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10 ANTRIM GROVE

LONDON

NW3 4XR

BASEMENT IMPACT ASSESSMENT (BIA)

FOR

AN EXTENSION TO AN EXISTING BASEMENT

32026/R/001A/RJM

October 2013

APPROVAL SHEET AND FOREWORD

10 ANTRIM GROVE

LONDON

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BASEMENT IMPACT ASSESSMENT (BIA)

FOR

AN EXTENSION TO AN EXISTING BASEMENT

Report Ref: 32026/R/001A/RJM

Report Status: First issue		Date of Issue: October 2013
		Signature
Author	**R J Moore / J Sturman**	
Checked and Approved	**G Davies**	

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10 ANTRIM GROVE
LONDON, NW3 4XR
BASEMENT IMPACT ASSESSMENT (BIA) REPORT

1 INTRODUCTION

Knapp Hicks and Partners Limited (KHPL) have been instructed by Bchitecture on behalf of their client to undertake the first stage of a Basement Impact Assessment (BIA) for 10 Antrim Grove, London NW3. This document has been prepared in accordance with London Borough of Camden guidance document CPG4 and is submitted in respect of an extension of a previously approved basement. The proposed works will extend the approved basement towards the front boundary and will comprise of an additional 18m^2 area of basement below part of the front garden.

A site investigation was carried out by Site Analytical Services (SAS) in 2011 and included a trial pit and borehole within the area of the proposed extension. The findings are summarised in this report.

Due diligence and care has been used in the preparation of this report, however the contents should be read with due regard to the time and financial resource made available to compile this report.

Whilst every effort has been made to ensure the accuracy of the data supplied and any analysis derived from it, there may be conditions at the site that have not been disclosed by the available records and could not therefore be taken into account. In particular, it should be noted that groundwater conditions vary due to seasonal and other effects and may at times be significantly different from those measured by intrusive investigations. No liability can be accepted for any such variations in these conditions.

In addition, any recommendations made are specific to the development as detailed in this report, and no liability will be accepted should they be used for the design of alternative schemes without prior consultation with KHPL.

Site Description

The site is located at 10 Antrim Grove, London NW3 at approximate grid reference TQ275848. It is rectangular in shape with approximately 8m length frontage onto Antrim Grove. The site runs approximately 34m SE-NW parallel with neighbouring residential properties. The house is semi-detached and adjoins No8 Antrim Grove to the north east.

The existing level of Antrim Grove is approximately 59.25mAOD, the ground floor level in the existing building is approximately 60.0mAOD. The front garden falls slightly towards the site boundary with Antrim Grove.

The house has a patio area to the rear of the property and a raised garden area beyond. The garden area is set approximately 800mm above the patio area and is accessed by five steps.

Copies of the Architects layout plans and sections for the approved basement, annotated to show the proposed basement extension beneath the front garden, are provided in Appendix A.

Proposed Development

A basement area beneath the existing house and rear garden has already been approved and is shown on the attached drawings. This assessment is submitted in respect of a proposed

extension of the approved basement. The extension will extend to an area of approximately 18m^2 at the front of the property, beneath part of the existing front garden. The proposed basement extension will be finished such that the basement is set back from Antrim Grove by 2m.

The basement is proposed to extend approximately 3.20m below the level of the existing front garden, which is 3.55m below the existing ground floor level.

Copies of the Architects layout plans and sections for the proposed development are provided in Appendix A.

Geology

The 1:50,000 Geological Map (Sheet No. 256: North London) indicate the site to be underlain by London Clay. However, some made ground is also expected given the history of development on the site and surrounding area.

The above geology has been confirmed in boreholes carried out by SAS at 10 Antrim Grove and excavations for a deeper basement at a property to the east (See attached borehole records in Appendix C and further discussion in Section 2 below).

2. SITE INVESTIGATION

Scope of Investigation

A site investigation was carried out in April 2011 by Site Analytical Services Ltd and consisted 2No continuous flight auger boreholes to 10mbgl. One was located in the front garden and the second was located to the rear of the property, in the raised area of the garden.

Standpipes were installed in both the boreholes to a depth of 5mbgl.

A hand dug pit was excavated to 0.77mbgl, at the front corner of the house, in the side passage, to prove the detail of the existing foundations.

Ground Conditions

The boreholes and trial pit confirmed the expected geology of topsoil and made ground resting on a thin layer of gravelly clay Head. The Head was proved to 1.20mbgl at the front of the house, to 1.70mbgl to the rear of the property and greater than 0.77mbgl in the trial pit adjacent to the front corner. London Clay is present below the Head and extends to below the proposed basement. A ground investigation undertaking at the adjacent 8 Antrim Grove site also proved similar ground conditions.

BH1 was carried out within the front garden and TP1 was excavated to confirm the existing foundation details which consisted of a 3 layer brick corbel to 0.32mbgl on a 100mm thick concrete strip foundation placed of a 200mm thick foundation of cemented brick, ash and flint cobble. The formation appears to be stiff silty sandy slightly gravelly CLAY Head.

BH1 proved the geology as 0.30m of Topsoil overlying stiff sandy silty slightly gravelly CLAY Head Deposits. London Clay was encountered below 1.20m and was proved to greater than 10mbgl. The log recorded no groundwater during boring.

Occasional rootlets are present in the London Clay but the natural moisture content is generally sufficiently high to suggest that desiccation is not present.

Groundwater

Groundwater was not encountered in either of the boreholes during the intrusive investigation. Standpipes were installed in both boreholes and the monitored groundwater level stabilized at 1.32mbgl to the front of the property and 1.16mbgl to the rear of the property.

We understand that during previous works in the neighbouring property to the east side, 8 Antrim Grove, and at No15 Antrim Grove, almost opposite, basement excavations have been carried out to greater than 2.0mbgl and the excavation has remained generally dry with just a little seepage which is interpreted to be perched groundwater within the Head Deposits overlying the London Clay (see attached photograph of 8 Antrim Grove excavations).

Classification for Buried Concrete

Results of chemical tests on representative samples of the clay indicate that ground conditions on site contain locally elevated levels of sulphate and therefore a design sulphate class of DS-3 and an aggressive concrete classification of AC-3 are recommended for concrete in contact with the ground.

Waste Management (Disposal of Spoil)

Waste Acceptance Criteria tests have been carried out and submitted to the basement contractors waste handler to arrange disposal to an appropriate waste handling facility.

3. BASEMENT IMPACT ASSESSMENT (STAGE 1 – SCREENING)

The London Borough of Camden has ruled that all new basement developments within their area are to be subject to the assessment process described in CPG4 Basements and Lightwells, adopted April 2011. This policy has been developed so that permission will only be granted for new basements which do not:

- Cause harm to the built and natural environment and local amenity;
- Result in flooding; or
- Lead to ground instability

This is a new basement for a property which currently has an existing basement which is being implemented under the existing house and part of the rear garden, as well as under part of the front garden adjacent to the front entrance. The leisure facilities and primary living space in the garden are all in the existing consented basement.

The Basement Impact Assessment contains five stages in total:

- Stage 1 – Screening
- Stage 2 – Scoping
- Stage 3 – Site investigation
- Stage 4 – Impact assessment; and
- Stage 5 – Review and decision making

This report addresses the first stage in the process i.e. screening of the proposal and is supplemented by the findings of recent investigations of the existing structure. At this stage, the guidance requires any proposed application to make an assessment on the impact of the development on (a) groundwater and surface water flows, and (b) land stability.

The screening process is described in Appendix E of CPG4 and includes 3 flowcharts as follows:

- Surface flow and flooding
- Subterranean (groundwater) flow
- Slope Stability

Potential impacts linked to the screening flowcharts are provided in CPG4 Appendix F.

Each of the above flow charts and responses to the questions asked are presented on the following pages of this report.

A. Surface flow and flooding screening flowchart

Question		Yes (Y), No (N), Unknown (U) (see also notes provided at base of table)
1.	Is the site within the catchment of the pond chains on Hampstead Heath?	N
2.	As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	N
3.	Will the proposed basement result in a change in the proportion of hard surfaced / paved external areas?	N
4.	Will the proposed basement result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	N
5.	Will the proposed basement result in any changes to the quality of surface water being received by adjacent properties or downstream watercourses?	N

Notes

Q1 - By inspection of Figure 14 of CPG4

Q2 – Existing surface water pipes are not shown on the survey but it is unlikely that this development will materially change existing routes

Q3 – The development will not change the impermeable/permeable area ratio for the site, as the basement extension will be reinstated at existing ground level to reflect the existing arrangement, i.e. garden and shrub planting.

B. Subterranean (groundwater) flow screening flowchart

Question		Yes (Y), No (N), Unknown (U) (see also notes provided at base of table)
1a.	Is the site located directly above an aquifer?	N
1b.	Will the proposed basement extend beneath the water table surface?	Y
2.	Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	N
3.	Is the site within the catchment of the pond chains on Hampstead Heath?	N
4.	Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	N
5.	As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	N
6.	Is the lowest point of the excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line?	N

Notes

Q1a – The site is located on the London Clay which is a non-aquifer

Q1b – Groundwater was encountered in recent site investigation holes above the proposed depth of the basement however this is considered to be a perched water table overlying the relatively impermeable London Clay which will be encountered at 1.20mbgl.

Q3 – By inspection of Figure 14 CPG4, the site is approximately 1km south east from the Hampstead Heath Extension Chain Catchment

Q4 – The development will not change the impermeable/permeable area ratio for the site, as the basement extension will be reinstated at existing ground level to reflect the existing arrangement, i.e. garden and shrub planting.

Q5 – There will be no change to the drainage arrangements for the site

Q6 – In addition, there are no surface water features located within 240m of the site.

C. Slope stability screening flowchart

Question		Yes(Y),No(N), Unknown (U) (see also notes provided at base of table)
1.	Does the existing site include slopes, natural or manmade greater than 7deg. (approx. 1V in 8H)?	N
2.	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7deg.?	N
3.	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7deg.?	N
4.	Is the site within a wider hillside setting in which the general slope is greater than 7deg.?	N
5.	Is the London Clay the shallowest strata at the site?	N
6.	Will any trees be felled as part of the proposed development? Are any works proposed within any tree protection zones?	N
7.	Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	N
8.	Is the site within 100m of a watercourse or a potential spring line?	N
9.	Is the site within an area of previously worked ground?	N
10.	Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?	N N
11.	Is the site within 50m of the Hampstead Heath ponds?	N
12.	Is the site within 5m of a highway or pedestrian right of way?	Y
13.	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Y
14.	Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	N

Notes

Q1 –The topography surrounding the site is gently sloping (less than 3 degrees) towards Antrim Grove. The rear garden incorporates a small bank of approximate height 800mm. The ground floor level of the existing house is approximately 1.0m above the road level along Antrim Grove.

Q2 – There will be no changes to the surrounding topography.

Q5 – Based on available site investigation records and reference to the 1:50,000 Geological Map, the geological profile is expected to consist of variable depths of made ground and/or Head, over London Clay. The formation level for the proposed basement is expected to penetrate the London Clay by a minimum 2.00m at the front of the property.

