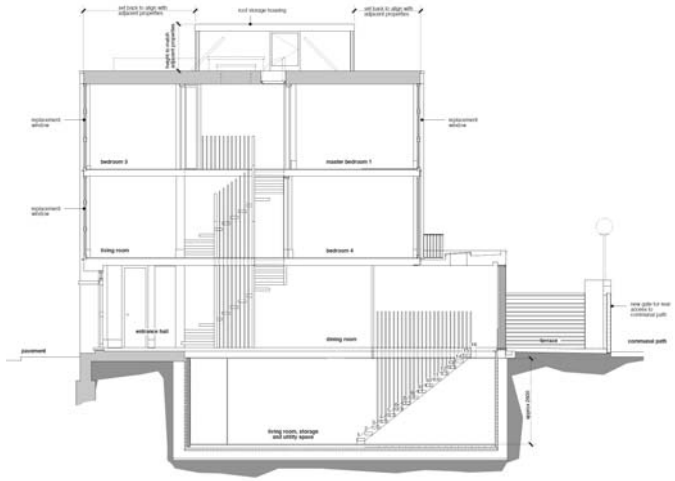


# Basement Impact Assessment: 56 Hawtrey Road

## (Groundwater only)

# Basement Impact Assessment: 56 Hawtrey Road

## Prepared for

Christine and Paul Koffel
56 Hawtrey Road
London
NW3 3SS

**Report reference:** 63489R1, May 2015
**Report status:** Final

**Confidential**
**Prepared by**
**ESI Ltd**

*New Zealand House,160 Abbey Foregate, Shrewsbury, SY2 6FD, UK*
*Tel +44(0)1743 276100 Fax +44 (0)1743 248600 email **info**@esinternational.com*
Registered office: New Zealand House, 160 Abbey Foregate, Shrewsbury, SY2 6FD. Registered in England and Wales, number 3212832

# Basement Impact Assessment: 56 Hawtrey Road

This report has been prepared by ESI Ltd. (ESI) in its professional capacity as soil and groundwater specialists, with reasonable skill, care and diligence within the agreed scope and terms of contract and taking account of the manpower and resources devoted to it by agreement with its client, and is provided by ESI solely for the internal use of its client.

The advice and opinions in this report should be read and relied on only in the context of the report as a whole, taking account of the terms of reference agreed with the client. The findings are based on the information made available to ESI at the date of the report (and will have been assumed to be correct) and on current UK standards, codes, technology and practices as at that time. They do not purport to include any manner of legal advice or opinion. New information or changes in conditions and regulatory requirements may occur in future, which will change the conclusions presented here.

This report is confidential to the client. The client may submit the report to regulatory bodies, where appropriate. Should the client wish to release this report to any other third party for that party's reliance, ESI may, by prior written agreement, agree to such release, provided that it is acknowledged that ESI accepts no responsibility of any nature to any third party to whom this report or any part thereof is made known. ESI accepts no responsibility for any loss or damage incurred as a result, and the third party does not acquire any rights whatsoever, contractual or otherwise, against ESI except as expressly agreed with ESI in writing.

**Confidential**
**Prepared by**
**ESI Ltd**

*New Zealand House,160 Abbey Foregate, Shrewsbury, SY2 6FD, UK*
*Tel +44(0)1743 276100 Fax +44 (0)1743 248600 email **info**@esinternational.com*

**63489R1. Final**

**Groundwater**

| | Name | Signature |
|---|---|---|
| Author | Jonathan Kinnear |  |
| Checked by | Heather Streetly (CGeol) |  |
| Reviewed by | Barnaby Harding |  |

**Revision record:**

| Issue | Report ref | Comment (SW/GW) | Author | Checker | Reviewer | Issue date | Issued to |
|---|---|---|---|---|---|---|---|
| 1 | 63489 R1D1 | Groundwater | JAK | HRS | BCH | 01/05/15 | Christine Athanassious, Paul Koffel, Anna Williamson, Simon Bennett |
| 2 | 63489 R1 | Groundwater | JAK | HRS | BCH | 11/05/15 | Christine Athanassious, Paul Koffel, Anna Williamson, Simon Bennett |
| 3 | | | | | | | |
| 4 | | | | | | | |

**Confidential**
**Prepared by**
**ESI Ltd**

*New Zealand House,160 Abbey Foregate, Shrewsbury, SY2 6FD, UK*
*Tel +44(0)1743 276100 Fax +44 (0)1743 248600 email **info**@esinternational.com*
Registered office: New Zealand House, 160 Abbey Foregate, Shrewsbury, SY2 6FD. Registered in England and Wales, number 3212832

# REPORT SUMMARY

The assessment findings are summarised as follows:

| | | |
|---|---|---|
| 2. Impacts to ground water flows and related flooding | High | |
| | **Med** | |
| | Low | |

| Key: | | | |
|---|---|---|---|
| | **High** | | *There is a high potential risk* |
| | **Med** | | *There is medium potential risk* |
| | **Low** | | *There is a low potential risk* |

## **RECOMMENDATIONS** (FOR NEXT STEPS)

The water detected in the onsite borehole is most likely to be groundwater originating from the London Clay. There is a medium potential risk to the proposed basement construction as the recorded levels of groundwater are higher than the proposed depth of the basement, however this can be mitigated by appropriate design and construction techniques.

The potential impact to the groundwater environment is considered low as the London Clay severely limits any flow of groundwater.

There is a small possibility that the water detected in the onsite boreholes may be sourced from a recharge to the Made Ground that overlies the London Clay, in which case there is a low potential risk and no action would be required to mitigate impacts of the proposed development on groundwater.

On this basis the impacts have been conservatively assessed as Medium.

## CONTENTS



## FIGURES



## APPENDICES

# 1 INTRODUCTION

## 1.1 Background

ESI Ltd (ESI) was commissioned by Anna Williamson in February 2015 to undertake a Basement Impact Assessment (BIA) for the proposed development at 56 Hawtrey Rd, London, NW3 3SS (the Site). This is a mid-terrace three storey house located at the approximate national grid reference of 527049 184207 in the London Borough of Camden (Figure 1.1)

