Basement Impact Assessment

in connection with proposed development at

No. 6 Kentish Town Road
Camden
London
NW1 9LG

for

Kentish Town Spaces (UK) Ltd

LBH4581 Ver. 1.0

September 2019

LBH WEMBLEY

ENGINEERING

Document Control

Version	Date	Comment		Authorised
			Darcy Kitson-Boyce MEng (Hons) GMICE FGS FRGS	Seamus Lefroy-Brooks BSc(hons) MSc CEng MICE CGeol FGS CEnv MIEnvSc FRGS SiLC RoGEP UK Registered Ground Engineering Adviser NQMS SQP DoWCoP QP
0.1	13th June 2019	Draft Issue	DKB	SRLB
1.0	4th September 2019	Issue for Planning		

LBH WEMBLEY ENGINEERING

12 Little Balmer

Buckingham Industrial Park

Buckingham

MK18 1TF

Tel: 01280 812310

email: enquiry@lbhgeo.co.uk

website: www.lbhgeo.co.uk

Executive Summary

It is proposed to construct a single level of basement beneath the entire footprint of an existing commercial property at No. 6 Kentish Town Road.

This report provides an assessment of the potential impacts that the basement development may have upon the surrounding area, neighbouring structures and the local environment.

Geology

The proposed basement will extend into the London Clay.

Hydrogeological Impacts

There is no shallow groundwater table at this site and hence no scope for the basement to cause adverse hydrogeological impacts to be caused by the proposed basement construction.

Hydrological Impacts

There will be no change to the flood risk at the site or neighbouring sites.

A SuDS scheme is to be included as part of the development.

Stability Impacts

Ground movement assessments have been undertaken to demonstrate the acceptability of the proposed construction methodology upon the neighbouring structures, resulting in a prediction of Burland Category 0 (Negligible) damage.

Conclusion

The assessment concludes that no adverse residual or cumulative stability, hydrological or hydrogeological impacts are expected to either neighbouring structures or the wider environment as a result of this development.

Contents

Foreword-Guidance Notes

GENERAL

This report has been prepared for a specific client and to meet a specific brief. The preparation of this report may have been affected by limitations of scope, resources or time scale required by the client. Should any part of this report be relied on by a third party, that party does so wholly at its own risk and LBH WEMBLEY disclaims any liability to such parties.

The observations and conclusions described in this report are based solely upon the agreed scope of work. LBH WEMBLEY has not performed any observations, investigations, studies or testing not specifically set out in the agreed scope of work and cannot accept any liability for the existence of any condition, the discovery of which would require performance of services beyond the agreed scope of work.

VALIDITY

Any use of or reliance upon the report in circumstances other than those for which it was commissioned shall be at the client's sole risk. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should therefore not be relied upon in such altered circumstances.

THIRD PARTY INFORMATION

The report may present an opinion based upon information received from third parties. However, no liability can be accepted for any inaccuracies or omissions in that information.

1. Introduction

1.1 Background

It is proposed to deepen the existing cellar beneath the entire footprint of the existing property at No. 6 Kentish Town Road to provide a full height basement space.

1.2 Brief

LBH WEMBLEY have been appointed by Kentish Town Spaces (UK) Ltd to complete a Basement Impact Assessment (BIA) in support of a forthcoming planning application to be submitted to the London Borough of Camden, in order to satisfy the specific requirements of the 2018 Camden Planning Guidance (CPG) on Basements, and associated 2010 Camden Geological, Hydrogeological and Hydrological Study.

1.3 Planning Policy

The 2017 Camden Local Plan Policy A5 Basements reads as follows:

"The Council will only permit basement development where it is demonstrated to its satisfaction that the proposal would not cause harm to:

a) neighbouring properties;
b) the structural, ground, or water conditions of the area;
c) the character and amenity of the area;
d) the architectural character of the building; and
e) the significance of heritage assets.
In determining proposals for basements and other underground development, the Council will require an assessment of the scheme's impact on drainage, flooding, groundwater conditions and structural stability in the form of a Basement Impact Assessment and where appropriate, a Basement Construction Plan.

The siting, location, scale and design of basements must have minimal impact on, and be subordinate to, the host building and property. Basement development should:

f) not comprise of more than one storey;
g) not be built under an existing basement;
h) not exceed 50% of each garden within the property;
i) be less than 1.5 times the footprint of the host building in area;
j) extend into the garden no further than 50% of the depth of the host building measured from the principal rear elevation;
k) not extend into or underneath the garden further than 50% of the depth of the garden;
l) be set back from neighbouring property boundaries where it extends beyond the footprint of the host building; and
m) avoid the loss of garden space or trees of townscape or amenity value.

Exceptions to f. to k. above may be made on large comprehensively planned sites.

The Council will require applicants to demonstrate that proposals for basements:

n. do not harm neighbouring properties, including requiring the provision of a Basement Impact Assessment which shows that the scheme poses a risk of damage to neighbouring properties no higher than Burland Scale 1 'very slight';
o. avoid adversely affecting drainage and run-off or causing other damage to the water environment;
p. avoid cumulative impacts;
q. do not harm the amenity of neighbours;
r. provide satisfactory landscaping, including adequate soil depth;
s. do not harm the appearance or setting of the property or the established character of the surrounding area;
t. protect important archaeological remains; and
u. do not prejudice the ability of the garden to support trees where they are part of the character of the area.

The Council will not permit basement schemes which include habitable rooms and other sensitive uses in areas prone to flooding.

We will generally require a Construction Management Plan for basement developments.

Given the complex nature of basement development, the Council encourages developers to offer security for expenses for basement development to adjoining neighbours."

The following policies in the Local Plan are also relevant to basement development and will be taken into account when assessing basement schemes:

- "Policy A2 Open space";
- "Policy A3 Biodiversity";
- "Policy D1 Design";
- "Policy D2 Heritage"; and
- "Policy CC3 Water and flooding".

In addition to the Local Plan Policy, Camden publishes Camden Planning Guidance on Basements and Lightwells. These CPG documents do not carry the same weight as the main Camden Development Plan documents (including the above Policy A5) but they are important supporting documents.

1.4 Report Structure

This report commences with a desk study and characterisation of the site, before progressing to BIA screening and scoping assessments, whereby consideration is given to identifying the potential hydrogeological, hydrological and stability impacts to be associated with the proposed development.

A ground model is then developed, which is followed by an outline construction methodology and an assessment of the potential ground movements affecting the neighbouring structures.

Finally, an assessment of the potential impacts of the proposed scheme is presented.