Q6 – The basement extension is unaffected by trees.

Q7 – We are unaware of any shrink-swell subsidence or evidence thereof on site or in the area of the site.

Q8 – There are no Environment Agency flood plains, river network entries or surface water features in the vicinity of the site.

Q9 - No previous workings are reported on or near the site.

Q10 - Groundwater was not encountered in the borehole during the intrusive investigation. A standpipe was installed and the monitored groundwater level stabilized at 1.32mbgl to the front of the property. Similar works in nearby property to the east side, 8 Antrim Grove, and across the road have been carried out to greater than 2.0mbgl and excavations have remained generally dry with just a little seepage which is interpreted to be perched groundwater within the Head Deposits overlying the London Clay.

Dewatering may be necessary during construction and is likely to take be in the form of pumping from a sump in the base of the excavation. Trial excavations down to formation level prior to commencement of construction will confirm the rate of inflow to open excavations.

Q12 – the site is within 5m of Antrim Grove. The proposed basement will maintain a 2m zone of undisturbed ground between the basement wall and Antrim Grove pavement. This will be sufficient to allow the construction of any temporary works required for the scheme and for maintenance of the highway and footway alongside.

Q13 – It is understood that the adjacent property to the east, No8 has almost completed construction of a basement of similar extents and therefore the proposed scheme at No10 Antrim Grove will have minimal impact. To the other side, No12, it is considered that arrangements made for the existing approved basement at No10 will be sufficient.

Q14 – No tunnels have been identified passing underneath or close to the footprint of the site.

4. RESULTS OF THE SCREENING PROCESS

The basement has been assessed in accordance with the three flow charts detailed in Appendix E of the CPG4 Basement and Lightwells.

Part 3A which considers surface water and flooding issues has raised no issues with regard to the development.

Part 3B which covers subterranean (groundwater) flow has returned two potential issues with regard to the development: (1) Groundwater has been encountered in recent site investigation holes above the proposed formation of the basement. It is considered that this can be overcome by sump pumping during excavation and by incorporation of groundwater control / tanking measures in the basement walls and floor. Trial holes to proposed formation level will check the rate of inflow to excavations which penetrate deeper than the water levels recorded in site investigation holes, and reference can be made to previous works undertaken to form the existing basement at No 10. (2) The proposed development will not increase the impermeable/permeable area ratio for the site because the garden will be reinstated over the top of the basement.

Part 2C covers slope stability. The screening flowchart has returned two affirmative answers as follows: (1) Question 12 which confirms the location of the basement in relation to the public highway which can be dealt with through the design of appropriate temporary and permanent works to ensure the stability of the highway, and (2) Question 13 concerning the change in differential depth of the foundations between the new development and adjacent property. Again this can be dealt with through the design of appropriate temporary and permanent works to ensure the stability of the adjacent properties.

5. CONCLUSIONS AND RECOMMENDATIONS

The basement formation is expected to be below a perched water table. It is acknowledged that there may be perched water within the made ground and Head Deposits, and groundwater may arise from claystones and fissures in the London Clay above formation level. It is also acknowledged that groundwater level can also be subject to seasonal and other changes. However, Knapp Hicks propose that, subject to consultation with a reputable basement contractor and the contractor responsible for existing recent basement excavations at Nos 10 and 8 Antrim Grove, no further action will be deemed necessary to deal with groundwater beyond following good industry standard practice for construction of basements.

It is recommended that the rate of seepage into excavations penetrating to the proposed formation level be confirmed in advance of construction as this information will assist with selection of appropriate waterproofing techniques and decisions on the use of traditional underpinning techniques vs contiguous or secant piling techniques for the basement retaining walls. It is recommended that these investigations include CCTV condition surveys of all public and private sewers passing close to the boundaries of the proposed scheme.

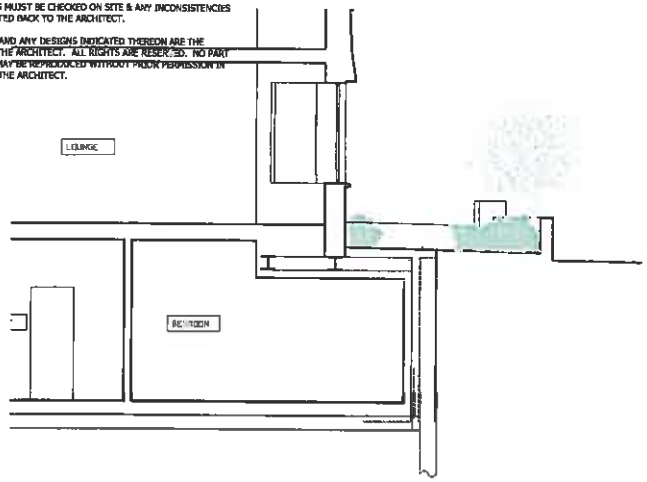
Where the basement is located close to highway boundaries, the designer will ensure that the basement wall and any temporary works are designed to accommodate the required highway loadings. Further, this wall will be constructed using techniques which prevent the highway land and any associated infrastructure from being destabilised. The designer will also ensure that no party walls with adjacent properties are undermined during the project.

REFERENCES

1. Camden Planning Guidance: Basements and Lightwells, CPG4
2. ACS Consulting, Letter Reference eb/aiams1/antrimgrove, Tree Appraisal and Protection at: 10 Antrim Grove, Belsize Park, dated 6th July 2010.

APPENDIX A

Site Plans
&
Cross Sections
(Existing & Proposed)



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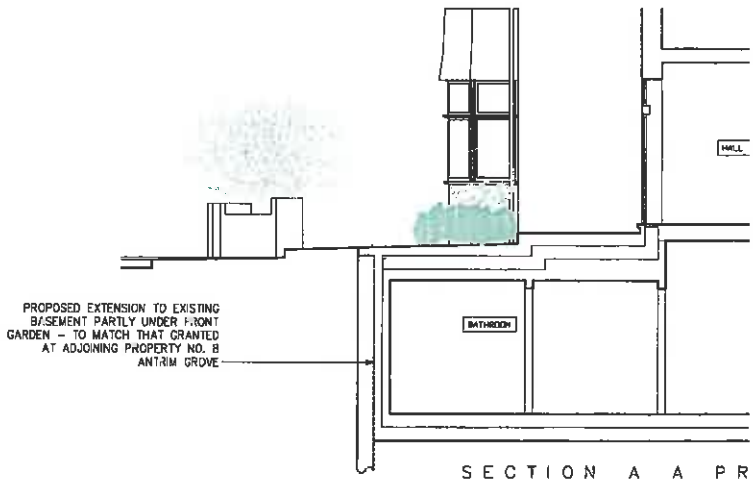

4 PROPOSED PART SECTION A-A
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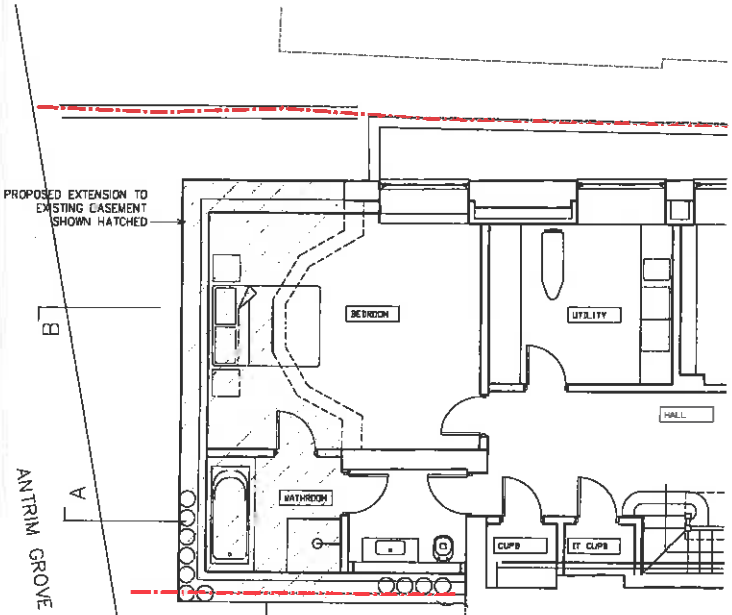

1 PROPOSED PART BASEMENT LEVEL PLAN
1 : 50

2 PROPOSED PART GROUND LEVEL PLAN
1 : 50

AS PROPOSED

Architecture
11A Beresford Road London N2 8AT
t 07892 763407 e Barchitecture@gmail.com

LOCATION
10 Antrim Grove, Belsize Park
London NW3 4XR

DRAWING TITLE
PROPOSED BASEMENT EXTENSION

DATE
APR 2010

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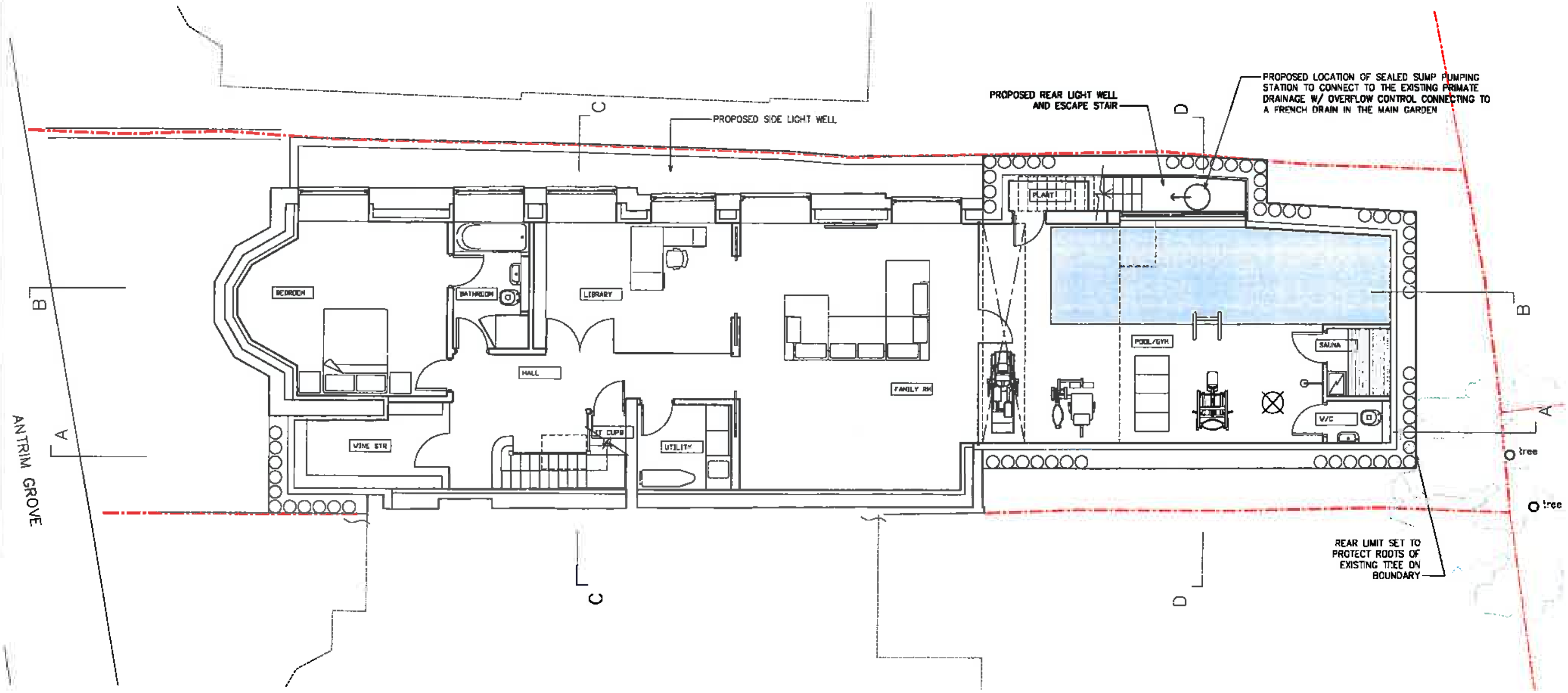
1:100@A3

