KNAPP HICKS & PARTNERS LTD

CONSULTING STRUCTURAL, CIVIL & GEOTECHNICAL ENGINEERS

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No. 2886020

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8 ANTRIM GROVE

LONDON

NW3 4XR

BASEMENT IMPACT ASSESSMENT (BIA) & SITE INVESTIGATION REPORT

30452/R/001A/RJM

February 2012

APPROVAL SHEET AND FOREWORD

8 ANTRIM GROVE

LONDON

NW3 4XR

BASEMENT IMPACT ASSESSMENT (BIA)

Report Ref: 30452/R/001A/RJM

Report Status: Revision 0 - Draft		Date of Issue: February 2012
		Signature
Author	**R J Moore / J Sturman**	
Checked and Approved	**G Davies**	

This report has been prepared with all reasonable skill, care and diligence within the terms of the contract with the Client and within reasonable limitations of the resources devoted to it by agreement with the Client.

This report is confidential to the Client and Knapp Hicks & Partners Limited accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.

This report shall not be used for engineering or contractual purposes unless signed by the author and the approver and on behalf of Knapp Hicks & Partners Limited, and unless the report status is "Final".

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APPENDICES

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

1 INTRODUCTION

Knapp Hicks and Partners Limited (KHPL) have been instructed to undertake the first stage of a Basement Impact Assessment (BIA) for 8 Antrim Grove, London NW3, to be prepared in accordance with London Borough of Camden guidance document CPG4. A site investigation was also requested by the client and 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 8 Antrim Grove, London NW3 at approximate grid reference TQ275848. It is rectangular in shape with approximately 9m length frontage onto Antrim Grove. The site runs approximately 34m SE-NW parallel with neighbouring residential properties.

The existing level of Antrim Grove is approximately 59.25mAOD and the ground floor level in the existing building is 60.40mAOD.

The house has an outbuilding at the rear with a 1.2m wide paved terrace. The garden area is set approximately 800mm above the terrace level and is accessed by three steps.

Copies of the Architects existing site layout plans and sections are provided in Appendix A.

Proposed Development

It is proposed to create a basement area beneath the existing house which will contain a gymnasium, games room and additional living accommodation. The existing outbuilding will be removed and the ground floor extended out towards the garden. A new terrace will then be created set partially over the new basement.

The ground floor FFL level is 60.40mAOD and the proposed basement floor level is 57.10mAOD. Taking a nominal 500mm construction thickness for the basement floor slab, the formation for the basement will be positioned at 56.60mAOD, i.e. approximately 3.80m below existing ground floor level. The proposed terrace will be set at 60.40mAOD to tie into the 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, made ground is expected given the history of development on the site and surrounding area.

The above geology has been confirmed in boreholes and excavations for a deeper basement at the adjacent property to the south (See attached borehole records in Appendix D)

The London Clay is overlain by some deposits of Head and made ground.

2. SITE INVESTIGATION

Scope of Investigation

A site investigation was carried out in December 2011 and consisted of 3No window sampler boreholes. One was located in the front garden, one was located within the paved path immediately to the rear of the house, and the third hole was placed in the rear garden close to the rear extent of the proposed basement.

Standpipes were installed in the 2 boreholes to the rear of the house.

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

Ground Conditions

The boreholes and trial pit confirmed the expected geology of topsoil and thin made ground resting on a thin layer of gravelly clay Head. The Head was proved to 2.40mbgl at the front of the house, to 1.10mbgl alongside the rear of the house, and 1.55mbgl at the back end of the rear garden. London Clay is present below the Head and extends to below the proposed basement. A ground investigation undertaking at the adjacent 10 Antrim Grove site also proved similar ground conditions.

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 encountered in the borehole at the rear of the back garden in association with a claystone band in the clay at around 2.80mbgl. Upon completion of the borehole, the groundwater level was monitored for 3 hours and was rising slowly. A standpipe was also installed in the borehole at the rear of the house and a slow seepage was noted into this hole. Subsequent monitoring of the boreholes measured standing water at 0.4mbgl in the borehole at the rear of the house and 1.1mbgl in the borehole at the rear of the garden.

A second monitoring visit was carried out in January. In BH3, water level was at 0.8m. The water was baled out to 3.0mbgl and after 1.5 hours had risen to 1.5mbgl. In BH2, the standing water level was at 0.35m. The water was baled out to 2.7m at and after 1 hour had risen back to 2.4mbgl.

We understand that current works ongoing at No15 Antrim Grove, almost opposite, recent basement excavations have been carried out to 2.0mbgl and the excavation has remained dry.

Classification for Buried Concrete

Recent tests 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 these should be 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 fpr a property which currently does not have one. It will occupy the full width of the semi-detached property, and extend a significant distance into the garden. It is proposed to install leisure facilities and additional living space.

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?	Y
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 proposed development will increase external hard paved areas. The increase in roof area on the ground floor extension at the back of the building will be offset by the installation of a sedum roof. However the terrace will be increased in width from 1.2m to 3.7m approximately.

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?	Y
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.

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

Q4 – Although technically the development will marginally increase the impermeable/permeable area ratio for the site the increase in roof area will be offset by a sedum roof and the increased terrace area is not considered to have a significant effect on the surface water regime.

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

Q6 – 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 – See site survey provided with this report. The topography surrounding the site is gently sloping (around 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 1.15m 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 1.40m at the front of the property and by more to the rear.

Q6 – A mature sycamore tree is present in the garden to the north of the site. An independent assessment of this tree and the potential effects of the proposed basement has been carried out by an arboriculturalist and the basement design has been amended accordingly to ensure that the tree will not be affected by the scheme (Ref 2: Letter Reference ha/letrpt1/8antrimgrv, dated 27th January)

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 encountered as seepages in site investigation holes undertaken to the rear of the property. The groundwater level has been monitored for a period of time, rises slowly and settles at around 0.4m to 1.1m below ground level.

It is considered that dewatering will be necessary during construction, probably in the form of pumping from a sump in the base of the excavation. It is recommended that trial excavations down to formation level are carried out prior to commencement of construction to confirm the rate of inflow to open excavations.

Q12 – the site is within 5m of Antrim Grove. The proposed basement will not extend beyond the front of the existing house which is approximately 3m from Antrim Grove. 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 west, No10 has obtained planning permission for construction of a basement of similar extents and therefore the proposed scheme at No8 Antrim Grove will have minimal impact. To the other side, No6, it may be necessary to undertake some underpinning of the flank wall to No6 prior to commencement of construction of the proposed basement at No8.

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 one issue with regard to the development, which is that there will be a change in the proportion of hard surfaced / paved external areas. However, the increase in roof area on the ground floor extension at the back of the building will be offset by the installation of a sedum roof. The terrace will be increased in width from 1.2m to 3.7m approximately.

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. It is recommended that some trial holes be excavated to proposed formation level to check the rate of inflow to excavations which penetrate deeper than the water levels recorded in site investigation holes. Specialist advice should be sought to confirm appropriate groundwater control measures both for the temporary and the permanent works. (2) The proposed development will marginally increase the impermeable/permeable area ratio for the site; however this will largely be offset by the provision of a sedum roof to the ground floor extension and the reinstatement of the garden 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 the water table. It is acknowledged that there may be perched water within the made ground, and groundwater may arise from claystones and fissures in the London Clay above formation level. 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 dewatering specialist, 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 adjacent the 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.

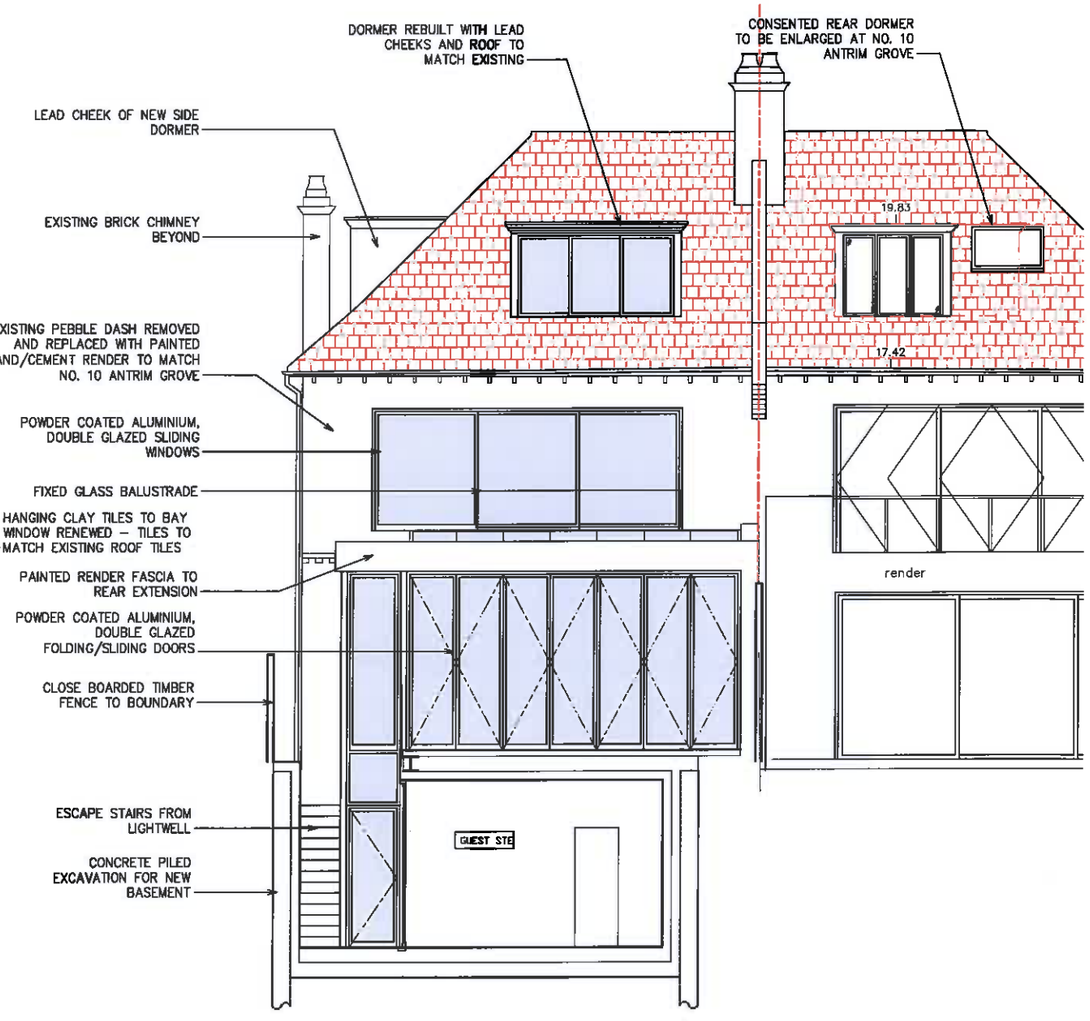
REFERENCES

1. Camden Planning Guidance: Basements and Lightwells, CPG4
2. ACS Consulting, Letter Reference ha/letrpt1/8antrimgrv, Tree Protection and Construction at: 8 Antrim Grove, London NW3, dated 27th January, 2012.