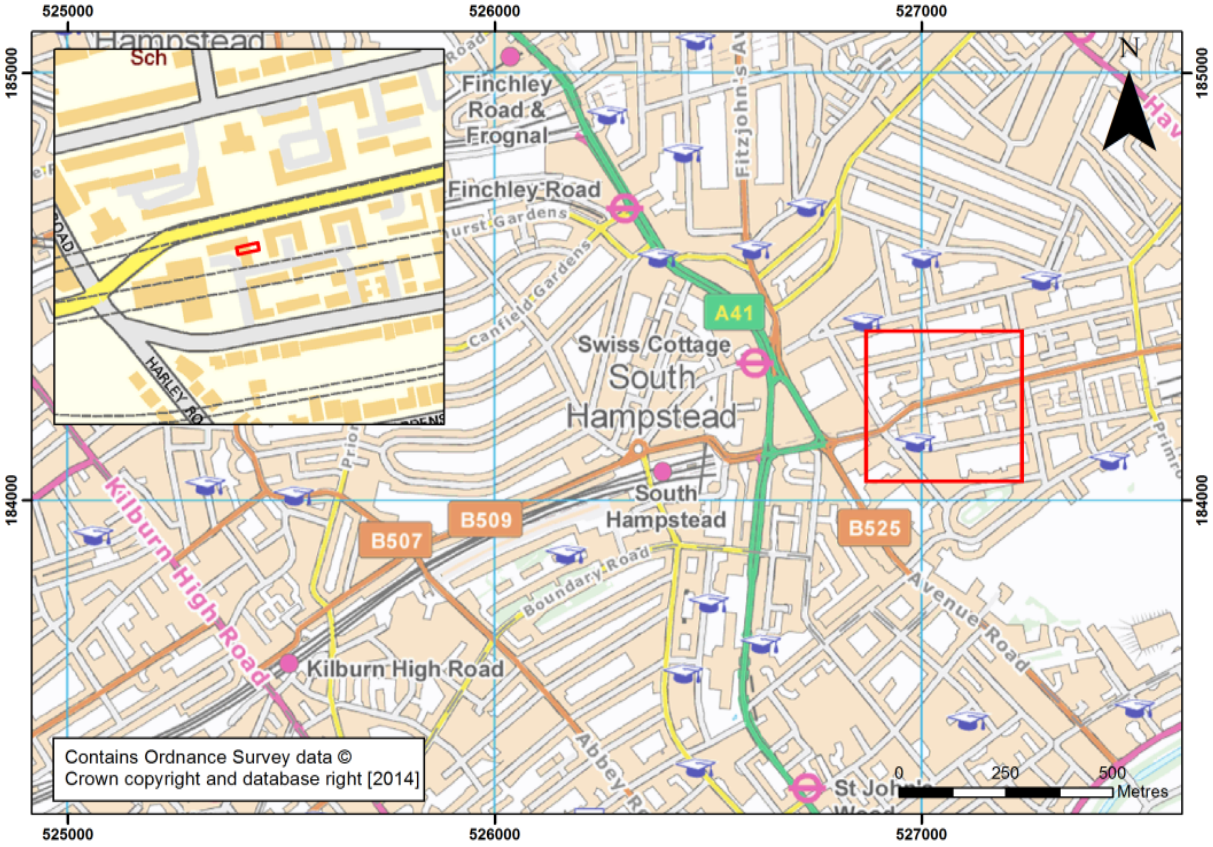



**Figure 1.1 Site Location**

This document is a desk study which considers the potential impact relating to the proposed basement development in terms of groundwater flow and flooding and complies with guidance issued by the London Borough of Camden. This report will be used for submission to the Planning Authority for approval of the proposed development.

## 1.2 Scope of Works

The following scope of works was requested: an assessment of the impacts of the proposed development on ground water flow and levels. This report outlines the, hydrogeological conditions with relevance to construction of the basement at the property. The assessment conforms to the requirements of guidance set out by The London Borough of Camden which provides comprehensive guidance on planning applications for basement extensions. These guidelines for basement impact assessments (ARUP (2010), Camden Borough Council, (2011)) have been consulted in order to complete a screening analysis of key hydrological and hydrogeological issues that will satisfy the relevant planning requirements.

The works undertaken follow the procedure outlined below:

1) Screening – this process aims to identify sites that are a priority for investigation.

2) Scoping – this process uses simple calculations to try to demonstrate whether the potential hazards identified in the screening stage pose a risk as a result of the development, and whether the actual risk is significant.
3) Site investigation - to develop an understanding of the site and its immediate surroundings
4) Impact Assessment – this stage evaluates the direct and indirect implications of the proposed project.

### 1.3 Proposed Basement Works

The proposed development is for the excavation of a new single storey basement partially below the footprint of the existing residential property and fully under an above-ground extension to the property which has planning permission but has yet to be built. Site plans are shown in (Appendix A).

The depth of the completed basement is expected to be c. 3.4 m below ground level (mBGL) (note, the ground level at the Site is approximately 50 maOD).

The basement will have an external area of approximately 65 $m^2$. The property, including the area of the yet to be built extension, has a total area of 85 $m^2$ therefore the proposed basement shall occupy an area that is approximately 77% of the total building footprint. The proposed basement shall extend from the rear of the extended property, occupying its full width but does not extend the full length of the property to the front facing side.

# 2 SCREENING

The screening stage for Impact Assessment has been considered as set out in CPG4 (Camden Council, 2011) as follows:

| **2.1 GROUND WATER** (Subterranean (ground water) flow screening chart (Figure 1, CPG4 (Camden Council, 2011)) | | | |
|---|---|---|---|
| **Impact question** | **Answer** | **Justification** | **Reference** |
| 1a) Is the Site located directly above an aquifer? | **No** | The Site is located upon the London Clay Formation; a sedimentary bedrock comprising bioturbated or poorly laminated, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. This may contain high porosity, low permeability horizons within generally low permeability and low porosity material that is classified as Unproductive Strata by the Environment Agency.<br>The closest deep borehole log TQ28SE1769 (270 m west-north west of the site) shows that locally the London Clay has a thickness of about 83 m (Appendix B).<br>There is Made Ground, mainly comprising silty clay, ranging in thickness between 1.4 m and 2.15 m overlying the London Clay; this was logged during the ground investigation undertaken by Point Drilling Services on 13th March 2015 (Appendix C). The ground investigation comprised three boreholes that were drilled in the rear garden (patio area) of the existing property; two to a depth of 5 mBGL that penetrate the London Clay and one to a depth of 2 mBGL that only extends through the Made Ground. Point Drilling Services found the London Clay to be stiff becoming very stiff slightly silty Clay with rare partings of Silt. | British Geological Survey, 2015.<br>Environment Agency, 2015.<br>Point Drilling Services, 2015 |
| 1b) Will the proposed basement extend beneath the water table surface? | **Uncertain** | Given the nature of the London Clay in the vicinity of the Site significant groundwater flow in the London Clay beneath the Site is unlikely.<br>The proposed development is therefore unlikely to encounter a water table or extend beneath it.<br>No water strikes were reported during the drilling of the boreholes to 5 m depth during the ground investigation (Appendix C).<br>However water level dip measurements undertaken at the Site in the three weeks following the ground investigation show that water has entered the boreholes and that the water levels in the boreholes were about 2 mBGL, with a maximum recorded level of 1.65 mBGL on 30 March 2015 (refer to Appendix D). The source of this water is uncertain; since neither the Made Ground nor the London Clay should be sustaining significant groundwater flows. In each borehole water levels exceeded the base of the proposed basement (3.4 mBGL). | British Geological Survey, 2015.<br>Point Drilling Services, 2015 |

| | | | |
|---|---|---|---|
| 2) Is the Site within 100m of a watercourse, well (used/disused) or potential spring line? | **No** | The closest open water course is the Grand Union Canal which lies approximately 1.0 km southeast of the Site. This watercourse is down gradient topographically from the Site.<br>The culverted ("lost") river Tyburn runs 70 m to the west of the proposed development and another culverted tributary of the Tyburn runs 150 m to the east of the proposed development<br>There are no wells within 100 m of the Site. | British Geological Survey, 2015.<br>Ordnance Survey Mapping. 2015.<br>Barton, 1992. |
| 3) Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas? | **No** | The proposed basement will extend beyond the current footprint of the property and beneath a ground floor extension that has planning permission but has yet to be constructed. As such, the proposed basement will not alter the proportion of hard surfaced / paved external areas. | Site Plans. |
| 4) 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)? | **No** | There will be no change to the total area covered by hard standing or paving with the proposed development. | Site Plans. |
| 5) Is the lowest point of the proposed 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 or spring line. | **No** | There are no known ponds or spring lines within close proximity of the Site. | Ordnance Survey Mapping. 2015. |