JOB NO
1007

DWG NO/REV
118/-



1 EXISING BASEMENT LEVEL PLAN

1 : 50

EXISTING

0 1 2 5

Bchitecture

10 Antrim Grove, Belsize Park
London NW3 4XR

EXISTING BASEMENT PLAN

APR 2010

1:50 @A1
1:100@A3

1007

110/J

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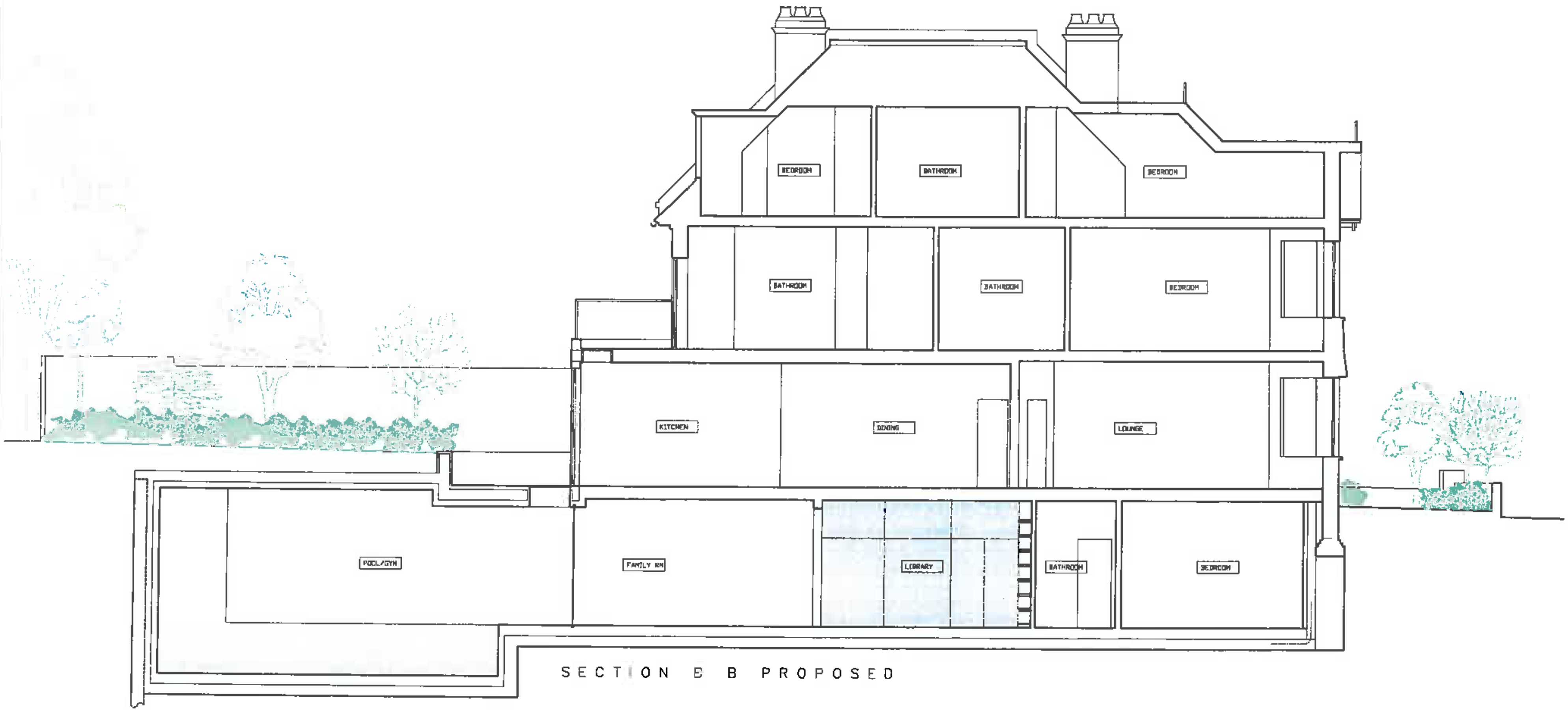
ALL DIMENSIONS MUST BE CHECKED ON SITE & ANY INCONSISTENCIES MUST BE REPORTED BACK TO THE ARCHITECT.



1 EXISTING SECTION B-B

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EXISTING

B chitecture
11A Belsize Road London NW6 4RX
07932 735-107 Bchitecture@gmail.com

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DRAWING TITLE: EXISTING SECTIONS

DATE: APR 2010

SCALE: 1:50 @A1 1:100@A3

JOB NO: 1007

DWG NO/REV: 116/E

USE FIGURED DIMENSIONS ONLY. DO NOT SCALE FROM THIS DRAWING.

ALL DIMENSIONS MUST BE CHECKED ON SITE & ANY INCONSISTENCIES MUST BE REPORTED BACK TO THE ARCHITECT.

1 EXISTING SECTION A-A

1 : 50

EXISTING

Bchitecture

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DRAWING TITLE	EXISTING SECTIONS
DATE	APR 2010
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JOB NO	1007
DWG NO/REV	115/F

APPENDIX B

Photographs – Existing Site

View to rear of 10 Antrim Grove

View of recent basement excavation to rear 8 Antrim Grove. Water in base of excavation is rainwater.

View of garden to front of 10 Antrim Grove (Area of proposed basement extension)

View of 10 Antrim Grove from street. (No 8 is to RHS)

View of 10 Antrim Grove from back garden

APPENDIX C
Ground Investigation Records

Ref: 11/17630
April 2011

Report on a Ground Investigation

At

10 Antrim Grove, Belsize Park, London, NW3 4XR

For

Mr Philip Bloom

1.0 INTRODUCTION

At the request of Mr David Cherrett, Consulting Engineer to Mr Philip Bloom, a ground investigation was carried out in connection with a proposed basement development at the above site.

The information was required for the design and construction of foundations and infrastructure for the proposed basement development and to assess whether any remediation was required for the protection of the end-user from the presence of potential contamination within the soils encountered.

The recommendations and comments given in this report are based on the ground conditions encountered in the exploratory holes made during the investigation and the results of the tests made in the field and the laboratory. It must be noted that there may be special conditions prevailing at the site remote from the exploratory hole locations which have not been disclosed by the investigation and which have not been taken into account in the report. No liability can be accepted for any such conditions.

This report does not constitute a full environmental audit of either the site or its immediate environs.

2.0 THE SITE AND LOCAL GEOLOGY

(National Grid Reference: TQ 275 847)

2.1 General

The site of the proposed extension is located beneath 10 Antrim Grove, Belsize Park, London, NW3 4XR. The extension extends below the entire footprint of the house and the majority of the back garden. Further details of the site layout are indicated on the sketch site plan (Figure 1).

The 1:50000 Geological Survey of Great Britain (England and Wales) covering the area indicates the site to be underlain by the London Clay Formation, although a surface cover of made ground may be expected in an established urban environment.

3.0 SCOPE OF WORK

3.1 General

The scope of the investigation was agreed with the Consulting Engineer and comprised:

- The drilling of two continuous flight auger boreholes (Boreholes 1 and 2) to a depth of 10m below ground level.
- The placement of a gas and groundwater monitoring standpipe to a depth of 5m below ground level in both of the boreholes.
- The excavation by hand of one trial pit (Trial Pit 1) to a depth of 0.77m below ground level to expose the existing foundations of the front of the house, confirm the near surface soil conditions and obtain further samples for laboratory testing.
- Sampling and in-situ testing as appropriate to the ground conditions encountered in the boreholes and trial pit.
- Interpretative reporting on foundation options for the proposed building works and infrastructure.
- A study into the possibility of the presence of toxic substances in the soil, together with limited comment on any remediation required.

3.2 Ground Conditions

The locations of the boreholes and trial pit are shown on the sketch site plan (Figure 1).

The exploratory holes revealed ground conditions that were generally consistent with the geological records and known history of the area and comprised made ground up to 0.40m in thickness resting on deposits typical of the London Clay Formation.

For detailed information on the ground conditions encountered in the boreholes and trial pit, reference should be made to the exploratory hole records presented in Appendix A.

The made ground extended down to depths of 0.30m and 0.40m below ground level in Boreholes 1 and 2 respectively and to a depth of 0.20m below ground level in Trial Pit 1 and consisted of a surface layer of grass or flower beds overlying dark brown topsoil, fine to medium flint gravel and brick fragments.

Natural soils were encountered below the made ground and consisted initially of stiff sandy silty mottled clay with occasional gravel representing Superficial Head deposits. Rootlets were encountered in these deposits above 1.50m depth in Borehole 2 only. The Superficial Head deposits extended down to depths of up to 1.70m below ground level in the boreholes and to the full depth of investigation of 0.77m below ground level in Trial Pit 1.

Weathered London Clay was encountered below these soils and consisted of stiff becoming stiff to very stiff mottled silty clay with some becoming occasional pockets and partings of silty fine sand and occasional small gypsum crystals. The weathered London Clay extended to depths of 6.80m and 7.60m below ground level in Boreholes 1 and 2 respectively.

The weathered clay was underlain by more competent London Clay comprising of stiff to very stiff becoming very stiff fissured silty clay with occasional partings of silty fine sand and scattered small gypsum crystals and occasional claystone nodules. These deposits extended down to the full depths of investigation of 10.00m below ground level in Boreholes 1 and 2 respectively.

3.3 Groundwater

Groundwater was not encountered in any of the exploratory holes and the material remained essentially dry throughout.

It must be noted that the speed of excavation is such that there may well be insufficient time for light seepages of groundwater to enter the boreholes and trial pit and hence be detected, particularly within more cohesive soils of low permeability.

Groundwater was subsequently found to have stabilised at respective depths 1.32m and 1.16m below ground level in the monitoring standpipes installed in Boreholes 1 and 2 after a period of approximately four weeks.

Isolated pockets of groundwater may also be present perched within any less permeable material found at shallower depth on other parts of the site especially within the made ground.