APPENDIX A

Site Plans
&
Cross Sections
(Existing & Proposed)

1 PROPOSED FRONT ELEVATION
1 : 50



2 PROPOSED REAR ELEVATION
1 : 50

0 1 2 5

Bchitecture
11A Berestead Road London N2 8AT
t 07932 796 407 e Bchitecture@gmail.com

LOCATION
8 Antrim Grove, Belsize Park
London NW3 4XR

DRAWING TITLE
PROPOSED ELEVATIONS

DATE
JAN 2012

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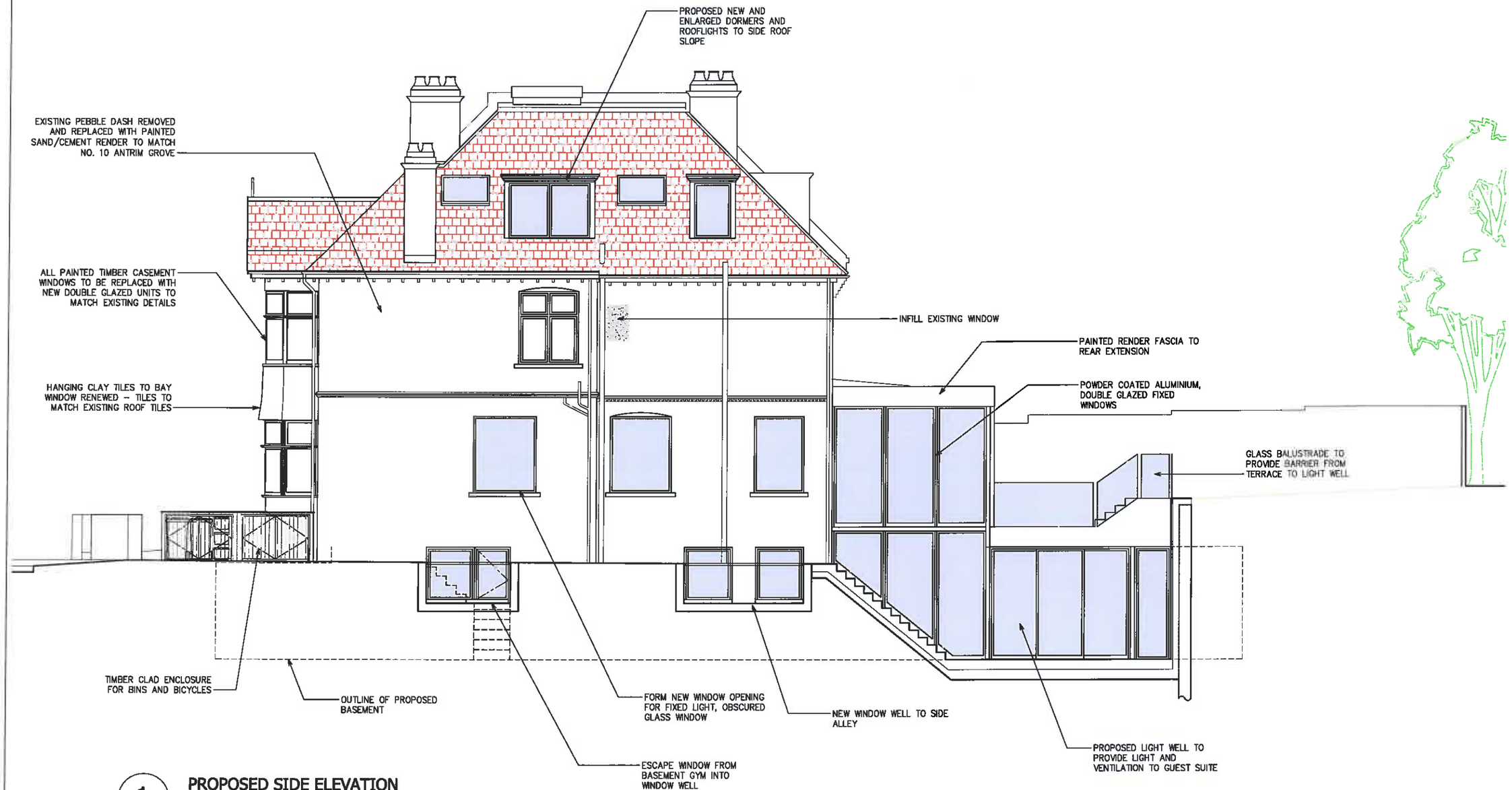
1:100@A3

JOB NO
1115

DWG NO/REV
113/-



1 **PROPOSED SIDE ELEVATION**

1 : 50

Bchitecture
11A Beresford Road London N2 8AT
t 07932 786 407 e Bchitecture@gmail.com

LOCATION
8 Antrim Grove, Belsize Park
London NW3 4XR

DRAWING TITLE
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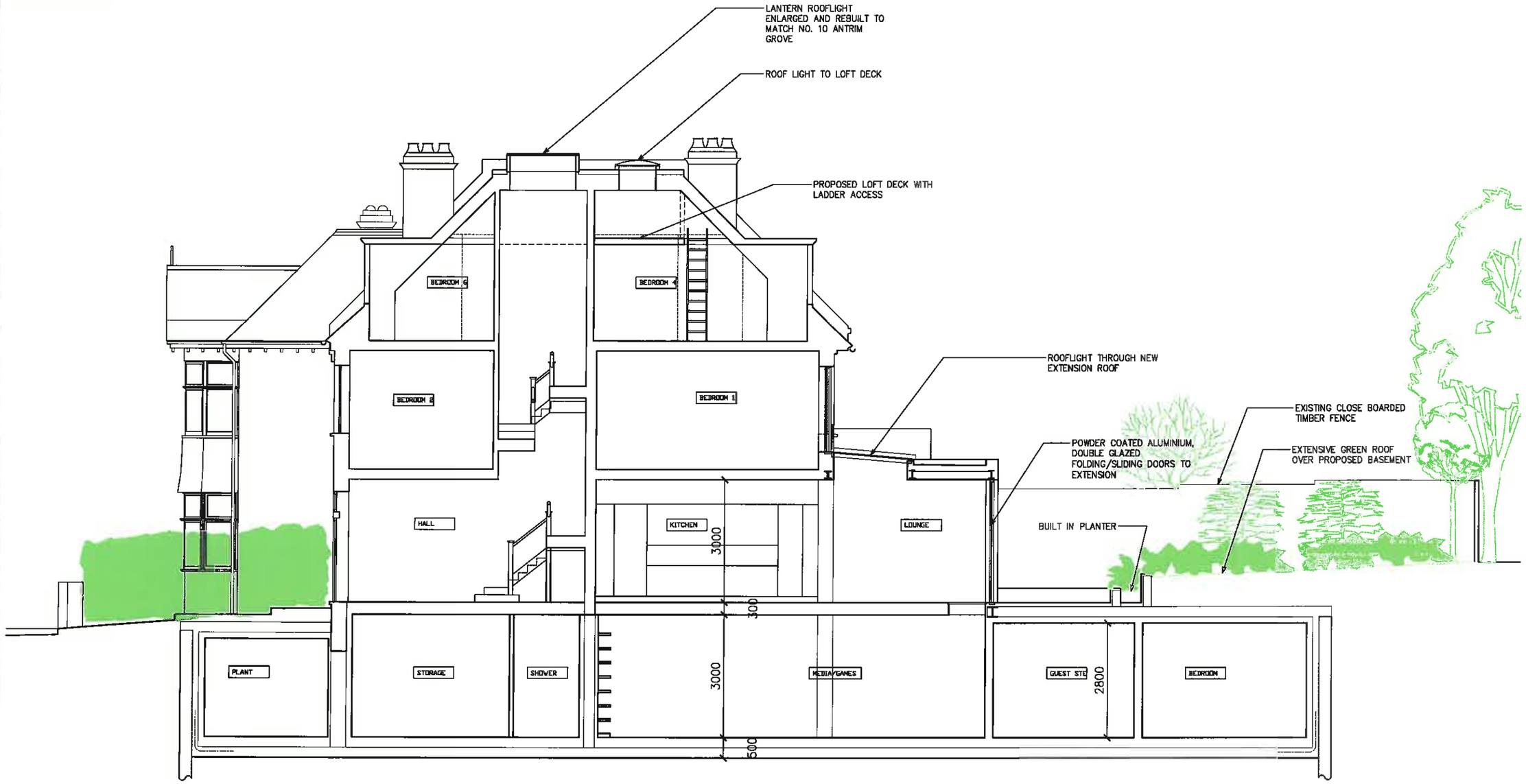

1 PROPOSED SECTION B-B
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Bchitecture
11A Buresford Road London N2 8JT
t 07932 796 407 e bchitecture@gmail.com