1.5 Documents Consulted

2019 Jul	Existing Basement Drawing by Ambigram Architects	Ref. aa_1703 E103
2019 Jul	Existing Ground Floor Drawing by Ambigram Architects	Ref. aa_1703 E103
2019 Jul	Existing Section BB by Ambigram Architects	Ref. aa_1703 E302
2019 Jul	Existing Section AA by Ambigram Architects	Ref. aa_1703 E301
2019 Jul	Proposed Ground Floor Drawing by Ambigram Architects	Ref. aa_1703 P102
2019 Jul	Proposed Basement Drawing by Ambigram Architects	Ref. aa_1703 P101
2019 Jul	Proposed Section BB by Ambigram Architects	Ref. aa_1703 P302
2019 Jul	Proposed Section AA by Ambigram Architects	Ref. aa_1703 P301
2019 Sep	Outline SuDS Strategy by LBH WEMBLEY ENGINEERING	Ref: LBH4577suds v1.0

2. The Site

2.1 Site Location

Location Plan

The site is situated on the eastern side of Kentish Town Road, approximately 40m to the northeast of Camden Town underground station.

The site may be located approximately by postcode NW1 9LG or by National Grid Reference 528940, 183935.

2.2 Topographical Setting

The site lies on a very gentle southeastwards falling slope on the west bank of the now culverted River Fleet, which runs approximately 200m from the site.

Extract from Figure 16 of the CGHHS

2.3 Site Description

The site is occupied by a late 19th Century three storey terraced building with a mansard roof and a cellar beneath the entire building footprint. The ground floor level of the property is set at approximately +26.3m OD, with the existing cellar floor understood to extend to approximately 2.5m depth.

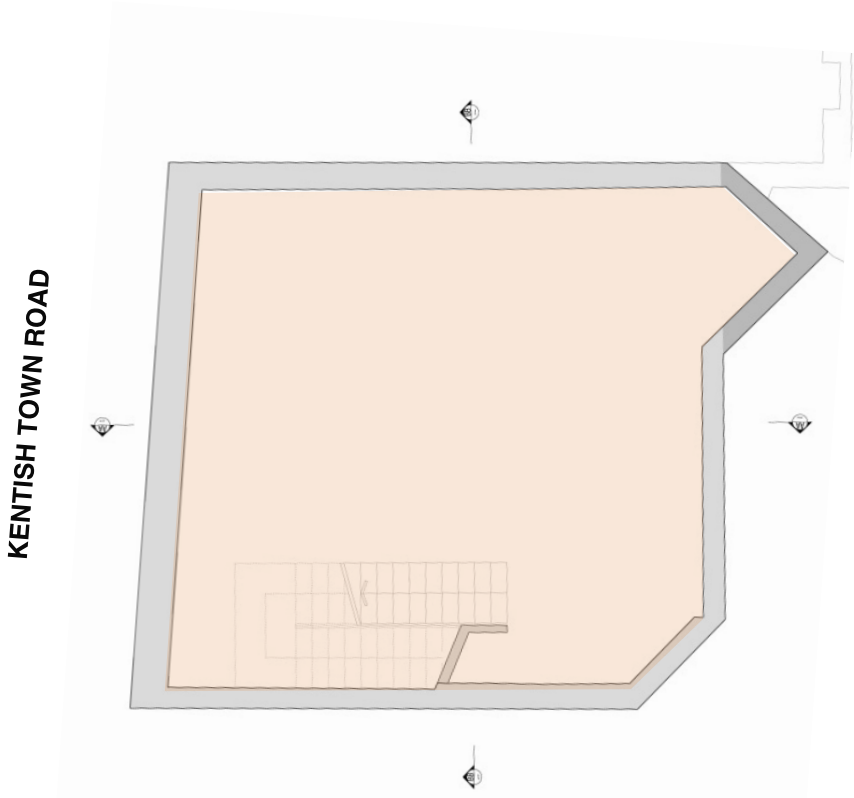
No. 4 Kentish Town Road, a similarly constructed three storey building, borders the site to the south.

To the north lies another similarly constructed three storey building at No. 8 Kentish Town Road; which has recently been redeveloped to create an approximately 4m deep basement, involving underpinning of the party wall with No. 6.

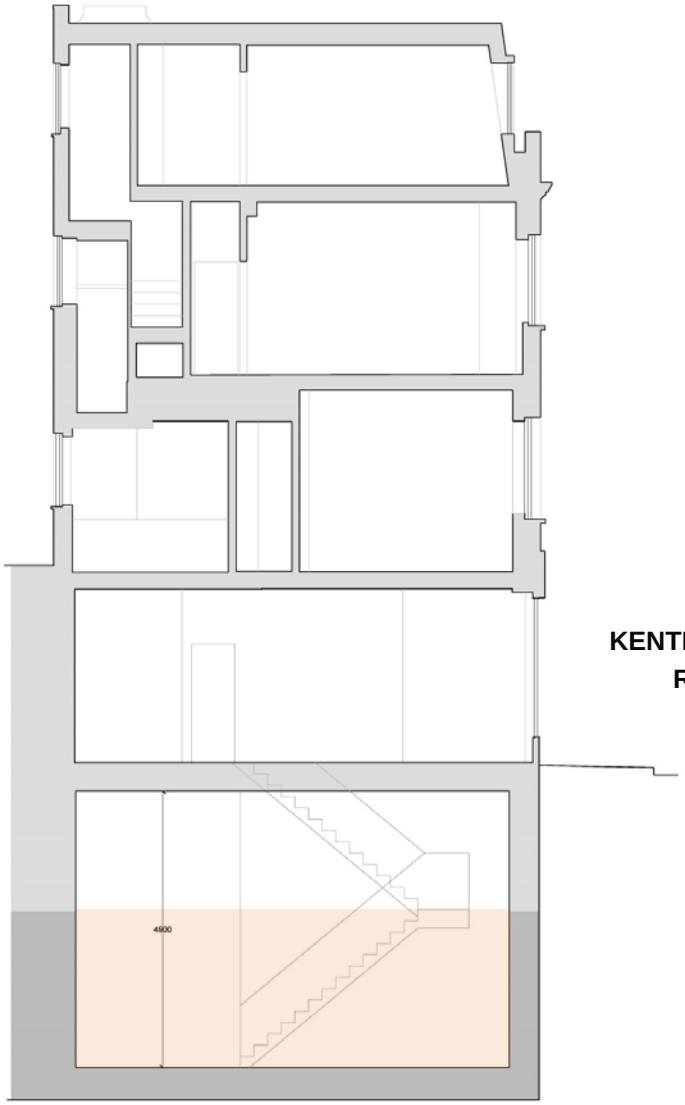
To the rear the site adjoins the three storey terraced building at Nos. 1 – 3 Camden Road. A recent redevelopment of this property included excavation and construction of an approximately 4m deep basement; hence the rear party wall to No. 6 Kentish Town Road has been underpinned to a similar depth.