It should be noted that the comments on groundwater conditions are based on observations made at the time of the investigation (March 2011) and that changes in the groundwater level could occur due to seasonal effects and also changes in drainage conditions.

4.0 IN-SITU AND LABORATORY TESTS

4.1 In-Situ Tests

In essentially cohesive soils with a granular content, Mackintosh Probe tests were made in order to assess the undrained shear strength of the materials. The results indicate that the natural cohesive soils are of a stiff consistency based on the methods outlined by Stroud and Butler, all results being interpreted using the generally accepted correlation as follows:

Mackintosh N75 X 0.38 = SPT 'N' Value

or

Mackintosh N300 X 0.1 = SPT 'N' Value

In essentially cohesive soils, in-situ shear vane tests were made at regular depth intervals in order to assess the undrained shear strength of the materials. The results indicate that the near surface cohesive soils are of a stiff becoming very stiff consistency with increasing depth below ground level.

The results of the in-situ tests are shown on the exploratory hole records contained in Appendix A.

4.2 Classification Tests

Atterberg Limit tests were conducted on six samples of cohesive soil taken from the upper cohesive soils present in the boreholes. The results fall into Classes CI and CH according to the British Soil Classification System, although one test made at 1.00m depth in Borehole 2 was affected by the presence of gravel within the soil sample.

Classes CI and CH are fine grained sandy and silty clay soils of intermediate and high plasticity and as such generally have medium bearing and settlement characteristics, have a low permeability and a generally high susceptibility to shrinkage and swelling movements with changes in moisture content, as defined by the NHBC Standards, Chapter 4.2. The results indicated Plasticity Index values between 29% and 46%, with five of the samples being above the upper 40% boundary between soils assessed as being of medium swelling and shrinkage potential and those assessed as being of high swelling and shrinkage potential with the other sample falling below this boundary classifying it as being of medium swelling and shrinkage potential.

The test results are given in Table 1, contained in Appendix B.

4.3 Sulphate and pH Analyses

The results of the sulphate and pH analyses made on two natural soil samples selected to be close to anticipated foundation level and to give a range of depth are presented on Table 2, whilst further results are contained within the contamination analyses, both contained in Appendix B. The results show the natural soil samples to have water soluble sulphate contents of up to 1.94g/litre associated with near neutral pH values and the sample of made ground to have a water soluble sulphate content of 0.02g/litre again associated with a near neutral pH value.

5.0 CONTAMINATION TESTING

5.1 General

Samples were obtained from 0.75m depth below ground level in Borehole 1 and from 0.25m depth below ground level in Borehole 2 made at the locations indicated on the sketch site plan (Figure 1). Samples were analysed from this depth range below ground level as it is felt that these soils will be representative of those of highest end-user exposure through the dermal contact, dust inhalation, soil ingestion and vegetable consumption pathways and to assess deeper soils on site. The samples were also analysed in order to determine the classification of the material for landfill purposes.

5.2 Interpretation of Findings

The hazard caused by the presence of a substance or element is not absolute but depends on the proposed end use of the site.

It is understood that the site is to be developed for residential purposes. As such the Soil Guideline Values for residential use have been used in the following soil assessment.

Site data has been assessed against current generic assessment criteria (GAC) / guideline values in accordance with current industry practice and statutory guidance; chemical toxicology (TOX), Soil Guideline Value (SGV) reports developed using the new Contaminated Land Exposure Assessment (CLEAv1.06) framework and CLR 11 (Environment Agency, 2009).

However, it must be remembered that GAC are not binding standards but can be useful in forming judgements regarding the level of risk i.e. unacceptable or acceptable. Exceedance of GAC does not automatically result in the requirement for remedial / risk management work but would warrant further assessment.

5.3 Soil Guideline Values, CLR Documents & Chartered Institute of Environmental Health Values

From January 2009 revised Soil Guidance Values for certain contaminants were issued in the Contaminated Land Reports (CLR) by the Environment Agency in conjunction with Department of the Environment, Food, Agriculture and Rural Affairs. These values and the CLEA methodology used to derive them have superseded CLEA and TOX reports for soil contaminants.

The CLR Documents are a series of contaminated land guidance documents developed by various past and present government agencies involved with protection of the environment.

These documents aim to provide a set of generic Soil Guideline Values and a site specific modelling programme based upon tolerable predicted uptakes from experimental data for a variety of common industrial toxic contaminants. In instances of carcinogenic and mutanagenic substances the guideline values are set on the basis of "As Low As Reasonably Practicable" (ALARP), as theoretically mutation can occur on exposure to a single particle of the contaminant.

At the time of writing this report generic soil guideline values are only in place for Selenium (350mg/kg), Nickel (130mg/kg), Mercury (1-170mg/kg), Inorganic Arsenic (32mg/kg), Benzene (0.33mg/kg), Ethylbenzene (350mg/kg), Xylenes (230-250mg/kg), Toluene (610mg/kg), Cadmium (10mg/kg) and Phenols (420mg/kg) - for a residential scenario.

The Environment Agency has also released a new version of the CLEA software and its handbook to help assessors estimate risks. The Chartered Institute of Environmental Health Generic Assessment Criteria for Human Health Risk Assessment adopt the Environment Agency's CLEA UK (Beta) Model and as such have derived guideline values that are compatible with current English legislation, policy and technical guidance.

Generic Assessment Criteria for Human Health Risk Assessment for Chromium compounds have been produced by Chartered Institute of Environmental Health. These are Trivalent Chromium (Chromium III) at 627mg/kg and Hexavalent Chromium (Chromium VI) at 4.3mg/kg for a residential scenario.

Assessment criteria for selected individual Polycyclic Aromatic Hydrocarbons have been produced by Chartered Institute of Environmental Health; however no values have been attached to Total Polycyclic Aromatic Hydrocarbons. Sixteen individual Polycyclic Aromatic Hydrocarbons with attached screening values include Benzo(a)pyrene (0.83-1.0mg/kg), Dibenzo(a,h)anthracene (0.76-0.90mg/kg), Fluorene (160-780mg/kg) and Naphthalene (1.5-8.7mg/kg) for a residential scenario.

The concentrations of the phytotoxic substances Total Copper, Total Zinc and Boron have been assessed against the Chartered Institute of Environmental Health Generic Assessment Criteria for Human Health Risk Assessment of 2330mg/kg, 3750mg/kg and 291mg/kg respectively which assumes a residential scenario.

The concentrations of Total Petroleum Hydrocarbons have been assessed against assessment criteria for individual Aromatic and Aliphatic carbon band ranges produced by Chartered Institute of Environmental Health for a residential scenario.

As no generic UK derived guidance is currently available for acceptable concentrations of Total Cyanide a screening value of 20mg/kg (Thiocyanate) has been used as a preliminary screening tool to identify where potential risks may exist.

As no generic UK derived guidance is currently available for acceptable concentrations of Total Lead a previous Soil Guideline Value of 450mg/kg for residential land use has been used to identify where potential risks may exist.

5.4 Assessment of Soil Analyses

It is understood that the site is to be developed for residential purposes and as such the Soil Guideline Values for residential use have been used in the following soil assessment. The samples selected for contamination assessment were sub-contracted to QTS Environmental Limited (a UKAS and MCERTS accredited laboratory) and their report is contained in Appendix B.

5.5 Discussion

The concentrations of zootoxic heavy metals (Total Arsenic, Total Lead, Total Cadmium, Total Selenium and Total Nickel) encountered did not exceed the Soil Guideline Values for residential use in the samples analysed. As such there is not considered to be any potentially significant level of end-user risk associated with the concentrations of these contaminants encountered.

The concentrations of Trivalent Chromium and Hexavalent Chromium encountered did not exceed CIEH Generic screening values for residential use.

A marginal concentration of Total Mercury was encountered in the sample from 0.25m depth in Borehole 2 at 1.2mg/kg, compared to CIEH Generic screening value of 170mg/kg for Inorganic Mercury and 1mg/kg for Elemental Mercury. It is considered that in excess of 99% of mercury encountered within soils would be within the inorganic form and as such it is not believed that the concentrations encountered would be sufficient to pose a significant risk to end-users of the site in a residential scenario.

The concentrations of Total Cyanide were below the screening value of 20mg/kg and the concentrations of Total Phenol were below the Soil Guideline Value for residential use and as such there are not considered to be any significant risks to end-users of the site from these contaminants.

The concentrations of individual Polycyclic Aromatic Hydrocarbons encountered did not exceed CIEH Generic screening values for residential use.

The concentrations of Petroleum Hydrocarbons encountered within individual Aromatic and Aliphatic carbon band ranges in the samples analysed did not exceed the generic screening values produced by Chartered Institute of Environmental Health for a residential scenario.

The concentrations of BTEX substances (Benzene, Toluene, Ethylbenzene and Xylenes) encountered did not exceed the Soil Guideline Values for residential use in the samples analysed. As such there is not considered to be any potentially significant level of end-user risk associated with the concentrations of these contaminants encountered.

There was no MTBE detected within the samples analysed.

The concentrations of the phytotoxic substances Total Copper, Total Zinc and Boron encountered in the samples obtained were below the CIEH Generic screening values for residential use and are not considered to be a significant risk to end-users of the site, or sufficient to impair the successful growth of plant species on site.

Concentrations of Total Sulphide did not exceed 5mg/kg in the samples obtained from the site. It is therefore not anticipated that sulphides will present any human health risk at the site and are not considered sufficient to affect construction or service materials.

The concentrations of Total Sulphate did not exceed the BRE guidance level of 2400mg/kg in the samples analysed. From the water soluble sulphate concentration BRE Special Digest 1 : 2005, Tables C1 and C2 would classify both samples as Class DS-1. As such reference should be made to the appropriate BRE Guidance documents when selecting construction materials on-site.

The samples were analysed using the Catwastesoil assessment tool, which concluded that both samples were non-hazardous in nature. For the purpose of waste disposal, none of the parameters tested exceeded the upper limit criteria for Inert Waste and it is likely that the soil samples analysed would be classified as:

BH1 @ 0.75m *Inert waste*

BH2 @ 0.25m *Inert waste*

5.6 Gas and Groundwater Monitoring Results

The standpipes installed in Boreholes 1 and 2 were monitored for gas and groundwater levels on 21st, 25th and 31st March 2011 and the results are presented on Tables 3, 3a and 3b contained in Appendix B.

The groundwater level measurements indicate that the groundwater level has stabilised after a period of about four weeks at depths of 1.32m and 1.16m below ground level in the monitoring standpipes installed in Boreholes 1 and 2 respectively.

5.6.1 Methane

Methane is a flammable asphyxiating gas, the flammable range being 5 to 15% by volume in air. If such a methane-air mixture is confined in some way and ignited it will explode. The 5% by volume concentration is termed the lower explosive limit (LEL). Methane is a buoyant gas having a density about two-thirds that of air. Carbon Dioxide is a non-flammable toxic gas, which is about 1.5 times as heavy as air.

