U1</td>
<td>45 blows</td>
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<td>4.00-4.40</td>
<td>U2</td>
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<td>D5</td>
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<tr>
<td>4.80</td>
<td>W1</td>
<td>slow seepage(1)</td>
<td>at 4.80m, rose to 4.75m in 20 mins. 45 blows</td>
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<td>5.00-5.40</td>
<td>U3</td>
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<td></td>
<td>(5.50)</td>
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<td>Stiff fissured dark grey CLAY</td>
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<td>8.30-8.75</td>
<td>U4</td>
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<td>SPT N=22</td>
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</table>

### Remarks
0.5 hrs clean up working area  
Chiselling from 2.00m to 2.20m for 0.5 hours. Chiselling from 7.90m to 8.15m for 0.25 hours. Excavating from 0.00m to 1.20m for 1.25 hours.
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Casing Diameter (m)</th>
<th>Water Depth (m)</th>
<th>Field Records</th>
<th>Level (mOD)</th>
<th>Depth (m) (Thickness)</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>11.30-11.75</td>
<td>U5</td>
<td>150mm cased to 3.00m</td>
<td>70 blows</td>
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<td>11.80</td>
<td>D9</td>
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<tr>
<td>12.80-13.25</td>
<td>SPT N=26</td>
<td>3.5/5,6,7,8</td>
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<td>14.30-14.75</td>
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<td>75 blows</td>
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<tr>
<td>14.80</td>
<td>D10</td>
<td>(11.90)</td>
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<td>17.50-17.95</td>
<td>U7</td>
<td>80 blows</td>
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<td>18.00</td>
<td>D11</td>
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<td>20.00</td>
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**Remarks**
Chiselling from 17.20m to 17.40m for 0.25 hours.
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<th>Level (mOD)</th>
<th>Depth (m) (Thickness)</th>
<th>Description</th>
<th>Legend</th>
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<td>0.50</td>
<td>C1</td>
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<td></td>
<td></td>
<td>(0.19)</td>
<td>CONCRETE</td>
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<tr>
<td>0.64</td>
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<td>1.00</td>
<td>C2</td>
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<td>(1.52)</td>
<td>MADE GROUND: Soft grey, brown and black slightly sandy clay with gravel of flint, brick and concrete. Odorous and wet</td>
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<tr>
<td>2.00</td>
<td>C4</td>
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<td>2.16</td>
<td>Complete at 2.20m</td>
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<td>2.16</td>
<td>C5</td>
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**Plan**

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|        |        |        |        |        |        |
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```

**Remarks**

Floating product on water in base of pit. Water in clay below 0.64 m depth.

**Scale (approx)** 1:20

**Logged By**

**Figure No.** 4336.TP1
<table>
<thead>
<tr>
<th>Depth (m)</th>
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<th>Field Records</th>
<th>Level (mOD)</th>
<th>Description</th>
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<td>0.20</td>
<td>C1</td>
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<td>(0.17)</td>
<td>CONCRETE</td>
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<td>0.17 (0.03)</td>
<td>MADE GROUND: Grey, black and brown fragments of concrete, flint and bituminous gravel in a matrix of silt and sand sized particles</td>
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<td>0.20</td>
<td>Complete at 0.25m</td>
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**Remarks**

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**Scale (approx)**: 1:20

**Logged By**: 4336.TP2

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