2.4 Proposed Development

It is proposed to deepen the existing cellar beneath the entire footprint of the building by approximately 3m to create a single storey basement with internal headroom of 4.9m, extending to approximately 5.5m depth below street level (approx. +21m OD).



Proposed Basement Plan



Proposed Section Drawing
(Proposed basement excavation highlighted orange)

3. Desk Study

3.1 Site History

Earlier buildings on and adjacent to the site were demolished at the end of the 19th century and replaced by the existing row of terraced buildings. A mansard roof was later added to No. 6 Kentish Town Road.

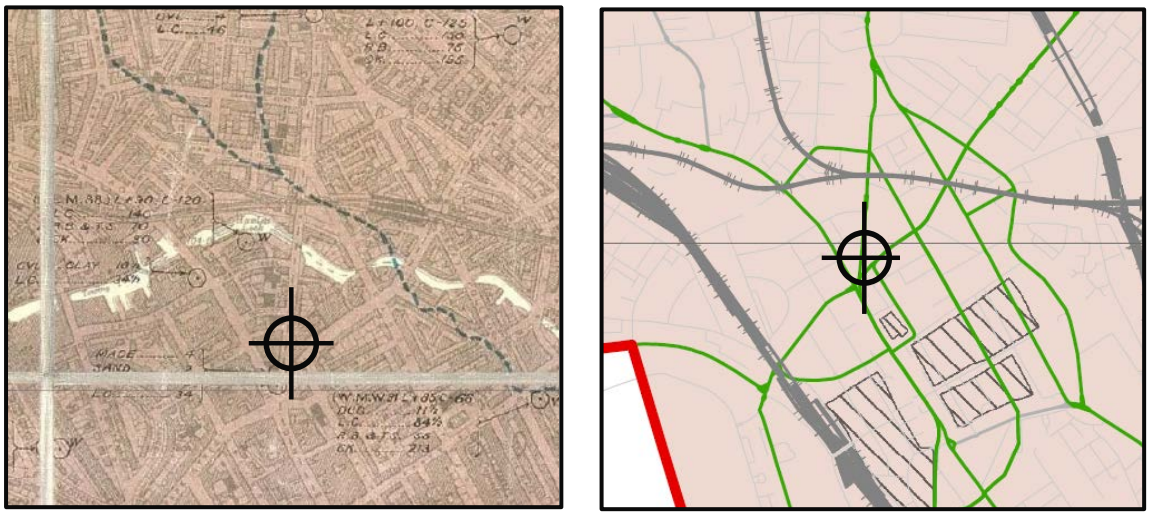
The site itself has remained relatively unchanged, albeit extensive redevelopment has recently taken place in the surrounding area.

Nos. 1-3 Camden Road has recently been developed, including conversion of the upper floors to provide residential accommodation and excavation of a single storey basement.

Basements have also recently been excavated beneath No. 8 & Nos. 10-12 Kentish Town Road, adjoining the site to the north, and it is understood that planning approval has been granted for a basement beneath No. 3a Camden Road to the rear of the site.

3.2 Geological Information

The British Geological Survey (BGS) records indicate that the site is underlain by the London Clay Formation.



Extracts of Figure 2 (left) and Figure 3 (right) of the CGHHS

3.3 Hydrogeological Information

The London Clay Formation may be considered virtually impermeable; hence no significant groundwater flow is expected to occur beneath the site.

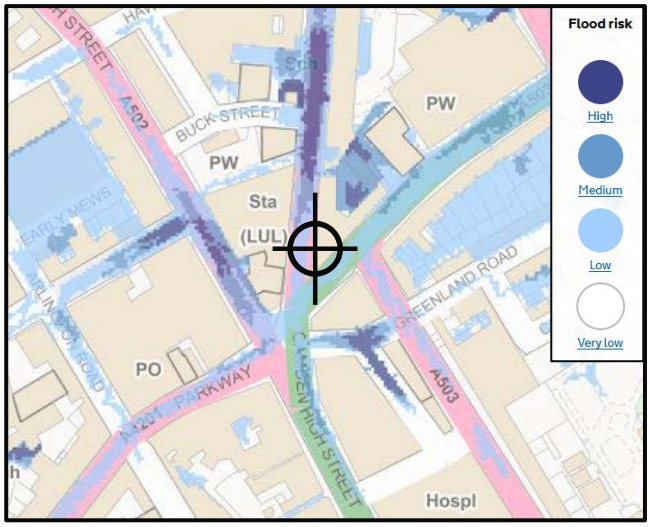
3.4 Hydrological, Drainage and Flood Risk Information

Figure 2 of the CGHHS (above) indicates that the River Fleet passes approximately 200m to the northeast of the site. There are no surface water features in the vicinity of the site.

Environment Agency (EA) surface water flood maps indicate that the site itself is at a very low risk, although Kentish Town Road is at a low risk of surface water flooding.

Figure 6 of the Camden SFRA indicates that the site lies within a Critical Drainage Area (Group 3 003).

The existing building occupies the entirety of the site.



Extract of EA surface water flood risk map

4. Screening & Scoping Assessments

The Screening & Scoping Assessments have been undertaken with reference to Appendices E and F of the CGHSS, which is a process for determining whether or not a BIA is usually required.

4.1 Screening Assessment

The Screening Assessment consists of a series of checklists that identifies any matters of concern relating to the following:

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

4.1.1 Screening Checklist for Subterranean (Groundwater) Flow

Question	Response	Justification
Is the site is located directly above an aquifer?	**No**	The Environment Agency (EA) maps indicate that the site is not underlain by an aquifer.
Will the proposed basement extend beneath the water table surface?	**No**	
Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	**No**	The nearest watercourse is the culverted River Fleet, approximately 200m to the northeast of the site.
Is the site within the catchment of the pond chains on Hampstead Heath?	**No**	See CGHHS Fig.14.
Will the proposed development result in a change in the area of hard-surfaced/paved areas?	**No**	Both the existing site and proposed development are entirely hard surfaced.
Will more surface water (e.g. rainfall and run-off) than at present will be discharged to the ground (e.g. via soakaways and/or SUDS)?	**No**	All surface water falling within the development will be attenuated and discharged to the Thames Water combined sewer.
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?	**No**	See CGHHS Fig.12.