Various guidelines have been published to help determine mitigation measures for landfill gas. `Landfill Gas' includes gas which may be generated in natural soils such as organic alluvium peat. Methane presents an explosion and asphyxiant hazard and Carbon Dioxide an asphyxiant hazard.

Building Research Establishment Report BR212 `Construction of New Buildings on Gas-Contaminated Land', states that if Methane concentrations in the ground are unlikely to exceed 1% by volume and a house or small building is constructed in accordance with its recommendations, then no further protection is required. The recommendations include installing granular under slab venting and sealing floor slabs.

CIRIA Report C665 (2007) "Assessing risks posed by hazardous ground gases to buildings" provides guidance on the monitoring and control of landfill gas. The report suggests a classification system which is summarised in Table 8.5 in the document and employs a method which uses both gas concentrations and borehole flow rates to define a characteristic situation for a site based on the Gas Screening Value (also named the limiting borehole gas volume flow) for methane and carbon dioxide.

5.6.2 Carbon Dioxide

Building Research Establishment Report BR212 `Construction of New Buildings on Gas-Contaminated Land', 1991 states that if carbon dioxide concentrations are above 1.5% by volume then protection should be considered to prevent gas ingress. If concentrations exceed 5% by volume, such protective measures are required. This has been superseded by CIRIA Report C665 (2007), states that if carbon dioxide concentrations are above 5% by volume then protection should be considered to prevent gas ingress.

5.6.3 Oxygen

CIRIA Report 149 summarises the physiological effects of an oxygen deficient atmosphere. Between 19-21% Oxygen (Vol.) is described as the normal range of concentration in the atmospheric air, whilst <6% causes convulsions, gasping respiration and death.

5.6.4 Carbon Monoxide

The occupational exposure standards for carbon monoxide are 30 ppm for long term exposure (8 hours calculated from the HSE Guidance Note EH40, 1991) and 200 ppm for short term exposure (15 minutes calculated from the HSE Guidance Note EH40, 1991) (CIRIA Report C665).

5.6.5 Hydrogen Sulphide

Hydrogen sulphide is toxic at low concentrations. The occupational exposure standard for hydrogen sulphide is 10 ppm for 8-hour time weighted average reference period and 15 ppm for short-term exposure (10 minutes reference period) (HSE Guidance Note EH40, 1991).

5.6.6 Results

The Gas Screening Value is calculated as follows:

The Gas Screening Value (litres of gas per hour) = maximum borehole flow rate (l/h) x maximum gas concentration (%)

On-site monitoring has shown emissions of methane in air of 0.0% and carbon dioxide in air of 1.1% recorded during the monitoring visits. The maximum borehole flow rate was 0.0 l/h.

As such the Gas Screening Value for methane at site is 0.0 l/h and the Gas Screening Value for carbon dioxide at site is also 0.0 l/h. As such the worst case value for the site would be less than 0.01 litres of gas per hour.

Carbon monoxide and Hydrogen Sulphide were not detected above the detection limits of the gas monitoring instrument in either of the boreholes monitored during the monitoring programme.

The minimum level of oxygen recorded during the monitoring period was 20.3%. This falls into the physiological effects bracket of '*normal range of concentration in the atmospheric air*'. Such levels do not pose potential risk to human health.

These results equate to a Characteristic Situation 1, which requires no special precautions at site.

Employing the NHBC 'traffic light' characterisation system, the site would be classified as Green in accordance with CIRIA Report C665. Table 8.7 using the Gas Screening Value for methane and carbon dioxide and as such gas prevention measures would not be considered necessary for the site.

For further information on design and construction details, discussions should be sought with a specialist contractor. Guidance may also be obtained from the BRE Report BR212 'Construction of New Buildings on Gas-Contaminated Land' and CIRIA Report C665 (2007). It may also be prudent to contact the local Environmental Health Officer in order to comply with the Local Authority requirements.

6.0 FOUNDATION DESIGN

6.1 General

It is proposed to form a subterranean basement under the existing main house and rear garden at the site. Exact details of the structure, layout and loadings were not available at the time of preparation of this report.

The section of the sheet or the diameter of the piles could be reduced by installing a braced waling to the wall. Piles placed as part of the permanent works would be propped by the roof to the basement and would not be acting purely as a cantilevered support in the long term.

To reduce the likelihood of loss of ground if a sheet piled wall was adopted when removing the sheets, it is considered that the sheet piles should be incorporated into the final wall design. Assuming that the earth retaining wall will be propped, i.e. have its base slab and first floor slab cast in place soon after excavation, it is unlikely that full if any earth pressures will act on the wall while it is not propped. The greatest force acting on the wall, in the short term, is likely to be from the hydrostatic head should water percolate and be retained to the rear of the earth retaining structure.

Given the unknown depth of the proposed basements (and therefore unknown founding materials), the design parameters for each element of soil recorded in the relevant exploratory holes are provided in Table A below. The depth of pile penetration can be calculated once structural details of the proposed basement are known.

Founding Material	Depth to Top of Stratum (m)	Description	Angle of Shearing Resistance (degrees) (Φ)[1]	Coefficient active pressure (Ka)	Coefficient passive resistance (Kp)	Presumed Safe Bearing Capacity qS (kPa)[2]
Superficial Head	0.20 to 0.40	Stiff sandy silty gravelly CLAY	23	0.49	2.28	150-200kPa
Weathered London Clay	1.20 to 1.70	Stiff becoming stiff to very stiff silty clay	22	0.45	2.2	240-270kPa
London Clay	6.80 to 7.60	Stiff becoming very stiff silty clay	21	0.47	2.12	270-300kPa

Table A. Summary of design parameters for proposed basement foundation

Notes:

1. Calculated using guidance from BS8002

2. As the depth and structural details of the proposed basement are unknown these values should be used as guidance only. Further investigation will be required once foundation depths are known.

Groundwater will affect the stability of basement wall and slab since the allowable bearing pressure is reduced when the groundwater level is near the foundation level.

The varying loads placed onto the cohesive soil may cause issues surrounding yielding and basal instability of the structure. In addition the London clay is known to have a medium and high swelling and shrinkage potential in this area.

6.4 Piled Foundations

In the event that the use of conventional spread foundations proves either impracticable or uneconomical due to the size and depth of foundation required, then a piled foundation would be needed. In these ground conditions, it is considered that some form of auger bored and in-situ cast concrete piled foundation with reinforced concrete ground beams should prove satisfactory.

The construction of a piled foundation is a specialist activity and the advice of a reputable contractor, familiar with the type of soil and groundwater conditions encountered at this site, should be sought prior to finalising the foundation design. The actual pile working load will depend on the particular type of pile chosen and method of installation adopted.

To achieve the full bearing value a pile should penetrate the bearing stratum by at least five times the pile diameter.

Where piles are to be constructed in groups the bearing value of each individual pile should be reduced by a factor of about 0.8 and a calculation made to check the factor of safety against block failure.

Driven piles could also be used and would develop much higher working loads approximately 2.5 to 3 times higher than bored piles of a similar diameter at the same depth. However, the close proximity of adjacent buildings will in all probability preclude their use due to noise and vibration.

6.5 Basement Slabs

Due to the presence of clay soils assessed to be of medium and high swelling and shrinkage potential at shallow depth below, it is recommended that ground slabs should be designed as being fully suspended.

6.6 Excavations

Shallow excavations for the basements and services are likely to require nominal side support in the short term and groundwater is unlikely to be encountered in significant quantities once any accumulated surface water within the made ground has been removed. Deeper and longer excavations below approximately 0.20 to 0.40m below existing ground level will require close side support and some light seepages of groundwater may well be encountered towards the base of the made ground.

No particular difficulties are envisaged in removing such water by conventional internal pumping methods from open sumps.

Normal safety precautions should be taken if excavations are to be entered.

6.7 Chemical Attack on Buried Concrete

The results presented on Table 3 show the natural soil samples to have water soluble sulphate contents of up to 1.94g/litre associated with near neutral pH values. The sample of made ground tested indicated a water soluble sulphate content of 0.02g/litre, again associated with a near neutral pH value.

In these conditions, it is considered that deterioration of buried concrete due to sulphate or acid attack is likely to occur. The final design of buried concrete according to Tables C1 and C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-3 conditions.

In addition, segregations of gypsum were noted within the London Clay and also are well known to occur within London Clay. Consequently, it is considered that any buried concrete at depth may be attacked by such sulphates in solution and that it would be prudent to design any such concrete in accordance with full Class DS-3 conditions.

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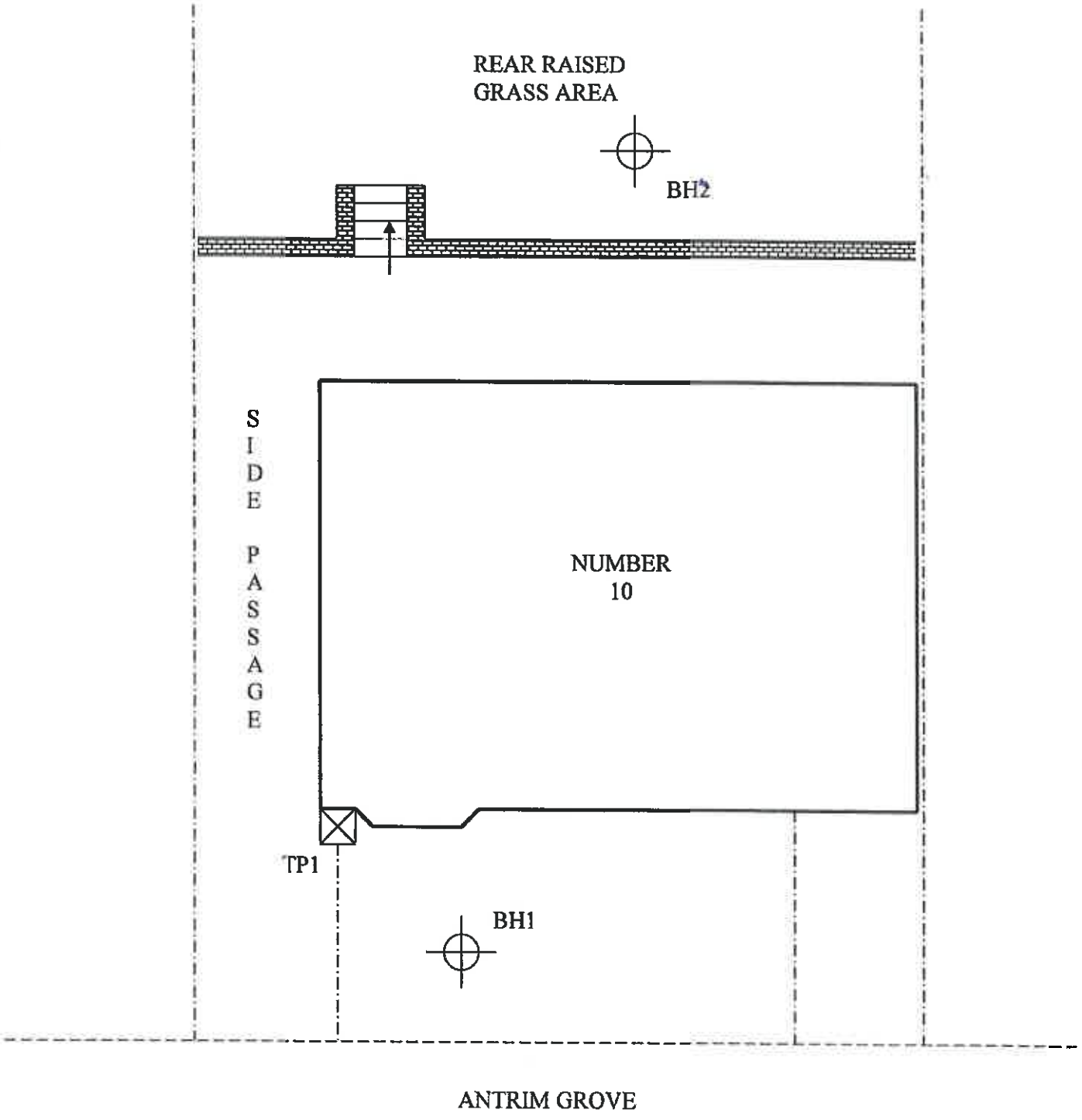
Site Analytical Services Ltd.			REF: 11/17630
LOCATION:	10 Antrim Grove, Belsize Park, London, NW3 4XR		FIG: 1
TITLE:	Sketch Site Plan	DATE: March 2011	SCALE: NTS



APPENDIX `A'

Borehole / Trial Pit Logs

Site Analytical Services Ltd.

