BASEMENT IMPACT ASSESSMENT SCREENING REPORT:
'LAND STABILITY'

PROPOSED REDEVELOPMENT:

10a OAKHILL AVENUE, LONDON NW3 7RE [SCHEME 1]

Client:	**Eli Nathenson** **43 Burghley Road** **London** **NW5 1UH**
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Report ref:	**9374B/MC/AW**
Date:	**25th April 2014 [Rev 2]**

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'LAND STABILITY'

PROPOSED REDEVELOPMENT:

10a OAKHILL AVENUE, LONDON NW3 7RE [SCHEME 1]

DOCUMENT ISSUE STATUS:

Issue	Date	Description	Author	Checked / approved
Rev 0	5 Feb 2014	First issue for Scheme 1	Matthew Clarke	Alan Watson
Rev 1	31 Mar 2014	Minor textual changes and Slope Angle Map added	Matthew Clarke	Alan Watson
Rev 2	25 April 2014	Amendment to proposal design	Matthew Clarke BSc(Hons) MSc(Dipl) CGeol FGS	Alan Watson BSc (Eng) CEnv CEng MICE

TABLE OF CONTENTS

APPENDIX

Plans, drawings & photographs

1.0 INTRODUCTION

The proposed development of No. 10a Oakhill Avenue, London NW3 7RE [Scheme 1], is for demolition of the existing house and construction of a five-storey block of flats, with a lower ground floor and single level basement. The total depth of the completed basement below upper ground floor level [at +95.17mOD] is expected to be approximately 6.0m, with an estimated area of 450m². Close to the entirety of the basement will be beneath the footprint of the existing building.

This report presents the potential impact relating to the proposed subterranean development in terms of 'slope stability' as presented in the guidance document published by Arup 2010: 'Camden geological, hydrogeological and hydrological study: Guidance for subterranean development', Issue01 dated November 2010.

The site was the subject of a previous report: Soil Consultants Limited's report, 'Factual Ground Investigation' [Ref 9374A/MC/AW, dated May 2013].

2.0 SITE DESCRIPTION

The site of our investigation comprises the existing residential buildings, at number 10a Oakhill Avenue, in the Frognal and Fitzjohns district of the London Borough of Camden, at postcode NW3 7RE and approximate National Grid Reference 525690E, 185715N – as shown on the Location Maps in the Appendix.

The site, which is approximately rectangular on plan, extends for some 23m along the northern side of Oakhill Avenue and 60m towards the north-west - covering an area of around 1135m². The existing buildings have a maximum of four above-ground storeys, including the front-aspect lower ground floor and are set amidst hardstanding with peripheral soft landscaping to the front and a garden to the rear. The site is bounded by further residential properties along Oakhill Avenue to the front and side and also to the rear, on Heath Drive.

The site is on ground that slopes gently down, from Parliament Hill 500m to the NE, towards the River Westbourne, some 2.9km to the SW. It lies at an approximate elevation of +93mOD, although there are various elevation changes across the site. Oakhill Avenue descends the hill along the steepest gradient and there is a fall across the length of the property of around 2.0m: that is, a gradient of 1-in-12, or 4.8°. The property is partially cut into the hillside and the southern half has been cut [by some 2.5m] to form an area of level hardstanding, providing access to lower ground floor garages, that are at street level at that end of the site. The northern half of the property is fronted by a terrace garden, which is accessed by stairway; rising from street level to the general 'ground floor' level of +96.2mOD. This general level extends, apart from a western corner of the rear garden which is at a lower elevation, to a point approximately mid-way along the property's length. From here the site slopes down by around 2.0m, at a gradient of 1-in-14, or 4.1°.

Beyond the western site boundary the ground slopes down more steeply, towards a valley of the headwaters of the River Westbourne, down which Heath Drive runs. Although the slope angle there could not be properly assessed, the Camden Slope Angle Map [Figure 16 of the Arup report] shows angles, in that vicinity, of between 7° and 10° and, locally, >10°. These slope angles are, however, outside of the site and some 20m from the existing building footprint, as shown on the annotated plan in the Appendix.

There are rows of mature trees within the pavement on both sides of Oakhill Avenue and several mature trees, including oaks, within the gardens of the property and neighbouring properties.

It is understood that the site has been the subject of an arboricultural survey and it is recommended that this be consulted with regard to tree locations, conditions, height and species.

The current site features are shown on the Site Photographs and annotated Site Plan, which are included in the Appendix.

3.0 BASEMENT IMPACT ASSESSMENT – LAND STABILITY

As part of the Local Authority planning process for this development we have been asked to provide a 'Land Stability' basement impact assessment for this scheme. The hydrology/hydrogeology aspects of the basement impact assessment are being undertaken by others.

The screening stage for slope stability has been considered as set out in Figure 2 of CPG4 Camden Council, 2010 [Slope stability screening flowchart] and the results have been tabulated in Table 1 below.

Table 1: Impact of proposed basement works on SLOPE stability

Impact question	Answer	Justification	Reference
1] Does the existing site include slopes, natural or man-made greater than 7 degrees [approximately 1-in-8]?	No	There is a slope of less-than 5 degrees in and around the site.	Measurement from available survey data both on site and in the local vicinity (reference Kings Site Survey drawing 95274.0001, dated April 2013 and Ordnance Survey data).
2] Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7 degrees?	No	There are no plans to alter these site levels.	Site plans / proposed development plans.
3] Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees?	No	Available reference shows slopes greater than 7 degrees in the properties to the west and north-west. However, from our observations on site, this land is located >20m distance from the building footprint. The site does not lie within the areas of >7° slope highlighted in Figure 16 of the Arup Report, which would otherwise require land stability issues to be considered in detail.	The Arup report: Figure 16, Slope Angle Map and the annotated version in this report Appendix.
4] Is the site within a wider hillside setting in which the general slope is greater than 7 degrees?	Yes	Available reference shows slopes greater than 7 degrees within the valley of the headwaters of the River Westbourne, to the north-west. However, this land is located >20m distance from the building footprint.	The Arup report: Figure 11, Watercourses; and Figure 16, Slope Angle Map and the annotated version in this report Appendix.

