BASEMENT IMPACT ASSESSMENT

for

192 HAVERSTOCK HILL

LONDON NW3 2AJ

by

Norman Train, C.Eng, F.I.StructE, F.I.C.E

CONTENTS

Document Control

Revision	Date	Status
01	30 April 2012	Final Issue
02	2 May 2012	Expansion of sections on topographical and sustainable construction
03	31 May 2012	Revised drawings
04	8 June 2012	Minor corrections
05	3 Sept 2012	Screening in Appendix 1 expanded, Section 3.7 Site Investigation added and text developed to address feedback from planning officer
06	7 Sept 2012	Reformatted
07	9 Oct 2012	Site Investigation details added
08	21 Oct 2014	2.3 Cantilever over shared access removed from upper floors

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Norman Train C.Eng, FIStructE, FICE

1. INTRODUCTION

This Basement Impact Assessment, BIA, has been prepared in support of the planning application for a mixed residential and commercial development of 192 Haverstock Hill. This BIA, has been prepared in accordance with LB of Camden CPG4, Basements and Lightwells and the Camden Geological, Hydrogeological and Hydrological Study, CGHHS.

CPG4 screening questions are presented in Appendix 1 and Site Photographs are included in Appendix 2. A Site Location Plan and drawings of the Proposed Development are presented in Appendix 3. The site investigation letter report and borehole logs are presented in Appendix 4.

1.1 BIA Stages

A Stage 1 Screening has been completed, utilising the questions in CPG4, and these are presented in Appendix 1. An additional question, GW1B, has been added to the Groundwater screen set relating to water issues rather than water table.

The screening has been used to define the Stage 2 Scope of the Assessment.

As part of the Stage 3 site investigations and study, a site walk over was completed on 17 April and a meeting was held with London Underground relating to the Northern Line alignment. The desk top research included published geology, aquifer classification and flood data. Two boreholes were excavated to a maximum depth of 20m.

The Stage 4 Impact Assessment of the scheme is presented in Sections 3 to 6.

2. EXISTING SITE AND PROPOSED DEVELOPMENT

For the purposes of this assessment, Haverstock Hill is taken to the west with Belsize Park Underground Station to the south. This means that Allingham Court is to the north and the Globe Tennis Club and parking are to the east.

2.1 Existing Site

192 Haverstock Hill is a narrow rectangle, having a street frontage along Haverstock Hill of 9m and a depth from front to rear of 33m. The site is currently occupied with a single storey shop unit without a basement. Photo 1. See Site Location Plan in Appendix 3. The surface of the site is impervious.

To the north of the site, as Nos 194 to 208 Haverstock Hill, is Allingham Court as a five storey block of flats with shops at the ground floor. Photos 1 & 3. Allingham Court does not have a basement.

To the south side of No 192 is a shared access leading to the Globe Lawn Tennis Club at 190A Haverstock Hill. The shared access is a cul de sac which provides vehicular access to the tennis club's car parking; at its narrowest point this access is 4m wide. Photos 2 to 4. Behind the site to the east is a parking bay on the shared access.

The shared access is under the control of LB of Camden Estates; it is not a formal highway, but clearly the access is subjected to traffic loadings from cars and lorries accessing the tennis club car parking.

There are no signs of distress or significant movement in any of the adjacent buildings.

<u>London Underground Tunnels</u>
To the south of the access at No 190 Haverstock Hill is Belsize Park Underground Station. This extends back the full depth of No 192. Photo 1. The lift shaft and emergency stairs are located in the middle of the

station and extend down to the platform concourse 30m below ground level. London Underground has confirmed that the Northern Line running tunnels are to the west under Haverstock Hill; there are deep emergency tunnels beneath the site but these are 40m below ground level.

Behind the Station, with access from the shared access, is an electricity sub-station.

2.2 Topography and Levels

The site is on the hill dropping from Hampstead towards the Thames basin. The natural gradient is from northwest to southeast. This means that not only does Haverstock Hill have a gradient descending to the south but there is a fall from front to rear across the site of just under 1.0m. Photos 1 to 3.

The front of the site is at +68.8m OD with the parking bay to the rear at +68.0m OD. The tennis club parking to the rear of the site is at +67.8m OD. The crossfall across the width of the site is up to 0.5m at the front, but this reduces at the rear. Photo 1.

The topographical survey levels show that the slope along Haverstock Hill is 1 in 21 and along the shared access is 1 in 40; the gradients of the slopes on and around the site are all less than 1in 8.

2.3 Proposed Scheme

It is proposed to construct a six storey block including basement giving A1 Retail at basement and ground and 5 flats on the upper four floors. Vertical circulation is to the rear of the building.

The building follows the building line of Allingham Court along the Haverstock Hill frontage with a 7.5m patio area behind the pavement. The basement extends out beneath this patio so the basement wall is 3.5m behind the pavement; the basement extends the full footprint of the building.

The building steps back 1.0m on the southern side to the front so the clearance along the shared access is increased to 5.0. The flats on the upper floors are are set back on the road frontage and spaced away from Allingham Court. See drawings in Appendix 3.

The scheme will be framed in concrete.

2.4 Basement and Foundations

<u>Basement</u>
The basement will be constructed with contiguous piles around the whole perimeter, lined with concrete to form a box. The contiguous piles would be designed to act as free cantilevers in the temporary condition before the ground floor slab is cast. See drawings in Appendix 3. The basement extends beneath the full footprint of the building . The basement abuts Allingham Court and will be lower than its foundations.

<u>Foundations</u>
The scheme will have piled foundations; these will be around the perimeter and beneath the internal columns.

Contiguous piled walls will be used to ensure lateral stability to:

i. the Allingham Court foundations to the north;
ii. the shared access to the south;
iii. the rear of the pavement along Haverstock Hill.

The contiguous piles will be designed for appropriate highway loadings for Haverstock Hill pavement and the share access and for the surcharge from Allingham Court foundations. The piles will be drilled from ground level and a capping beam cast on top before any excavation commences. The piles will be stiff enough to ensure that there is no appreciable movement to the ground on any of the perimeters.