# 3 SCOPING

| **3.2 GROUND WATER** (Subterranean (ground water) flow screening chart (Figure 1, CPG4 (Camden Council, 2011)) | | | |
|---|---|---|---|
| **Impact question** | **Answer** | **Justification** | **Reference** |
| 1b) Will the proposed basement extend beneath the water table surface? | **Uncertain** | Many of the borehole logs from within a 500 m radius of the Site show that no groundwater was encountered at depths relating to the proposed basement during boring, this includes borehole log TQ28SE1769 located approximately 270 m north west of the site, (provided in Appendix B).<br>There was no water encountered during the drilling of three boreholes, two of which were completed to depths of 5 m and the other to a depth of 2 m for the ground investigation at the Site on 13th March 2015.<br>However water has been detected and monitored in all three boreholes at the Site between 27th March and 2nd April 2015 at an average level of about 2 mBGL and a maximum recorded level of 1.65 mBGL.<br>It is uncertain where the water detected in the borehole has come from, and there are two possibilities with different implications. 1) A flux of water in the Made Ground from recharge events could have penetrated the screened section of the borehole 2) There is a small amount of groundwater present in the London Clay and due to low permeability of the material this was not detected during the ground investigation. Subsequently it slowly filled the borehole.<br>Should the water have originated in the London Clay above the base of the proposed basement then it is very unlikely to indicate any significant groundwater flow locally due to the low permeability of the Clay; this means that neighbouring properties would be very unlikely to be affected. However, the implications for the construction of the basement would need to be considered. This is the most likely explanation since the peak levels were recorded following a significant rainfall event, when negligible amounts of water were recorded in the borehole located solely in the Made Ground.<br>Should the water have originated from surface water or from minor inflow from the Made Ground, there would be no risk either to neighbouring properties or to the proposed construction. | British Geological Survey, 2015.<br>Point Drilling Services, 2015 |

# 4 SITE CONCEPTUAL MODEL

| **4.1 CONCEPTUAL UNDERSTANDING** | | |
|---|---|---|
| Geology | Superficial | There is shallow cover of Made Ground at the Site with a thickness in the range of 1.4 m to 2.15 m |
| | Bedrock | Underlying the Made Ground at the Site is the London Clay Formation; a sedimentary bedrock comprising bioturbated or poorly laminated, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. This is expected to have a local thickness of between 60 and 100 m and has been logged at a thickness of 83 m in a nearby borehole TQ28SE1769 (Appendix B). The clay is reported to become more fissured with depth. |
| Aquifers | The London Clay is not classed as an aquifer by the Environment Agency, but as unproductive strata which is defined as rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow. (Environment Agency, 2014) | |
| Groundwater levels | There is uncertainty regarding the source of groundwater beneath the site based on the available data. Water was not encountered during the construction of three boreholes during the ground investigation in March 2015. However, water has since been detected in each of the boreholes at a depth of about 2 mBGL with maximum recorded levels at 1.65 mBGL during a 3 week period following the initial boreholes installation. There are two possible scenarios to cause this:<br>1) A flux of water draining vertically through the Made Ground from recharge events has penetrated the screened section of the borehole. There is anecdotal evidence which indicates that the peak in groundwater levels followed a heavy rainfall event in the preceding days (tele. comms. with Bob Lowther of Point Drilling Services, 2015). This would be a low risk scenario.<br>2) There is groundwater present in the London Clay and due to low permeability of the material and exceptionally low flow this was not detected during the ground investigation. This would be a medium risk scenario for the proposed construction, though it would remain low risk for neighbouring properties. This is the most likely explanation since the peak levels were recorded following a significant rainfall event, when negligible amounts of water were recorded in the borehole located solely in the Made Ground. If the water was originating in the Made Ground then higher levels would have been observed in the shallow borehole as the low permeability London Clay would prevent rapid infiltration.<br>If groundwater proves to be present in the London Clay at a level of 1.65 mBGL then the proposed basement would extend below the water table by 1.1 m at its base. The water levels would also be subject to seasonal variation, although groundwater levels at the time of monitoring would be expected to be at their annual peak following the winter recharge period | |

## 4.2 IMPACTS ON GROUNDWATER FLOWS

If there is groundwater present in the clay then it is unlikely to have any significant flow due to its low permeability. Therefore the volume of water passing through the Site would be relatively low and there would be minimal impact.

Based upon the points above, the construction of the basement would cause a relatively minor obstruction of groundwater flow leading to slightly increased flows around the proposed basement .

As the development is not expected to cause any significant rise in groundwater height up gradient from the property, adjacent properties are not expected to be affected. There are not known to be any other basements adjacent to the site.

Down gradient properties are also not expected to be affected by the development.

# 5 CONCLUSIONS (IMPACT ASSESSMENT)

## 5.1 Ground water

Potential impacts of the proposed basement development at 56 Hawtrey Rd have been considered as set out in the scope of works. The following summary conclusions are made:

- The proposed basement will be constructed to a depth of 3.4 m below ground level into the underlying Made Ground and London Clay.
- Groundwater was not present during or immediately after the site investigation, however it was observed in the onsite boreholes two weeks after the investigation and following a period of heavy rainfall.
- There are two possible scenarios to explain the presence of the water in the onsite boreholes:
    1. It is a flux of water from recharge events that has entered the borehole due to vertical drainage in the Made Ground and the position of the borehole screen.
    2. There is groundwater present in the clay.

  It is most likely that the water originates from the London Clay as there was very little water recorded in the borehole in the Made Ground
- The overall risk from the proposed development is considered to be medium, as the groundwater present in the onsite boreholes is recorded at a level higher than the intended depth of the proposed basement.
- The potential impact to the groundwater environment is considered low as the London Clay severely limits any flow of groundwater

## 5.2 Recommendations

It is recommended that due to the Site being classified as medium potential risk, mitigation would be required in the form of an appropriate basement design and construction method as the basement would extend below the groundwater level,.

# REFERENCES

**Arup, 2008**. Royal Borough of Kensington & Chelsea Town Planning Policy on Subterranean Development Phase 1 - Scoping Study DRAFT, June 2008.

**Barton, N., 1992**. The Lost Rivers of London, revised edition. Historical Publications Ltd. London.

**British Geological Survey, 2015** Received 09/04/15 from http://mapapps.bgs.ac.uk/geologyofbritain/home.html.

**Camden Council, 2011.** Camden Planning Guidance: Basements and lightwells. London Borough of Camden, CPG4.

**Environment Agency, 2015.** What's in your backyard website. Received from , April 2015.

**Ordnance survey mapping**, 1:10,000. © Crown copyright. All rights reserved. Licence number AL 100015683

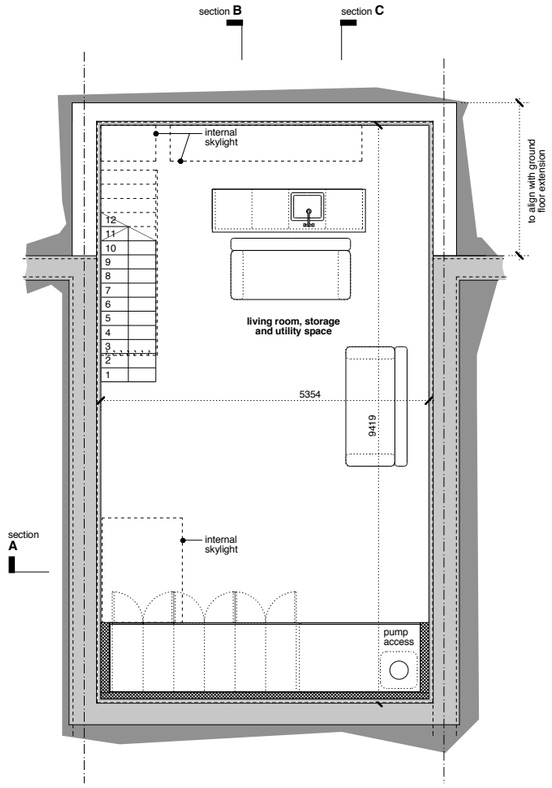
**London Borough of Camden, 2010.** Camden Geological, Hydrogeological and Hydrological Study.