Site	Borehole Number
10 ANTRIM GROVE, BELSIZE PARK, LONDON, NW3 4XR	BH1

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
CONTINUOUS FLIGHT AUGER	100mm cased to 0.00m		MR PHILIP BLOOM	1117630
	Location	**Dates**	**Engineer**	**Sheet**
	TQ 275 847	07/03/2011	MR DAVID CHERRETT	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.30)	MADE GROUND - grass over dark brown sandy topsoil with brick fragments		
0.25	D1					0.30	Stiff mottled brown, orange brown and grey sandy silty CLAY with occasional fine to medium flint gravel		
0.50	D2								
0.75	D3					(0.90)			
1.00	D4								
1.00-1.13	M1 100/130					1.20	Stiff becoming stiff to very stiff brown and mottled orange brown and veined blue grey silty CLAY with occasional partings of orange brown silty fine sand, occasional small gypsum crystals		
1.50	D5								
1.50	V1 122								
2.00	D6								
2.00	V2 129								
2.50	D7								
2.50	V3 134								
3.00	D8								
3.00	V4 140								
3.50	V5 140+								
3.50	D9								
4.00	D10					(5.60)			
4.00	V6 140+								
4.50	D11								
4.50	V7 140+								
5.00	D12								
5.00	V8 140+								
6.00	V9 140+								
6.00	D13								
						6.80	Stiff to very stiff becoming very stiff dark grey brown fissured silty CLAY with occasional partings of light brown silty fine sand, scattered small gypsum crystals and a weak grey claystone nodule from 6.70m to 7.000m depth		
7.00	D14								
7.00	V10 140+								
8.00	D15								
8.00	V11 140+								
						(3.20)			
9.00	D16								
9.00	V12 140+								
10.00	V13 140+			07/03/2011:DRY					
10.00	D17					10.00			

Remarks
V = Vane Test - Result in kPa
M = Mackintosh Probe - Blows/Penetration (mm)
D = Disturbed Sample
Groundwater was not encountered during boring

Scale (approx)	Logged By
1:50	JIP

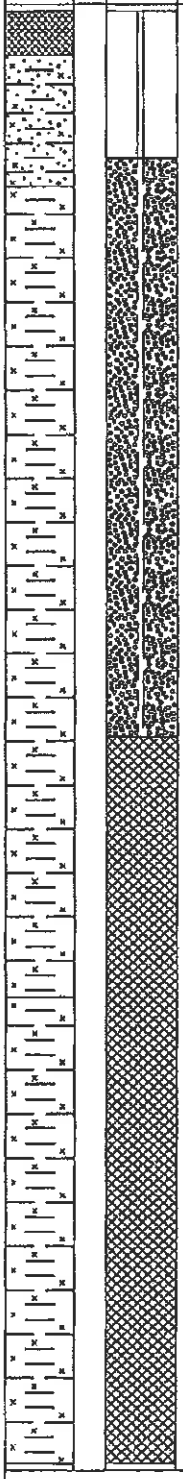
Figure No.
1117630.BH1

Site Analytical Services Ltd.

Site	Borehole Number
10 ANTRIM GROVE, BELSIZE PARK, LONDON, NW3 4XR	BH1

Installation Type	Dimensions	Client	Job Number
MONITORING STANDPIPE	Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 100 mm	MR PHILIP BLOOM	1117630

Location	Ground Level (mOD)	Engineer	Sheet
TQ 275 847		MR DAVID CHERRETT	1/1



Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description
					Bentonite Seal
				1.00	
					Slotted Standpipe
				5.00	
					General Backfill
				10.00	

Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
07/03/11				DRY			10.00		DRY	

Instrument Groundwater Observations

Inst. [A] Type : SINGLE STANDPIPE

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
21/03/11		1.51		Gas readings taken
25/03/11		1.43		Gas readings taken
31/03/11		1.32		Gas readings taken

Remarks

Lockable cover set in concrete
Gas valve fitted

Site Analytical Services Ltd.

Site	Borehole Number
10 ANTRIM GROVE, BELSIZE PARK, LONDON, NW3 4XR	BH2

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
CONTINUOUS FLIGHT AUGER	100mm cased to 0.00m		MR PHILIP BLOOM	1117630
	Location	**Dates**	**Engineer**	**Sheet**
	TQ 275 847	07/03/2011	MR DAVID CHERRETT	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.40)	MADE GROUND - grass over dark brown sandy topsoil with some fine to medium flint gravel and brick fragments		
0.25	D1					0.40	Stiff mottled brown, orange brown and grey sandy silty CLAY with occasional fine to medium flint gravel and rootlets above 1.50m depth		
0.50	D2								
0.75	D3								
1.00	D4					(1.30)			
1.00	V1 98								
1.50	D5								
1.50-1.60	M1 100/100					1.70	Stiff becoming stiff to very stiff brown and mottled orange brown and veined blue grey silty CLAY with occasional partings of orange brown silty fine sand, occasional small gypsum crystals		
2.00	D6								
2.00	V2 127								
2.50	D7								
2.50	V3 138								
3.00	D8								
3.00	V4 140+								
3.50	V5 140+								
3.50	D9								
4.00	D10								
4.00	V6 140+								
4.50	D11								
4.50	V7 140+					(5.90)			
5.00	D12								
5.00	V8 140+								
6.00	V9 140+								
6.00	D13								
7.00	D14								
7.00	V10 140+								
						7.60	Stiff to very stiff becoming very stiff dark grey brown fissured silty CLAY with occasional partings of light brown silty fine sand, scattered small gypsum crystals and a weak grey claystone nodule from 8.70m to 7.000m depth		
8.00	D15								
8.00	V11 140+								
						(2.40)			
9.00	D16								
9.00	V12 140+								
10.00	V13 140+			07/03/2011:DRY					
10.00	D17					10.00			

Remarks
Groundwater was not encountered during boring
D = Disturbed Sample
M = Mackintosh Probe - Blows/Penetration (mm)
V = Vane Test - Result in kPa

Scale (approx)	Logged By
1:50	JIP

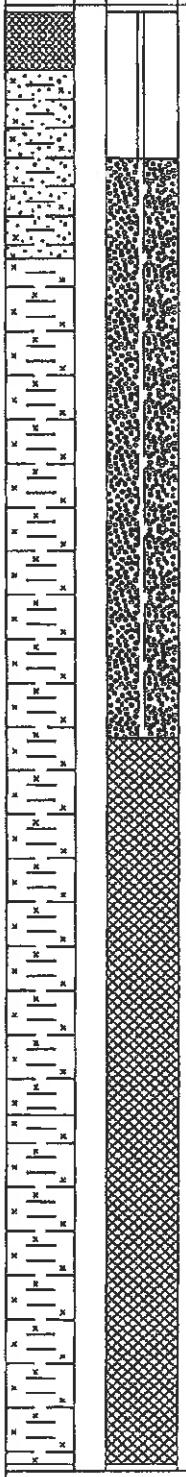
Figure No. 1117630.BH2

Site Analytical Services Ltd.

Site	Borehole Number
10 ANTRIM GROVE, BELSIZE PARK, LONDON, NW3 4XR	BH2

Installation Type	Dimensions	Client	Job Number
MONITORING STANDPIPE	Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 100 mm	MR PHILIP BLOOM	1117630

Location	Ground Level (mOD)	Engineer	Sheet
TQ 275 847		MR DAVID CHERRETT	1/1



Groundwater Strikes During Drilling

Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings 5 min	Readings 10 min	Readings 15 min	Readings 20 min	Depth Sealed (m)

Groundwater Observations During Drilling

Date	Start of Shift Time	Start of Shift Depth Hole (m)	Start of Shift Casing Depth (m)	Start of Shift Water Depth (m)	Start of Shift Water Level (mOD)	End of Shift Time	End of Shift Depth Hole (m)	End of Shift Casing Depth (m)	End of Shift Water Depth (m)	End of Shift Water Level (mOD)
07/03/11				DRY			10.00		DRY	

Instrument Groundwater Observations

Inst. [A] Type : SINGLE STANDPIPE

Date	Instrument [A] Time	Instrument [A] Depth (m)	Instrument [A] Level (mOD)	Remarks
21/03/11		1.22		Gas readings taken
25/03/11		1.19		Gas readings taken
31/03/11		1.16		Gas readings taken

Remarks

Lockable cover set in concrete
Gas valve fitted

Site Analytical Services Ltd.