Impact question	Answer	Justification	Reference
5] Is the London Clay the shallowest stratum at the site?	No	Available data show the Claygate Member of the London Clay Formation to be the shallowest stratum at the site. This was confirmed by our ground investigation and Head deposits were not encountered. However, it is likely that piled retaining walls will transfer structural loads down into the London Clay, and well below the Claygate Beds, therefore removing any significant risk from slope stability issues.	The Arup report: Figure 4, North Camden Geological Map. SCL Factual GI report 9374/MC/AW, dated May 2013.
6] Will any trees be felled as part of the proposed development and/or any works proposed within any tree protection zones where trees are to be retained?	Yes	Two Cypress trees are to be removed as is one Birch tree graded 'unsuitable'. There will be only minor to slight encroachments onto RPA.	Landmark Trees' Tree Constraints Plan, dated May 2013 and ESI Ltd email of 21 May 2013.
7] Is there a history of seasonal shrinkage/swelling subsidence to the local area, and or evidence of such effects at the site?	Likely	No evidence of structural distress due to soil volume changes was evident at the site. The shrinkage/volume-change potential of the Claygate Member has been shown to be low. The deeper London Clay strata are expected to be of high volume-change potential. A significant number of trees, including mature oaks, are present within the site and close to the site boundaries. These data indicate that soil shrinkage and swelling is likely to occur, but that the effects will not be major as the proposed basement is highly likely to extend below the depth of any volume change.	SCL Factual GI report 9374/MC/AW, dated May 2013.
8] Is the site within 100m of a watercourse or a potential spring line?	Yes	Available reference shows the valley of the headwaters of the River Westbourne a short distance to the north-west.	The Arup report: Figure 11, Watercourses.
9] Is the site within an area of previously worked ground?	No	No areas of backfill have been identified within 1km.	The Arup report: Figure 4, North Camden Geological Map and SCL walkover.
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?	Yes	The Claygate Member is classed as a 'Secondary A' aquifer. The underlying London Clay is classed as an 'Unproductive stratum'. Basement construction will likely encounter groundwater within the Claygate Member and dewatering/groundwater control is likely to be required.	SCL Factual GI report 9374/MC/AW, dated May 2013.

Impact question	Answer	Justification	Reference
11] Is the site within 50m of the Hampstead Heath Ponds?	No	The nearest pond is more than 750m distant.	The Arup Report: Fig 14, Hampstead Heath Surface Water Catchments and Drainage.
12] Is the site within 5m of a highway or pedestrian right of way?	Yes	Oakhill Avenue along the southern boundary.	Site plans.
13] Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes	Piled basement retaining walls are likely to extend below founding levels to adjacent properties. The basement should be at reasonable distance [approx. 3m to 5m] from adjacent structures so as not to affect their stability. The movement expected from a properly constructed and supported wall should be relatively small, within tolerable limits.	Proposed development plans
14] Is the site over [or within] the exclusion zone of any tunnels, e.g. railway lines?	No	Nearest tunnels >1km distant.	The Arup Report: Fig 18, Transport Infrastructure

4.0 CONCLUSIONS

From the available information we consider that the risk to ground stability from this development should be LOW and no additional work in respect of land stability assessment is necessary. This is on the condition that the works are undertaken by reputable specialists and the temporary and permanent works are adequately designed, with due consideration to the geology and hydrogeology of the site and surrounding areas. We conclude that for the proposed basement construction, it should certainly be possible to design the construction methods to ensure that ground movements do not adversely affect any adjacent properties and infrastructure.

As the existing ground investigation data extends only to a maximum depth of 7m, it will be necessary to conduct additional, deeper, investigation to allow adequate characterisation of the ground to inform a Ground Movement Analysis and Slope Stability Assessment to properly aid design. This additional investigation could be performed using a cable percussion rig located within the front driveway and should be extended to a minimum depth of approximately 18m below ground level.

APPENDIX

Plans, drawings & photographs

- Site Photographs
- Proposed Development Plans and Section
- Slope Angle Map
- Site Plan
- Location Maps

Site Location	10a Oakhill Avenue London NW3 7RE	Report No: 9374/MC

Walkover Survey Photographs – 2 May 2013

General view of the front of the property

N half of the front of the property and No 8

View up along Oakhill Avenue

View down along Oakhill Avenue

View down along Oakhill Avenue

Rear garden – western area at slightly lower elevation

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Site Location	10a Oakhill Avenue London NW3 7RE	Report No: 9374/MC

Walkover Survey Photographs – 2 May 2013

View to NNE from western edge of house

View to N across rear garden

Rear of house

View down towards property on Heath Drive - from rear garden

View from top of stairs – N part of site

View across hardstanding from N terrace

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0 1 2 3 4 8m

NOTES

PLANNING

REV K 22.04.14_ New entrance door

Bed 4
28 sqm

Bed 3
25 sqm

En-suite
5 sqm

En-suite
5 sqm

Bed 4
12 sqm

En-suite
4 sqm

Bed 2
33 sqm

Bed 3
19 sqm

36 sqm

29 sqm

Bed 2
31 sqm

Flat 1.
139 sqm

Flat 2.
129 sqm

En-suite
17 sqm

Recycling
6 sqm

En-suite
9 sqm

Parking
Flat 1

Parking
Flat 2

Parking
Flat 3

Store
13 sqm

Parking
2nd space
No. 8

Parking
Flat 5

Parking
Flat 4

Parking
1st space
No. 8

Bins

EXISTING WALL
RETAINED TO SUPPORT
EXISTING TREE

Martin Evans
Architects ©
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JOB
OAKHILL AVENUE
LONDON
NW3 7RE