**Point Drilling Services, 2015** Site investigation borehole logs.

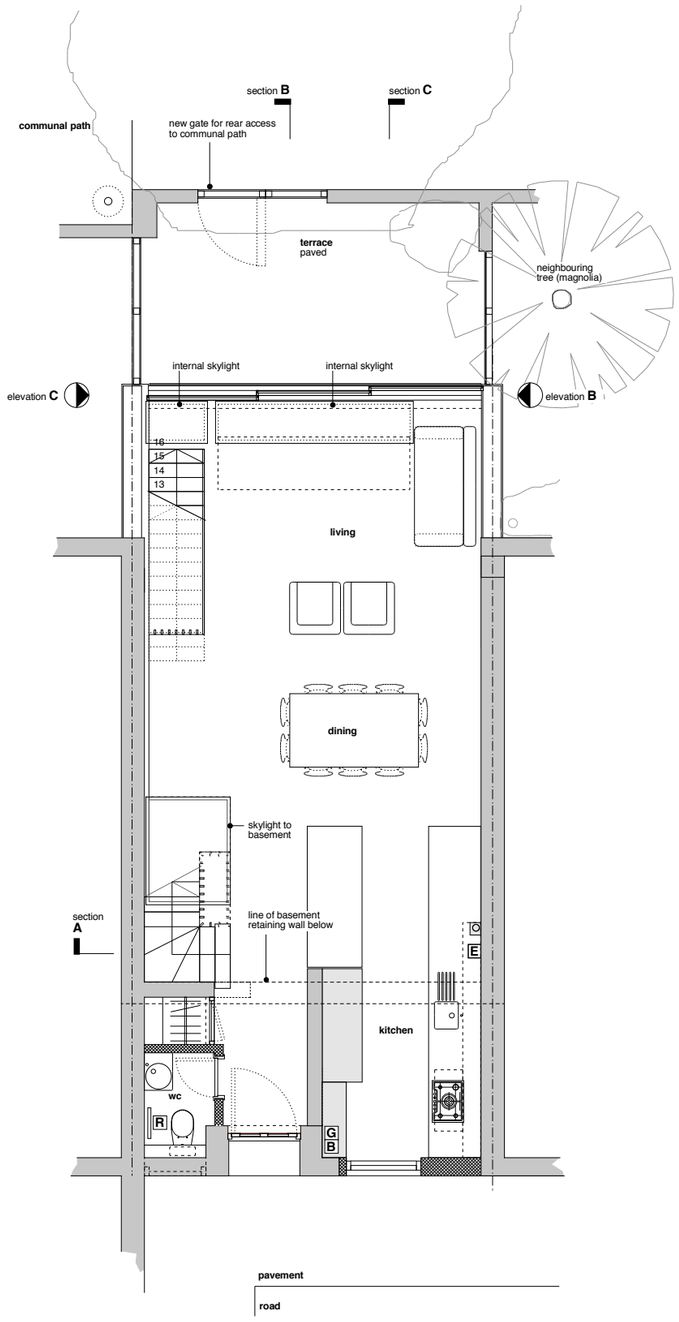
# APPENDICES

# APPENDIX A

## Hawtrey Road Proposed Development Plans




**Basement**
**finished floor to ceiling height generally 2600mm**




**Ground Floor**
**existing finished floor to ceiling dimension generally 2500mm**



N

**Read in conjunction with:**
**drawings P01-07, current revisions**

All dimensions approximate, for indicative purposes only

Structural elements and foundations subject to confirmation by structural engineer

Party wall lines subject to confirmation by party wall surveyor

| Rev | Date | Description |
|---|---|---|
| A | 30 04 2015 | Planning |

# 56 Hawtrey Road

Project: 56 Hawtrey Road, NW3 3SS
Drawing Number: **P04** Revision: **A**
Drawing Title: **General Arrangement Plans Proposed Basement-Ground**
Scale: 1:50 @ A1, 1:100 @ A3
Date: 24 12 2014
Status: **PLANNING**

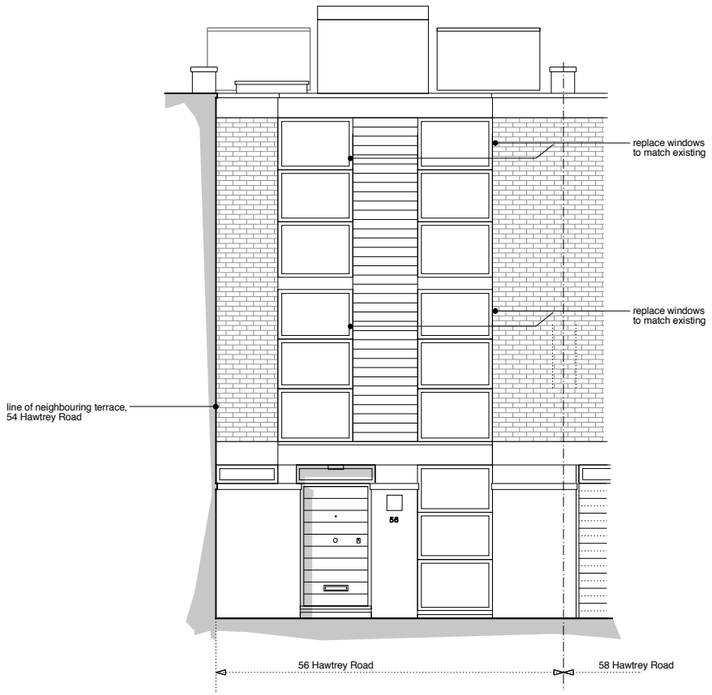
**Anna Williamson** ARCHITECTS
90 Hawtrey Road London NW3 3SS UK
t 020 7586 0475 m 07967 738 992
e studio@annawilliamsonarchitects.co.uk

**Read in conjunction with:**
**drawings P01-07, current revisions**

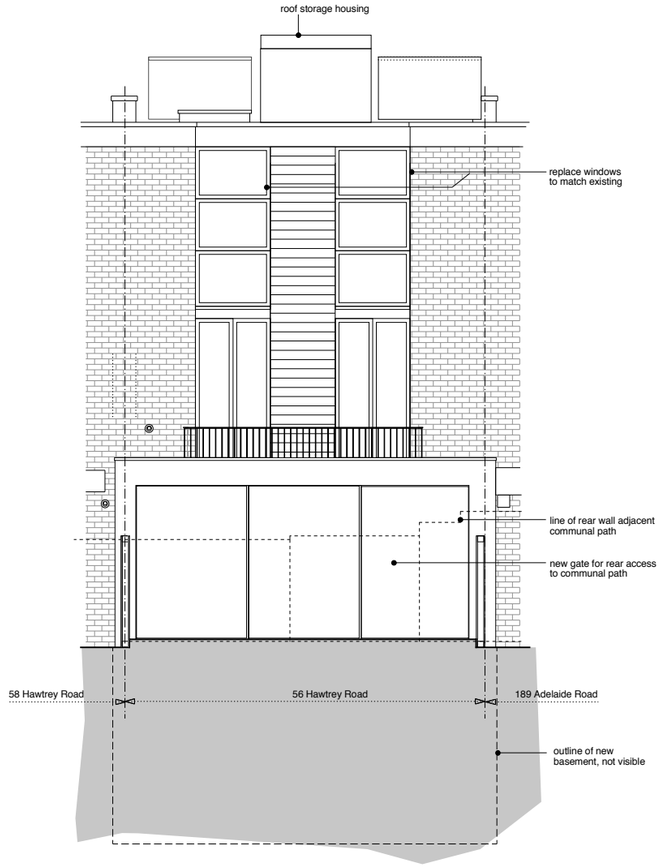
All dimensions approximate, for indicative purposes only

Structural elements and foundations subject to confirmation by structural engineer