4.1.2 Screening Checklist for Surface Flow and Flooding

Question	Response	Justification
Is the site within the catchment area of the pond chains on Hampstead Heath?	**No**	See CGHHS Fig.14.
As part of the site drainage, will surface water flows (e.g. rainfall and run-off) be materially changed from the existing route?	**No**	The existing drainage arrangement will be maintained.
Will the proposed basement development result in a change in the proportion of hard-surfaced/paved areas?	**No**	Both the existing site and proposed development are entirely hard surfaced.
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?	**No**	The existing drainage arrangement will be maintained.
Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	**No**	The existing drainage arrangement will be maintained.
Is the site in an area known to be at risk from surface water flooding, or is it at risk from flooding for example because the proposed basement is below the static water level of a nearby surface water feature?	**No**	Although Kentish Town Road is indicated to be at a low risk of surface water flooding, the site itself is indicated to be at a very low risk.

4.1.3 Screening Checklist for Stability

Question	Response	Justification
Does the existing site include slopes, natural or manmade, greater than 7 degrees?	**No**	There are no slopes greater than 7 degrees within the site.
Does the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7 degrees?	**No**	No re-profiling is planned at the site.
Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees?	**No**	There are no slopes greater than 7 degrees within the development land.

Is the site within a wider hillside setting in which the general slope is greater than 7 degrees?	**No**	Figure 6 of the CGHHS indicates that the general slope of the wider hillside is less than 7 degrees.
Is London Clay the shallowest strata at the site?	**Yes**	The site is underlain by London Clay.
Will trees be felled as part of the proposed development and/or are works proposed within tree protection zones where trees are to be retained?	**No**	There are no trees on the site.
Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	**No**	
Is the site within 100m of a watercourse of a potential spring line?	**No**	The nearest watercourse is the culverted River Fleet, roughly 200m to the northeast of the site.
Is the site within an area of previously worked ground?	**No**	The British Geological Survey (BGS) records do not indicate that the site lies within an area of previously worked ground.
Is the site within an aquifer?	**No**	The Environment Agency (EA) maps indicate that the site is not underlain by an aquifer.
Will the proposed basement extend beneath the water table such that dewatering may be required during construction?	**No**	
Is the site within 50m of the Hampstead Heath ponds?	**No**	See CGHHS Fig.14.
Is the site within 5m of a highway or pedestrian right of way?	**Yes**	The proposed basement adjoins the pedestrian right of way on Kentish Town Road.
Will the proposed basement significantly increase the differential depth of foundations relative to the neighbouring properties?	**Yes**	The proposed basement will increase the differential depth to foundations to No. 4 and No. 8 Kentish Town Road as well as Nos. 1a – 3 Camden Road.
Is the site over (or within the exclusion zone of) tunnels, e.g. railway lines?	**Yes**	The LUL Northern Line tunnels run beneath the pavement to Kentish Town Road, adjacent to the site.

4.2 Scoping Assessment

Where the checklist is answered with a “yes” or “unknown” to any of the questions posed in the flowcharts, these matters are carried forward to the scoping stage of the BIA process. The other potential concerns considered within the screening process have been demonstrated to be not applicable or not significant when applied to the proposed development.

The scoping produces a statement which defines further the matters of concern identified in the screening stage. This defining should be in terms of ground processes, in order that a site specific BIA can be designed and executed (Section 6.3 of the CGHHS).

4.2.1 Scoping for Stability

- **Is the London Clay the shallowest strata at the site?**

The guidance advises that of the soil strata present in LB Camden, the London Clay is the most prone to seasonal shrink-swell (subsidence and heave).

- **Is the site within 5m of a highway or pedestrian right of way?**

The guidance advises that excavation for a basement may result in damage to the road, pathway or any underground services buried in trenches beneath the road or pathway.

- **Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?**

The guidance advises that excavation for a basement may result in structural damage to neighbouring properties if there is a significant differential depth between adjacent foundations.

- **Is the site over (or within exclusion zone of) any tunnels, e.g. railway lines?**

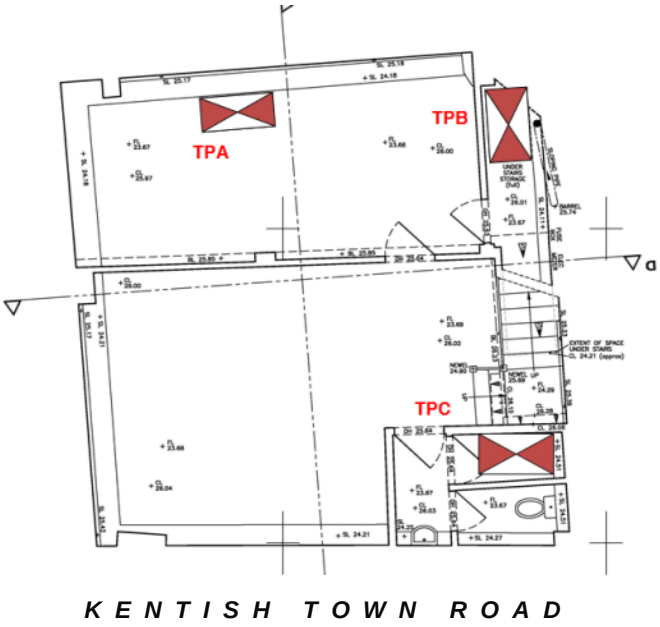
The guidance advises that excavation for a basement may result in damage to the tunnel.

5. Site Investigation

An intrusive ground investigation, comprising three hand excavated trial pits was undertaken in August 2019.

The adjacent site plan indicates the approximate locations of the exploratory positions, while the associated records are appended.

Previous ground investigations undertaken at neighbouring properties No. 8 Kentish Town Road and No. 3a Camden Road have also been studied.



5.1 Ground Conditions

The London Clay is present at shallow depth below the existing cellar, and is recorded to comprise typical firm, becoming stiff, pale brown silty clay.

5.2 Groundwater

No shallow groundwater table is present beneath the site.

6. Outline Basement Construction Methodology

6.1 Excavation

The basement deepening will require approximately 3m of excavation and will extend down into the London Clay Formation.

The basement perimeter walls will be formed by conventional underpinning and the construction of L-shaped reinforced concrete segments excavated and cast in-situ in a 'hit and miss' sequence of 1m wide sections.

Given the depth of the existing cellar, the front wall and party wall with No. 4 Kentish Town Road will be around 3m; thus a single stage of underpinning will be required.

The party wall with No. 8 Kentish Town Road is already underpinned to the required depth by virtue of the existing basement at this property.

Nos. 1a – 3 Camden Road is understood to include a basement; however, given the depth of the proposed basement at No. 6, a single stage of underpinning of no more than 2m is envisaged.

A small wedge-shaped area in the far rear of No. 6 will also require underpinning is set at ground level; however, the rear party wall with No. 3a Camden Road is expected to be underpinned to approximately 5.5m depth prior to the development of No. 6.

