Southern Testing
Environmental & Geotechnical

# Site Investigation Report

Desk Studies | Risk Assessments | Site Investigations | Geotechnical | Contamination Investigations | Remediation Design and Validation

Site: 4 Upper Terrace, London, NW3 6RH

Client: Andrew Guy

Report Date: May 2013

Project Reference: J10982

AGS ace ISO 9001 ISO 14001 BS18001

ST Consult
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# SUMMARY

The site, 4 Upper Terrace, Hampstead, comprises a three-storey residential property with a rear terrace area and garden. We understand that a single level basement with further deepened area for a swimming pool is proposed.

The British Geological Survey of the area indicates that the site geology consists of Bagshot Formation over Claygate Member over London Clay.

The soils encountered comprised Topsoil over a sequence of very silty/clayey sands interbedded with horizons of firm clays.

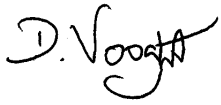
The sulphate content of the fill and natural soil was found to fall within Class DS-1. The ACEC classification for the site is AC-1.

Allowable bearing capacity of between 150 and 190kPa has been recommended for foundations formed on the underlying medium dense to dense sands.

A discussion is given on basement construction and design soil parameters.

Waste Classification Tests have been undertaken on the materials likely to be excavated for the basement. The results suggest that the materials are likely to be classified as Inert, however final classification will be made by the receiving landfill.





J.N. Race MSc CGeol
(Countersigned)

D. Vooght MSc
(Signed)

For and on behalf of Southern Testing Laboratories Limited

STL: J10982
7 May 2013

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# A INTRODUCTION

## 1 Authority

Our authority for carrying out this work is contained in a returned Southern Testing Project Order Form dated 28th March 2012 and signed by the client Mr A. Guy.

## 2 Location

The site is located just south of Hampstead Heath approximately 500m northwest of Hampstead Underground Station. The approximate National Grid Reference of the site is TQ 261 861.

## 3 Proposed Construction

We understand that it is proposed to extend the existing basement out under the terrace and into the garden area. At the time of writing exact details of the proposed construction had not been finalised however the works might include a basement of single storey depth (plus a pool) with a maximum excavation depth in the region of 6 metres.

## 4 Object

This is a Phase II geotechnical investigation.

The object of the investigation was to assess foundation bearing conditions and other soil /groundwater parameters relevant to the proposed development.

## 5 Scope

This report presents our exploratory hole logs and test results and our interpretation of these data.

As with any site there may be differences in soil conditions between exploratory hole positions.

This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

Contamination issues are not considered in this report.

The findings and opinions conveyed via this Site Investigation Report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Limited believes are reliable. Nevertheless, Southern Testing Laboratories Limited cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

The site investigation was conducted and this report has been prepared for the sole internal use and reliance of Andrew Guy and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorization of Southern Testing Laboratories Limited. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The recommendations contained in this report may not be appropriate to alternative development schemes.

# B DESK STUDY AND WALKOVER SURVEY

No formal desk study has been undertaken as part of this work, but reference has been made to the following:

## 6 Geology

The British Geological Survey of the area (Map No. 256 – North London) indicates that the site geology consists of Bagshot Formation over Claygate Member over London Clay.

### 6.1 Bagshot Formation

This formation consists of fine white, buff and crimson sands with occasional seams of pipe clay, silt, and local beds of flint gravel.

The Beds are usually 30-45m in thickness and often have a band of flint pebbles at the base. There is a basal layer of mottled loams and clay, with subordinate amounts of reddish sand that resembles the Reading Beds. The clays are succeeded by more sandy, locally pebbly, yellow or gold coloured strata. These beds produce a marked feature above the loam, and sometimes have been taken as the junction with the underlying London Clay. The uppermost part of the formation is a grey clay and mottled loam, about 6m thick in the type area.

### 6.2 Claygate Member

The Claygate Member of the London Clay formation comprises sandy transition beds, about 15 m thick, at the top of the London Clay and consists of alternations of sand and clay. Sand predominates above, and clay below. They were commonly worked for brick making.

### 6.3 London Clay

London Clay is a well-known stiff (high strength) blue-grey, fissured clay, which weathers to a brown colour near the surface. It contains thin layers of nodular calcareous mudstone - "claystone" - from place to place, and crystals of water clear calcium sulphate (selenite) are common. Although slopes will stand in the clay at steep angles in the short term, the long-term stable slope angle is about $7^{o}$ for grassed, or cleared slopes, and a few degrees more for wooded slopes.

## 7 Hydrology and Hydrogeology

Data from the Environment Agency and other information relating to controlled waters is summarised below.

| Data | | Remarks | Possible Hazard to/from Site Y/N |
|---|---|---|---|
| Groundwater Vulnerability | Superficial Deposits | There are no superficial deposits within the site boundary. | N. |
| | Bedrock | As indicated by the Environment Agency (EA) Website (dated 21st June 2012) the bedrock within the site boundary is classified as Secondary A Aquifer - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. | Y. |
| Source Protection Zones | | As indicated by the EA Website (dated 21st June 2012) the site is not located within a Source Protection Zone. | N. |
| Flood Risk | | As indicated by the EA Website (dated 18th May 2012) the site is not located within an area that is at risk of flooding from river or sea sources. | N. |

## 8 Site Description

The site, which extends to approximately 0.09 Ha comprises a three-storey brick built residential property with a garden area and a basement level that extends under the entire footprint of the building. The site is situated in an elevated position with ground levels sloping towards the south. The site itself is split into two areas with the lower garden area that contains the lawn, tree and play area on the western side which then steps up to the terrace around the house. A large brick built wall defines the garden area.

The site is bound to the south and southwest by adjacent 2/3 storey residential properties and by the road 'Upper Terrace'. To the north the site is bound by a grassed and vegetated area called 'West Heath' and to the east by further residential dwellings.

On the whole the vegetation on site comprises grass with bushes and hedges. However, there is a tree towards the southern side of the garden (which is protected) and several other trees.

### 8.1 Photographs

A series of photographs showing the site and surrounding area is included in Appendix D.