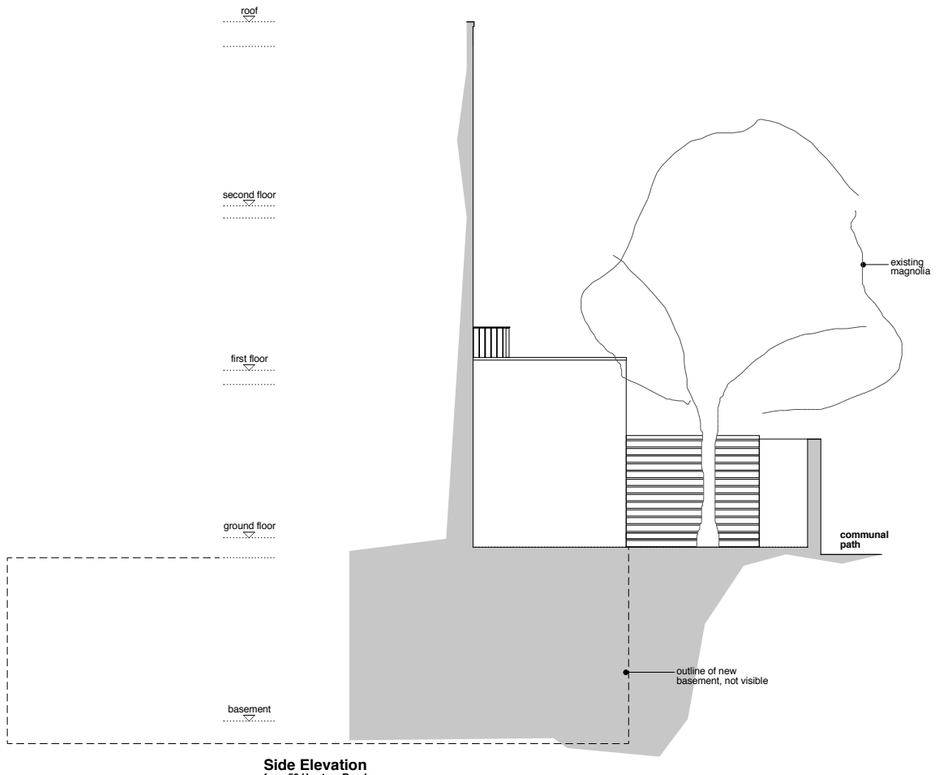
Party wall lines subject to confirmation by party wall surveyor



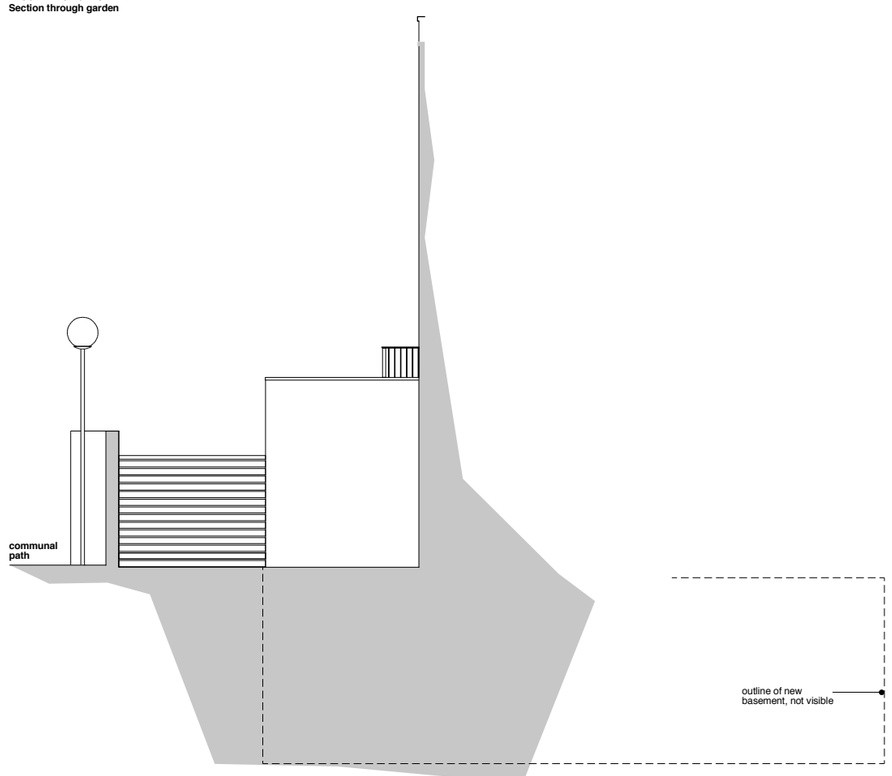

**Front Elevation**
**from Hawtrey Road**


**Rear Elevation**
**Section through garden**




**Side Elevation**
**from 58 Hawtrey Road**




**Side Elevation**
**from 189 Adelaide Road**

| Rev | Date | Description |
|---|---|---|
| A | 30 04 2015 | Planning |

# 56 Hawtrey Road

| | |
|---|---|
| Project | 56 Hawtrey Road, NW3 3SS |
| Drawing Number | **P05** Revision **A** |
| Drawing Title | **General Arrangement Proposed GA Elevations** |
| Scale | 1:50 @ A1, 1:100 @ A3 |
| Date | 24 12 2014 |
| Status | **PLANNING** |

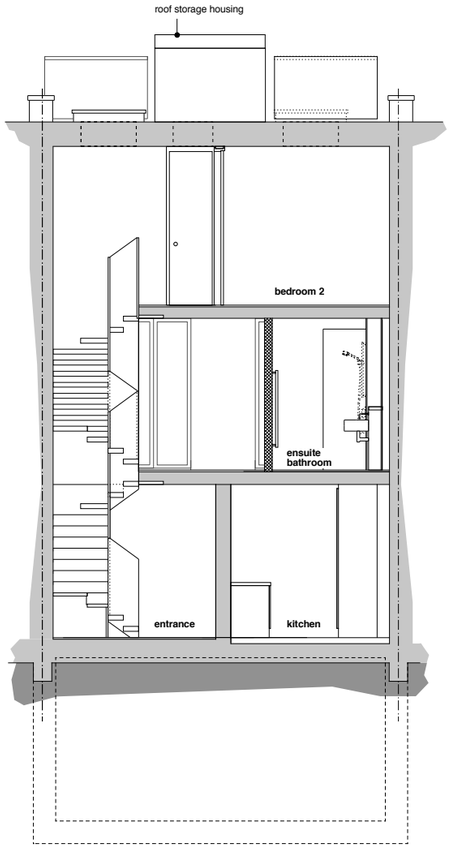
**Anna Williamson** ARCHITECTS
90 Hawtrey Road London NW3 3SS UK
t 020 7586 0475 m 07967 738 992
e studio@annawilliamsonarchitects.co.uk