LOCATION
8 Antrim Grove, Belsize Park
London NW3 4XR

DRAWING TITLE
PROPOSED SECTIONS

DATE
JAN 2012

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JOB NO
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DWG NO/REV
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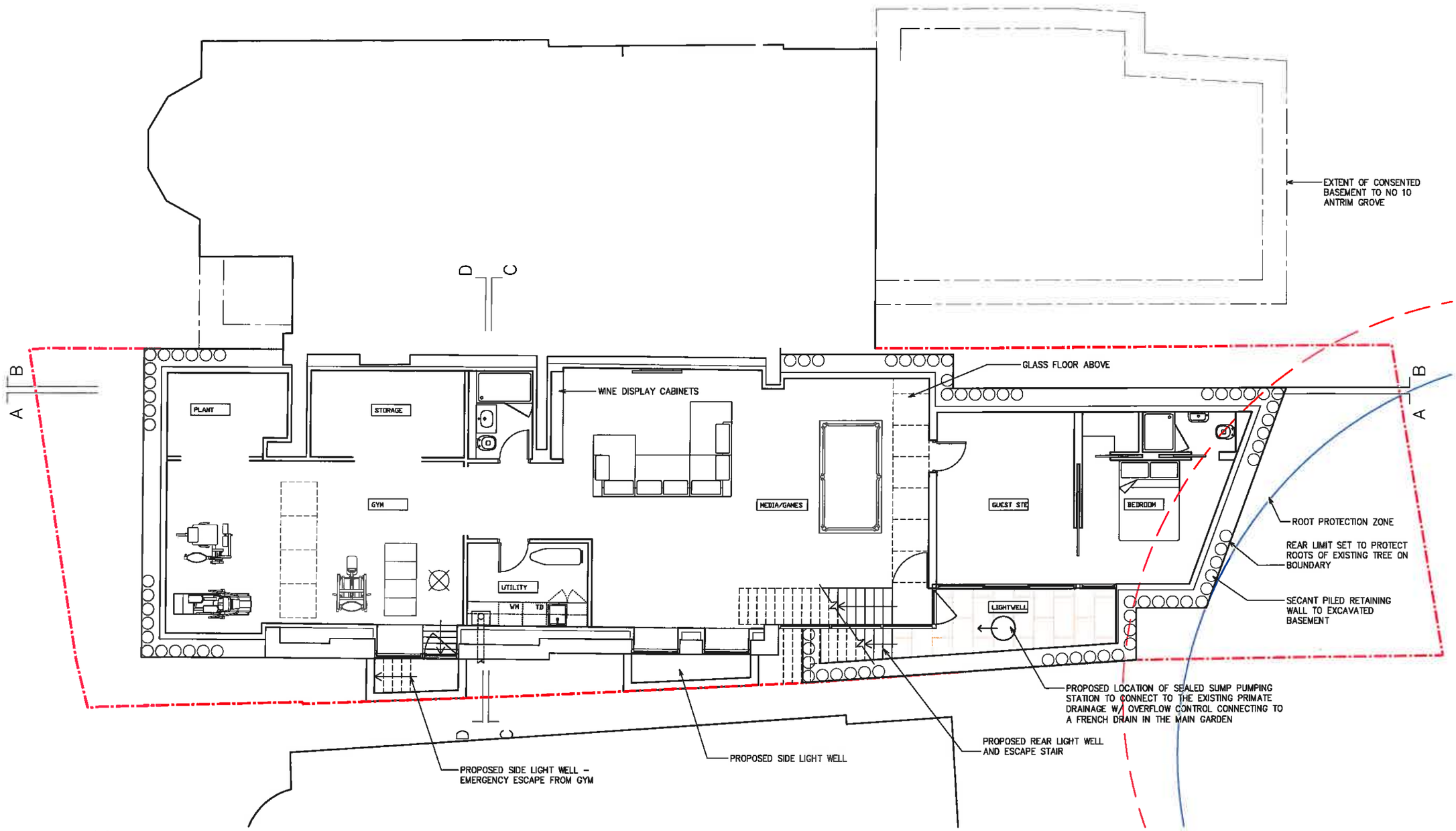

1 PROPOSED BASEMENT LEVEL PLAN

1 : 50

Pchitecture
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t 07932 796 407 e Pchitecture@gmail.com

LOCATION

8 Antrim Grove, Belsize Park
London NW3 4XR

DRAWING TITLE

PROPOSED PLANS

DATE

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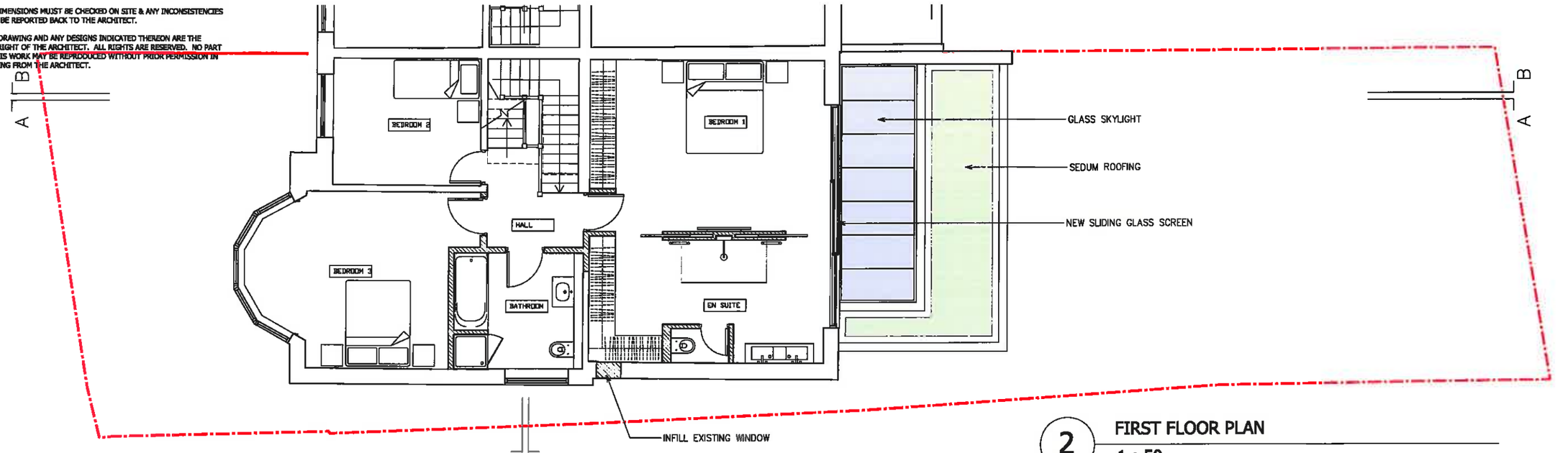

2 FIRST FLOOR PLAN
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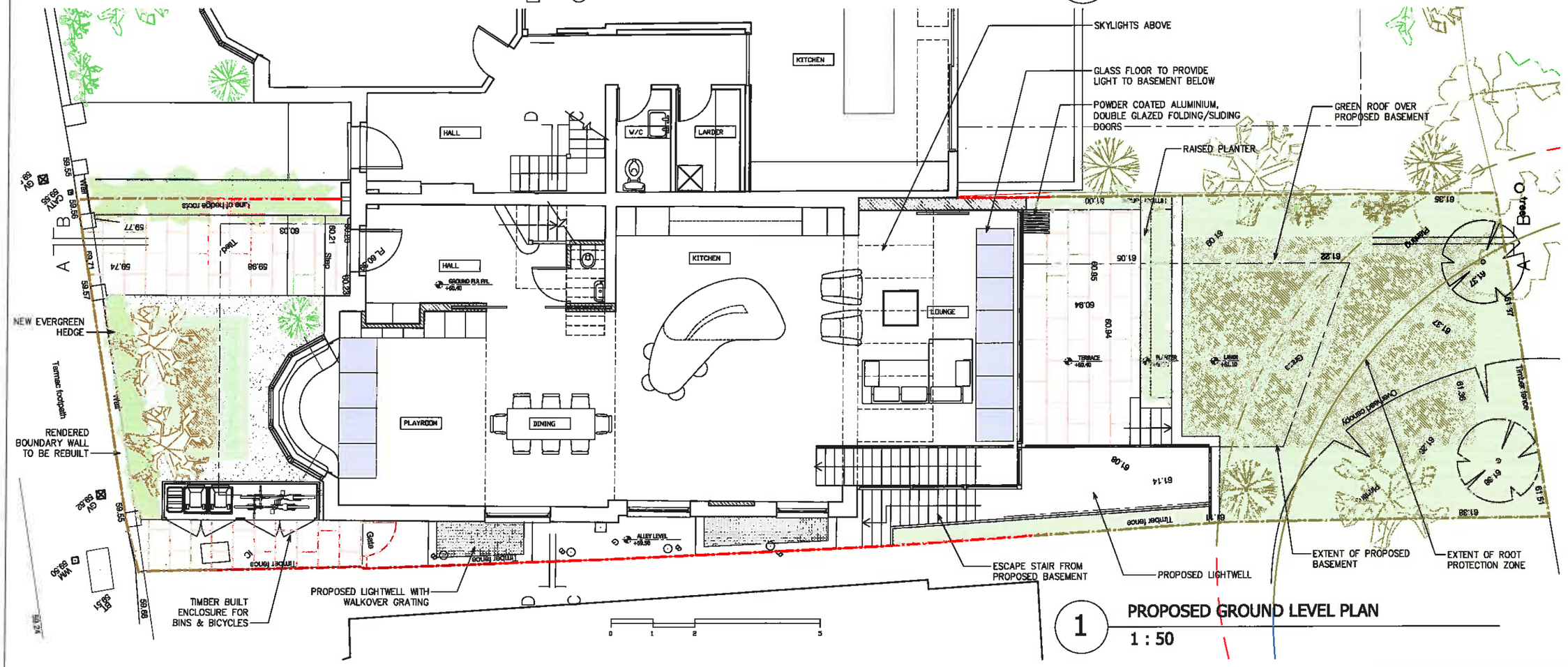

1 PROPOSED GROUND LEVEL PLAN
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Bchitecture
11A Beresford Road London N2 8AT
t 07932 796 407 e Bchitecture@gmail.com

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8 Antrim Grove, Belsize Park
London NW3 4XR

DRAWING TITLE
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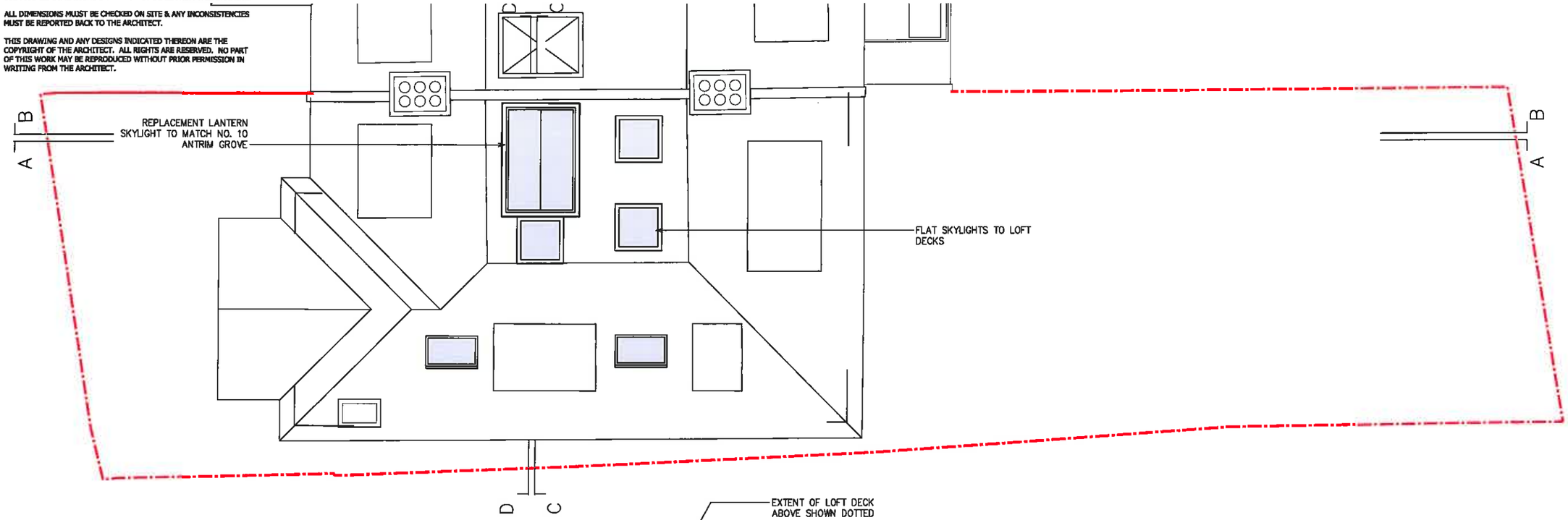