# C SITE INVESTIGATION

## 11 Method

The strategy adopted for the intrusive investigation comprised the following:

- 1 No 20m and 2 No. 6m deep boreholes were drilled using a light percussion, 150mm diameter, 'breakdown' shell and auger boring rig.
- Groundwater monitoring standpipes were installed in each of the above boreholes.
- A series of 6 No. test pits was excavated by hand.

Exploratory hole locations are shown in Figure 1 in Appendix A.

## 12 Weather Conditions

The fieldwork was carried out between 16th and 23rd April 2012, at which time the weather was generally overcast with sunny spells.

## 13 Soils as Found

The soils encountered are described in detail in the attached exploratory hole logs (Appendix A), but in general comprised a covering of Topsoil over very silty/clayey sands interbedded with horizons of firm clays. A summary is given below.

| Depth to Base (m BGL) | Soil Type | Description |
|---|---|---|
| 0.35/1.10 | TOPSOIL | Dark grey slightly clayey SAND, with rootlets and occasional fragments of brick. [TOPSOIL] |
| 6.2 | SAND/CLAY | Loose to medium dense orange brown/brown fine to medium with some coarse SAND, with occasional flint gravel, interbedded with medium strength firm grey patched sandy CLAY. |
| 9.1 | SAND | Medium dense, light greenish brown, very silty fine to medium SAND |
| 20.0+ | SAND/CLAY | Medium dense (becoming dense |

| Depth to Base (m BGL) | Soil Type | Description |
|---|---|---|
| | | below 16.50m) brown very clayey/silty fine SAND, interbedded with very sandy CLAY. |

A series of hand excavated trial pits were carried out in locations as specified by the Engineer. Photographic records and trial pit sections are given in Appendix A.

### 13.1 Visual and Olfactory Evidence of Contamination

No obvious visual or olfactory signs of contamination were noted within the soils.

### 14 Groundwater Strikes

While boring was in progress water was added to assist boring in the sands, which tends to mask groundwater entries into the borehole. On completion of the boreholes, no groundwater was observed and the boreholes were dry.

Groundwater monitoring standpipes were installed in each of the boreholes for further long term monitoring.

## D FIELD TESTING AND SAMPLING

The following in-situ test and sampling methods were employed. Descriptions are given in Appendix B together with the test results.

- Disturbed Samples
- Standard Penetration Test

## E GEOTECHNICAL LABORATORY TESTS

The following tests were specified by the Engineer to be carried out on selected samples. Test method references and results are given in Appendix C.

- Natural Moisture Content
- Atterberg Limit Test
- pH and Sulphate Content of Soil
- Particle Size Distribution by Wet Sieve Method
- Drained Shearbox Tests

# F DISCUSSION OF GEOTECHNICAL TEST RESULTS AND RECOMMENDATIONS

## 15 Soil Classification and Properties

| Soil Type | Depth | Compressibility | VCP | Permeability | Frost Susceptible | CBR | Remarks |
|---|---|---|---|---|---|---|---|
| Topsoil | GL to 0.35/1.0m | N/A | N/A | N/A | | | Not suitable for foundations |
| Sand/Clay | 6.2 | Medium to low | Negligible (on mass) | Low to medium (on mass) | Yes | Average | |
| Sand | 9.1 | Low | Negligible (on mass) | Low to medium (on mass) | N/A | | |
| Sand/Clay | 20+ | Low | Negligible (on mass) | Low to medium (on mass) | N/A | | |

## 16 Swelling and Shrinkage

The sand materials will have negligible swelling and shrinkage properties. The impersistent horizons of clay materials were classified as clays or silts of low to high plasticity with a plasticity index range of 6 to 41% and a mean value of 21%.

In terms of NHBC precautions relating to swelling and shrinkage issues, the clay horizons appear impersistent in nature. Furthermore, given that a basement structure is proposed with anticipated formations levels of between 3.5 and 6m, no specific precautions will be required in relation to swelling and shrinkage precautions.

## 17 Groundwater Levels and Groundwater Monitoring

Groundwater levels can vary considerably from season to season and year to year, often rising close to the ground surface in wet or winter weather, and falling in periods of drought. To date the site has been visited on three separate occasions to measure standing water levels in the standpipes. The latter visit on the 15/6/2012 included the installation of groundwater data loggers (divers) in each borehole location for further monitoring on a monthly basis. The results of the monitoring prior to the installation of the groundwater data loggers and on the day of their installation are tabulated below:

| Test Location | Installation Depth (mBGL) | Standing Groundwater Level (mBGL) | | |
|---|---|---|---|---|
| | | 3/5/2012 | 17/5/2012 | 15/6/2012 |
| BH1 | 7.8 | Dry | Dry | Dry |
| BH2 | 6.1 | Dry | Dry | Dry |
| BH3 | 5.8 | Dry | 4.76 | 4.68 |

As noted, groundwater data loggers were installed in the three boreholes on the 15th June 2012 and downloaded on a monthly basis with the results forwarded to the Engineer. The final download was carried out on the 23rd April 2013. The plots of the downloaded groundwater measurements are given in Appendix F. It should be noted that in the case of BH1, this borehole remained dry over the period of monitoring and therefore no plot is given for BH1. In the case of BH2 only traces of groundwater was noted in the base of the standpipe.

Using Hazens formula for estimating the permeability of the sand materials, a range of $4x10^{-4}$ to $4x10^{-5}$m/sec is indicated although where clay horizons are present the permeability could be considerably lower. On removal of the data loggers, the Engineer requested that a series of permeability tests be carried out within the standpipes installed in the three boreholes to confirm the permeability of the soil materials. In the case of BH's 1 and 2 and given the low to negligible presence of groundwater in the standpipes only falling head tests were carried out. As a water table was present in BH3, a rising head test was initially carried out by baling out the standpipe and measuring the rise in water table. Following the rising head test, a falling head test was then subsequently carried out. The results of the permeability tests are given in Appendix F.

A summary table of the measured permeabilities are also given below:

| Test Location | Test Type | Permeability m/sec* |
|---|---|---|
| BH1 | Falling Head | $5.6x10^{-6}$ |
| BH2 | Falling Head | $1.5x10^{-6}$ |
| BH3 | Rising Head | $1.1x10^{-6}$ |
| BH3 | Falling Head | $2.2x10^{-6}$ |

*Time Lag Analysis

It is noted that the above measured values are less than the permeability values indicated using Hazens formula which is based on the particle size distribution of the soil materials.