**Read in conjunction with:**
**drawings P01-07, current revisions**

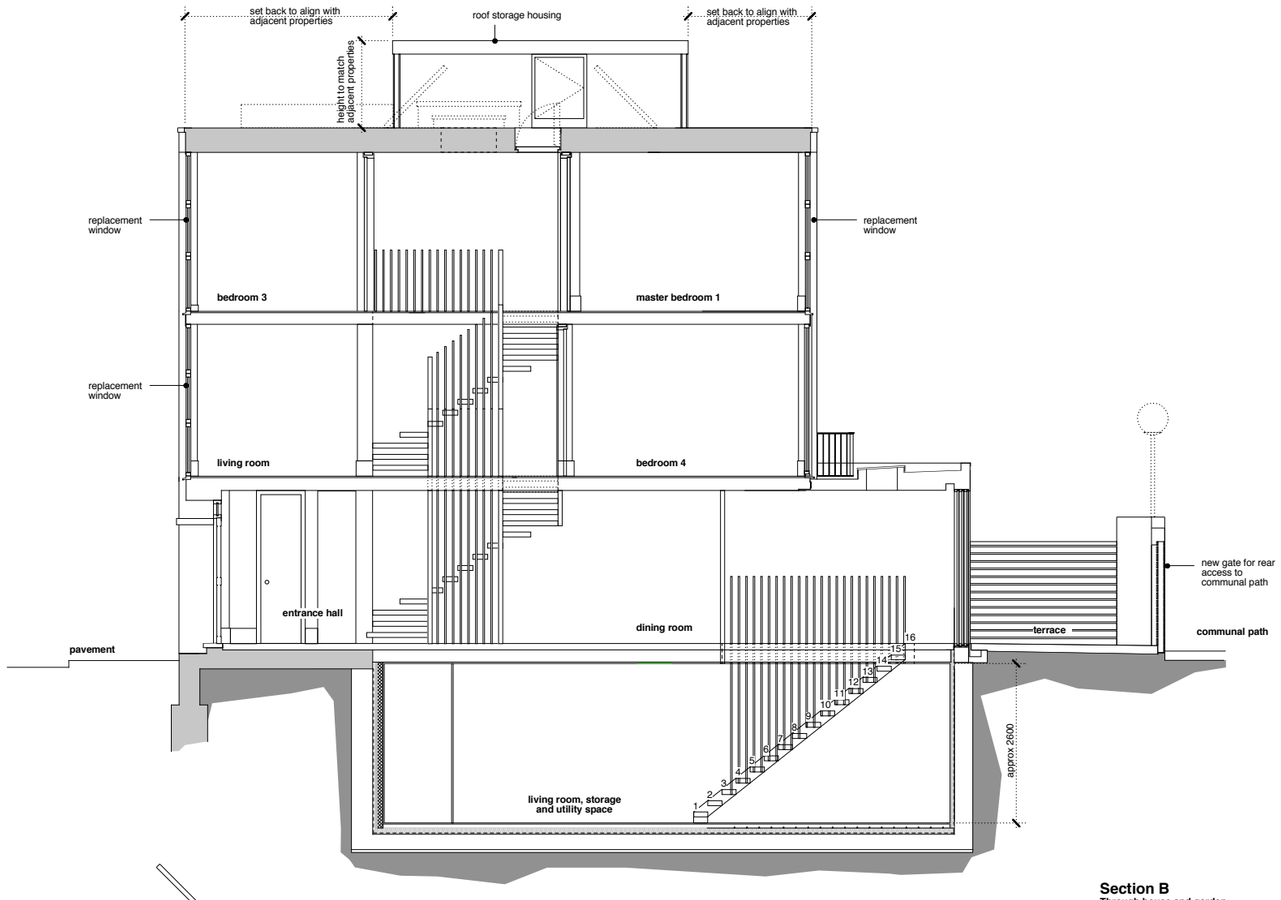
All dimensions approximate, for indicative purposes only

Structural elements and foundations subject to confirmation by structural engineer

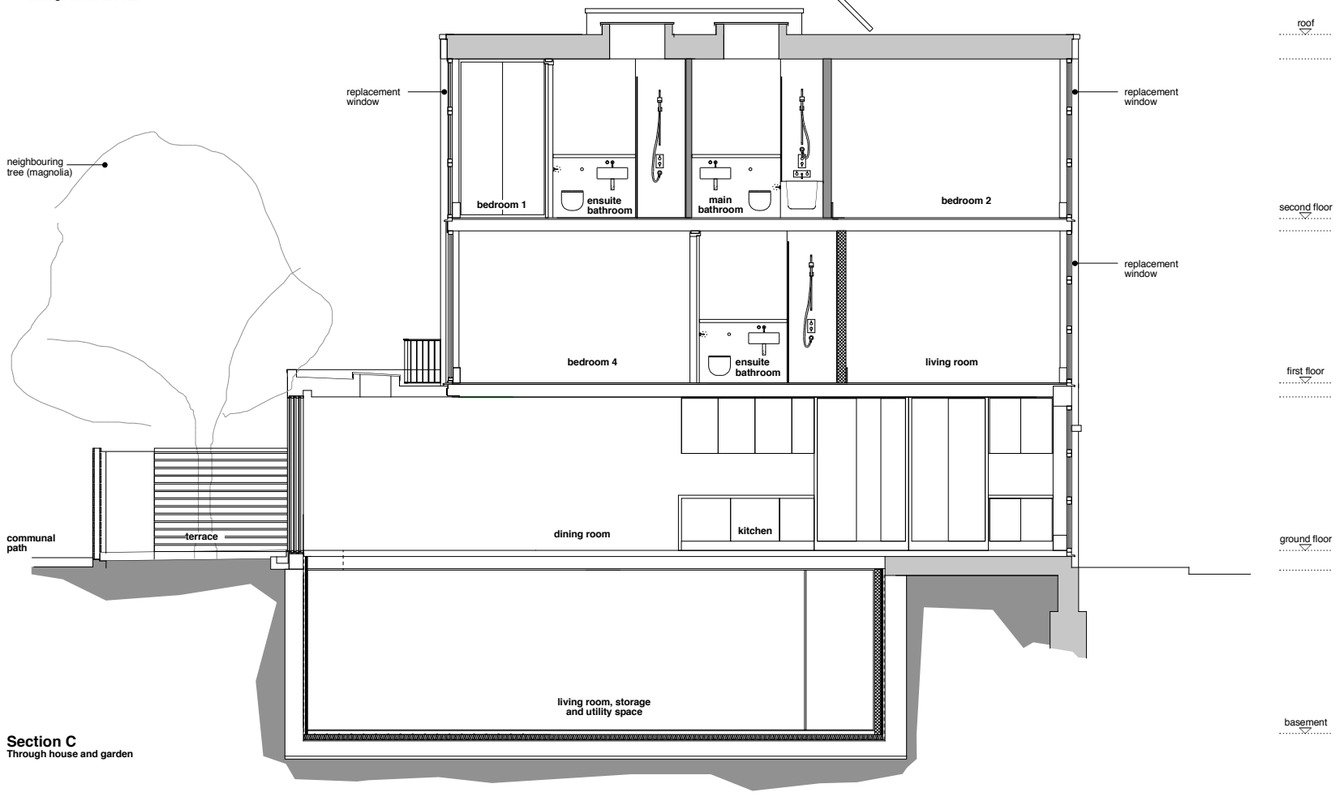
Party wall lines subject to confirmation by party wall surveyor




**Section A**
**Through house and stair**




**Section B**
**Through house and garden**




**Section C**
**Through house and garden**

| Rev | Date | Description |
|---|---|---|
| A | 30 04 2015 | Planning |

# 56 Hawtrey Road

| | |
|---|---|
| Project | 56 Hawtrey Road, NW3 3SS |
| Drawing Number | P06 |
| Revision | A |
| Drawing Title | General Arrangement Proposed GA Sections |
| Scale | 1:50 @ A1, 1:100 @ A3 |
| Date | 24 12 2014 |
| Status | PLANNING |

**Anna Williamson** ARCHITECTS
90 Hawtrey Road London NW3 3SS UK
t 020 7586 0475 m 07967 738 992
e studio@annawilliamsonarchitects.co.uk