TITLE
LOWER GROUND FLOOR PLAN

DATE	06.02.2014
SCALE	1:50 @ A1
DRAWN	A.F

DRAWING NO. OHA-PL-PR-03K

0 1 2 3 4 8m

N

NOTES

PLANNING

NOTE:

REV K 22.04.14_ Bathrooms to lifetime homes compliance

Informal/ Dining
62 sqm

Informal/ Dining
48 sqm

Kitchen

Kitchen

Bedroom 1
36 sqm

Bedroom 1
34 sqm

wc
2 sqm

Store
3 sqm

Pantry
3 sqm

wc
2 sqm

25 sqm

25 sqm

lift

Flat 1.
198 sqm

Flat 2.
175 sqm

En-suite
11 sqm

Cloaks

En-suite
11 sqm

Living &
Dining room
43 sqm

Living &
Dining room
48 sqm

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LONDON
NW3 7RE

TITLE
PROPOSED UPPER GROUND FLOOR PLAN

DATE	06.02.2014
SCALE	1:50 @ A1
DRAWN	S.N.D.

DRAWING NO. OHA-PL-PR-04K

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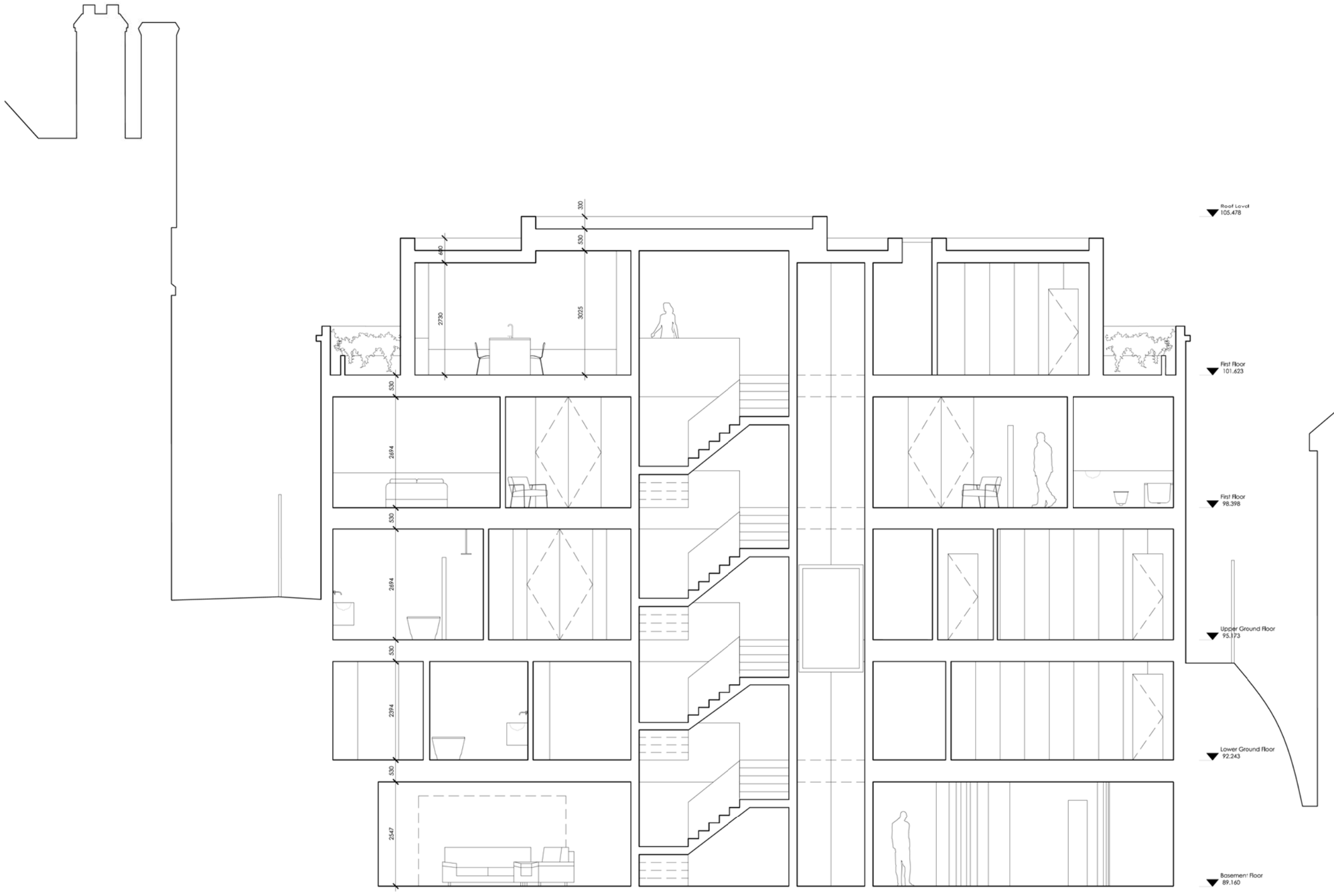


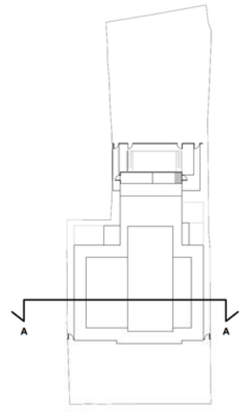
NOTES

PLANNING

NOTE:

REV B 24.02.14_ Reduction of window and roof n second floor

REV C 22.04.14_ Levels corrected



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JOB
OAKHILL AVENUE
LONDON
NW3 7RE