On the basis of the groundwater observations made while boring was in progress and the measurements to date it would appear that the "regional" water table is below the proposed excavation depth of the basement (6m depth). However given that shallower standing water levels have been measured it is likely that sources of groundwater in the form of perched inflow/seepages e.g clay/silt horizons will need to be allowed in terms of basement

excavation/wall type and construction, design and tanking/drainage measures. In addition allowances for dewatering of perched sources of groundwater will be required along with adequate waterproofing measures to the basement construction and the potential for hydrostatic uplift on basement slabs etc.

## 18 Sulphates and Acidity

Within the single test specified by the Engineer, a pH value of 6.8 was measured on the sand material, which would indicate a very slightly acidic/near neutral soil condition. The measured soluble sulphate on the same sample was 132mg/l, which falls into a Design Sulphate Class DS-1.

On the basis of the groundwater measurements to date, perched groundwater could be present and the groundwater condition should prudently be assumed as mobile. The ACEC site classification is therefore AC-1.

## 19 Bearing Capacity

At the anticipated formation level of 3.5-6.0m BGL, foundations will generally be formed on medium dense to dense sand materials. It should be noted that impersistent horizons of weaker clay are present and where these are encountered at formation they should be removed and replaced with lean mix. In addition foundations should be reinforced to cater for any differential movement.

| Strip Width (mm) | 600 | 750 | 900 | 1200 | 1500 | 1800 | 2000 |
|---|---|---|---|---|---|---|---|
| Allowable Bearing Pressure (kPa) | 150 | 175 | 190 | 190 | 180 | 170 | 170 |

| Pad Size (mm) | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 | 4000 |
|---|---|---|---|---|---|---|---|
| Allowable Bearing Pressure (kPa) | 190 | 180 | 170 | 170 | 170 | 170 | 165 |

To utilise the above bearing pressures it will be necessary to demonstrate that no weaker materials are present beneath the foundation level, e.g. soft to firm clay horizons, possibly by the use of probing techniques or similar. Providing no weaker horizons are present within the influence of loaded foundations the above allowable bearing pressures are with respect to an estimated settlement of 25mm and an isolated foundation condition.

In terms of a raft or basement raft foundation, a net allowable bearing pressure of 150kPa would be available for a raft bearing onto the underlying medium dense to dense sands. Excavation of the basement will result in soil unloading and associated unload displacements within the sand materials. However these will be immediate and therefore there will not be any requirement for any heave precautions in the design of the basement slab.

It should be noted that due the silty/clayey nature of the sands that they will be highly susceptible to wetting up and softening. Accordingly all foundations should preferably be excavated in dry working conditions and the formations protected immediately on excavation by a protective blinding layer of lean mix.

## 19.1 Piling

If contiguous or secant bored piles are to be installed as part of the basement construction, as with any piling scheme, discussions should be held with selected piling contractors to discuss the technical and financial merits of their various systems and overall resources, with respect to equipment available for the soils described and anticipated, to achieve the depths and diameters considered with an adequate safety margin.

From the viewpoint of pile type, and given the close proximity of adjacent structures, a bored pile solution is considered to be a more appropriate pile type. In terms of bored piles and, noting the presence of potentially unstable soils (sands), and the potential presence of perched groundwater, a continuous flight auger grout injected pile (CFA) would be best suited to the ground conditions encountered. Careful monitoring during construction of these pile types is, however, required. The site history is unknown however it should be noted that subsurface obstructions could be encountered in the form of old foundations, drain runs etc. associated with previous development/buildings on the site (see also section 20 below). Accordingly allowances for their removal/breaking out should be made when carrying out piling works and excavations.

In the case of a contiguous bored pile wall solution, this will likely comprise a series of bored piles with a typical gap of approximately 100-150mm between each pile. There is a risk of erosion/migration of sand materials from between the gaps in the piles (particularly where perched groundwater is present) and therefore the use mesh/sprayed concrete to ensure that no soil erosion/movement takes place from between the pile gaps could be considered. In addition to cater for the permeation of groundwater through the piled wall and sprayed concrete, a drainage cavity or some other form of waterproofing measures will need to be considered as part of the basement construction.

### 19.1.1 Basement Design Parameters

The results of the two direct shear box tests on samples of the sand materials reported effective angles of friction ($\phi'$) of 37 and 38°.

There is an empirical relationship between the SPT N values for the angle of friction ($\phi'$) of a granular material (Peck, Hanson and Thorburn).

In addition, the peak and critical states angles of friction can also be estimated from grading, angularity and SPT N values (BS 8002, 1994).

Where: $(\phi'_{peak})=30+A+B+C$

$(\phi'_{cv})=30+A+B$

Assuming a moderately graded sand material (B=2) and a subangular case for the angularity (A=2), the following angles of friction are estimated versus depth using the above relationships and Figure SPT2 (Appendix B), which depending on the depth of the basement the designer may also wish to consider in his assessment of design parameters for the bored pile walls:

| Depth (mbgl) | $\phi'$ | $\phi'_{peak}$ | $\phi'_{cv}$ |
|---|---|---|---|
| 2 | 30 | 34 | 34° |
| 4 | 30.6 | 34.2 | |
| 6 | 31.3 | 34.4 | |
| 8 | 31.9 | 34.7 | |
| 10 | 32.5 | 34.9 | |
| 12 | 32.8 | 36.2 | |
| 14 | 33.7 | 36.6 | |
| 16 | 34.4 | 37.1 | |
| 18 | 35 | 37.5 | |
| 20 | 35.5 | 38 | |

A bulk unit weight of 19k/$m^3$ is recommended for the sand materials

## 20 Excavations and Trenching

Statutory lateral earth support will be required in all excavations where men must work. An allowance for breaking out sub-surface obstructions associated with existing foundations and former underground structures will need to be made. We understand that there are possibly vaults beneath the garden of No 5, which because of boundary changes might extend into the garden of No 4. Further investigation of the location of the vaults possibly using geophysics or similar might detect their location.