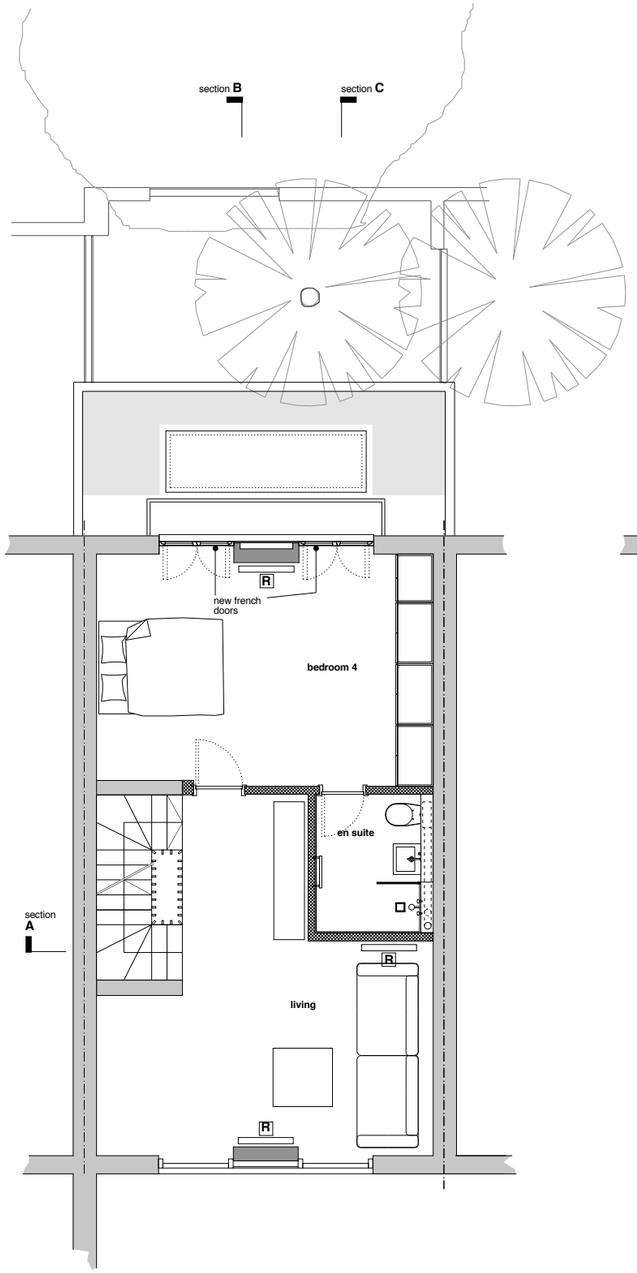
N

**Read in conjunction with:**
**drawings P01-07, current revisions**

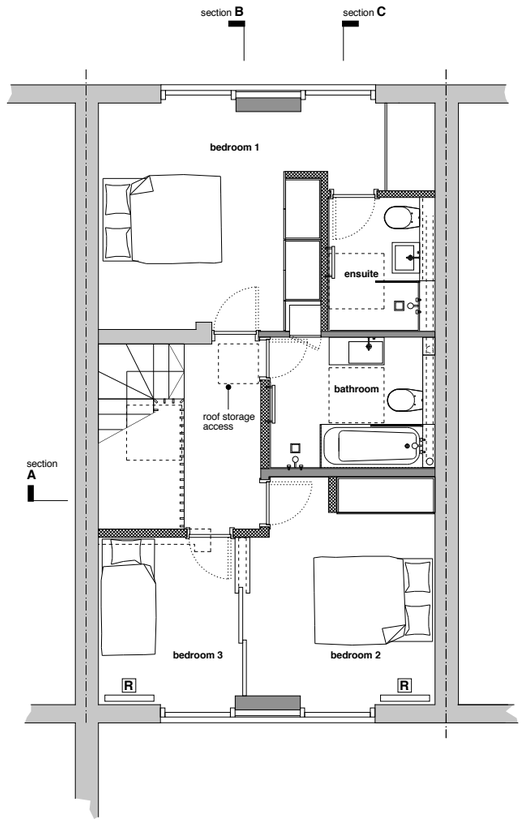
All dimensions approximate, for indicative purposes only

Structural elements and foundations subject to confirmation by structural engineer

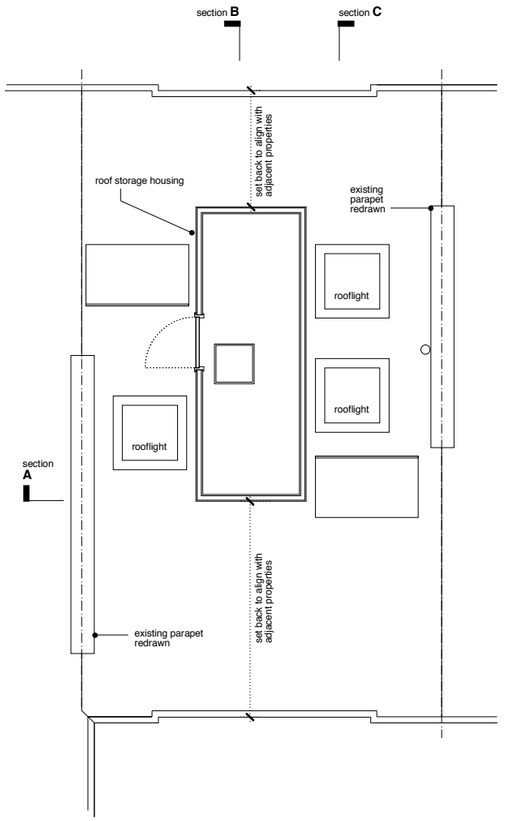
Party wall lines subject to confirmation by party wall surveyor




**First Floor**
**existing finished floor to ceiling height generally 2480mm**




**Second Floor**
**existing finished floor to ceiling height generally 2600mm**




**Roof**
**not surveyed**

| Rev | Date | Description |
|---|---|---|
| | | |

# 56 Hawtrey Road

| | |
|---|---|
| Project | 56 Hawtrey Road, NW3 3SS |
| Drawing Number | **P07** Revision **-** |
| Drawing Title | **General Arrangement Plans Proposed Level 1-Roof** |
| Scale | 1:50 @ A1, 1:100 @ A3 |
| Date | 30 04 2015 |
| Status | **PLANNING** |

**Anna Williamson** ARCHITECTS
90 Hawtrey Road London NW3 3SS UK
t 020 7586 0475 m 07967 738 992
e studio@annawilliamsonarchitects.co.uk

# APPENDIX B

## Local Borehole Log of TQ28SE1769

ACC NO 46102.

TQ28/209

**From:** sjjenkins@btconnect.com
**To:** <hydroenq@bgs.ac.uk>
**Date:** Tue, Aug 15, 2006 5:34 pm
**Subject:** Swiss Cottage Pump Test - Rosemary Fry

Rosemary
Please find attached the pump test data for Swiss Cottage. Not quite a dry hole but close.
Regards

Steve Jenkins
Contracts Manager
Drilcorp Ltd
T 0191 5273970
F 0191 5273115
M 07743 806302

Yield less than 1 m3/hour during pump test.
Recovery slow.
Borehole in use but will need modifications.

AC NO 45499

SWISS COTTAGE OPEN SPACE

TQ28/209

| | | | |
|---|---|---|---|
| Owner | L B CAMDEN | Licence No | |
| Occupier | | IGS Ref No | |
| Ground Level | 56 m OD | | ft OD |
| Level of Well Top | m OD | | ft OD |
| Rest Water Level | 90 m bwt | | ft bwt |
| (Date 02/11/04) | m OD | | ft OD |
| Construction | 25/06/04 | | |

| Depth bwt m | Diameter mm | Linings (below well top) From m | To m | Diameter mm | Type |
|---|---|---|---|---|---|
| 0 - 9 | 250 | 0 | 117 | 150 | SOLID STEEL |
| 9 - 117 | 244 | 0 | 157 | 113/103 | UPVC |
| 117 - 157 | 150 | | | | |
| | | | | | |
| | | | | | |

| | | | |
|---|---|---|---|
| Abstraction Rates | | Type of Pump | |
| | gph | Chem/Bact Anal | YES NO |
| | gpd | Well Driller | DRILL CORP |

If insufficient space has been allowed, continue in 'Notes' overleaf

| | | |
|---|---|---|
| Nat Grid Ref | TQ 268 843 | |
| Status | LIC | |
| Aquifer | UPPER CHALK | |

| Summary of Geological Section | Thickness | Depth |
|---|---|---|
| MADE GROUND | 0.5 | 0.5 |
| TOP SOIL | 0.7 | 1.2 |
| LONDON CLAY | 83.0 | 84.2 |
| N.R.B. | 12.0 | 96.2 |
| THANET SAND | 4.2 | 100.4 |
| LUTTY CHALK | 11.6 | 112.0 |
| UPPER CHALK | 47.0 | 159.0 |

RECEIVED FROM
- 4 JUL 2005
ENVIRON AGENCY

# APPENDIX C

## Hawtrey Road Ground Investigation Report

# POINT DRILLING SERVICES

Birdsnest, Oakmead Road, St Osyth, Essex. CO16 8NL. Email: ylowther@aolcom

Telephone: 01255 821004 Mobile 07771533402


SITE INVESTIGATION TRIAL PIT LOG DATE: 14.3.15

SITE ADDRESS: 56 HAWTERY RD. CAMDEN/SWISS COTTAGE.