3 GROUNDWATER FLOW

3.1 Stage 1 Screening

GW1 The site is not on an aquifer. CGHH Fig 8 shows the site is founded on London Clay as a non productive strata.

GW1A London Clay is an impermeable stratum and there is not a free water surface within the London Clay. The basement will not extend beneath the water table.

GW1B There may be water issues to the base of any made ground on top of the London Clay and also with the more permeable fissured or claystone layers within the clay. These do not constitute a continuous subterranean flow or water table.

GW2 There are no water courses or water features in the immediate vicinity of the site. CGHH Fig 11 shows that the River Fleet is 400m to the west is the nearest watercourse.

Tributaries to the River Tyburn originate to the west of Haverstock Hill.

GW3 CGHH Fig 14 shows that the Hampstead Ponds catchment is to the north of the site.

GW4 The site is currently 100% impervious.

GW5 The current surface water drains will be maintained. With the proposed green roof, the attenuation of the discharge will be increased.

GW6 CGHH Fig 12 shows that there are no water features in the vicinity of the site.

3.2 Stage 2 Scoping

- Possible water issues in the made ground on top of the London Clay or in Claystone bands within the clay itself.

3.3 Stage 3 Study and Site Investigation

Study

The London Clay is an impervious layer which is classified as an unproductive stratum and means that there are no groundwater flows across the site. The properties of London Clay are well understood with published data. In hydrogeological terms, the site does not have the challenges of the Claygate beds to the Hampstead Ponds catchment nor the alluvial deposits of the Thames basin to the south of the borough.

As an impervious layer there is no water table with a pheratic surface within the London Clay. The claystone bands within the London Clay can be water bearing but these are minor issues and do not constitute a continuous subterranean flow or water table. There is also the possibility of minor issues and seepage in any made ground mantle on top of the London Clay but given that up slope is Allingham Court, these will not be significant.

Site Investigation

Two boreholes were sunk to 15m and 20m at the front and the rear of the site respectively and the letter report, borehole logs and location plan are given in Appendix 4.

This established that there is a minimal made ground mantle, ranging between 0.6m and 1.6m, overlying weathered, becoming unweathered London Clay. There were water seepages in the rear borehole at 7.3m and in the front borehole at 6.2m, but both boreholes were dry on completion.

As noted in the letter report, *'Water seepage is almost certainly due to thin bands of claystone or lenses of sand which are almost certainly discontinuous as evidenced by the fact that both boreholes were dry on completion and the water seepages were was at different depths below ground level.'*

3.4 Stage 4 Impact Assessment

Groundwater Flow
London Clay is impervious and there is no groundwater flow within it.

Water Issues and Seepages
There is no perched water table to the base of the made ground and the seepages that were encountered are deeper than the proposed basement.

The lack of any standing water in the boreholes demonstrates that the seepages in the London Clay do not constitute a continuous water flow and the groundwater is not effected by the piling

Given the lack of any perched water table contiguous piles will be used rather than secant piles.

4 GROUND STABILITY

4.1 Stage 1 Screening

GS1 CGHH Fig 16 shows that the slopes on this part of Haverstock Hill are less than 7^{o} [1 in 8]

GS2 There will be no significant remodelling of the slopes

GS3 CGHH Fig 10 shows that the contours on this part of Haverstock Hill are all < 1 in 8

GS4 The topographical survey levels show that the slope along Haverstock Hill is 1 in 21 and along the shared access is 1 in 40.

GS5 The 1:10,000 scale geological map shows that the site is founded on London Clay. The Claygate Beds are found 0.6km to the north east of the site towards Hampstead Whilst the site is founded on London Clay, the slopes to the surrounding area are all < 1 in 8

GS6 No tree will be felled

GS7 There is no history of seasonal movement in the vicinity of the site.

GS8 CGHH Fig 11 shows that the River Fleet is 400m to the west as the nearest watercourse with a tributary of the River Tyburn spring 250m to the east.

GS9 As a site to the side of Haverstock Hill as an established road up to Hampstead, there is likely to be a superficial made ground mantle associated with previous historic development.

The current levels demonstrate that there has not been any significant working of the ground.

GS10A CGHH Fig 8 shows the site is founded on London Clay as a non productive stratum

GS1OB London Clay is an impermeable stratum and the basement will not extend beneath the water table.

GS11 The site is 0.6km to the south of the Hampstead Ponds and is at a lower altitude

GS12 The basement along the Haverstock Hill frontage is 3.5m behind the back of the pavement and 7m from the carriageway. The design will need to take cognisance of highway loading on both the Haverstock Hill and share access and contiguous piles will be used to ensure stability of both the highway and shared access.

GS13 No works will be undertaken on the adjoining foundations with contiguous piles used to ensure that the pressure bulb beneath these and the ground around these is held stable.

GS14 The site is over London Underground deep tunnels. This will affect the foundations but does not have an impact on the slope stability of the site

4.2 Stage 2 Scoping

- The site is found on London Clay
- The site is within 5m of the pavement to Haverstock Hill, but is 7m from the carriageway
- The basement will increase the differential depth of foundations relative to neighbouring properties
- The site is situated over London Underground deep tunnels

4.3 Stage 3 Study and Site Investigation

Study
Whilst the site is founded on London Clay, the slope angles are all less than 1 in 20 and ground stability is not an issue. No trees are being removed and heave will not be an issue.

A visual assessment of the external elevations of Allingham Court and Belsize Park Station shows that neither of these is exhibiting any movement or structural distress.

Both the site walkover and the records in CGHHS show that there are no problems of land stability in the vicinity of the site.

Site Investigation
The depth of the made ground mantle varies from 0.6m to the rear to 1.6m to the front, overlying weathered London Clay. This means the basement is founded in the London Clay.

The increasing strength of the clay with depth can be seen with the increasing SPT count and blows required in driving the U100 samples

4.4 Stage 4 Impact Assessment

Stability of Adjacent Buildings
There is no movement in the adjoining buildings and their structural integrity has not been compromised.