TITLE
PROPOSED SECTION A-A

DATE	06.02.2014
SCALE	1:50 @ A1
DRAWN	B.A
DRAWING NO.	OHA-PL-PR-10 C

0 1 2 3 4 8m

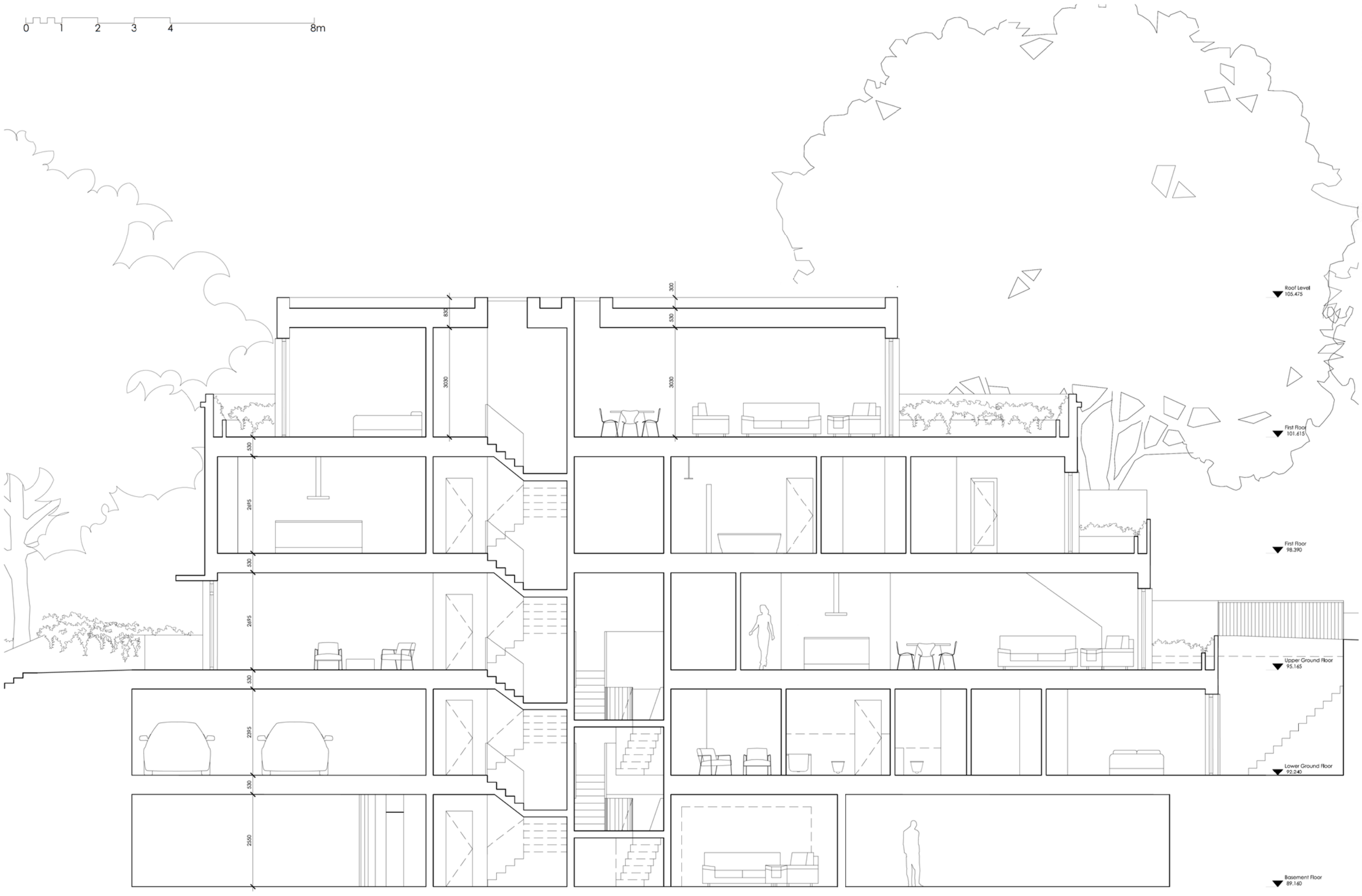
NOTES

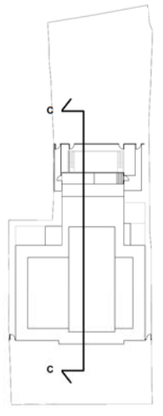
PLANNING

REV C 24.02.14_ Reduction of window and roof in second floor

REV D 24.03.14_ Removal of the swimming-pool in the basement.

REV E 22.04.14_ Levels corrected





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JOB
OAKHILL AVENUE
LONDON
NW3 7RE

TITLE
PROPOSED SECTION C-C

DATE	06.02.2014
SCALE	1:50 @ A1
DRAWN	B.A
DRAWING NO.	OHA-PL-PR-12 E

0 1 2 3 4 8m

10 Oakhill Avenue

10 A Oakhill Avenue

8 Oakhill Avenue

GREEN ROOF, BEHIND & BELOW PARAPET

Roof Level 105.475

BRONZE FRAME WINDOWS

PRIVACY PLANTING

BRICK

First Floor 101.615

STONE

BRONZE FRAME WINDOWS

DARK BRONZED METAL PANEL

First Floor 98.390

TIMBER FRONT DOOR

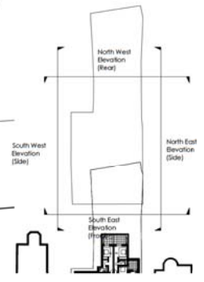
BRICK

Upper Ground Floor 95.165

ALUMINIUM GARAGE DOORS

BRICK

Lower Ground Floor 92.240



NOTES

PLANNING

NOTE:

REV F 24.02.14_ Reduction of window and roof n second floor

REV G 22.04.14_ Levels corrected & New entrance door

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OAKHILL AVENUE
LONDON
NW3 7RE

TITLE
PROPOSED ELEVATION
SOUTH-EAST (FRONT)