Site 10 ANTRIM GROVE, BELSIZE PARK, LONDON, NW3 4XR			**Trial Pit Number** TP1
Excavation Method HAND EXCAVATION	**Dimensions** 800 X 800	**Ground Level (mOD)**	**Client** MR PHILIP BLOOM	**Job Number** 1117630
	Location TQ 275 847	**Dates** 07/03/2011	**Engineer** MR DAVID CHERRETT	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	MADE GROUND - dark brown sandy topsoil with some fine to medium flint gravel and brick fragments (flower bed)		
0.25	D1				0.20	Stiff mottled brown, orange brown and grey sandy silty CLAY with occasional fine to medium flint gravel		
0.50	D2				(0.57)			
0.70 0.70-0.77	D3 M1 100/80		07/03/2011:DRY		0.77			
						Complete at 0.77m		

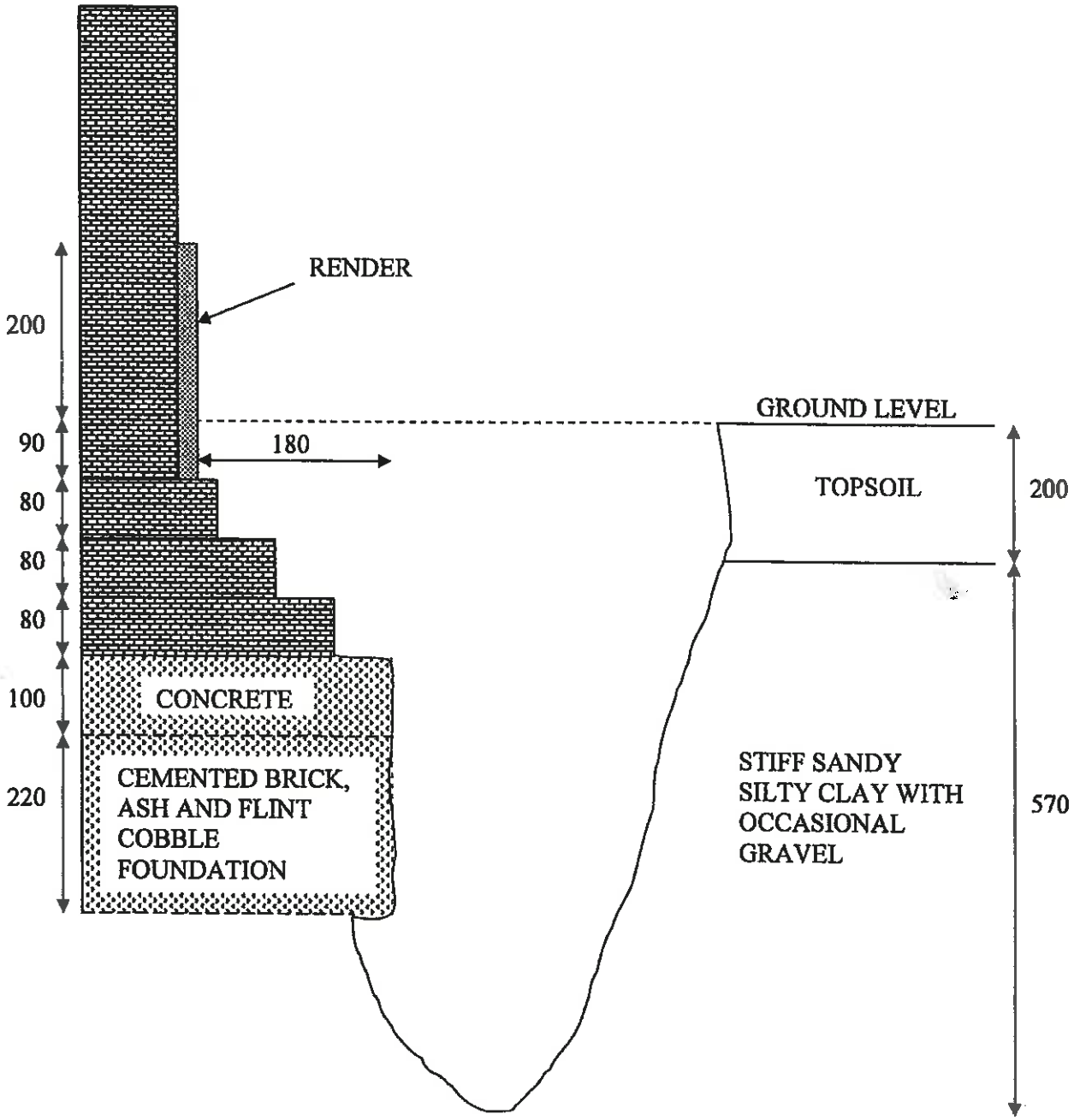
Plan

Remarks

Groundwater was not encountered during excavation
D = Disturbed Sample
M = Mackintosh Probe - Blows/Penetration (mm)
For details of foundations exposed see sketch

Scale (approx)	Logged By	Figure No.
1:25	JIP	1117630.TP1

Site Analytical Services Ltd.				REF: 11/17630
LOCATION:	10 Antrim Grove, Belsize Park, London, NW3 4XR			FIG: 2
TITLE:	Trial Pit 1	DATE:	Mar 2011	SCALE: NTS



END OF TRIAL PIT 1 AT 770mm DEPTH

DIMENSIONS IN mm

APPENDIX `B'

Laboratory Test and Gas Monitoring Data

Site Analytical Services Ltd.

Ref: 11/17630

PLASTICITY INDEX & MOISTURE CONTENT DETERMINATIONS

LOCATION 10 Antrim Grove, Belsize Park, London, NW3 4XR

BH/TP No.	Depth m	Natural Moisture %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Passing 425 µm %	Class
BH1	1.50	23	49	20	29	100	CI
	2.50	29	64	20	44	100	CH
	3.50	30	67	21	46	100	CH
BH2	1.00	24	59	17	42	79	CH
	2.00	24	58	15	43	100	CH
	3.00	30	62	20	42	100	CH

Table 1

Site Analytical Services Ltd.

Ref: 11/17630

SULPHATE & pH DETERMINATIONS

LOCATION 10 Antrim Grove, Belsize Park, London, NW3 4XR

BH/TP No.	DEPTH BELOW GL m	SOIL SULPHATES AS SO_4 TOTAL %	SOIL SULPHATES AS SO_4 WATER SOL g/l	WATER SULPHATES AS SO_4 g/l	pH	CLASS	SOIL - 2mm %
BH1	2.00		0.12		7.7	DS-1	100
BH2	5.00		1.94		7.4	DS-3	100

Classification – Tables C1 and C2 : BRE Special Digest 1 : 2005

Table 2

Site Analytical Services Ltd.

Ref: 11/17630

GAS MONITORING

LOCATION 10 Antrim Grove, Belsize Park, London, NW3 4XR

MONITORING DATE 21st March 2011

BOREHOLE REF:		**BH1**	**BH2**
Methane	(%)	0.0	0.0
Carbon Dioxide	(%)	1.0	1.1
Oxygen	(%)	20.7	20.6
Hydrogen Sulphide	(p.p.m.)	0.0	0.0
Carbon Monoxide	(p.p.m.)	0	0
Atmospheric Pressure	(mb)	1030	1030
Water Level	(m.bgl)	1.51	1.22
Oxygen in Air	(%)	21.4	21.4
Flow	(l/hour)	0.0	0.0

N.B. Methane Lower Explosive Limit - 5% Gas in Air

Table 3

Site Analytical Services Ltd.

Ref: 11/17630

GAS MONITORING

LOCATION 10 Antrim Grove, Belsize Park, London, NW3 4XR

MONITORING DATE 25th March 2011

BOREHOLE REF:		**BH1**	**BH2**
Methane	(%)	0.0	0.0
Carbon Dioxide	(%)	0.6	0.9
Oxygen	(%)	20.8	20.3
Hydrogen Sulphide	(p.p.m.)	0.0	0.0
Carbon Monoxide	(p.p.m.)	0	0
Atmospheric Pressure	(mb)	1015	1015
Water Level	(m.bgl)	1.50	1.22
Oxygen in Air	(%)	21.0	21.0
Flow	(l/hour)	0.0	0.0

N.B. Methane Lower Explosive Limit - 5% Gas in Air

Table 3a

Site Analytical Services Ltd.

Ref: 11/17630

GAS MONITORING

LOCATION 10 Antrim Grove, Belsize Park, London, NW3 4XR

MONITORING DATE 31st March 2011

BOREHOLE REF:		**BH1**	**BH2**
Methane	(%)	0.0	0.0
Carbon Dioxide	(%)	0.2	0.5
Oxygen	(%)	20.8	20.6
Hydrogen Sulphide	(p.p.m.)	0.0	0.0
Carbon Monoxide	(p.p.m.)	0	0
Atmospheric Pressure	(mb)	1002	1002
Water Level	(m.bgl)	1.32	1.16
Oxygen in Air	(%)	21.0	21.0
Flow	(l/hour)	0.0	0.0

N.B. Methane Lower Explosive Limit - 5% Gas in Air

Table 3b

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Site Analytical Services Ltd
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River Road Business Park
33 River Road
Barking
Essex IG11 0EA

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QTS Environmental Ltd
Unit 1
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t: 01622 851105
russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 5438

Site Reference: 10 Antrim Grove

Project / Job Ref: 11/17630

Order No: 8996

Sample Receipt Date: 17/03/11

Sample Scheduled Date: 17/03/11

Report Issue Number: 1

Reporting Date: 23/03/2011

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

QTS Environmental Ltd
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Soil Analysis Certificate								
QTS Environmental Report No: 5438	Date Sampled	None Supplied	None Supplied					
Site Analytical Services Ltd	Time Sampled	None Supplied	None Supplied					
Site Reference: 10 Antrim Grove	TP / BH No	BH1	BH2					
Project / Job Ref: 11/17630	Additional Refs	None Supplied	None Supplied					
Order No: 8996	Depth (m)	0.75	0.25					
Reporting Date: 23/03/2011	QTSE Sample No	23663	23664					

Determinand	Unit	MDL	Accreditation					
Stone Content	%	<0.1	NONE	<0.1	<0.1			
Asbestos Screen	Positive / Negative	N/a	NONE	Negative	Negative			

General Inorganics	Unit	MDL	Accreditation					
Total Cyanide	mg/kg	<2	NONE	<2	<2			
Complex Cyanide	mg/kg	<2	NONE	<2	<2			
Free Cyanide	mg/kg	<2	NONE	<2	<2			
Total Sulphate as SO_4	mg/kg	<200	NONE	253	497			
W/S Sulphate as SO_4 (2:1)	g/l	<0.01	NONE	0.03	0.02			
Sulphide	mg/kg	<5	NONE	<5	<5			
Organic Matter	%	<0.1	NONE	0.8	3.3			
Total Phenols (monohydric)	mg/kg	<2	NONE	<2	<2			

Metals	Unit	MDL	Accreditation					
Arsenic (As)	mg/kg	<2	MCERTS	9	17			
W/S Boron	mg/kg	<1	NONE	<1	<1			
Cadmium (Cd)	mg/kg	<0.5	MCERTS	<0.5	<0.5			
Chromium (hexavalent)	mg/kg	<2	NONE	<2	<2			
Chromium (Cr)	mg/kg	<2	MCERTS	35	40			
Copper (Cu)	mg/kg	<4	MCERTS	9	53			
Lead (Pb)	mg/kg	<3	MCERTS	12	260			
Mercury (Hg)	mg/kg	<1	NONE	<1	1.2			
Nickel (Ni)	mg/kg	<3	MCERTS	8	20			
Selenium (Se)	mg/kg	<3	NONE	<3	<3			
Zinc (Zn)	mg/kg	<3	MCERTS	28	128			

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C
Analysis carried out on the dried sample is corrected for the stone content
Screening data for asbestos provided only refers to the health & safety issues associated with the safe handling of samples & is not conclusive as to the presence or otherwise of asbestos in any test sample