The made ground, sandy clays, will be prone to instability and unheralded collapse. The depth and type of adjacent foundations will need to be considered when construction/excavation is proposed within the influence of these foundations. Care will need to be taken to avoid undermining adjacent foundations and great care should be taken when designing temporary and permanent support/propping systems with respect to existing and adjacent foundations/structures, and when carrying out any underpinning works.

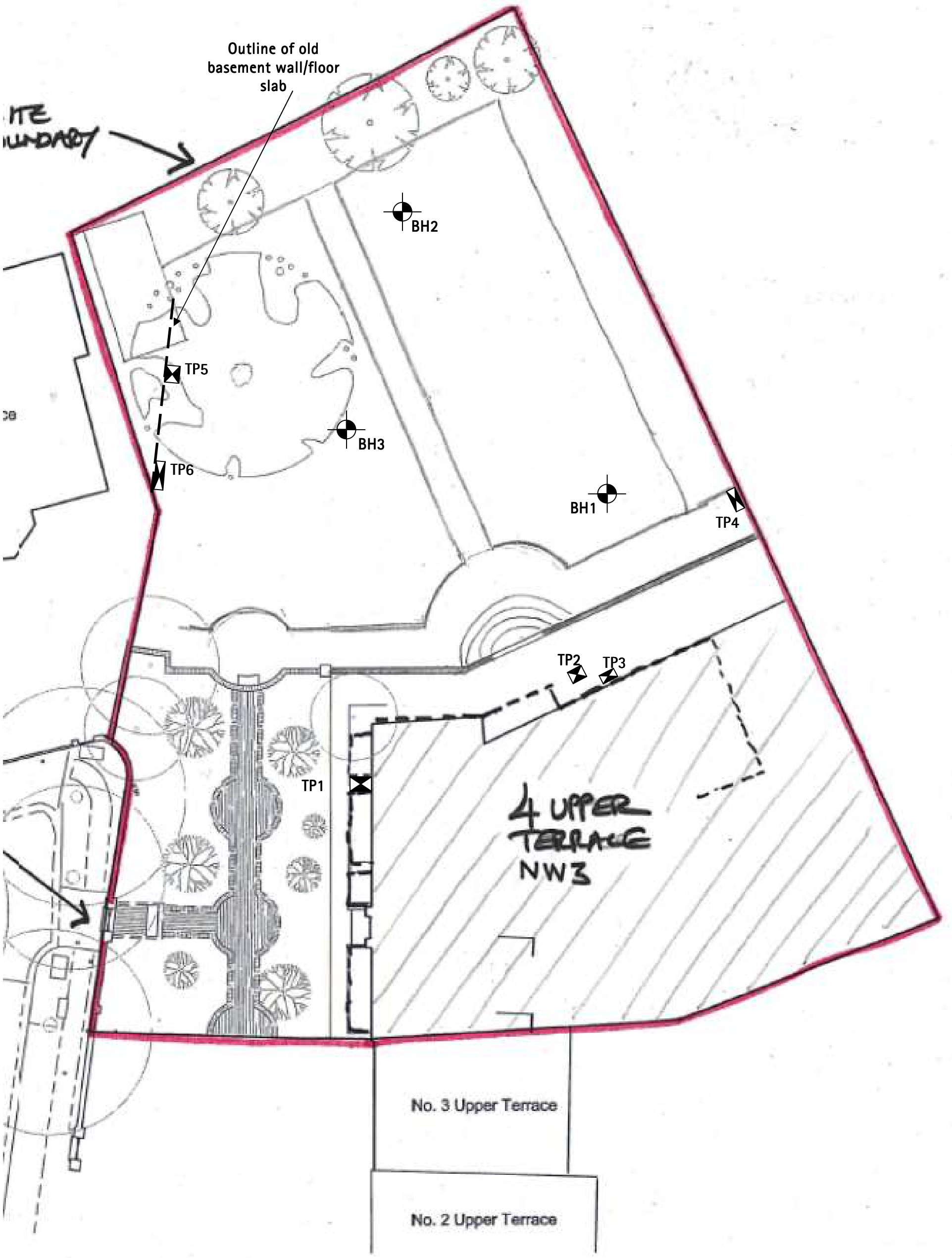
## 21 Comments on Waste Classification

Two representative samples of material that will be excavated for the proposed basement construction (topsoil and the underlying natural ground) have been subject to Waste Acceptance Criteria testing. The vast majority of results suggest an inert classification, although additional testing may be requested to confirm this.

All final waste classification is determined by the receiving landfill, so we would suggest that all test results be forwarded to the landfill for their assessment.

# APPENDIX A

Site Plans and Exploratory Hole Logs




NB: Positions of Boreholes and/or Trial Pits are only indicative unless dimensioned

| | | |
|---|---|---|
| Site: 4 Upper Terrace, London | STL: J10982 | Fig No: 1 |
| Date: 28 June 2012 | | |

Southern Testing

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creaton, Northampton NN6 8NN

ST Consult

Trial Pit and Borehole Location Plan

| Southern Testing Environmental & Geotechnical | Tel: 01342 333100<br>email: info@southerntesting.co.uk<br>www.southerntesting.co.uk | Project No.<br>**J10982** | Hole Type<br>Cable | Borehole No<br>**1**<br>Sheet 1 of 2 |
|---|---|---|---|---|

| | |
|---|---|
| Project Name: 4 Upper Terrace | Dates: 16/04/2012-17/04/2012 |
| Location: 4 UPPER TERRACE, HAMPSTEAD | NGR: 526100E - 186100N |
| Client: MR<br>A. GUY | Level: - |
| | Logged By<br>RF/TW |