Design Parameters for Piles
The contiguous piles will be designed to ensure that Allinghan Court, the pavement to Haverstock Hill and the shared access are held in position. Design parameters will be agreed with engineers representing the different parties.

Land Stability
The existing gradients are all shallower than 1 in 20 and there are no land slippage or ground stability problems within or adjacent to the site.

Slope Stability
There are no slopes being introduced in the scheme.

Ground Movement

The basement excavation will extend to a depth of 3.2m below ground level so the reduction in load on the underlying ground will be around 60kN/m^2. The self weight of the structure will be of the order of 45kN/m^2. With occupation the total load will be nearer 60kN/m^2. Hence there will be no long term ground movement.

There will be elastic rebound of the excavation within the site, but the piles will be installed from ground level and will act to restrain this rebound.

Adjoining Foundations
Allingham Court does not have a basement and so the excavation of the basement will introduce a differential depth. All of the foundation will be constructed from within the site and the foundations to Allingham Court will not be altered. Consequently there will not be any differential change in depth of the adjoining foundations. Stiffness of the ground will be maintained by the contiguous piles.

Highways
The front western wall is 3.5m behind the pavement to Haverstock Hill and will need to be designed to accommodate these loadings.

Underground Tunnels
The piles will be of the order of 20m deep and consequently will be 20m above the deep tunnels to the rear of the site. The piles will be 4m behind the front boundary and will be clear of the Northern Line running tunnels beneath Haverstock Hill.

5 SURFACE FLOW AND FLOODING

5.1 Stage 1 Screening

F1. The site is not within Hampstead Ponds Catchment. The ponds on Hampstead Heath and Parliament Hill Fields act as sources for the River Fleet which follows the base of the valley some 0.4km to the east of the site

F2. There are no material changes in surface water flows

F3. There are no changes in impervious area

F4. There are no changes in flow rate onto neighbouring land.

F5. There are no changes in quality of water discharge

F6. The site is too high to be subjected to any fluvial flooding. There have been instances of local surface water flooding within LB Camden, but Haverstock Hill is not listed as a street at risk of surface water flooding in CPG 4 or Floods in Camden [2003].

5.2 Stage 2 Scoping

There are no scoping issues.

5.3 Stage 3 Study and Site Investigation

Flooding in Camden 2003 was used in the screening.

5.4 Stage 4 Impact Assessment

There are no surface water flow or flooding issues with the site.

6 ADDITIONAL IMPACT ASSESSMENTS

6.1 Construction Plan

The preferred construction solution will utilise the shared access road with access to the site from the rear where the depth of the basement excavation is reduced to about 2.5m and a ramp access can be installed down to the basement. Both material deliveries and muck away will be from the back of the site utilising the shared access. If access is not possible from the shared access road, construction will have to be from the front off Haverstock Hill. Both of these options are explored in more detail in the Construction Management Plan.

6.1.1 The existing shop unit at No 192 is separate from Allingham Court and can be demolished without effecting Allingham Court.
6.1.2 The site will be hoarded and the ground floor slab peckered at the perimeter and internal pile locations
6.1.3 Pilling will be installed from ground level and the top of the piles exposed to construct the capping beam.
6.1.4 Once the piles and capping beams have been inserted the remainder of the ground floor slab will be removed and the basement will be excavated. There are two routes for construction trafic:
- either exiting from the rear of the site, using the shared access back onto Haverstock Hill;
- or using the site frontage along Haverstock Hill.

6.1.5 Whichever vehicle routing is used, a traffic management system will need to be adopted which takes cognisance of the pedestrian traffic.
6.1.6 The piles in the middle of the site will be cut down to basement level.
6.1.7 The pile caps and basement slab will be constructed.
6.1.8 The basement wall will be constructed inside the contiguous piles to give a monolithic box

6.2 Sustainable Construction

The inclusion of a green roof in the scheme will mean that the surface water will be improved.

6.3 Amenity and Landscape

The landscape will be improved with tree planting to the front of the scheme and the green roof.
The retaining wall to the rear will be shallow to minimise its effect on the root canopy to the tree in the rear car park.

6.4 Lightwells

There are no lightwells or roof lights at ground level.

6.5 Third Party Considerations and Impact on Neighbours

<u>Allingham Court and Shared Access</u>
The contiguous piling to the side of Allingham Court and to the shared access will have to be agreed as part of a party wall award with the adjoining owners. These awards will include the appropriate surcharge and stiffness criteria for the design of the contiguous piles as well as condition surveys.

Traffic management is discussed in the Construction Management Plan where pedestrian safety and segregation along the shared access is a key consideration.

London Underground
The pile solution will have to be submitted and agreed with London Underground. As discussed at the meeting with London Underground Asset Managers, the tunnels are unlikely to be effected by the piling. If necessary, verification of this could be made subject to a planning condition.

The shared access separates the basement from Belsize Park Station and consequently the basement will not effect the station foundations.

LB of Camden Highways
The basement is too remote from Haverstock Hill to need to be designed for full Highway Loadings.

6.6 Cumulative Impacts

The environmental setting is such that the impacts of the proposed scheme are minimal and as such there is no cumulative impact.

7 SUMMARY

The site is founded on London Clay as a stable impervious layer and the gradient of the ground is such that there are no problems of ground stability or surface water flooding. This means that there are no concerns with the environmental setting of the site.

The excavation of the new basement will use established piling techniques throughout and will be designed to ensure the stability of the neighbouring properties and shared access highway.

The site investigation has established that there is not a perched water table to the base of the made ground and has obtained strength parameters for the design of the contiguous piles.

There is nothing in this BIA to suggest that the construction of a basement at No 192 Haverstock Hill will have a detrimental impact on the site or neighbouring sites.