DATE	06.02.2014
SCALE	1:50 @ A1
DRAWN	B.A
DRAWING NO.	OHA-PL-PR-20G

0 2 4 6 8 16m

Roof Level
105.475

Second Floor
101.615

First Floor
98.390

Upper Ground Floor
95.165

Lower Ground Floor
92.240

Basement Floor
89.160

Outline of No.8
Oakhill Avenue

GREEN ROOF, BEHIND & BELOW
PARAPET

BRONZE FRAME WINDOW

BRICK

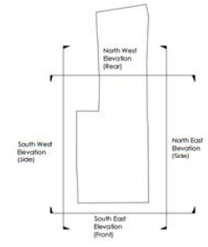
NOTES

PLANNING

NOTE:

REV B 24.02.14_ Reduction of window and roof in second floor

REV C 22.04.14_ Levels corrected



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OAKHILL AVENUE
LONDON
NW3 7RE

TITLE
PROPOSED ELEVATION
SOUTH-WEST (SIDE)
PRELIMINARY

DATE	06.02.2014
SCALE	1:50 @ A1
DRAWN	B.A

DRAWING NO. OHA-PL-PR-21 C

NOTES

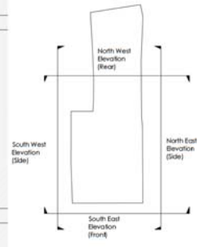
PLANNING

NOTE:

REV C 24.02.14_ Reduction of window and roof in second floor

REV D 22.04.14_ Levels corrected

0 1 2 3 4 8m



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OAKHILL AVENUE
LONDON
NW3 7RE

TITLE
PROPOSED ELEVATION
NORTH-WEST (REAR)

DATE	06.02.2014
SCALE	1:50 @ A1
DRAWN	B.A
DRAWING NO.	OHA-PL-PR-22 D

0 2 4 6 8 16m

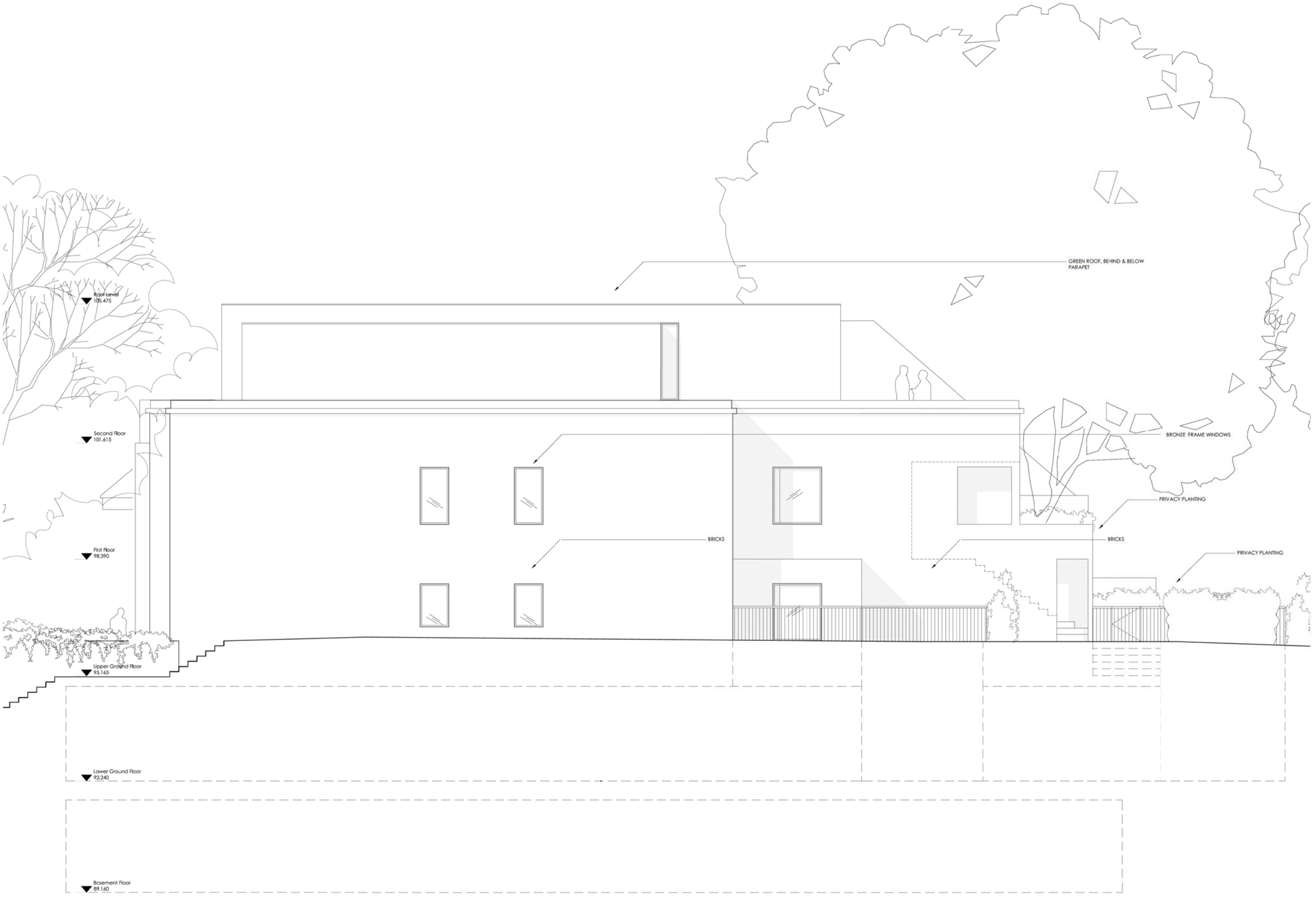
NOTES

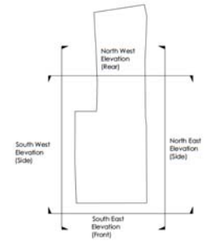
PLANNING

NOTE:

REV B 24.02.14_ Reduction of window and roof in second floor

REV C 22.04.14_ Levels corrected





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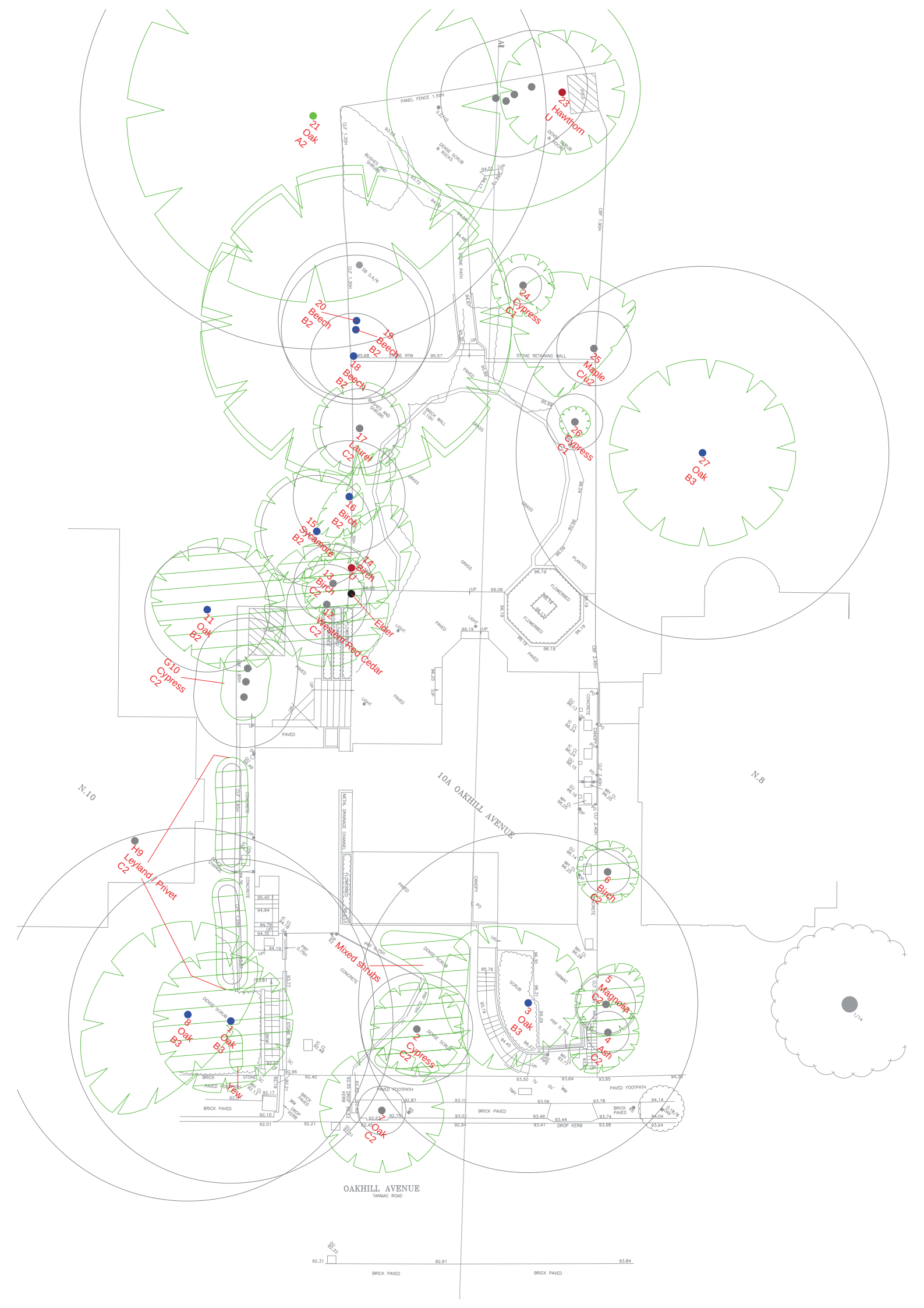
JOB
OAKHILL AVENUE
LONDON
NW3 7RE

TITLE
PROPOSED ELEVATION
NORTH-EAST (SIDE)

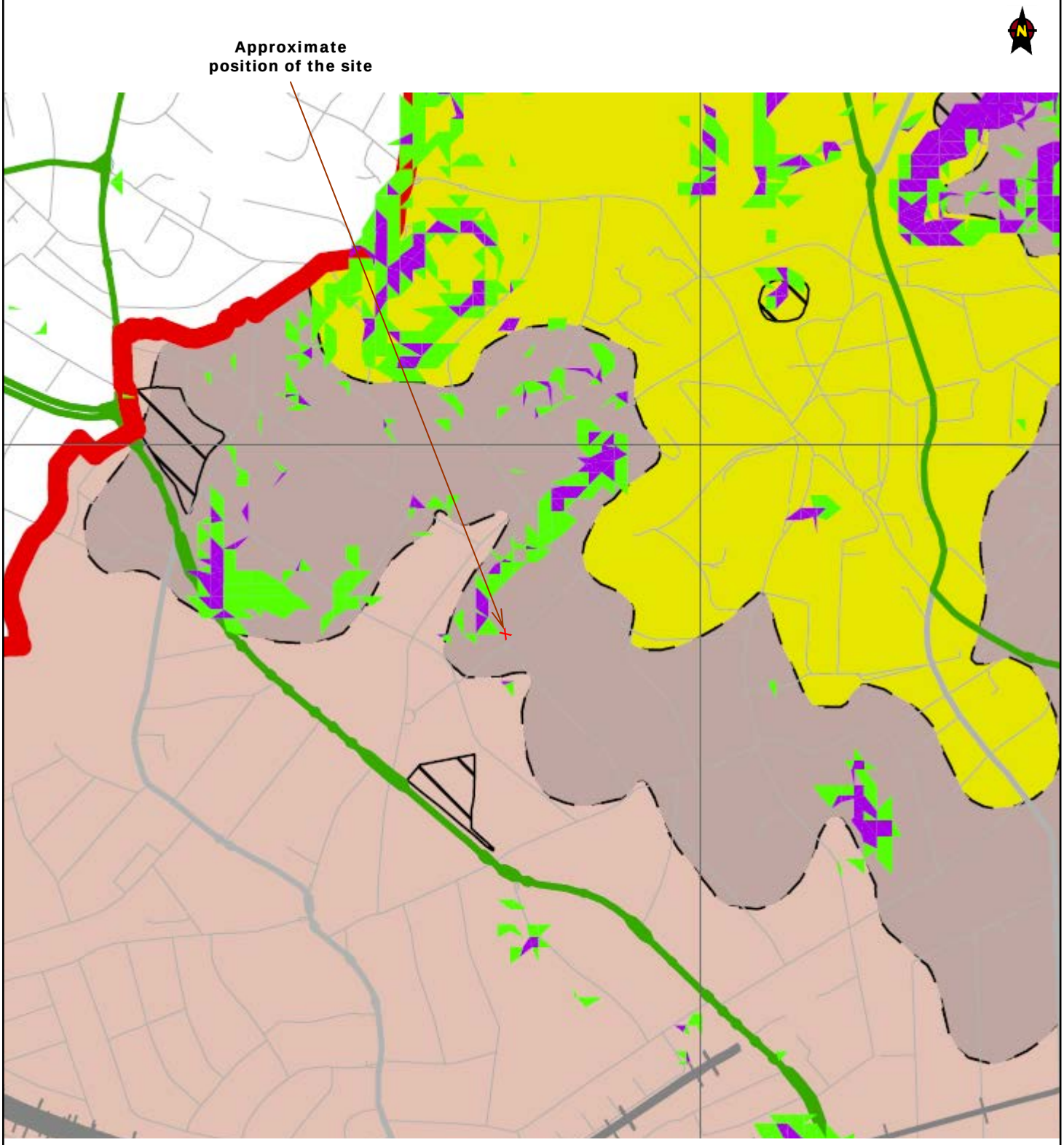
DATE	06.02.2014
SCALE	1:50 @ A1
DRAWN	S.N.D