| Well | Water Strikes | Samples & In Situ Testing | | | Level (m AOD) | Thickness | Legend | Depth (m) | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | | |
| | | 0.15 | D | | | 0.35 | | | Dark grey slightly clayey SAND, with rootlets, occasional flint gravel and occasional fragments of brick.<br>(TOPSOIL) |
| | | 0.30 | D | | | | | 0.35 | |
| | | 0.50 | D | | | 0.55 | | | Dark orange brown medium to coarse SAND, with occasional fragments of very weak sandstone.<br>(BAGSHOT BEDS) |
| | | 1.00 | LB | | | 0.40 | | 0.90 | |
| | | 1.50 | SPT | N=64 | | | | 1.30 | Grey medium SAND, with occasional fine rounded to sub-rounded flint gravel.<br>(BAGSHOT BEDS) |
| | | 1.50 | D | | | | | | |
| | | 2.00 | LB | | | | | | Medium dense brown medium SAND, with fine to medium (and occasional coarse) sub-rounded flint gravel and occasional clay lenses.<br>(BAGSHOT BEDS) |
| | | 3.00 | CPT | N=20 | | | | | |
| | | 3.00 | LB | | | | | | |
| | | | | | | 4.70 | | | |
| | | 4.00 | LB | | | | | | |
| | | 4.50 | CPT | N=28 | | | | | |
| | | 5.00 | LB | | | | | | |
| | | 6.00 | SPT | N=8 | | | | 6.00 | |
| | | 6.00 | LB | | | 0.20 | | 6.20 | Medium strength light grey (patched light buff brown) CLAY, with sand patches.<br>(BAGSHOT BEDS) |
| | | 6.20 | D | | | | | | Medium dense light greenish brown very silty fine to medium SAND<br>(BAGSHOT BEDS) |
| | | 7.00 | LB | | | | | | |
| | | 7.50 | SPT | N=27 | | | | | |
| | | 7.50 | D | | | 2.90 | | | |
| | | 8.00 | LB | | | | | | |
| | | 9.00 | SPT | N=8 | | | | 9.10 | |
| | | 9.00 | LB | | | | | | Medium dense (becoming dense below 16.50m) brown very clayey fine SAND, interbedded with very sandy CLAY.<br>(BAGSHOT BEDS) |
| | | 9.00 | D | | | | | | |
| | | 9.50 | D | | | | | | |
| | | | Type | Results | | | | | Continued next sheet |

## Borehole Details

| Casing Depth m bgl | Hole Depth m bgl | Casing Diameter mm |
|---|---|---|
| 12.00 | | 150 |

## Water Strikes

| Date | Water (m) | Casing (m) | Time (mins) | Rose to (m) | Sealed (m) |
|---|---|---|---|---|---|
| | | | | | |

## General Remarks:

BOREHOLE DRY ON COMPLETION

Southern Testing
Environmental & Geotechnical
Tel: 01342 333100
email: info@southerntesting.co.uk
www.southerntesting.co.uk

| Project No. | Hole Type | Borehole No |
|---|---|---|
| **J10982** | Cable | **1** Sheet 2 of 2 |

Project Name: 4 Upper Terrace

Dates: 16/04/2012-17/04/2012

Location: 4 UPPER TERRACE, HAMPSTEAD

NGR: 526100E - 186100N

Client: MR
A. GUY

Level: -

Logged By: RF/TW

| Well | Water Strikes | Samples & In Situ Testing | | | Level (m AOD) | Thickness | Legend | Depth (m) | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | | |
| | | 10.50 | SPT | N=14 | | | | | Medium dense (becoming dense below 16.50m) brown very clayey fine SAND, interbedded with very sandy CLAY. (BAGSHOT BEDS) |
| | | 10.50 | D | | | | | | |
| | | 11.00 | LB | | | | | | |
| | | 11.50 | D | | | | | | |
| | | 12.00 | SPT | N=19 | | | | | |
| | | 12.00 | D | | | | | | |
| | | 13.00 | LB | | | | | | |
| | | 13.50 | SPT | N=29 | | | | | |
| | | 13.50 | D | | | | | | |
| | | 14.50 | LB | | | 10.90 | | | |
| | | 15.00 | SPT | N=19 | | | | | |
| | | 15.00 | D | | | | | | |
| | | 16.00 | LB | | | | | | |
| | | 16.50 | SPT | N=43 | | | | | |
| | | 16.50 | D | | | | | | |
| | | 17.50 | LB | | | | | | |
| | | 18.00 | SPT | N=31 | | | | | |
| | | 18.00 | D | | | | | | |
| | | 19.00 | LB | | | | | | |
| | | 19.50 | SPT | N=43 | | | | | |
| | | 19.50 | D | | | | | | |
| | | | Type | Results | | | | | End of Borehole at 20.00 m |

## Borehole Details

| Casing Depth (m bgl) | Hole Depth (m bgl) | Casing Diameter (mm) |
|---|---|---|
| 12.00 | | 150 |

## Water Strikes

| Date | Water (m) | Casing (m) | Time (mins) | Rose to (m) | Sealed (m) |
|---|---|---|---|---|---|
| | | | | | |

## General Remarks:

BOREHOLE DRY ON COMPLETION

| Southern Testing Environmental & Geotechnical | Tel: 01342 333100<br>email: info@southerntesting.co.uk<br>www.southerntesting.co.uk | Project No.<br>**J10982** | Hole Type<br>Cable | Borehole No<br>**2**<br>Sheet 1 of 1 |
|---|---|---|---|---|

| | | | |
|---|---|---|---|
| Project Name: 4 Upper Terrace | | Dates: 18/04/2012 | |
| Location: | 4 UPPER TERRACE, HAMPSTEAD | NGR: 526100E - 186100N | |
| Client: | MR<br>A. GUY | Level: - | Logged By<br>RF/TW |

| Well | Water Strikes | Samples & In Situ Testing | | | Level (m AOD) | Thickness | Legend | Depth (m) | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|
| | | Depth (m) | Type | Results | | | | | |
| | | 0.15 | D | | | 0.40 | | | Dark grey slightly clayey SAND, with rootlets, occasional flint gravel and fragments of brick. (TOPSOIL) |
| | | 0.30 | D | | | | | 0.40 | |
| | | 0.50 | D | | | | | | Loose dark greyish brown (patched dark orange brown) medium to coarse SAND, with occasional very weak sandstone fragments. (BAGSHOT BEDS) |
| | | 1.00 | D | | | | | | |
| | | 1.50 | CPT | N=6 | | | | | |
| | | 1.50 | LB | | | 2.50 | | | |
| | | 2.50 | D | | | | | | |
| | | 3.00 | SPT | N=9 | | | | 2.90 | |
| | | 3.00 | D | | | | | | Loose yellowish brown medium to coarse SAND. (BAGSHOT BEDS) |
| | | | | | | 1.10 | | | |
| | | 4.00 | LB | | | | | 4.00 | |
| | | 4.50 | CPT | N=14 | | | | | Medium dense orange brown fine to medium SAND, with fine to medium rounded flint GRAVEL. (BAGSHOT BEDS) |
| | | 4.50 | LB | | | 0.80 | | | |
| | | 5.00 | D | | | 0.40 | | 4.80 | Medium strength firm grey (laminated orange brown) patched sandy CLAY. (BAGSHOT BEDS) |
| | | | | | | | | 5.20 | |
| | | | | | | 0.80 | | | Medium dense greenish grey silty fine to medium SAND. (BAGSHOT BEDS) |
| | | 6.00 | SPT | N=23 | | | | 6.00 | End of Borehole at 6.00 m |
| | | 6.00 | LB | | | | | | |
| | | 6.00 | D | | | | | | |