Appendix 1: CPG4 Stage 1 Screening

Basement Impact Assessment to CPG4
Stage 1 Screening

Screen	Response	Amplification
Subterranean (groundwater) flow		
GW1. Is the site founded on an aquifer	No	CGHH Fig 8 shows the site is founded on London Clay as a non productive stratum
GW1AWill the basement extend beneath the water table	No	London Clay is an impermeable stratum and there is not a free water surface within the London Clay.
GW1BWill the basement encounter water issues	Possible	There may be water issues on top of the London Clay and with the more permeable fissured or claystone layers within it. These do not constitute a continuous subterranean flow or water table.
GW2. Is the site within 100m of a watercourse	No	CGHH Fig 11 shows that the River Fleet is 400m to the west as the nearest watercourse.
GW3. Is the site within Hampstead Ponds catchment	No	CGHH Fig 14 shows that the Hampstead Ponds catchment is to the north of the site
GW4. Will proportions of impermeable areas change	No	The site is currently 100% impervious
GW5. Will more surface water discharge to ground	No	The current surface water drains will be maintained albeit with the green roof the attenuation of the discharge will be increased
GW6. Is the lowest excavation lower than any nearby water feature.	No	CGHH Fig 12 shows that there are no water features in the vicinity
Ground stability		
Stab1. Are existing slopes > 1 in 8	No	CGHH Fig 16 shows that the slopes on this part of Haverstock Hill are less than 7^{o} [1 in 8]
Stab2. Will remodelled slopes be > 1 in 8	No	There will be no significant remodelling of the slopes
Stab3. Does neighbouring land slope > 1 in 8	No	CGHH Fig 10 shows that the contours on this part of Haverstock Hill are all < 1 in 8
Stab4. Is site on hillside with slope > 1 in 8	No	The topographical survey levels show that the slope along Haverstock Hill is 1 in 21 and along the shared access is 1 in 40
Stab5. Is the site founded on London Clay	Yes	Whilst the site is founded on London Clay, the slopes to the surrounding area are all < 1 in 8
Stab6. Will any trees be felled	No	
Stab7. Is there a history of seasonal movement	No	
Stab8. Is the site within 100m of watercourse or spring	No	CGHH Fig 11 shows that the River Fleet is 400m to the west as the nearest watercourse with a tributary of the River Tyburn spring 250m to the east
Stab9. Is the site on worked ground	No	As a site to the side of Haverstock Hill there is likely to be a superficial made ground mantle associated with previous historic development. The levels demonstrate that there has not been any significant working of the ground
Stab10A Is the site on an aquifer	No	CGHH Fig 8 shows the site is founded on London Clay as a non productive stratum
Stab10. B If so will excavation be below water table	No	See amplification to GW1A
Stab11. Is the site within 50m of Hampstead Ponds	No	

Screen	Response	Amplification
Stab12. Is site within 5m of highway	Carriageway: No Pedestrian Pavement: Yes	The basement along the Haverstock Hill frontage is 3.5m behind the back of the pavement and 7m from the carriageway. The design will need to take cognisance of highway loading on both the Haverstock Hill and share access and contiguous piles will be used to ensure stability of both the highway and shared access.
Stab13. Will the basement increase the differential depth of foundations relative to adjoining properties	Yes	No works will be undertaken on the adjoining foundations will contiguous piles used to ensure that the pressure bulb beneath these and the ground around these is held stable.
Stab14. Is the site over tunnels	Yes	The site is over London Underground deep tunnels. This will affect the foundations but does not have an impact on the slope stability of the site
Surface Water and Flooding		
F1. Is site within Hampstead Ponds Catchment	No	
F2. Material changes in surface water flows	None	
F3. Changes in impervious area	No	
F4. Changes in flow rate onto neighbouring land	No	
F5. Changes in quality of water discharge	No	
F6. Is site in area of risk from surface water flooding	No	The site is not listed in either CPG4 or Floods in Camden [2003] as a road that has suffered from surface water flooding

Stage 2 Scoping

The key areas that need further investigation and clarification are:

- Possible water issues on top of the London Clay or in Claystone bands within the clay
- The site is found on London Clay
- The site is within 5m of the pavement to Haverstock Hill, but is 7m from the carriageway
- The basement will increase the differential depth of foundations relative to neighbouring properties
- The site is situated over London Underground deep tunnels

Appendix 2: Site Photographs

Photo 1 No 192 Haverstock Hill Road with Allingham Court to the North and Belsize Park Station to the south
Note 1 Allingham Court is 5 storeys
2 Crossfall to front of site is 0.5m