2 PROPOSED ROOF PLAN
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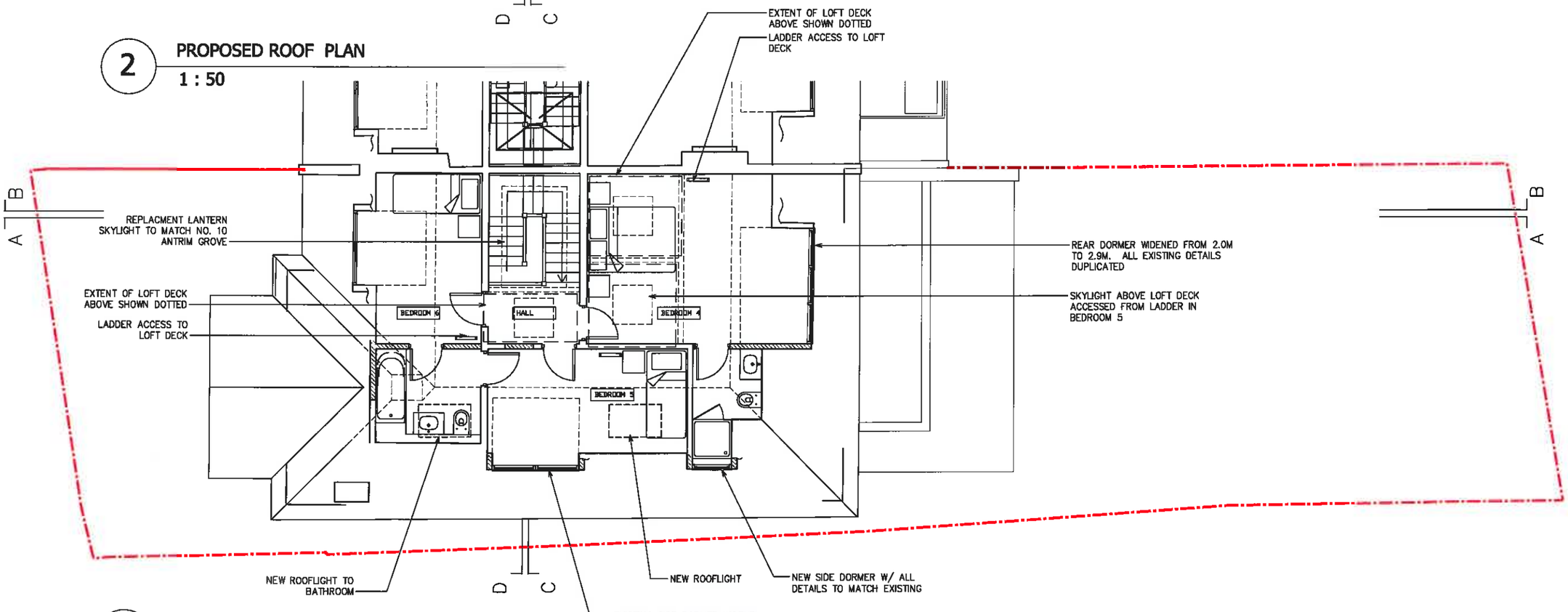

1 PROPOSED SECOND LEVEL PLAN
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11A Beresford Road London N2 3AT
t 07932 796 407 e Bcnitecture@gmail.com

LOCATION
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London NW3 4XR

DRAWING TITLE
PROPOSED PLANS

DATE
JAN 2012

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112/A

APPENDIX B

Photographs – Existing Site

Photo 1 – General Front View from Antrim Grove

Photo 2 – Detailed view of font of house from garden

Photo 3 – View along side passage from front including view of trial pit to check existing foundations

Photo 4 – View along side passage from front including boundary fence between No 6 and No 8

Photo 5 - View of rear of house

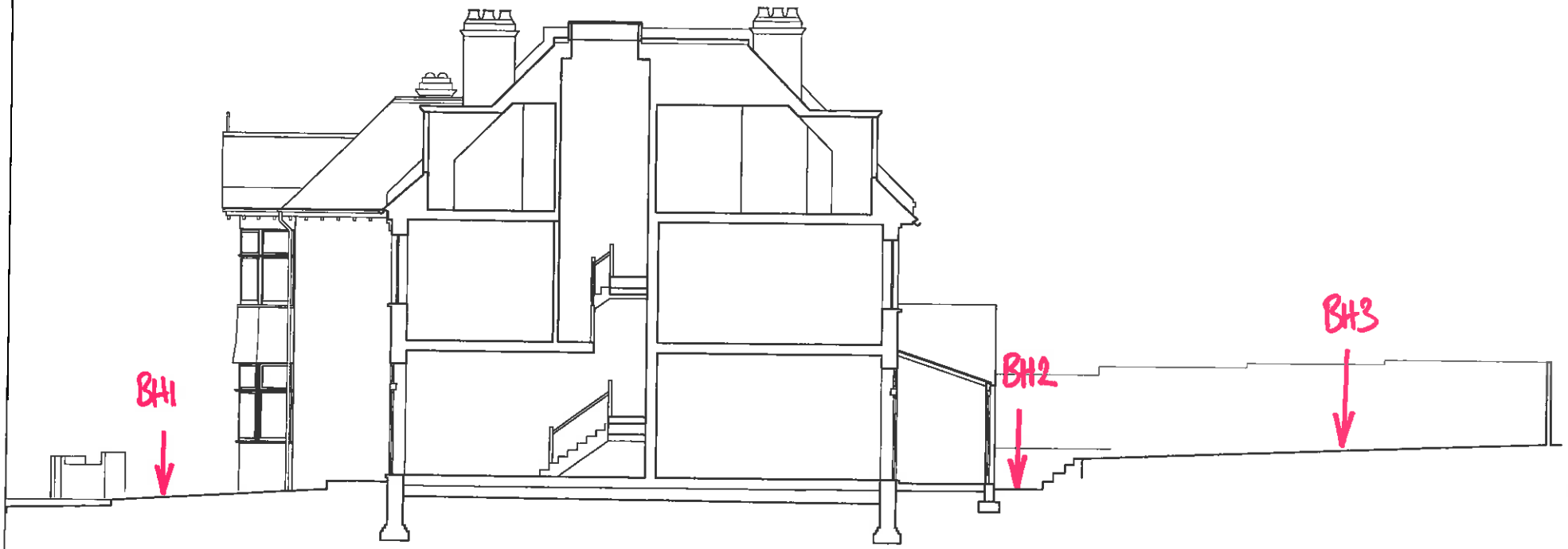
Photo 6 – View across rear of house towards No10

Note slope and steps up to garden level to right hand side of photo

Photo 6 – View across rear of house towards No6
Note slope up to garden level to left hand side of photo

APPENDIX C
Ground Investigation Records

1. Knapp Hicks Window Sampler Borehole logs (Dec 2012)
2. Geotechnical Laboratory Test Results
3. Waste Acceptance Criteria (WAC) Test Results



1 EXISTING SECTION B-B
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151 Dartmouth Road London NW2 4ET
07932 786 407 e Architecture@gmail.com

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8 Antrim Grove, Belsize Park
London NW3 4XR

DRAWING TITLE
EXISTING SECTIONS

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JAN 2012

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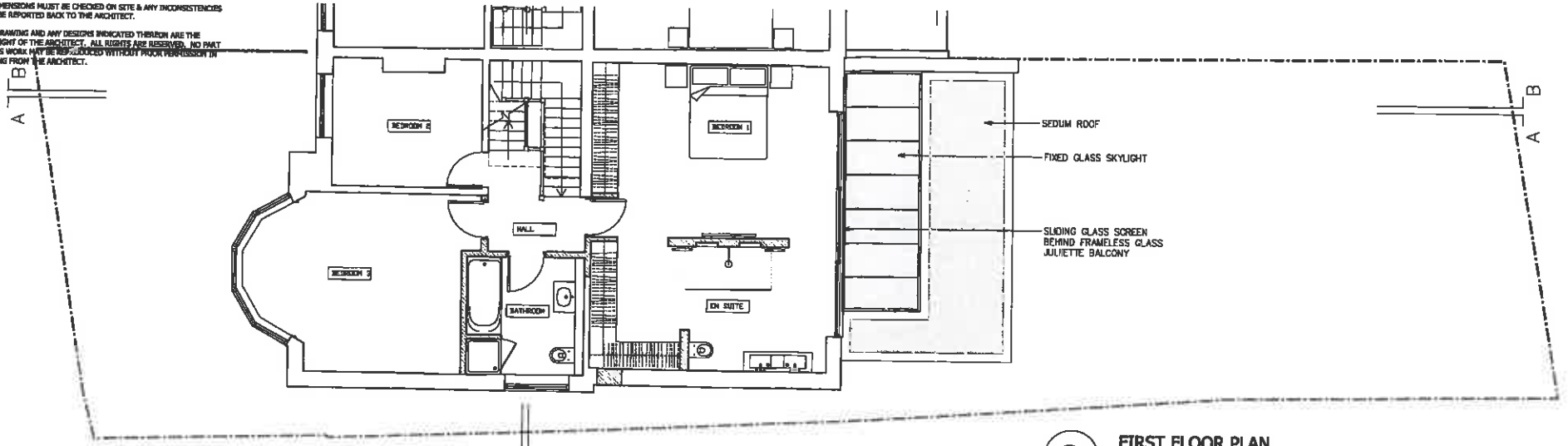