DRAWING NO. OHA-PL-PR-23 C


21 Oak A2
23 Hawthorn U
20 Beech B2
19 Beech B2
18 Beech B2
24 Cypress C1
25 Maple C/U2
26 Cypress C1
27 Oak B3
17 Laurel C2
16 Birch B2
15 Sycamore B2
14 Birch U
13 Birch C2
12 Western Red Cedar C2
Elder
11 Oak B2
G10 Cypress C2
H9 Leyland / Privet C2
10 Mixed shrubs
8 Oak B3
7 Oak B3
9 Yew
2 Cypress C2
3 Oak B3
4 Ash C2
5 Magnolia C2
6 Birch C2
1 Oak C2
10A OAKHILL AVENUE
OAKHILL AVENUE
TARMAC ROAD
N.10
N.8

Site & Location	10a Oakhill Avenue London NW3 7RE	Report No: 9374/MC

Annotated Slope Angle Map – showing relative location of the site



Legend

Slope
- 0° - 7°
- 7° - 10°
- > 10°

- London Borough of Camden
- Railway Lines
- A Roads

BGS 1:10K Artificial Ground
- MADE GROUND
- WORKED GROUND

BGS 1:10K Drift Geology
- ALLUVIUM
- HACKNEY GRAVEL FORMATION
- LANGLEY SILT FORMATION
- LYNCH HILL GRAVEL FORMATION
- STANMORE GRAVEL FORMATION

BGS 1:10K Solid Geology
- BAGSHOT FORMATION
- CLAYGATE MEMBER
- LAMBETH GROUP
- LONDON CLAY FORMATION

Based on extract from Arup's 'Camden geological, hydrogeological and hydrological study: Guidance for subterranean development', Issue01 dated November 2010, Figure 16

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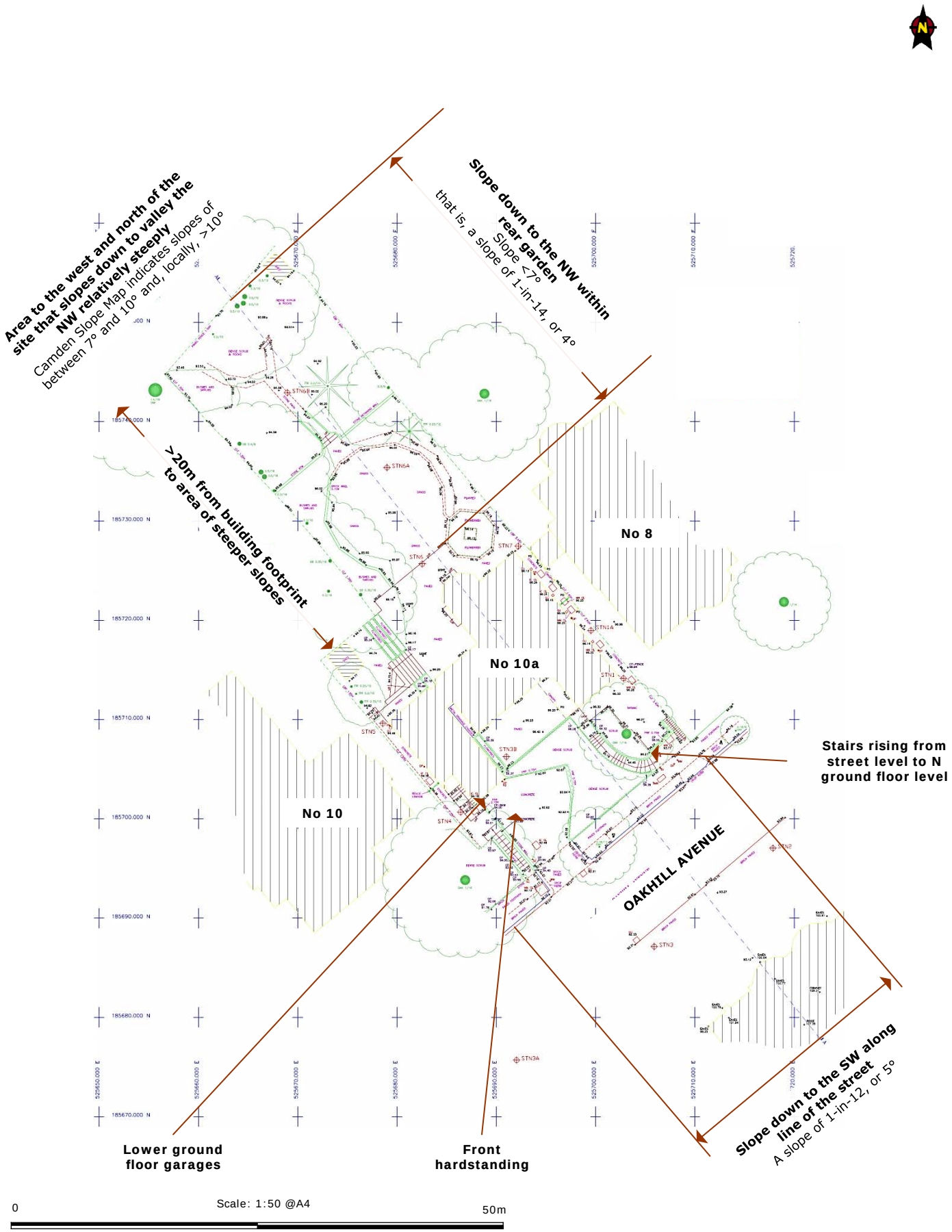
Site & Location	10a Oakhill Avenue London NW3 7RE	Report No: 9374/MC