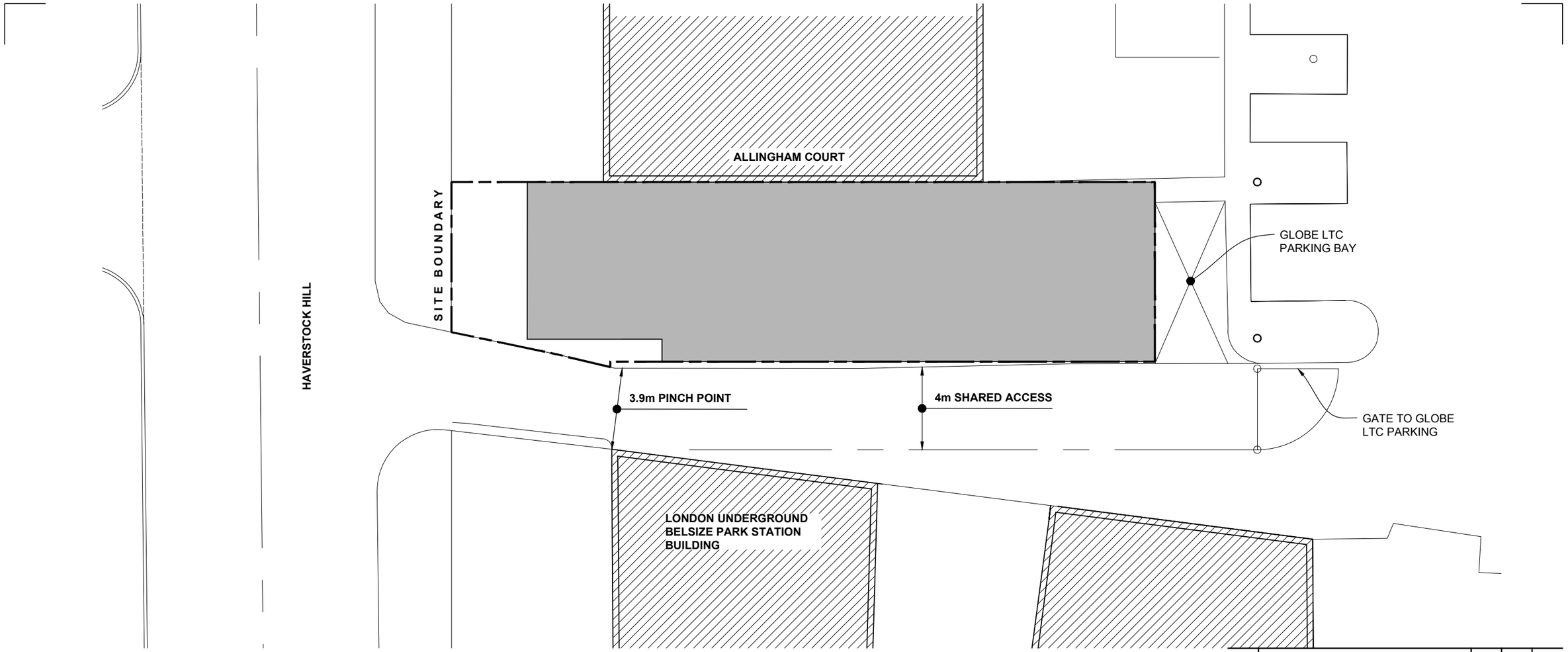
Photo 2 192 Haverstock Hill with shared access to south leading to the Globe Tennis Club to rear.
Note 1 Shared access drops 0.6m along side of shop and 1.0m overall from front to rear

Photo 3 Share drive and rear yard area to No !92
Note 1 Gated access to shared drive at start of parking to Globe Tennis Club

Photo 4 Car parking bays and mature trees behind No 192.

Appendix 3: Drawings

11922/03	Site Block Plan
11922/04	Basement Plan showing piling arrangement
11922/05	Cross section and details showing piling arrangement



Rev.	Description	By	Chkd.	Date

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Client:

Project: 192 Haverstock Hill, NW3

Title: SITE BLOCK PLAN AND SHARED ACCESS

Drawing Status:

Date:	Aug' 12	Drawing No.	Rev.
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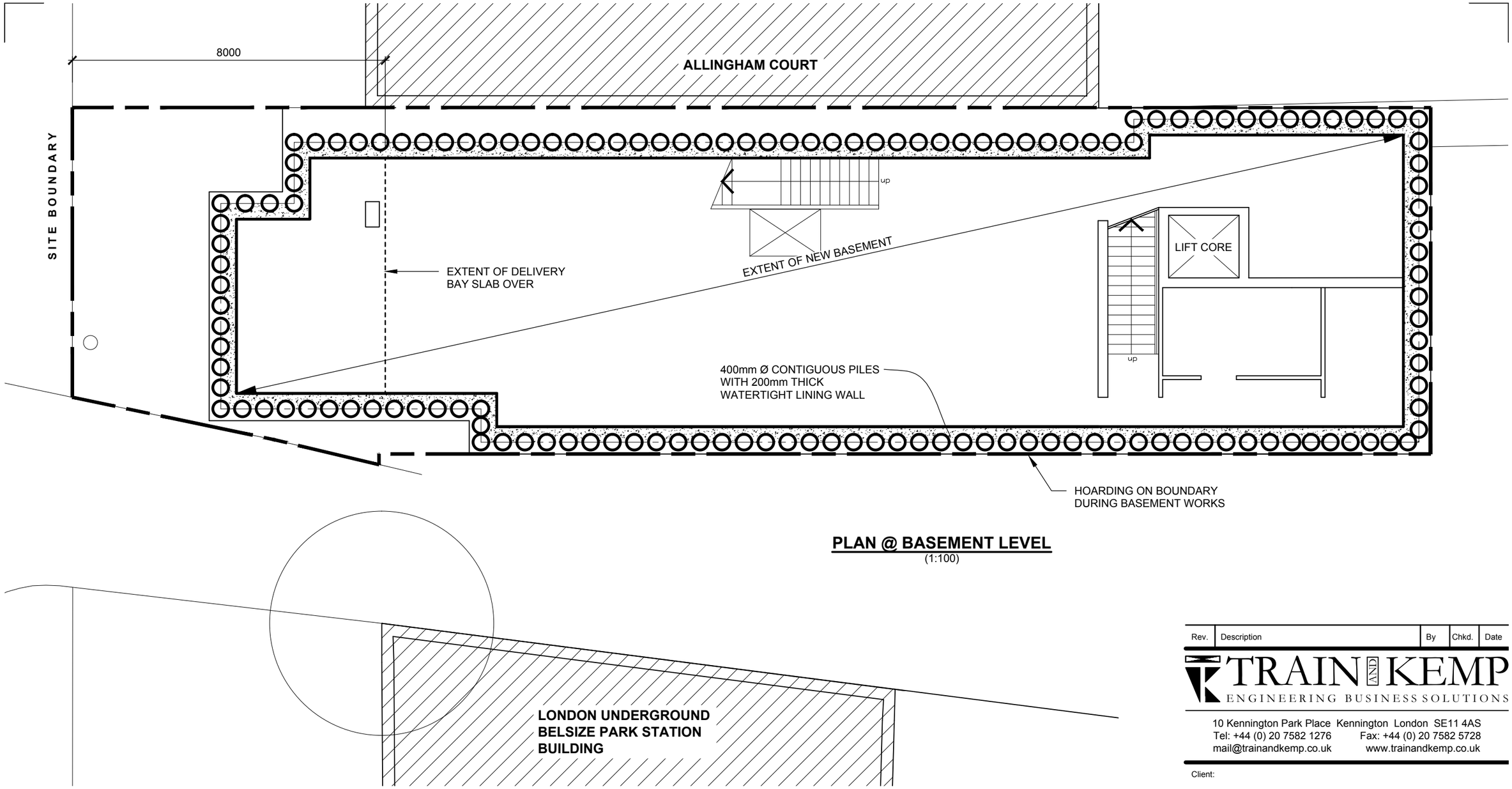
Drawn:	NPM		
Chkd:	NCT		