2 FIRST FLOOR PLAN
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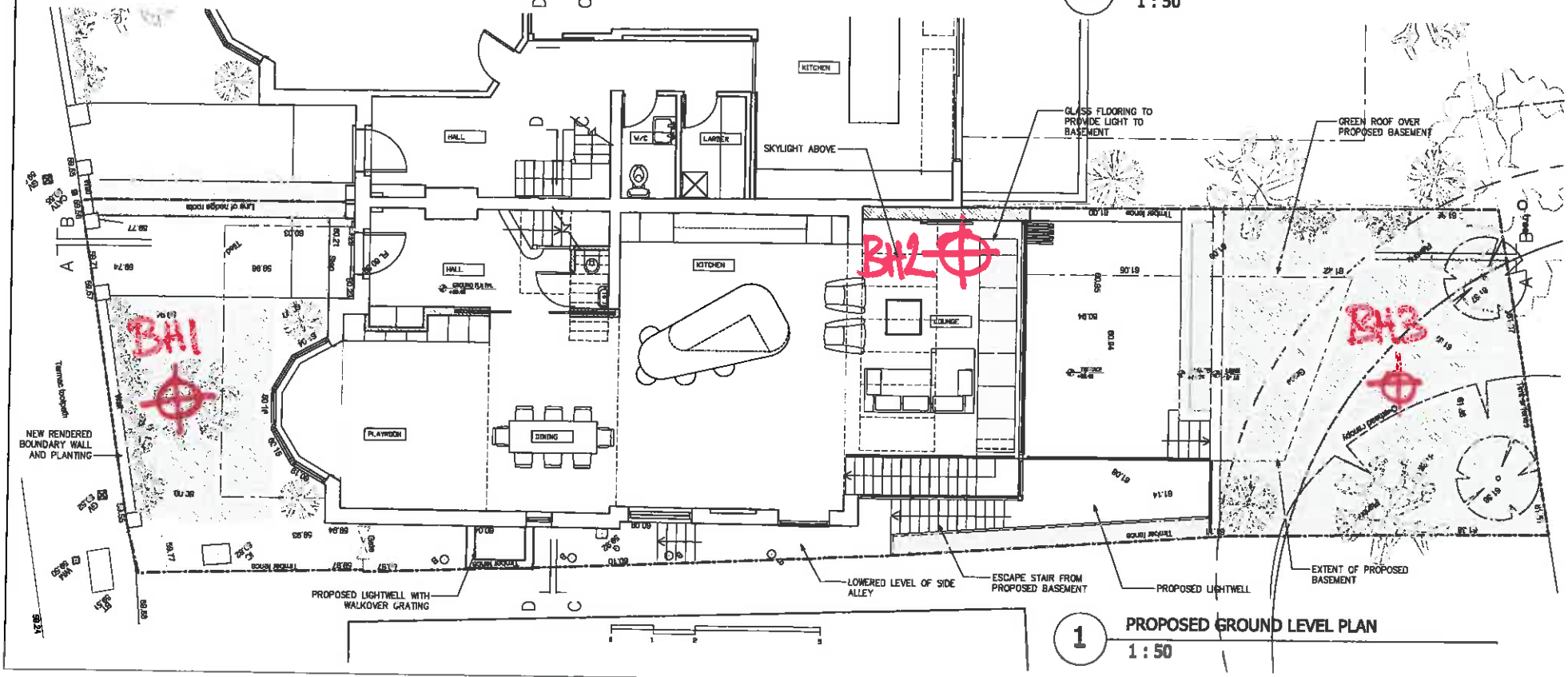

1 PROPOSED GROUND LEVEL PLAN
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Bchitecture
11A Beresford Road London N2 8AT
07932 196 407 e.bchitecture@gmail.com

LOCATION
8 Antrim Grove, Belsize Park
London NW3 4XR

DRAWING TITLE
PROPOSED PLANS

DATE
JAN 2012

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111/-

WINDOW SAMPLER LOGS (PRELIMINARY)

Borehole BH1	
Ground Level – 0.25m	Dark brown silty TOPSOIL
0.25m – 0.50m	Gradation (mix of topsoil and reworked clay) to:
0.50m – 1.20m	Firm to stiff orange brown CLAY with rootlets. Becoming gravelly from 1.0m
1.20m – 2.10m	Firm to stiff slightly gravelly to gravelly sandy CLAY with occasional rotted rootlets.
2.10m – 2.40m	Stiff brown locally gleyed grey fissured CLAY with occasional flint gravel and rootlets
2.40m – 5.00m	Stiff to very stiff brown, locally gleyed grey, fissured CLAY with localised gypsum mineralisation. Rootlets (<1mm diameter), possibly live, noted to 2.90mbgl
5.00m	*End of Borehole*

Additional Comments

- No groundwater was noted during excavation of the inspection pit / borehole or for 2 hours after completion
- Upon completion the hole was backfilled with arisings.

Borehole BH2	
Ground Level – 0.05m	CONCRETE
0.05m – 0.10m	MADE GROUND: Crushed brick
0.10m – 0.28m	MADE GROUND: Sandy fine to medium gravel of ash with fragments of brick
0.28m – 1.10m	Compact orange brown mottled grey clayey sandy fine to coarse GRAVEL. Matrix is firm to stiff.
1.10m – 1.30m	Stiff grey brown mottled grey silty CLAY. Occasional old rotted rootlets.
1.30m – 2.10m	Stiff brown silty CLAY with occasional rotted rootlets to 2mm diameter. 2.10m – 2.40m becomes stiff to very stiff 2.40m – 4.00m becomes very stiff with occasional silty partings
4.00m	*End of Borehole*

Additional Comments

- No groundwater was noted during excavation of the inspection pit / borehole or for 2 hours after completion of the borehole. Sample tubes were recovered dry. 5 hours after completion the groundwater level had risen to 3.72mbgl.

- Upon completion a standpipe was installed to 3.90mbgl

Borehole BH3	
Ground Level – 0.20m	Dark brown friable fine sandy silty TOPSOIL with roots
0.20m – 0.40m	Grading to:
0.40m – 1.55m	Stiff orange brown slightly gravelly silty CLAY. Fine gravel of chalk and with pockets of buff silt/fine sand. Becoming less gravelly and firm to stiff orange brown mottled grey, and possibly more damp, with depth.
1.55m – 2.10m	Very stiff fine to medium orange brown gravelly CLAY with sandy pockets.
2.10m – 2.20m	Gradation to hard dry brown CLAY
2.20m – 6.00m	Very stiff brown locally gleyed grey fissured thinly lamainated CLAY. No rootlets noted. 2.80m – claystone noted
6.00m	*End of Borehole*

Additional Comments

- Groundwater was noted during driving of the borehole with sampler tunes recovered wet from 2.80mbgl. May be associated with a claystone band at 2.80mbgl
- Upon completion a standpipe was installed to 4.7mbgl. Groundwater level rose from 4.35mbgl @ 11:53am to 2.9mbgl @ 3:30pm.

TRIAL PIT LOG

Trial Pit TP1	(See also sketch attached)
0.045 – 0.285	Brick Cobble
0.285 – 0.35	Concrete
0.35 – 0.70m	Rubble of brick & concrete, cemented
0.70m	Base of foundation
> 0.70m	Soft becoming firm orange brown clay, with rootlets, becoming gravelly.
~~5.00m~~ 0.80m	*End of ~~Borehole~~* Trial Pit

Additional Comments

- ~~Groundwater was noted during driving of the borehole and may be associated with a claystone band at 2.80mbgl~~
- ~~Upon completion a standpipe was installed to 4.7mbgl.~~

NOTES ON MONITORING.

Richard Moore

From: Paul [paul@geotechnicalservices.co.uk]
Sent: 27 January 2012 11:52
To: Richard Moore
Subject: Water levels

Richard

BH3 Top hole water at 0.8m. No cover over pipe! Baled out to 3.0m at 10.30am
By 11.38 water at 1.5m.

BH2 Lower hole water at 0.35m. Baled to 2.7m at 10.33. Rose to 2.3m by 11.42.

Building almost opposite has new basement going to 5m. Excavation has remained dry but standpipes showed water to be at about 2.5m!

Regards

Paul

Mobile 07825 221 318

Soiltec Laboratories Limited
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Sutton Road, Langley,
Maidstone, Kent ME17 3NQ

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E-mail: info@soiltec.net
Web: www.soiltec.net

LABORATORY REPORT

Date : 5th January 2012

Report No : 05145/17

Client : Knapp Hicks & Partners
Kingston House
The Boulevard
Orbital Park
Ashford
TN24 0GP

Client Ref : R. Moore

Site : 8 Antrim Grove

This report details the results of index property tests and natural moisture contents on soil samples recovered from the above.

4 Nr. Atterberg Limits

26 Nr. Natural Moisture Content

1 Nr. Particle Size Distribution

1 Nr. Soluble Sulphate Determination

All tests have been carried out in accordance with BS1377 : 1990

For and on behalf of
Soiltec Laboratories Limited

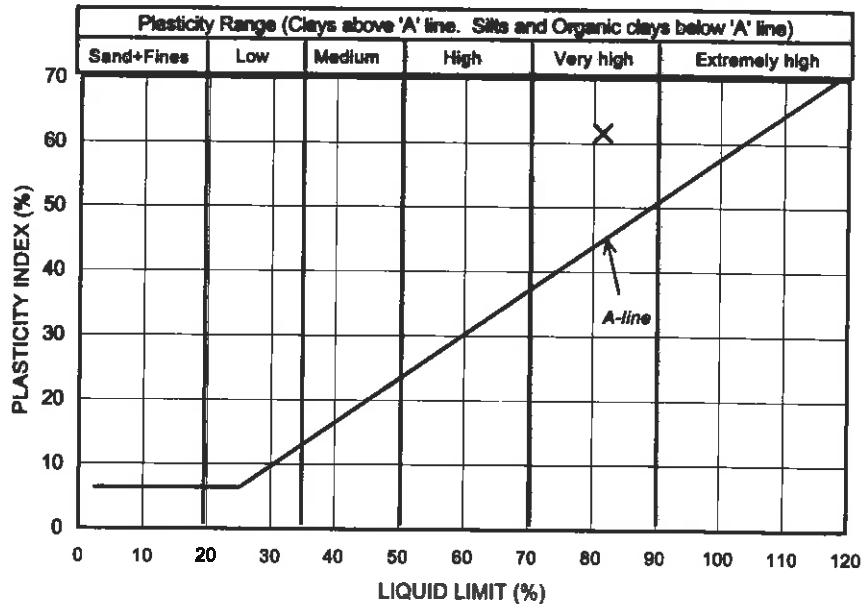
Soiltec

PLASTICITY INDEX

Client :	Knapp Hicks & Partners Ltd	Rep No:	05145/17
Site:	8 Antrim Grove	Borehole/Trial Pit :	2
		Sample No:	4
		Sample Depth (m)	1.50-1.90
		Date:	04/01/12

Sample description	:	0	
Test Method	:	BS1377:Part2:1990:4.4 Single point method	
Sample preparation	:	as received	
Material passing 425µm	:	100 %	
Natural Water Content	:	**29.6 %**	
Liquid Limit	:	**81 %**	
Plastic Limit	:	**20 %**	
Plasticity Index	:	**62 %**	
Liquidity Index	:	**0.16**	
Modified Plasticity Index	:	**62 %**	Ref : N.H.B.C. 4.2