During the works, temporary propping will be installed to ensure that lateral ground movements are minimised. As a precursor to the main basement excavation, it is envisaged full width propping will be provided at the existing basement floor level to restrain the newly underpinned walls during the excavation.

As the main basement excavation proceeds, additional temporary propping will be installed at lower levels where necessary to ensure that lateral ground movements are prevented.

In the permanent situation the reinforced concrete underpins will connect to the basement slab and the new ground floor slab to form a rigid concrete box to support the vertical structural loading of the overlying building. Both the basement raft slab and the ground floor slab will act as props.

6.1.1 Waterproofing

There is potential for water to collect around the basement in the long term. Hence, the basement is to be fully waterproofed and designed to withstand hydrostatic pressures in accordance with BS8102:2009, Code of Practice for the Protection of Below-Ground Structures against Water from the Ground. An assumed hydrostatic level at 1m depth is to be adopted for the purposes of assessing hydrostatic pressures.

6.1.2 Basement Heave

Although there is in this case a limited depth of excavation, there may still be some potential for residual heave.

An assessment of the likely extent of any long term uplift is made in Section 7 of this report.

6.2 Underpinning

Underpinning sections will be excavated in short widths not exceeding 1000mm.

The sequence of the underpinning will be in an extended 1, 3, 5, 2, 4 & 6 type numbering sequence, such that any given underpin will be completed, dry packed, and a minimum period of 48 hours lapsed before and adjacent excavation is commenced to form another underpin.

Each pin excavation will be undertaken only under the direct supervision of a suitably experienced and competent person. In the event that the vertical soil face to an underpin is judged to be potentially unstable, face support and lateral propping will be provided by perforated plywood sheeting supported by timber walings held by adjustable steel trench “acrow” props.

6.3 Retaining Walls

The following parameters may be considered in the design of the retaining walls:-

Suggested Retaining Wall Design Parameters			
Stratum	**Bulk Unit Weight**	**Effective Cohesion**	**Effective Friction Angle**
	(kN/m^3)	(c' - kN/m^2)	(ϕ'- degrees)
London Clay	20	Zero	25

6.4 Underground Infrastructure

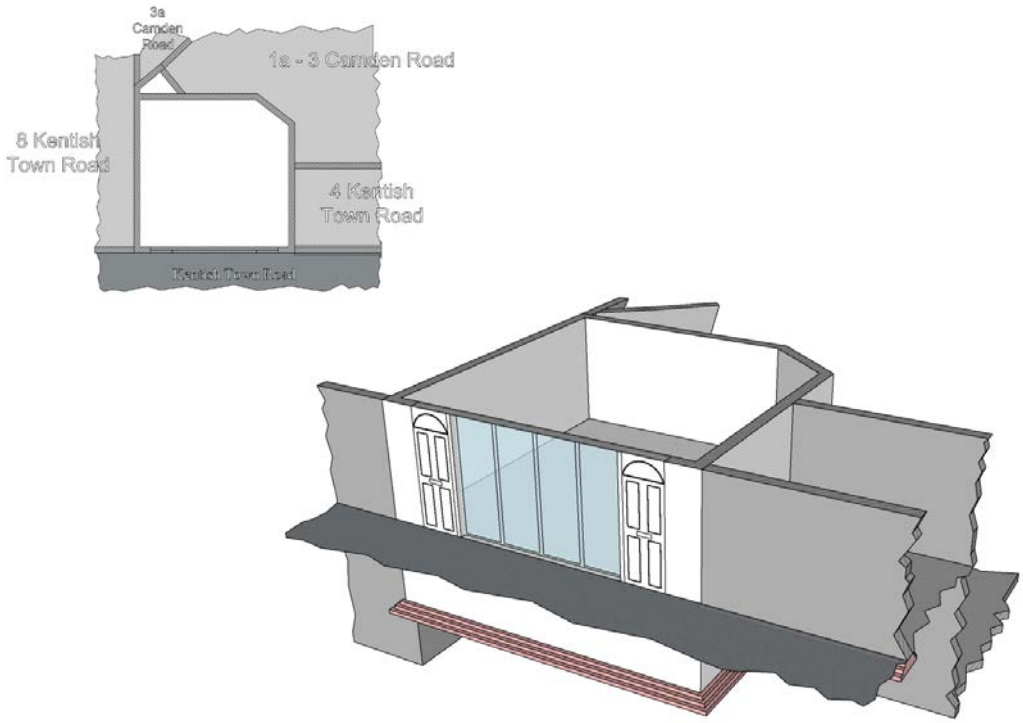
The southbound and northbound tunnels of the Northern Line, High Barnet branch are present at depth underneath Kentish Town Road, adjacent to the west of the property. Due to the lateral proximity of the tunnels to the proposed basement development, a separate Asset Impact Assessment is expected to be required to be undertaken in order to reassure Transport for London (TfL) that no adverse effects on the tunnels will be imposed.

A 230mm diameter combined sewer is indicated to the rear of the property, within the extent of No. 3a Camden Road boundary.

A historical drawing of No. 6 Kentish Town Road also indicates a sewer present beneath the existing cellar.

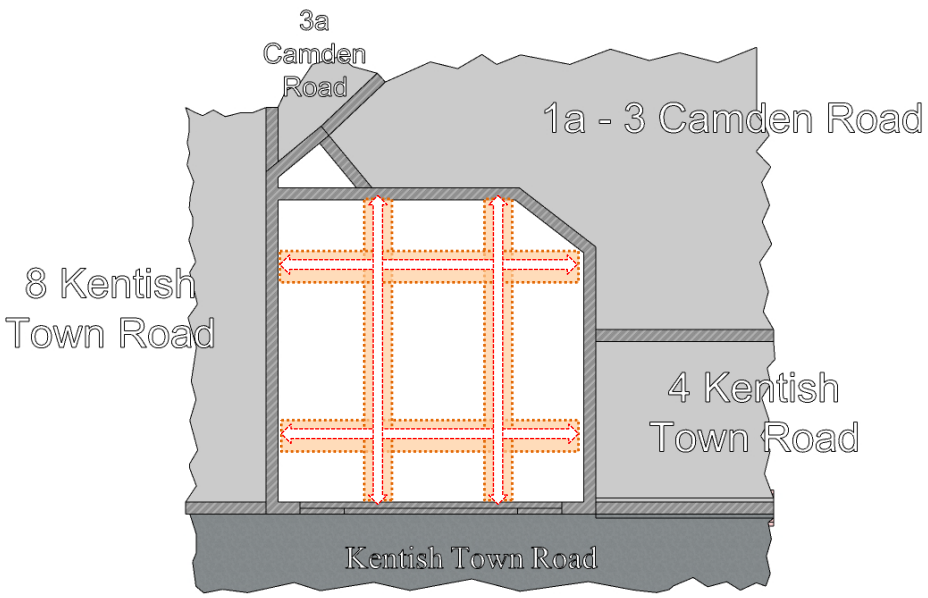
This sewer will need to be investigated further and, if still in use, it will be necessary to re-route the sewer as part of the development.