PLAN @ BASEMENT LEVEL
(1:100)

Rev.	Description	By	Chkd.	Date

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Project: 192 Haverstock Hill, NW3

Title: BASEMENT PLAN SHOWING
PILING ARRANGMENT

Drawing Status:

Date:	Aug' 12	Drawing No.	Rev.
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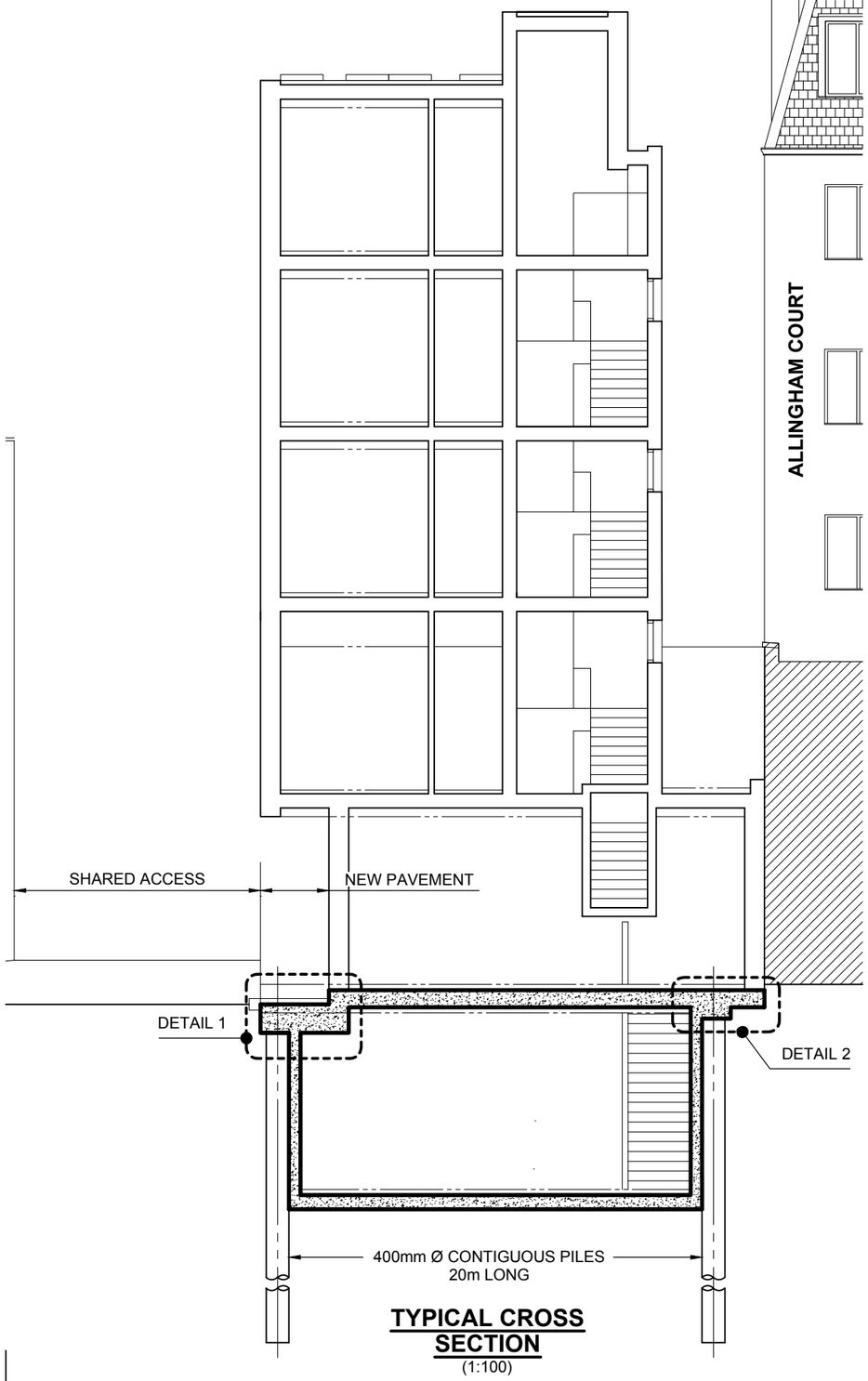
Drawn:	NPM		
Chkd:	NCT		