CASAGRANDE PLASTICITY CHART



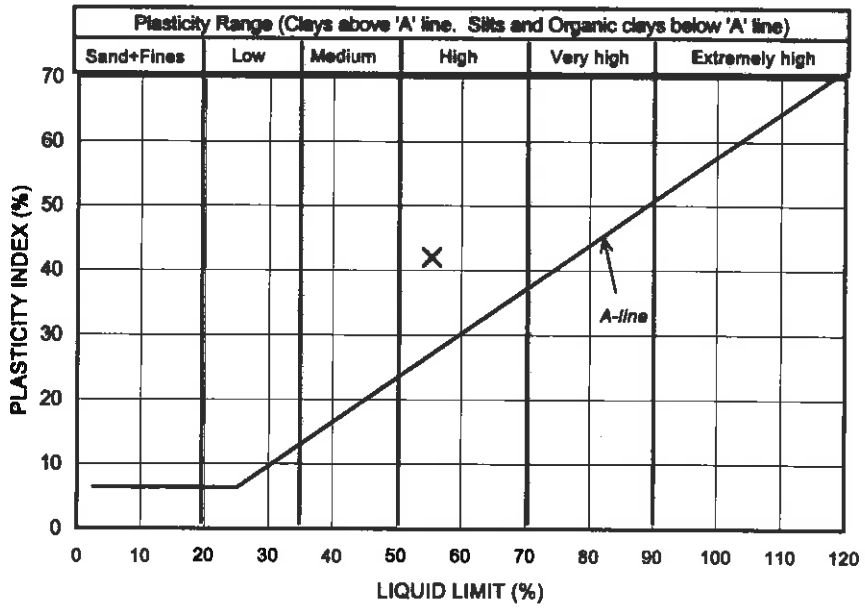
Operator	
Checked	
Approved	

PLASTICITY INDEX

Client :	Knapp Hicks & Partners Ltd	Rep No:	05145/17
Site:	8 Antrim Grove	Borehole/Trial Pit :	3
		Sample No:	1
		Sample Depth (m)	1.10-1.20
		Date:	04/01/12

Sample description	:	0	
Test Method	:	BS1377:Part2:1990:4.4 Single point method	
Sample preparation	:	as received	
Material passing 425µm	:	100 %	
Natural Water Content	:	**27.0 %**	
Liquid Limit	:	**55 %**	
Plastic Limit	:	**13 %**	
Plasticity Index	:	**42 %**	
Liquidity Index	:	**0.32**	
Modified Plasticity Index	:	**42 %**	Ref : N.H.B.C. 4.2

CASAGRANDE PLASTICITY CHART



Operator	
Checked	
Approved	

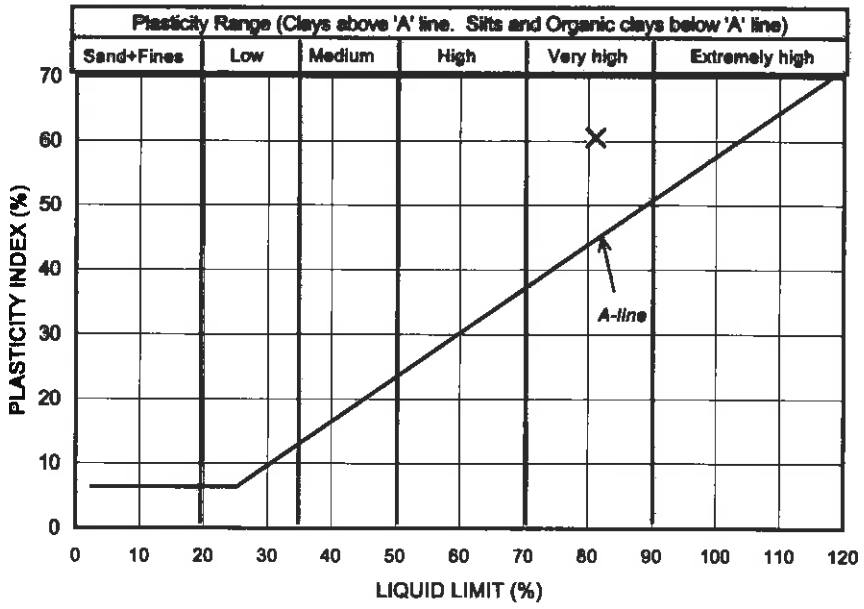
Soiltec

PLASTICITY INDEX

Client :	Knapp Hicks & Partners Ltd	Rep No:	05145/17
Site:	8 Antrim Grove	Borehole/Trial Pit :	3
		Sample No:	3
		Sample Depth (m)	2.40-2.60
		Date:	04/01/12

Sample description	:	0	
Test Method	:	BS1377:Part2:1990:4.4 Single point method	
Sample preparation	:	as received	
Material passing 425µm	:	100 %	
Natural Water Content	:	**29.2 %**	
Liquid Limit	:	**81 %**	
Plastic Limit	:	**21 %**	
Plasticity Index	:	**61 %**	
Liquidity Index	:	**0.14**	
Modified Plasticity Index	:	**61 %**	Ref : N.H.B.C. 4.2

CASAGRANDE PLASTICITY CHART



Operator	
Checked	
Approved	

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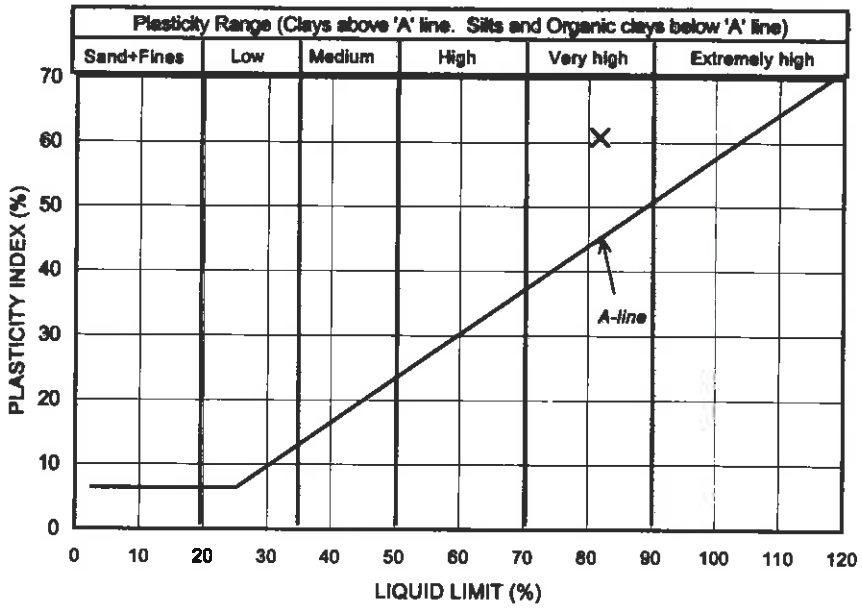
PLASTICITY INDEX

Client :	Knapp Hicks & Partners Ltd	Rep No:	05145/17
Site:	8 Antrim Grove	Borehole/Trial Pit :	3
		Sample No:	7
		Sample Depth (m)	4.40-5.50
		Date:	04/01/12

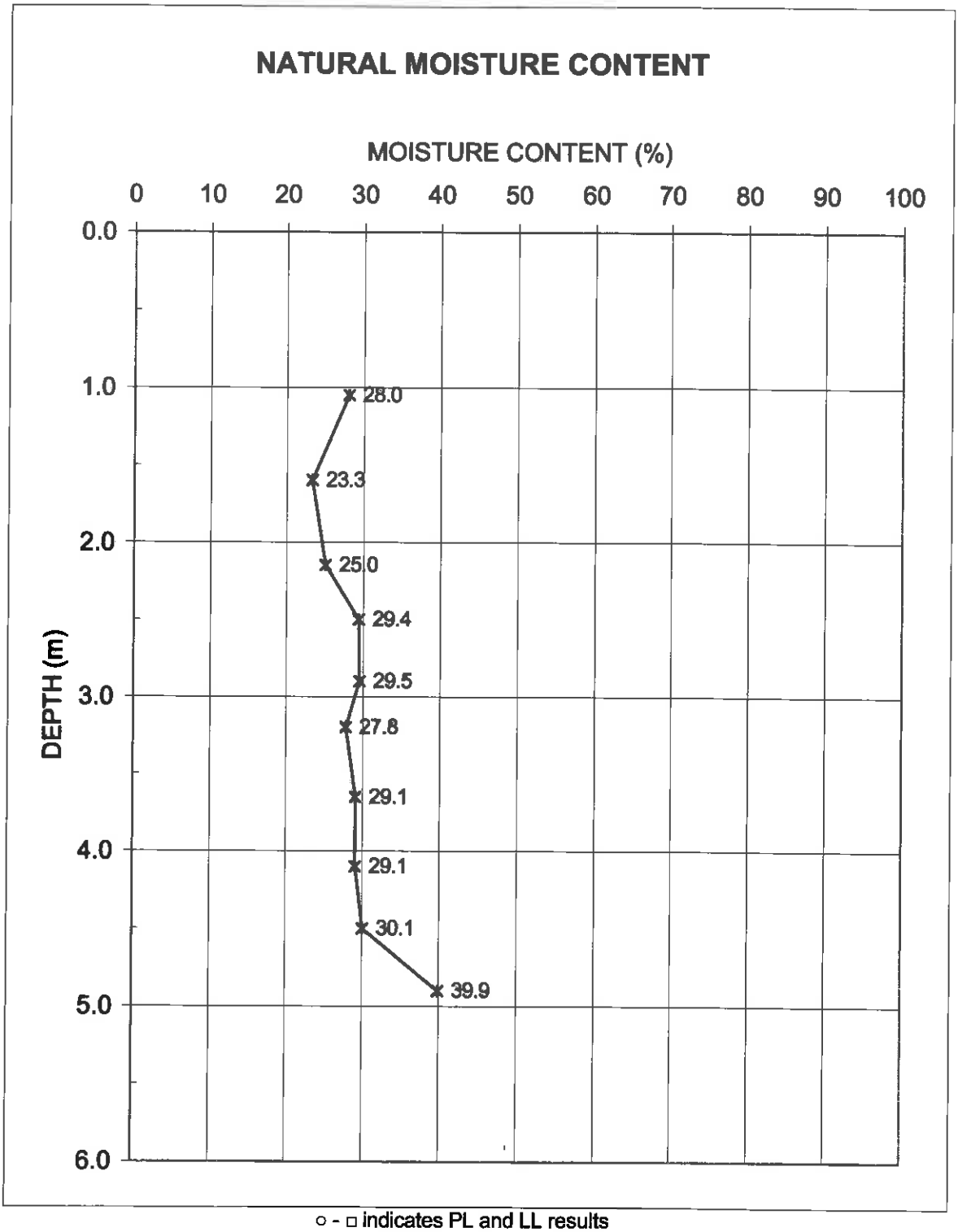
Sample description	:	0	
Test Method	:	BS1377:Part2:1990:4.4 Single point method	
Sample preparation	:	as received	
Material passing 425µm	:	100 %	
Natural Water Content	:	**30.1 %**	
Liquid Limit	:	**82 %**	
Plastic Limit	:	**21 %**	
Plasticity Index	:	**61 %**	
Liquidity Index	:	**0.15**	
Modified Plasticity Index	:	**61 %**	Ref : N.H.B.C. 4.2