6.5 Construction Sequence

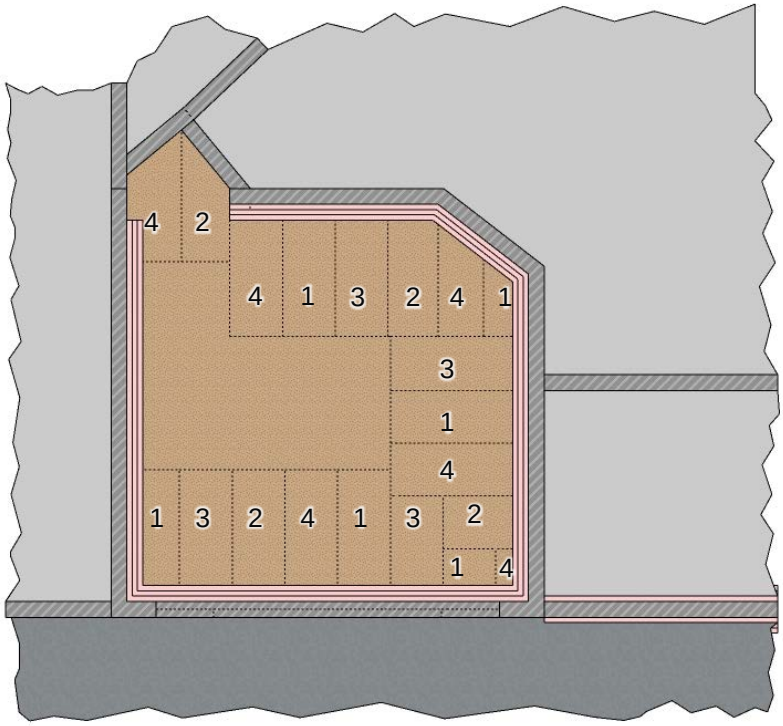


The following indicative construction sequence is proposed, and will be subject to detailed design by a structural engineer:

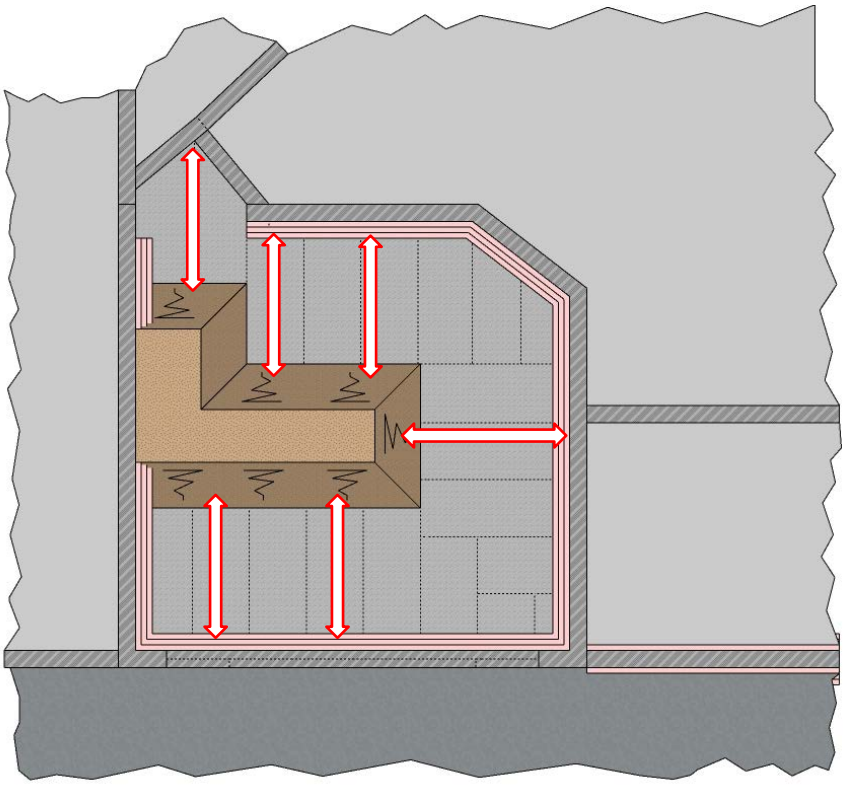
1. Install temporary propping at existing basement floor level in shallow trenches across the building footprint.

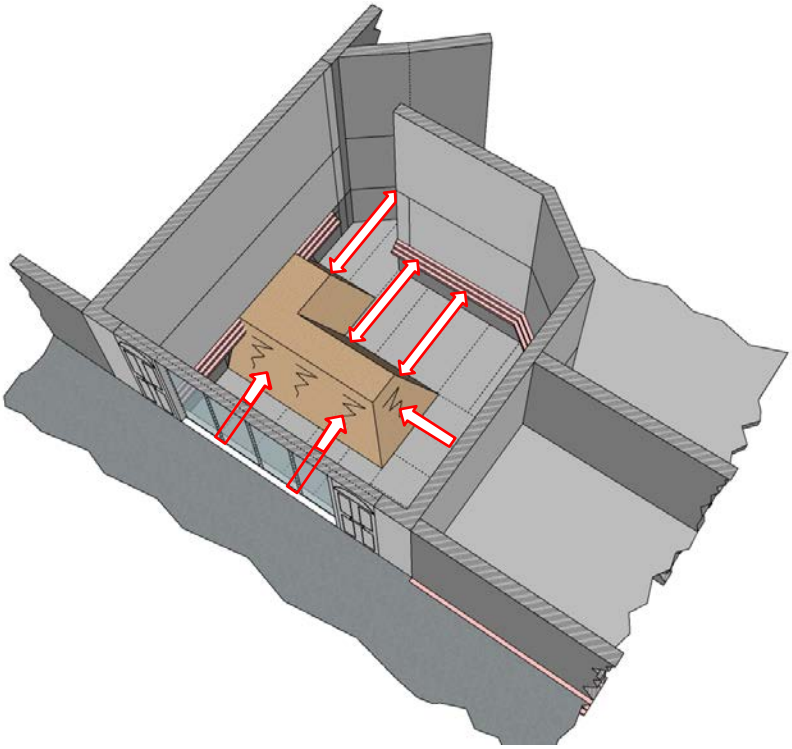


2. Underpin the façade and the perimeter party walls of the property in reinforced concrete L-sections. Suggested underpinning sequence presented below.