| | Type | Results |
|---|---|---|

## Borehole Details

| Casing Depth m bgl | Hole Depth m bgl | Casing Diameter mm |
|---|---|---|
| 6.00 | | 150 |

## Water Strikes

| Date | Water (m) | Casing (m) | Time (mins) | Rose to (m) | Sealed (m) |
|---|---|---|---|---|---|
| | | | | | |

## General Remarks:

BOREHOLE DRY ON COMPLETION

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Environmental & Geotechnical

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email: info@southerntesting.co.uk
www.southerntesting.co.uk

| Project No. | Hole Type | Borehole No |
|---|---|---|
| **J10982** | Cable | **3** Sheet 1 of 1 |

Project Name: 4 Upper Terrace

Dates: 19/04/2012

Location: 4 UPPER TERRACE, HAMPSTEAD

NGR: 526100E - 186100N

Client: MR
A. GUY

Level: -

Logged By: RF/TW

| Well | Water Strikes | Samples & In Situ Testing: Depth (m) | Type | Results | Level (m AOD) | Thickness | Legend | Depth (m) | Stratum Description |
|---|---|---|---|---|---|---|---|---|---|
| | | 0.15 | D | | | 1.10 | | | Dark grey slightly clayey SAND, with rootlets and occasional brick fragments. (TOPSOIL) |
| | | 0.50 | D | | | | | 1.10 | Dense orange brown clayey medium to coarse SAND, with occasional flint gravel. (Becoming more sandy with depth) (BAGSHOT BEDS) |
| | | 1.00 | D | | | | | | |
| | | 1.50 | SPT | N=42 | | 1.60 | | | |
| | | 1.50 | LB | | | | | | |
| | | 1.50 | D | | | | | | |
| | | 2.50 | LB | | | | | 2.70 | Medium dense buff brown medium to coarse SAND. (BAGSHOT BEDS) |
| | | 3.00 | SPT | N=13 | | 1.10 | | | |
| | | 3.00 | D | | | | | | |
| | | 4.00 | LB | | | | | 3.80 | Medium dense buff brown medium to coarse sandy fine to medium rounded to sub-rounded flint GRAVEL. (BAGSHOT BEDS) |
| | | 4.50 | CPT | N=18 | | 1.40 | | | |
| | | 5.50 | LB | | | 0.80 | | 5.20 | Dense greenish grey very silty fine SAND. (BAGSHOT BEDS) |
| | | 6.00 | SPT | N=35 | | | | 6.00 | End of Borehole at 6.00 m |
| | | 6.00 | D | | | | | | |

| | Type | Results |
|---|---|---|

## Borehole Details

| Casing Depth (m bgl) | Hole Depth (m bgl) | Casing Diameter (mm) |
|---|---|---|
| 6.00 | | 150 |