CASAGRANDE PLASTICITY CHART



Operator	
Checked	
Approved	

NATURAL MOISTURE CONTENT

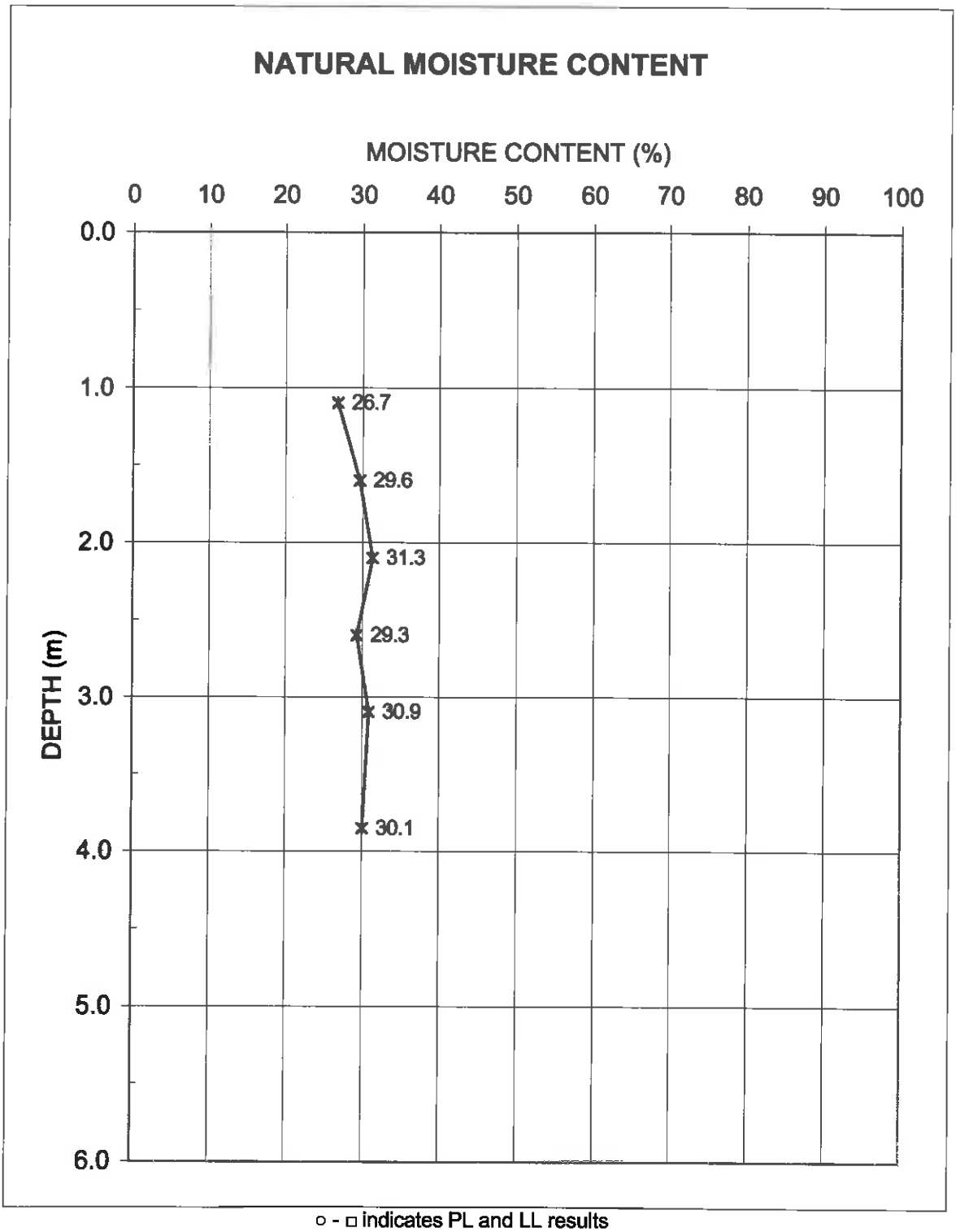


○ - □ indicates PL and LL results

♦ - indicates 0.4 LL and should only be applied to London Clay

Location :	8 Antrim Grove	Job ref:	05145/17
		BH/TP no:	1
Checked			
Approved		Date	05-Jan-12

NATURAL MOISTURE CONTENT

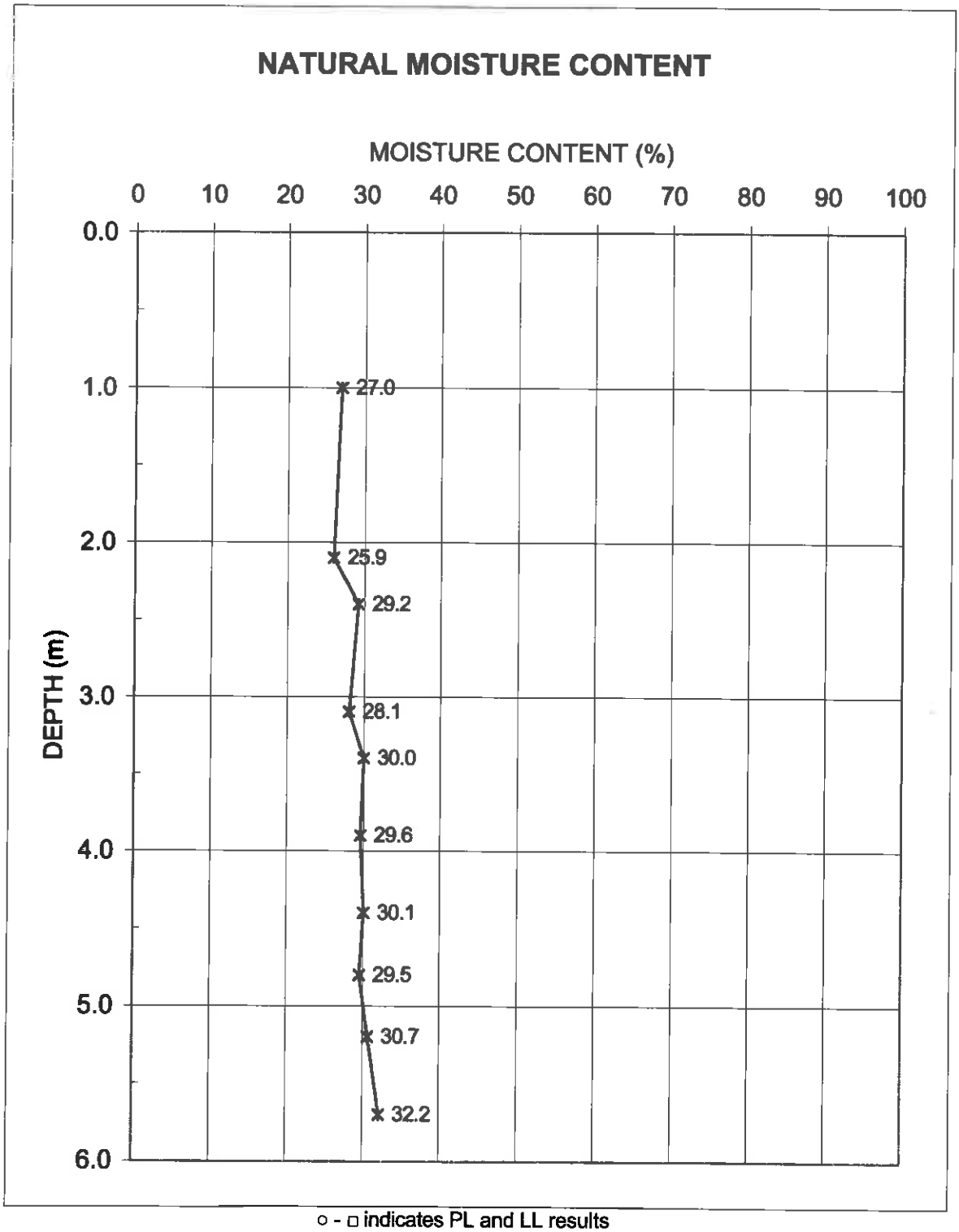


○ - □ indicates PL and LL results

♦ - indicates 0.4 LL and should only be applied to London Clay

Location :	8 Antrim Grove	Job ref:	05145/17
		BH/TP no:	2
Checked			
Approved		Date	05-Jan-12

NATURAL MOISTURE CONTENT



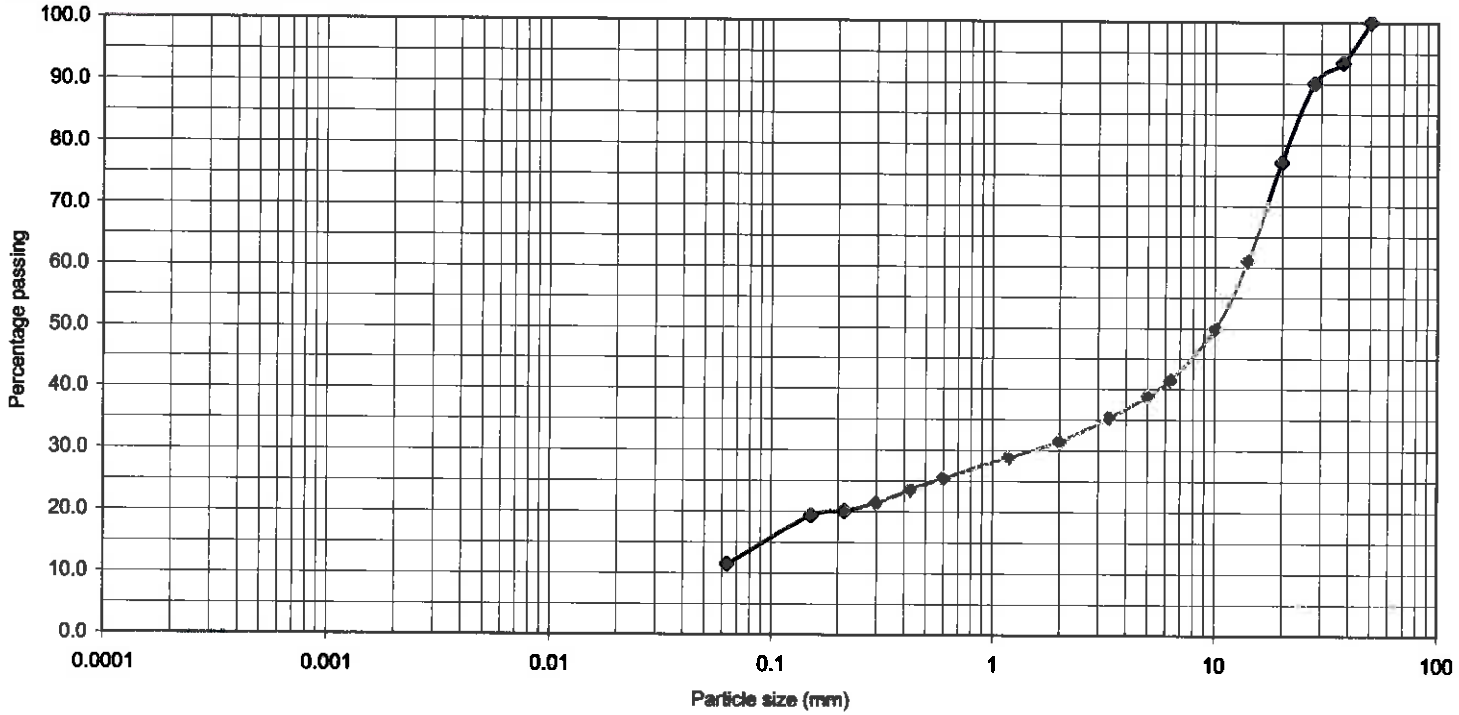
○ - □ indicates PL and LL results

♦ - indicates 0.4 LL and should only be applied to London Clay

Location :	8 Antrim Grove	Job ref:	05145/17
		BH/TP no:	3
Checked			
Approved		Date	05-Jan-12