Annotated Site Plan – showing point of interest from Walkover Survey



Based on extract from Kings Land and Architectural Surveyors' drawing 95274.0001, dated April 2013

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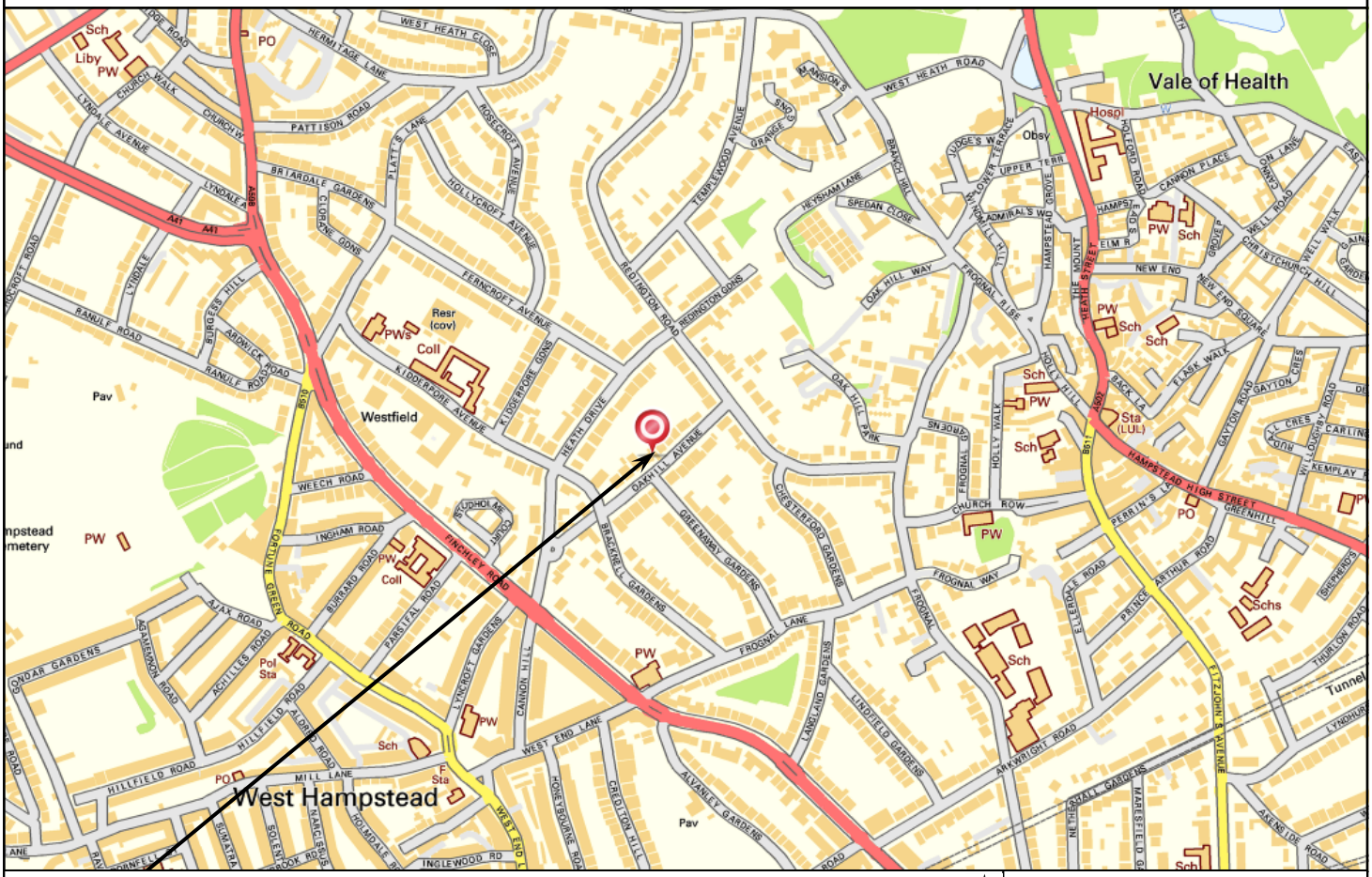
Site & Location

10a Oakhill Avenue
London NW3 7RE

Report No:
9374/MC

Location Maps



SITE LOCATION: approximate NGR 525690E, 185715N

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