TYPICAL CROSS SECTION
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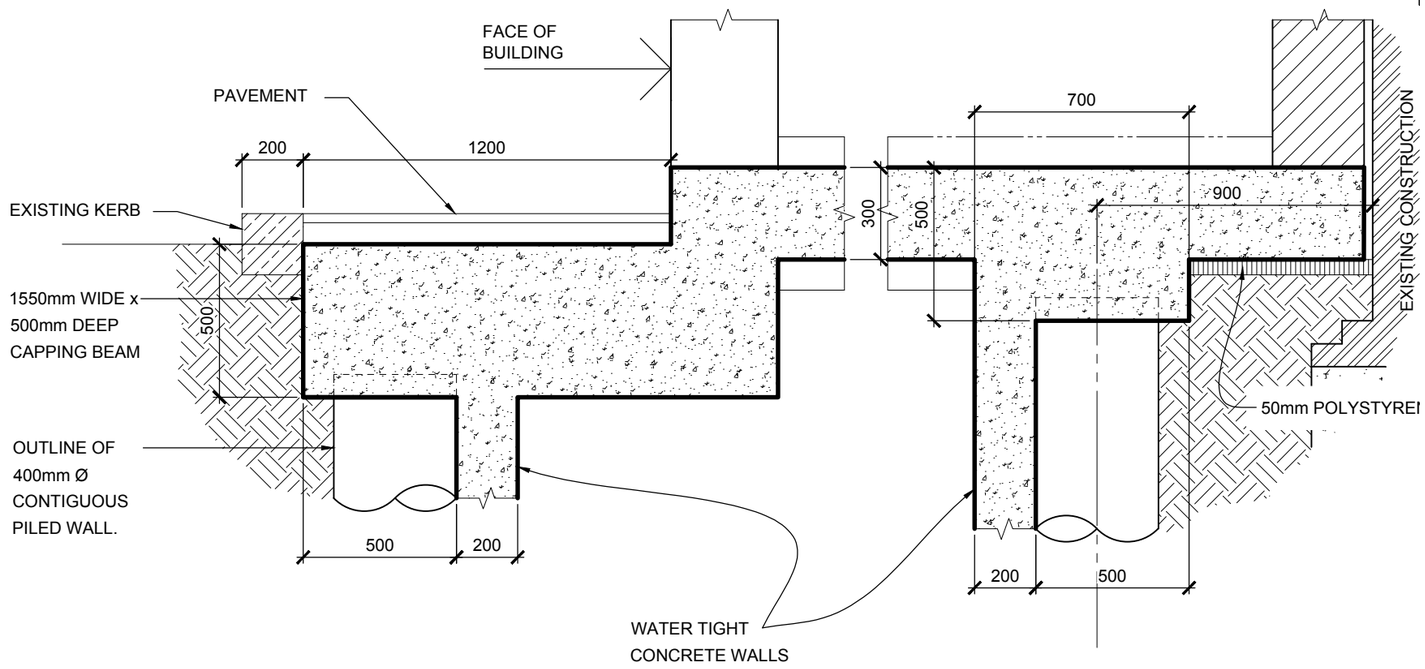

DETAIL 1
CONTIGUOUS PILE WALL
ALONG SHARED ACCESS
(1:20)

DETAIL 2
CONTIGUOUS PILE WALL
ALONG ALLINGHAM COURT
(1:20)

Rev.	Description	By	Chkd.	Date

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Client:

Project: 192 Haverstock Hill, NW3

Title: CROSS SECTION & DETAILS SHOWING PILING ARRANGMENT

Drawing Status:

Date: Aug' 12	Drawing No.	Rev.
Scale: 1:100/20 @ A3	11922/05	
Drawn: NPM		
Chkd: NCT		

Appendix 4: Site Investigation Report

K F GEOTECHNICAL

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G/101203/WJCW/001/ar

8 October 2012

Train and Kemp
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Kennington
London SE11 4AS

For the attention of Norman Train

Dear Norman

192 HAVERSTOCK HILL, LONDON NW3

I have pleasure in enclosing the logs of the two boreholes carried out at the above site, together with a site plan showing the location of the boreholes.

You will note that we encountered fill material at the rear in the shell and auger borehole to just 600mm but 1.6m at the front. Beneath this is firm brown silty clay typical of undisturbed weathered London Clay and at between 6.5m and 7.2m a stiff grey silty clay typical of undisturbed unweathered London Clay.

There was water seepage at 7.3m in borehole 1, and 6.3m in borehole 2 but both boreholes were dry and open on completion.

We assume that the basement formation will be at about 3.0m to 3.5m. The in-situ testing by hand held vane test in borehole 2 indicates a shear strength in the region of 125kPa at this depth, which would equate to a safe bearing capacity of 250kPa. The SPT tests at the same depth give a shear strength after Stroud of 63kPa, which would equate to a safe bearing capacity in the region of 130kPa. The differences are consistent with the on-site descriptions and we therefore have to assume at this stage that they are a reasonable assessment of the in-situ clay conditions.

Water seepage is almost certainly due to thin bands of claystone or lenses of sand which are almost certainly discontinuous as evidenced by the fact that both boreholes were dry on completion and the water seepage was at different depths below ground level

I trust this gives the information you require at present.

Yours sincerely

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Farnborough
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GU14 6BN
Tel: 01252 518821