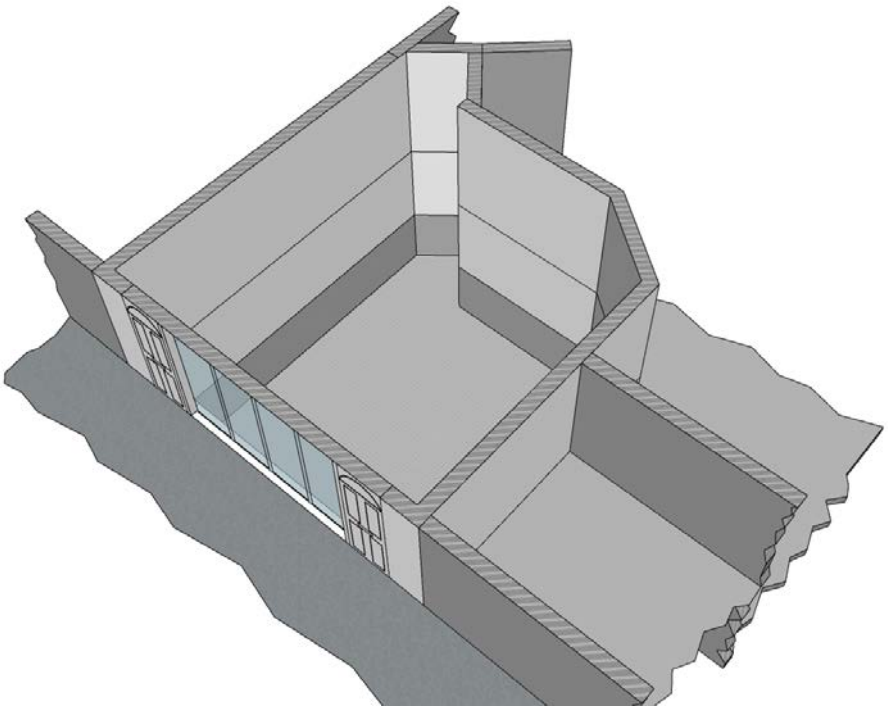


3. Install propping at proposed basement level across the constructed underpinning.



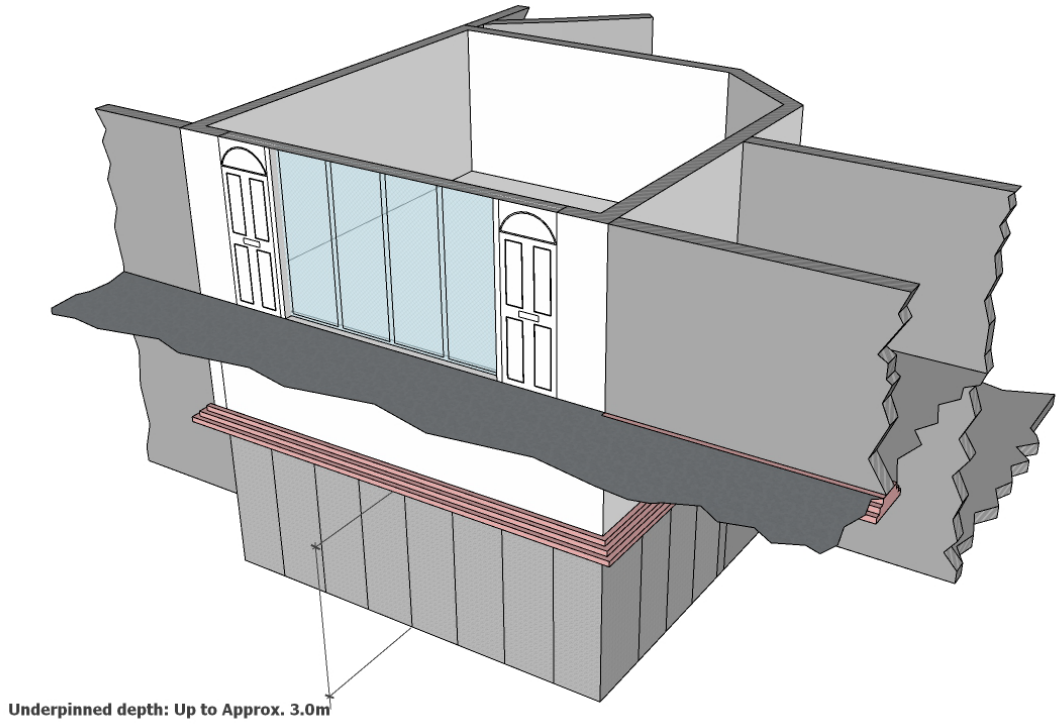


4. Commence excavation of the remaining soil in the eastern part of the basement.



5. Install below-slab drainage for foul and ground water, sumps and pumps.
6. Place slab reinforcement and cast remaining basement slab.
7. Remove low level temporary propping.
8. Construct basement liner walls, membranes, cavity drainage, insulation and screed.

9. Construct ground floor slab.
10. Remove ground level propping.



Finished basement development

7. Ground Movement to Neighbouring Properties

Camden Council seeks to ensure that harm will not be caused to neighbouring properties by basement development.

Camden Local Plan (June 2017) states that the BIA must demonstrate that the proposed basement scheme has a risk of damage to the neighbouring properties no higher than Burland Scale 1 'Very Slight'.

7.1 Structures Assessed for Ground Movement

7.1.1 No. 8 Kentish Town Road

No. 8 Kentish Town Road is already underpinned to the required depth by virtue of the existing basement at this property.

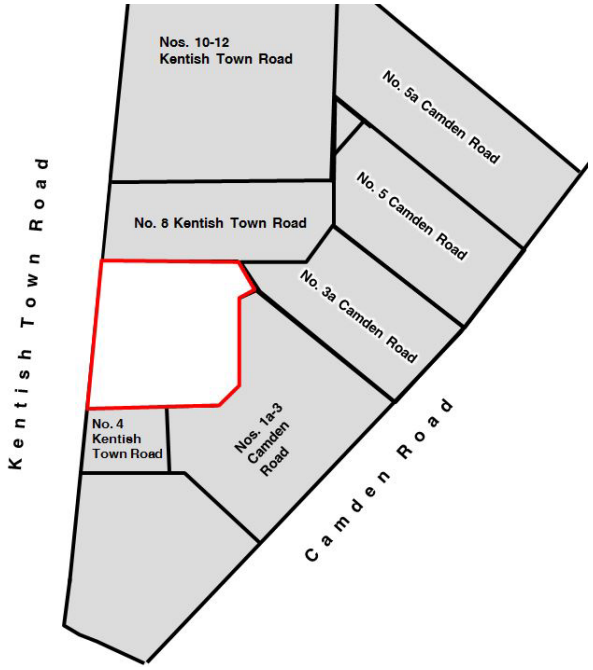
7.1.2 No. 3a Camden Road

No. 3a Camden Road shares a limited party wall with No. 6; which is expected to be underpinned to approximately 5.5m depth during the forthcoming basement excavation at No. 3a.