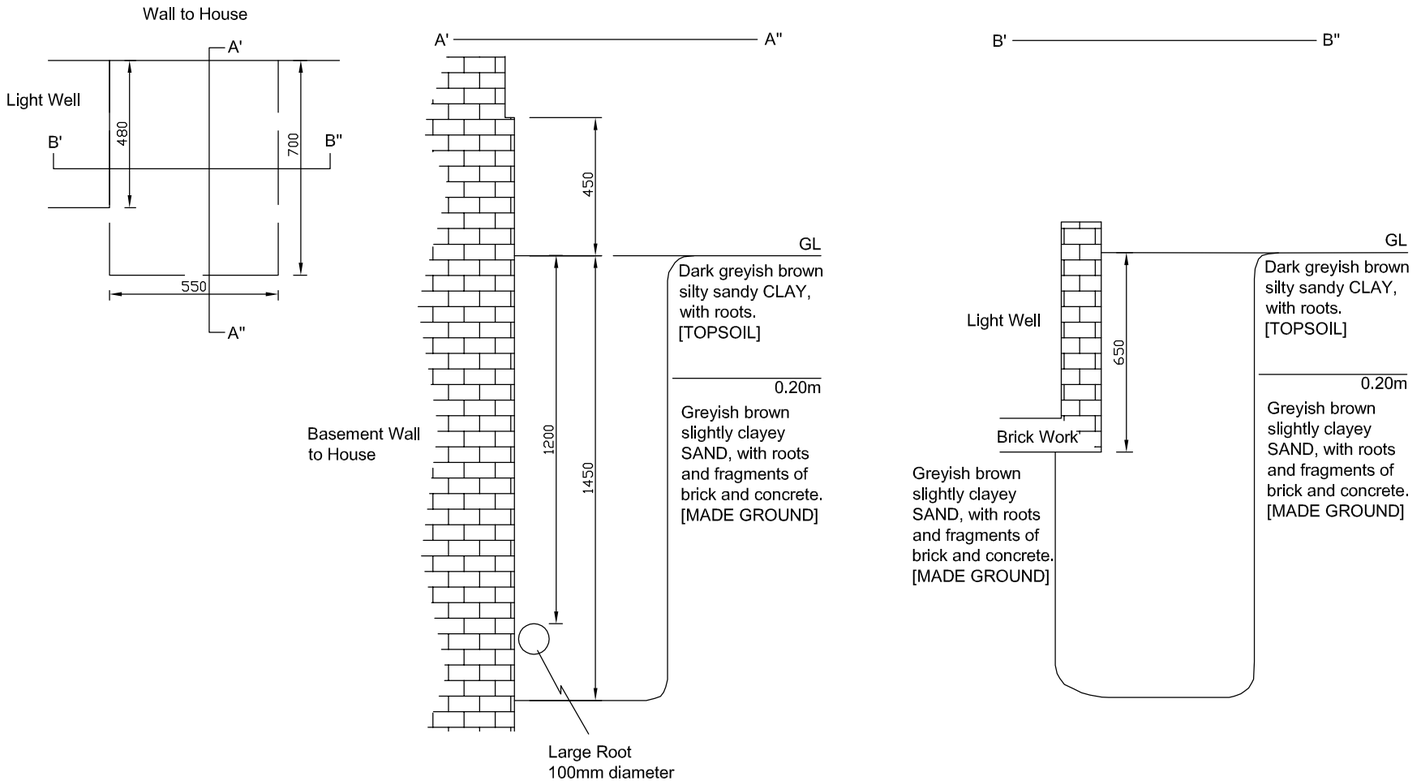
## Water Strikes

| Date | Water (m) | Casing (m) | Time (mins) | Rose to (m) | Sealed (m) |
|---|---|---|---|---|---|
| | | | | | |

## General Remarks:

BOREHOLE DRY ON COMPLETION

# TP1




## NOTES

1. All dimension in mm unless stated otherwise.
2. Brickwork pattern is indicative only.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**Client:**
Andrew Guy

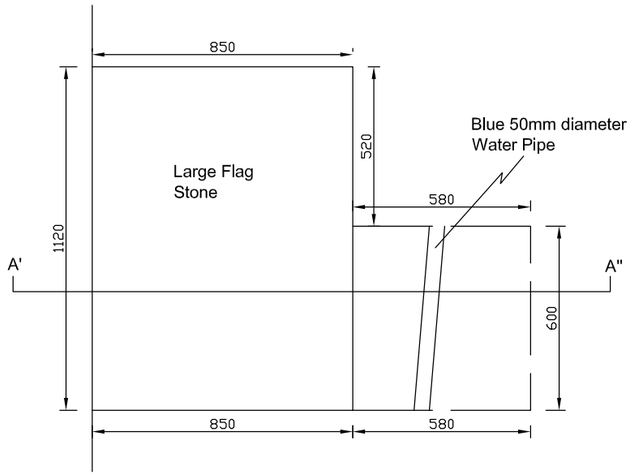
**Job Title:**
J10982 - 4 Upper Terrace

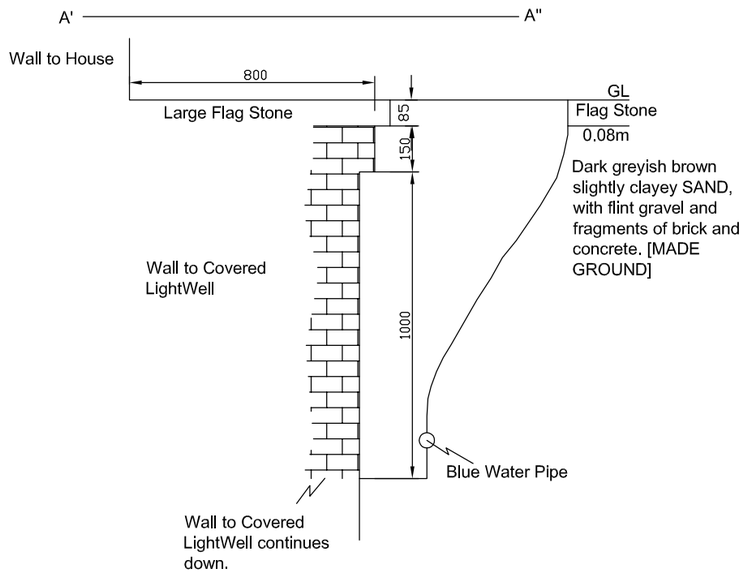
**Description:**
Cross-Section TP1

**Drawing No:**
1

| | |
|---|---|
| **Scale:** NTS | **Paper Size:** A3 |
| **Drawn by:** TW | **Checked by:** TW |
| **Date:** 26/04/2012 | |

# TP2




## NOTES

1. All dimension in mm unless stated otherwise.

2. Brickwork pattern is indicative only.

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**Client:**
Andrew Guy

**Job Title:**
J10982 - 4 Upper Terrace

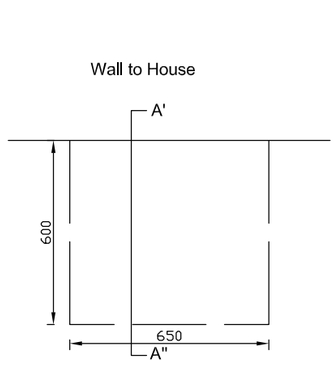
**Description:**
Cross-Section TP2

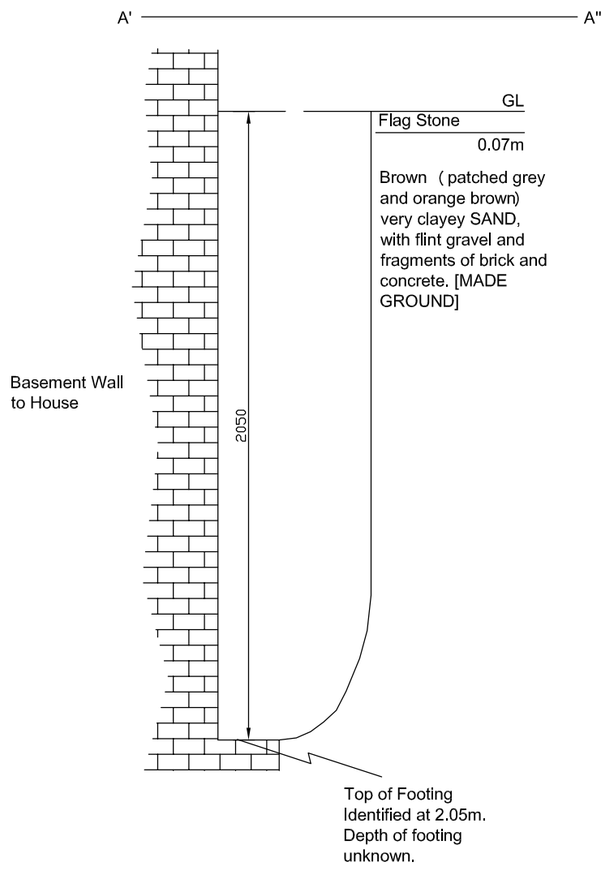
**Drawing No:**
2

| | |
|---|---|
| **Scale:** NTS | **Paper Size:** A3 |
| **Drawn by:** TW | **Checked by:** TW |

**Date:** 26/04/2012

# TP3




## NOTES

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2. Brickwork pattern is indicative only.