SITE LOCATION PLAN

Ref: G/101203/101

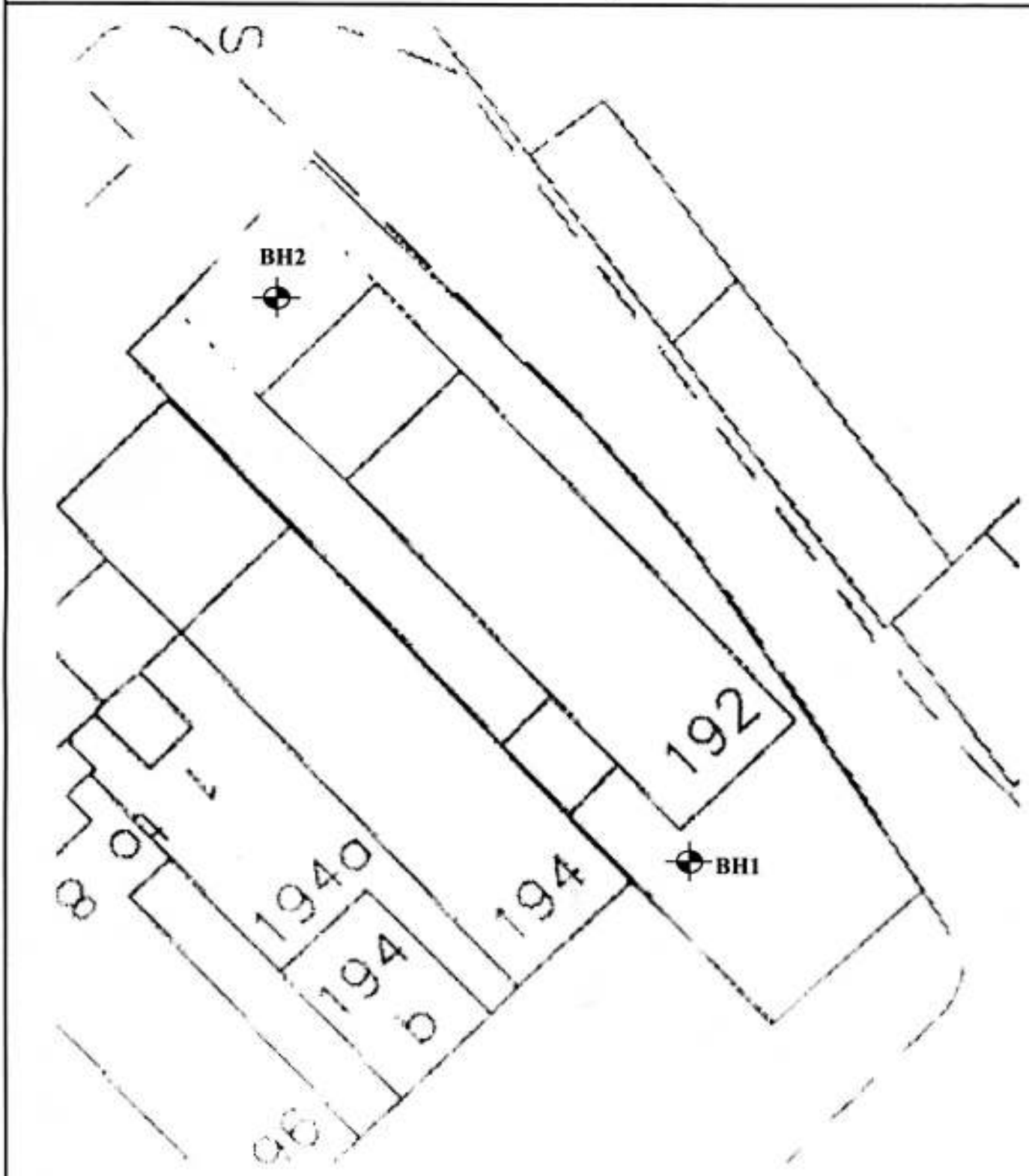
Sheet: 1 of 1

Scale: N/A

Date: 25 September 2012

Client: Train and Kemp

Location: **192 HAVISTOCK HILL, LONDON, NW3**



Remarks:

Key:

⊕	Borehole (BH)	SVP	Soil Vent Pipe	MH	Manhole
▣	Trial pit (TP)	RWP	Rainwater Pipe	G	Gully
●	Soil Samples (S)	⊠	Soakaway (SW)	◈	Tree/Bush (approx. ht in m)

K. F. Geotechnical

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Borehole 1			Ref: G101203
Sheet: 1	Scale: 1:50		Date: 25/9/12
Client: TRAIN AND KEMP			
Equipment & Method : Shell & Auger	Location: 192 HAVERSTOCK HILL, LONDON NW3		

Description of Strata [thickness]	Reduced Level	Legend	Depth	Samples Type	Samples Depth	Tests Type	Tests Value	Field Notes
Block paving and sand (0.10)	-0.10		0.10					
Concrete (0.10)	-0.20		0.20					
MADE GROUND: firm gravelly silty sandy clay (0.40)				D	0.40			
	-0.60		0.60					
Firm brown silty sandy CLAY (0.85)				D	0.80			
				U	1.00		27 BLOWS	
	-1.45		1.45	D	1.45			
Firm brown, grey veined silty CLAY becoming stiffer with depth (5.05)				D	2.00	S	N=19	
				U	3.00		37 BLOWS	
				D	3.45			
				D	4.00	S	N=14	
				U	5.00		46 BLOWS	
				D	5.45			
	-6.50		6.50	D	6.50	S	N=22	
Stiff grey silty CLAY (13.50)								Water seepage at 7.3m
				U	8.00		60 BLOWS	
				D	8.45			
				D	9.50	S	N=25	

Where 0.3m penetration has not been achieved, the number of blows for the quoted penetration is given. (Not the N value)
All depths and reduced levels are in metres.
Water level observations during boring are given on the last sheet of the log.

U Undisturbed Sample
D Disturbed Sample
B Bulk Sample
W Water Sample
S Standard Penetration Test
V Vane Test
MP Mackintosh Probe

Remarks

Borehole dry and open on completion
Standpipe installed to 10m
Borehole cased to 1m

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Description of Strata [thickness]	Reduced Level	Legend	Depth	Samples Type	Samples Depth	Tests Type	Tests Value	Field Notes
				U	11.00		80 BLOWS	
				D	11.45			
				D	12.50	S	N=26	
				U	14.00		96 BLOWS	
				D	14.45			
				D	15.50	S	N=33	
				U	17.00		100 BLOWS	
				D	17.45			
				D	18.50	S	N=38	
				U	19.50		100 BLOWS	
Base of Borehole	-20.00		20.00	D	19.95			

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Borehole 2			Ref: G101203
Sheet: 1	Scale: 1:50		Date: 1/10/12
Client: TRAIN AND KEMP			
Equipment & Method : Restricted Access Flight Auger	Location: 192 HAVERSTOCK HILL, LONDON NW3		

Description of Strata [thickness]	Reduced Level	Legend	Depth	Samples Type	Samples Depth	Tests Type	Tests Value	Field Notes
Concreteving and sand (0.10)	-0.10		0.10					
MADE GROUND: firm gravelly silty sandy clay with brick fragments (1.50)								Roots of live appearance to 1.3m
Stiff brown, grey veined silty CLAY (1.70)	-1.60		1.60	D	2.50			
				D	3.00	V	124	
Very stiff as above (3.90)	-3.30		3.30					
				D	4.00	V	140+	
				D	5.00	V	140+	
				D	6.00	V	140+	
				D D	6.50 6.00	S V	N=22 140+	Slight water seepage at 6.3m
Very stiff grey silty CLAY (7.80)	-7.20		7.20					
				D	8.00	V	140+	
				D	10.00	V	140+	

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Description of Strata [thickness]	Reduced Level	Legend	Depth	Samples Type	Samples Depth	Tests Type	Tests Value	Field Notes
(Continued) Very stiff grey silty CLAY (7.80)				D	12.00	V	140+	
Base of Borehole	-15.00		15.00	D	15.00			

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