TRIALPIT LOG REF: PLAN. DESCRIPTION:


LARGE TREE (POSS PLANE?)

KEY . DISTURBED SAMPLE. V.VANE TEST. MP. MACINTOSH PROBE TEST. R.ROOT SAMPLE.

POINT DRILLING SERVICES
BIRDSNEST, OAKMEAD ROAD ST OSYTH ESSEX CO16 8NL EMAIL: YLOWTHER@AOL.COM
TELEPHONE : 01255 821004 MOBILE : 07771 533 402

**SITE INVESTIGATION BOREHOLE LOG** **DATE:** 14.3.15

**SITE ADDRESS:** 56 HAWTERY RD. CAMDEN/SWISS COTTAGE.

BOREHOLE LOG REF: 1

| DEPTH | (H/A TO 2.5m FIRST) DESCRIPTION 6" BH | SOIL/ROOT SAMPLE | TEST RESULT | DEPTH OF TEST |
|---|---|---|---|---|
| 0 | SLAB OVER SOFT, SAND. | | | |
| 100mm | SOFT, DARK BROWN CLAYEY TOPSOIL. | | | |
| 400 | SOFT, DARK ORANGE/BROWN, SILTY CLAY FILL WITH OCC BRICK & CONCRETE PIECES. | | | |
| 600 | SOFT, ORANGE/BROWN, SLIGHTLY SILTY CLAY FILL. | | | |
| 1.5 | SOFT, (LOOSE) TO AUGER DARK BROWN, TOPSOILY SILTY CLAY FILL WITH OCC F, BRICK & COKE FRAGMENTS. (ROOTS SEEN to 2.0m O.L.A) | | | |
| 2150 | STIFF, MID BROWN GREY VEIN SLIGHTLY SILTY CLAY WITH OCC ORANGE SILT PARTINGS. (LONDON CLAY) | | | |
| 3.5 | AS ABOVE (VERY STIFF) | | | |
| 5.0 | BH END DRY & OPEN. | | | |
| | BH FINISH 11.30 AM | | | |
| | CHECKED 11.50 AM (DRY) | | | |
| | CHECKED 6.30 PM (DRY) | | | |

**KEY :** DISTURBED SAMPLE V: VANE TEST. MP : MACINTOSH PROBE TEST R:ROOT SAMPLE

POINT DRILLING SERVICES
BIRDSNEST, OAKMEAD ROAD ST OSYTH ESSEX CO16 8NL EMAIL: YLOWTHER@AOL.COM
TELEPHONE : 01255 821004 MOBILE : 07771 533 402

**SITE INVESTIGATION BOREHOLE LOG** **DATE:** 14.3.15

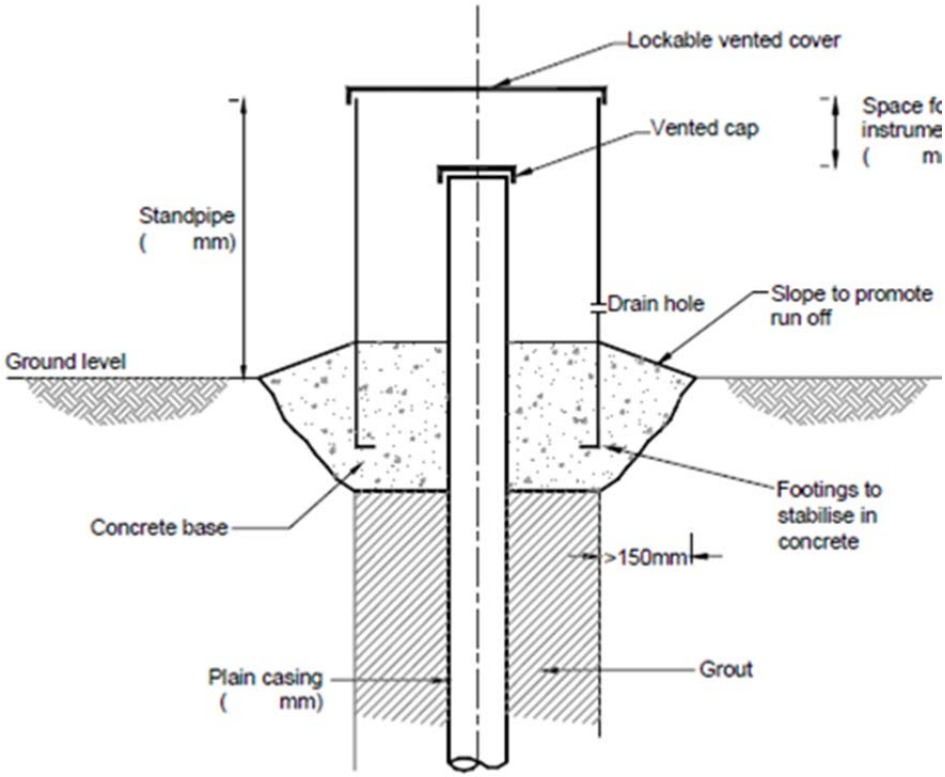
**SITE ADDRESS:** 56 HAWTERY RD. CAMDEN/SWISS COTTAGE.

BOREHOLE LOG REF: 2

| DEPTH | (H/A to 2.0m FIRST) DESCRIPTION 6" BH | SOIL/ROOT SAMPLE | TEST RESULT | DEPTH OF TEST |
|---|---|---|---|---|
| 0 | SLAB OVER SOFT SAND | | | |
| 100mm | SOFT, DARK BROWN, CLAYEY TOPSOIL | | | |
| 350 | SOFT, DARK ORANGE/BROWN SILTY CLAY WITH OCC BRICK & CONCRETE PIECES. | | | |
| 500 | SOFT, MID BROWN, SLIGHTLY SILTY CLAY FILL WITH OCC BRICK, & LARGE COKE FRAGMENTS. | | | |
| 1.4 | FIRM MID BROWN GREY VERY SLIGHTLY SILTY CLAY WITH OCC ORANGE SILT PARTINGS. (ROOTS SEEN to 2.0m O.W.A.) | | | |
| 2.0 | AS ABOVE (STIFF) | | | |
| 3.5 | AS ABOVE (VERY STIFF) | | | |
| 5.0 | BH END DRY & OPEN | | | |
| | BH FINISH 3.00 PM (DRY)<br>CHECKED 3.20 PM (DRY)<br>CHECKED 6.30 PM (DRY) | | | |
| | BH 3 6" | | | |
| 0 | AS BH2 (ADJACENT) | | | |
| 2.0 | BH END (DRY & OPEN) | | | |
| | BH FINISH 5.10 PM<br>CHECKED 5.30 PM (DRY)<br>CHECKED 6.30 PM (DRY) | | | |

**KEY :** DISTURBED SAMPLE V: VANE TEST. MP : MACINTOSH PROBE TEST R:ROOT SAMPLE

Recommended Borehole Design



# APPENDIX D

## Groundwater Levels

Groundwater levels (dip measurements)

| **Location**<br>**Borehole name** | **By House**<br>**BH1** | **End of Garden**<br>**BH2** | **By House**<br>**BH3 (Shallow)** | **Comment** |
|---|---|---|---|---|
| Depths (mBGL) | 5 | 5 | 2 | Depth to base |
| 14/03/2015 | dry | dry | dry | Drilling date |
| 27/03/2015 | 2.3 | 2.3 | dry | |
| 30/03/2015 | 2 | 1.65 | 1.95 | Maximum recorded levels |
| 02/04/2015 | 2.1 | 1.7 | dry | |