SOILTEC LABORATORIES LTD

Test method BS 1377-Part 2-1990



Sieve	%Pass
125	100
90	100
75	100
63	100
50	100
37.5	93
28	90
20	77
14	61
10	50
6.3	42
5	39
3.35	35
2	31
1.18	29
0.6	25
0.425	24
0.3	21
0.212	20
0.15	19
0.063	11

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
	SILT			SAND			GRAVEL			

Report No:	05145/17	Material Type	Gravel	Date:	05/01/12	Moisture =
Borehole/TP	2	Depth (m)	0.40-0.50m	Operator	MK	Approved

SOILTEC LABORATORIES LTD

Tel: 01622 862138 Fax: 01622 862904

CHEMICAL ANALYSIS REPORT

CLIENT: Knapp Hicks and Partners
SITE: 8 Antrim Grove
DATE SAMPLED: Not Known
SAMPLE REF: 05145/17
DATE SAMPLES RECEIVED: 19/12/11
SAMPLED BY: Client
TESTED BY: Soiltec (KH)

REPORT No: 05145/17
REPORT DATE: 21/12/11
SPEC: BS1377 Part3:1990
SOURCE: Not Known

MATERIAL: Soil

RESULTS

Sample Location	Depth (m)	pH	Water Soluble Sulphate (g/l) as SO_4^{2-}	Stone Content >2mm (% $^{w}/_{w}$)
BH3	2.6-2.7	7.0	0.11	<0.1

COMMENTS The analysis was carried out in accordance with BS1377 Part3:1990 i.e. the sulphate determination was carried out on the material passing a 2mm sieve.

Keith Huxley CSci CChem MRSC AMIEnvSc
Date: 21/12/11

Soiltec House~Langley Park~Sutton Road~Langley~Maidstone~Kent ME17 3NQ

Richard Moore
Knapp Hicks & Partners Ltd
Kingston House
Orbital Park
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russell.jarvis@qtsenvironmental.com

4480 4480

QTS Environmental Report No: 8241

Site Reference: 8 Antrim Grove

Project / Job Ref: 30452

Order No: None Supplied

Sample Receipt Date: 23/12/2011

Sample Scheduled Date: 23/12/2011

Report Issue Number: 1

Reporting Date: 06/01/2012

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: 8241	Date Sampled	16/12/11	16/12/11				
Knapp Hicks & Partners Ltd	Time Sampled	None Supplied	None Supplied				
Site Reference: 8 Antrim Grove	TP / BH No	BH1	BH3				
Project / Job Ref: 30452	Additional Refs	Topsoil	Topsoil				
Order No: None Supplied	Depth (m)	3.00 - 4.00	1.60 - 2.10				
Reporting Date: 06/01/2012	QTSE Sample No	37734	37735				

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

General Inorganics	Unit	MDL	Accreditation					
pH	pH Units	+ / - 0.1	MCERTS	7.7	7.2			
Total Cyanide	mg/kg	<2	NONE	<2	<2			
Total Sulphate as SO_4	mg/kg	<200	NONE	<200	7861			
W/S Sulphate as SO_4 (2:1)	g/l	<0.01	NONE	0.10	2.41			
Organic Matter	%	<0.1	NONE	0.4	0.5			
Total Organic Carbon (TOC)	%	<0.1	NONE	0.2	0.3			
Total Phenols (monohydric)	mg/kg	<2	NONE	<2	<2			

Metals	Unit	MDL	Accreditation					
Arsenic (As)	mg/kg	<2	MCERTS	4	4			
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	23	37			
Copper (Cu)	mg/kg	<4	MCERTS	8	17			
Lead (Pb)	mg/kg	<3	MCERTS	22	14			
Mercury (Hg)	mg/kg	<1	NONE	<1	<1			
Nickel (Ni)	mg/kg	<3	MCERTS	13	28			
Selenium (Se)	mg/kg	<3	NONE	<3	<3			
Vanadium (V)	mg/kg	<2	NONE	28	54			
Zinc (Zn)	mg/kg	<3	MCERTS	24	58			

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
Stone content is classified as material greater than 10mm in diameter

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Soil Analysis Certificate - Speciated PAHs							
QTS Environmental Report No: 8241	Date Sampled	16/12/11	16/12/11				
Knapp Hicks & Partners Ltd	Time Sampled	None Supplied	None Supplied				
Site Reference: 8 Antrim Grove	TP / BH No	BH1	BH3				
Project / Job Ref: 30452	Additional Refs	Topsoil	Topsoil				
Order No: None Supplied	Depth (m)	3.00 - 4.00	1.60 - 2.10				
Reporting Date: 06/01/2012	QTSE Sample No	37734	37735				

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	<0.1			
Pyrene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Benzo(a)anthracene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Chrysene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
Benzo(b)fluoranthene	mg/kg	<0.1	MCERTS	<0.1	<0.1			
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

QTS Environmental Ltd
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Soil Analysis Certificate - TPH CWG Banded							
QTS Environmental Report No: 8241	Date Sampled	16/12/11	16/12/11				
Knapp Hicks & Partners Ltd	Time Sampled	None Supplied	None Supplied				
Site Reference: 8 Antrim Grove	TP / BH No	BH1	BH3				
Project / Job Ref: 30452	Additional Refs	Topsoil	Topsoil				
Order No: None Supplied	Depth (m)	3.00 - 4.00	1.60 - 2.10				
Reporting Date: 06/01/2012	QTSE Sample No	37734	37735				

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

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

4480 4480

Soil Analysis Certificate - BTEX						
QTS Environmental Report No: 8241	Date Sampled	16/12/11	16/12/11			
Knapp Hicks & Partners Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: 8 Antrim Grove	TP / BH No	BH1	BH3			
Project / Job Ref: 30452	Additional Refs	Topsoil	Topsoil			
Order No: None Supplied	Depth (m)	3.00 - 4.00	1.60 - 2.10			
Reporting Date: 06/01/2012	QTSE Sample No	37734	37735			

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

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
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Tel : 01622 851105

4480 4480

Waste Acceptance Criteria Analytical Certificate

QTS Environmental Report No: 8241	Date Sampled	16/12/11	
Knapp Hicks & Partners Ltd	Time Sampled	None Supplied	
Site Reference: 8 Antrim Grove	TP / BH No	BH1	
Project / Job Ref: 30452	Additional Refs	Topsoil	
Order No: None Supplied	Depth (m)	3.00 - 4.00	
Reporting Date: 06/01/2012	QTSE Sample No	37734	

Determinand	Unit	MDL		Landfill Waste Acceptance Criteria Limits: Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
TOC	%	<0.1	0.2	3%	5%	6%
Loss on Ignition	%	<0.01	2.8	--	--	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	7.7	--	>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	0.02	0.04		0.3	20	100	300
Cadmium	<0.0005	<0.0005		<0.02	0.04	1	5
Chromium	<0.005	<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	0.005	0.004		<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	<0.005	<0.005		<0.2	4	50	200
Chloride	10	<10		<120	800	15000	25000
Fluoride	0.05	<0.03		<1	10	150	500
Sulphate	114	103		800	1000	20000	50000
TDS	214	61		625	4000	60000	100000
Phenol Index	<0.01	<0.01		<0.5	1	-	-
DOC	12.8	5.9		52.3	500	800	1000
Leach Test Information							
Sample Mass (kg)	0.186						
Dry Matter (%)	94						
Moisture (%)	6						
Stage 1							
Volume Eluate L2 (litres)	0.339						
Filtered Eluate VE1 (litres)	0.18						

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

					Landfill Waste Acceptance Criteria Limits		
QTS Environmental Report No: 8241		**Date Sampled**	16/12/11		**Inert Waste Landfill**	**Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Knapp Hicks & Partners Ltd		**Time Sampled**	None Supplied				
Site Reference: 8 Antrim Grove		**TP / BH No**	BH3				
Project / Job Ref: 30452		**Additional Refs**	Topsoil				
Order No: None Supplied		**Depth (m)**	1.60 - 2.10				
Reporting Date: 06/01/2012		**QTSE Sample No**	37735				
Determinand	**Unit**	**MDL**					
TOC	%	<0.1	0.3		3%	5%	6%
Loss on Ignition	%	<0.01	5.5		--	--	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	7.2		--	>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	0.14	0.08		0.5	20	100	300
Cadmium	<0.0005	<0.0005		<0.02	0.04	1	5
Chromium	<0.005	<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	0.002	0.003		<0.1	0.5	10	30
Nickel	<0.007	<0.007		<0.2	0.4	10	40
Lead	0.018	0.007		<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	<0.005	<0.005		<0.2	4	50	200
Chloride	127	23		201	800	15000	25000
Fluoride	0.1	0.05		<1	10	150	500
Sulphate	1891	1744		9028	**1000**	20000	50000
TDS	1905	1882		9633	**4000**	60000	100000
Phenol Index	<0.01	<0.01		<0.5	1	-	-
DOC	17.5	10.2		57.9	500	800	1000
Leach Test Information							
Sample Mass (kg)	0.216						
Dry Matter (%)	80.9						
Moisture (%)	19.1						
Stage 1							
Volume Eluate L2 (litres)	0.317						
Filtered Eluate VE1 (litres)	0.14						

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 8241	
Knapp Hicks & Partners Ltd	
Site Reference: 8 Antrim Grove	
Project / Job Ref: 30452	
Order No: None Supplied	
Reporting Date: 06/01/2012	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
37734	BH1	Topsoil	3.00 - 4.00	6	Brown gravelly clay with stones
37735	BH3	Topsoil	1.60 - 2.10	19.1	Brown clay with vegetation

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 8241
Knapp Hicks & Partners Ltd
Site Reference: 8 Antrim Grove
Project / Job Ref: 30452
Order No: None Supplied
Reporting Date: 06/01/2012

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	Fibrous Material Screen	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 SO_4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	D	Sulphate (as SO_4) - 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