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**Client:**
Andrew Guy

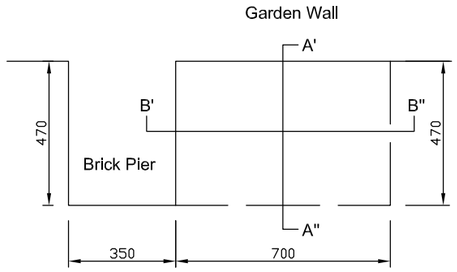
**Job Title:**
J10982 - 4 Upper Terrace

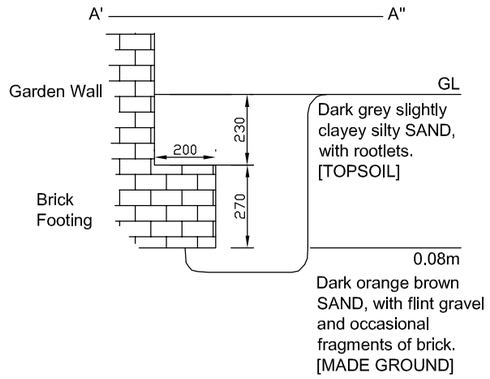
**Description:**
Cross-Section TP3

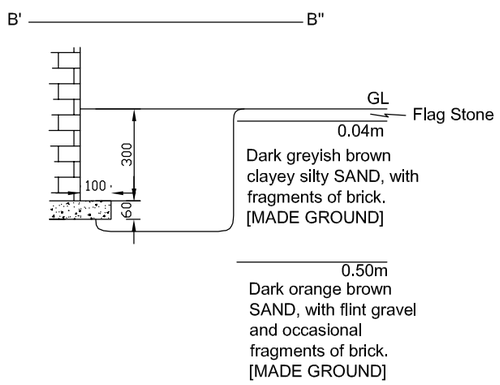
**Drawing No:**
3

| | |
|---|---|
| **Scale:** NTS | **Paper Size:** A3 |
| **Drawn by:** TW | **Checked by:** TW |
| **Date:** 26/04/2012 | |

# TP4




## NOTES

1. All dimension in mm unless stated otherwise.

2. Brickwork pattern is indicative only.

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**Client:**
Andrew Guy

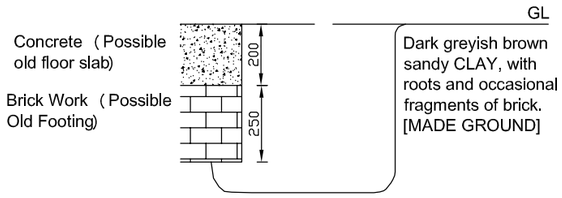
**Job Title:**
J10982 - 4 Upper Terrace

**Description:**
Cross-Section TP4

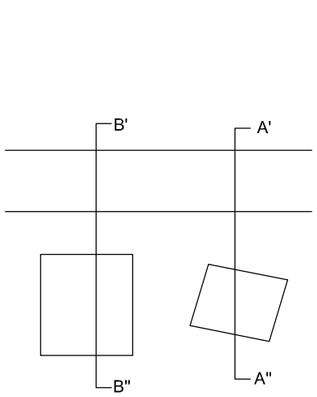
**Drawing No:**
4

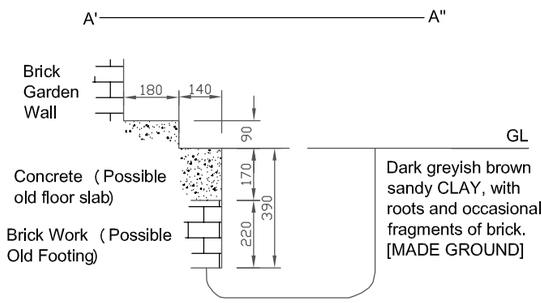
| | |
|---|---|
| **Scale:** NTS | **Paper Size:** A3 |
| **Drawn by:** TW | **Checked by:** TW |
| **Date:** 26/04/2012 | |

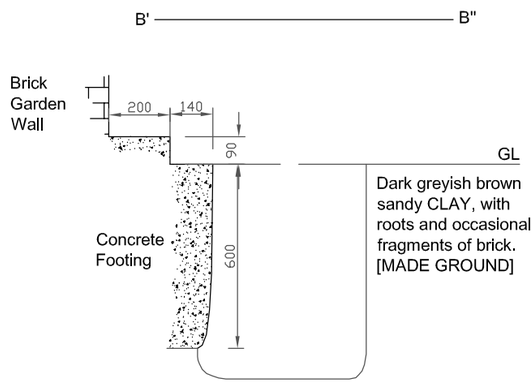
## TP5




## TP6




## NOTES

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2. Brickwork pattern is indicative only.

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**Client:**
Andrew Guy

**Job Title:**
J10982 - 4 Upper Terrace

**Description:**
Cross-Section TP5 and TP6

**Drawing No:**
5

| | |
|---|---|
| **Scale:** NTS | **Paper Size:** A3 |
| **Drawn by:** TW | **Checked by:** TW |
| **Date:** 26/04/2012 | |

Plate 1: General view of TP1.

Plate 2: Looking at the basement wall in TP1.

Plate 3: Looking at the footing of the lightwell in TP1.

Plate 4: General view of TP2.

Plate 5: Looking at wall of covered lightwell in TP2.

Plate 6: General view of TP3.

Plate 7: Looking at basement wall in TP3.

Plate 8: Looking at basement wall in TP3.

Plate 9: General view of TP4.

Plate 10: Looking at the footing in TP4.

Plate 11: Looking at the footings in TP4.

Plate 12: General view of TP5.