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Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 5438	Date Sampled	None Supplied	None Supplied			
Site Analytical Services Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: 10 Antrim Grove	TP / BH No	BH1	BH2			
Project / Job Ref: 11/17630	Additional Refs	None Supplied	None Supplied			
Order No: 8996	Depth (m)	0.75	0.25			
Reporting Date: 23/03/2011	QTSE Sample No	23663	23664			

Determinand	Unit	MDL	Accreditation					
Naphthalene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Acenaphthylene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Acenaphthene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Fluorene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Phenanthrene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Anthracene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Fluoranthene	mg/kg	<0.1	MCERTS	<0.1	0.29			
Pyrene	mg/kg	<0.1	MCERTS	<0.1	0.26			
Benzo(a)anthracene	mg/kg	<0.1	MCERTS	<0.1	0.13			
Chrysene	mg/kg	<0.1	MCERTS	<0.1	0.15			
Benzo(b)fluoranthene	mg/kg	<0.1	MCERTS	<0.1	0.14			
Benzo(k)fluoranthene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Benzo(a)pyrene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Dibenz(a,h)anthracene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Benzo(ghi)perylene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Coronene	mg/kg	<0.1	NONE	<0.1	<0.1			

Total Oily Waste PAHs	mg/kg	<1	MCERTS	<1	<1			
Total Dutch 10 PAHs	mg/kg	<1	MCERTS	<1	<1			
Total EPA-16 PAHs	mg/kg	<1.6	MCERTS	<1.6	<1.6			
Total WAC-17 PAHs	mg/kg	<1.7	NONE	<1.7	<1.7			

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

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Soil Analysis Certificate - TPH CWG Banded							
QTS Environmental Report No: 5438	Date Sampled	None Supplied	None Supplied				
Site Analytical Services Ltd	Time Sampled	None Supplied	None Supplied				
Site Reference: 10 Antrim Grove	TP / BH No	BH1	BH2				
Project / Job Ref: 11/17630	Additional Refs	None Supplied	None Supplied				
Order No: 8996	Depth (m)	0.75	0.25				
Reporting Date: 23/03/2011	QTSE Sample No	23663	23664				

Determinand	Unit	MDL	Accreditation					
Aliphatic >C5 - C6	mg/kg	<0.01	NONE	<0.01	<0.01			
Aliphatic >C6 - C8	mg/kg	<0.05	NONE	<0.05	<0.05			
Aliphatic >C8 - C10	mg/kg	<1	NONE	<1	<1			
Aliphatic >C10 - C12	mg/kg	<1	NONE	<1	<1			
Aliphatic >C12 - C16	mg/kg	<1	NONE	<1	<1			
Aliphatic >C16 - C21	mg/kg	<1	NONE	<1	<1			
Aliphatic >C21 - C34	mg/kg	<6	NONE	<6	<6			
Aliphatic (C5 - C34)	mg/kg	<6	NONE	<6	<6			
Aromatic >C5 - C7	mg/kg	<0.01	NONE	<0.01	<0.01			
Aromatic >C7 - C8	mg/kg	<0.05	NONE	<0.05	<0.05			
Aromatic >C8 - C10	mg/kg	<1	NONE	<1	<1			
Aromatic >C10 - C12	mg/kg	<1	NONE	<1	<1			
Aromatic >C12 - C16	mg/kg	<1	NONE	<1	<1			
Aromatic >C16 - C21	mg/kg	<1	NONE	<1	<1			
Aromatic >C21 - C35	mg/kg	<6	NONE	<6	<6			
Aromatic (C5 - C35)	mg/kg	<6	NONE	<6	<6			

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

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Soil Analysis Certificate - BTEX						
QTS Environmental Report No: 5438	Date Sampled	None Supplied	None Supplied			
Site Analytical Services Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: 10 Antrim Grove	TP / BH No	BH1	BH2			
Project / Job Ref: 11/17630	Additional Refs	None Supplied	None Supplied			
Order No: 8996	Depth (m)	0.75	0.25			
Reporting Date: 23/03/2011	QTSE Sample No	23663	23664			

Determinand	Unit	MDL	Accreditation					
Benzene	µg/kg	<2	MCERTS	<2	<2			
Toluene	µg/kg	<5	MCERTS	<5	<5			
Ethylbenzene	µg/kg	<10	MCERTS	<10	<10			
p & m-xylene	µg/kg	<10	MCERTS	<10	<10			
o-xylene	µg/kg	<10	MCERTS	<10	<10			

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

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Waste Acceptance Criteria Analytical Certificate

QTS Environmental Report No: 5438		Date Sampled	None Supplied				Landfill Waste Acceptance Criteria Limits	
Site Analytical Services Ltd		Time Sampled	None Supplied				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Site Reference: 10 Antrim Grove		TP / BH No	BH1						
Project / Job Ref: 11/17630		Additional Refs	None Supplied						
Order No: 8996		Depth (m)	0.75						
Reporting Date: 23/03/2011		QTSE Sample No	23663						
Determinand	Unit	MDL							
TOC	%	<0.1	0.5				3%	5%	6%
Loss on Ignition	%	<0.01	0.8				--	--	10%
BTEX	mg/kg	<0.05	<0.05				6	--	--
Sum of PCBs	mg/kg	<0.7	<0.7				1	--	--
Mineral Oil	mg/kg	<6	<6				500	--	--
Total PAH	mg/kg	<1.7	<1.7				100	--	--
pH	pH Units	+ / - 0.1	7.6				--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	N/a	<1				--	To be evaluated	To be evaluated

Eluate Analysis	2:1 mg/l	8:1 mg/l		Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic	<0.01	<0.01		<0.2	0.5	2	25
Barium	0.03	0.04		0.3	20	100	300
Cadmium	<0.0005	<0.0005		<0.02	0.04	1	5
Chromium	0.007	<0.005		<0.2	0.5	10	70
Copper	<0.01	<0.01		<0.5	2	50	100
Mercury	<0.005	<0.005		<0.01	0.01	0.2	2
Molybdenum	0.003	0.002		<0.1	0.5	10	30
Nickel	<0.007	<0.007		<0.2	0.4	10	40
Lead	<0.005	<0.005		<0.2	0.5	10	50
Antimony	<0.005	<0.005		<0.06	0.06	0.7	5
Selenium	<0.005	<0.005		<0.1	0.1	0.5	7
Zinc	0.006	<0.005		<0.2	4	50	200
Chloride	<10	<10		<120	800	15000	25000
Fluoride	0.1	0.1		<1	10	150	500
Sulphate	20	4		36	1000	20000	50000
TDS	139	95		625	4000	60000	100000
Phenol Index	<0.01	<0.01		<0.5	1	-	-
DOC	8.4	4.8		32.3	500	800	1000
Leach Test Information							
Sample Mass (kg)	0.196						
Dry Matter (%)	89.2						
Moisture (%)	10.8						
Stage 1							
Volume Eluate L2 (litres)	0.331						
Filtered Eluate VE1 (litres)	0.095						

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and QTS Environmental cannot be held responsible for any discrepencies with current legislation

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Waste Acceptance Criteria Analytical Certificate

QTS Environmental Report No: 5438		**Date Sampled**	None Supplied					**Landfill Waste Acceptance Criteria Limits**			
Site Analytical Services Ltd		**Time Sampled**	None Supplied					**Inert Waste Landfill**	**Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill**	**Hazardous Waste Landfill**	
Site Reference: 10 Antrim Grove		**TP / BH No**	BH2								
Project / Job Ref: 11/17630		**Additional Refs**	None Supplied								
Order No: 8996		**Depth (m)**	0.25								
Reporting Date: 23/03/2011		**QTSE Sample No**	23664								
Determinand	**Unit**	**MDL**									
TOC	%	<0.1	1.9					3%	5%	6%	
Loss on Ignition	%	<0.01	4.6					--	--	10%	
BTEX	mg/kg	<0.05	<0.05					6	--	--	
Sum of PCBs	mg/kg	<0.7	<0.7					1	--	--	
Mineral Oil	mg/kg	<6	<6					500	--	--	
Total PAH	mg/kg	<1.7	<1.7					100	--	--	
pH	pH Units	+ / - 0.1	7.5					--	>6	--	
Acid Neutralisation Capacity	mol/kg (+/-)	N/a	<1					--	To be evaluated	To be evaluated	
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**		**Cumulative 10:1 mg/kg**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**			
Arsenic			<0.01	<0.01		<0.2		0.5	2	25	
Barium			0.07	0.14		0.7		20	100	300	
Cadmium			<0.0005	<0.0005		<0.02		0.04	1	5	
Chromium			0.006	<0.005		<0.2		0.5	10	70	
Copper			0.01	<0.01		<0.5		2	50	100	
Mercury			<0.005	<0.005		<0.01		0.01	0.2	2	
Molybdenum			0.010	0.003		<0.1		0.5	10	30	
Nickel			<0.007	<0.007		<0.2		0.4	10	40	
Lead			0.056	0.014		<0.2		0.5	10	50	
Antimony			0.010	<0.005		<0.06		0.06	0.7	5	
Selenium			<0.005	<0.005		<0.1		0.1	0.5	7	
Zinc			0.025	0.013		<0.2		4	50	200	
Chloride			<10	<10		<120		800	15000	25000	
Fluoride			0.1	0.1		<1		10	150	500	
Sulphate			9	3		19		1000	20000	50000	
TDS			144	118		611		4000	60000	100000	
Phenol Index			<0.01	<0.01		<0.5		1	-	-	
DOC			11.7	5.6		31.1		500	800	1000	
Leach Test Information											
Sample Mass (kg)			0.213								
Dry Matter (%)			82.2								
Moisture (%)			17.8								
Stage 1											
Volume Eluate L2 (litres)			0.319								
Filtered Eluate VE1 (litres)			0.075								

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and QTS Environmental cannot be held responsible for any discrepencies with current legislation

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 5438	
Site Analytical Services Ltd	
Site Reference: 10 Antrim Grove	
Project / Job Ref: 11/17630	
Order No: 8996	
Reporting Date: 23/03/2011	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
23663	BH1	None Supplied	0.75	10.8	Light brown clay
23664	BH2	None Supplied	0.25	17.8	Black loamy clay

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 5438
Site Analytical Services Ltd
Site Reference: 10 Antrim Grove
Project / Job Ref: 11/17630
Order No: 8996
Reporting Date: 23/03/2011

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	AR	Asbestos Screening	Visual screening of samples for fibrous material	E024
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water followed by titration using silver nitrate	E021
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by turbidimeter	E020
Soil	D	Fluoride - Water Soluble	Test Kit	E023
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E011
Soil	D	Loss on Ignition @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	D	Phosphorus	Determination of phosphorus by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	AR	Sulphide	Determination of sulphide by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia, potassium iodide/iodate followed by ICP-OES	E002
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E011
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E009
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E009
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E010
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E009
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	VPH (C6 - C10)	Determination of hydrocarbons C6-C10 by headspace GC-MS	E001
Soil	AR	EPH TEXAS	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	TPH CWG	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	TPH LQM	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	EPH (with florisil cleanup)	Determination of acetone/hexane extractable hydrocarbons with florisil cleanup step by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001

Key

D Dried
AR As Received