7.1.3 No. 4 Kentish Town Road

No. 4 Kentish Town Road is a three storey terraced building that adjoins the site to the south.

It is understood that this property does not include a basement and the party wall is likely to be supported by a strip foundation extending to the depth of the adjoining cellar at 6 Kentish Town Road.



Plan showing the nearby basements (tinted grey)

Approximately 3m depth of underpinning will therefore be required.

7.1.4 Nos. 1a – 3 Camden Road

Nos. 1a – 3 Camden Road is a three storey terraced building that adjoins the site to the southwest.

This building comprises a basement beneath the full extent of the building, which is understood to extend to approximately 4m depth; hence a single stage of underpinning of approximately 1.5m depth will be required.

7.2 Modelled Ground Conditions

Excavation of the basement will result in unloading of the clay leading to theoretical heave movement of the underlying soil in both the short and long term. An analysis of the vertical movements has been carried out using the soil stiffness model detailed in the table overleaf.

For design purposes a conservative undrained strength profile has been adopted, assuming an average Cu of 70kN/m^2 at the surface of the London Clay Formation, increasing by 8kN/m^2 per m depth.

The Undrained Modulus of Elasticity (Eu) has been based upon an empirical relationship of Eu = 750 x undrained cohesion (Cu), and the Drained Modulus of Elasticity (E') has been based upon an empirical relationship of 350 x Cu.

Stratum:	**Undrained Elastic Modulus Eu (kN/m^2)**	**Drained Elastic Modulus E' (kN/m^2)**
London Clay Formation	52,500kN/m^2 at surface increasing linearly to 232,500kN/m^2 at 30m depth	35,000kN/m^2 at surface increasing linearly to 155,000kN/m^2 at 30m depth

Poisson's Ratios of 0.5 and 0.2 have been used for short term (undrained) and long term (drained) conditions respectively.

The analysis uses the above parameters for stratified homogeneity with the introduction of an assumed rigid boundary at approximately 30m depth.

7.3 Short Term Vertical Movements

There are two components of short term movement that will interact to affect the neighbouring structures.

These components are firstly progressive sagging movements of the underpinned walls due to imperfections in the underpinning process itself and then secondly elastic heave of the ground as a direct response to a net unloading of -60kN/m^2 unloading caused by excavation of the new basement.

7.3.1 Short Term Movement due to Underpinning

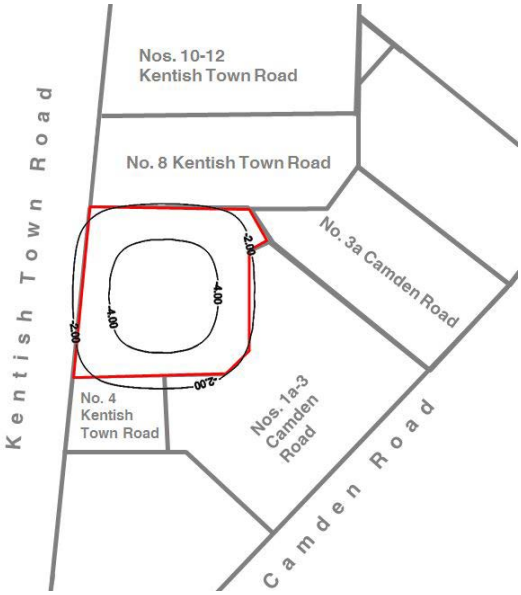
It is not possible to rigorously model the extent of party wall settlement arising from underpinning and experience indicates that amount of any movements are very much dependent on workmanship. However, it is suggested that given dry conditions and good workmanship, the amount of vertical movement of the party walls can reasonably be expected to be a maximum of 5mm per stage of underpinning.

For modelling purposes, the maximum depth of underpinning is assumed to be 3m; hence one stage of underpinning will be utilised.

On the simplistic assumption of a 45 degree angle of support to any walls extending away in a direction perpendicular to the party walls, the scale of this vertical movement associated with the underpinning process itself is assumed to extend to a distance of 5.5m behind the wall, due to the overall depth of the finished basement wall in comparison with the ground level.

7.3.2 Short Term Movements due to Excavation heave

Any short term movements below the excavation itself will go un-noticed, and the analysis suggests up to 2mm of heave movement of the surrounding party walls and new underpinning.

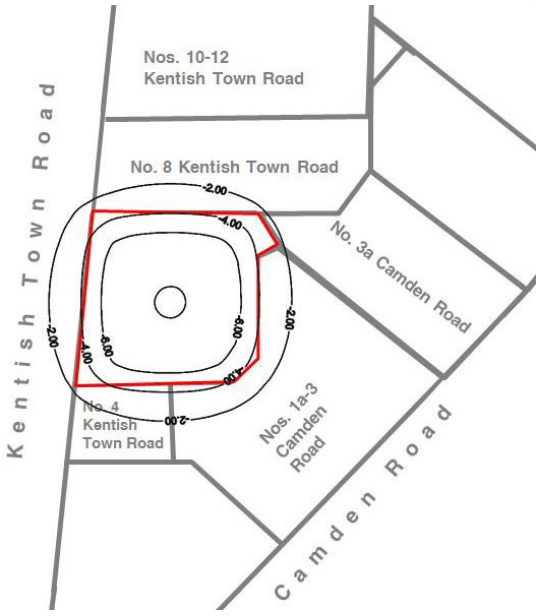


Plan showing theoretical approximate short term heave contours (mm) due to basement excavation

7.4 Post Construction Vertical Movements

There will be a mismatch between the weight of soil that is removed and the weight of the new structure. In this situation, a component of long term heave is inevitable and this could proceed for decades.

The results of the heave analysis, as presented on the plan shown below, suggest that there will be less than approximately 5mm post-construction heave movement beneath the party walls.



Plan showing theoretical approximate post-construction heave (mm) due to basement excavation

7.4.1 Cumulative Post Construction Movements

Given the recent basement excavation at No. 8 Kentish Town Road and Nos. 10-12 Kentish Town Road, as well as the proposed basement excavation at No. 3a Camden Road, consideration has been given to the potential cumulative movements of all these basement developments in the long term situation.

The results suggest that the scale of the cumulative post-construction heave may theoretically reach up to 10mm beneath the party walls to Nos. 1-3 Camden Road, No. 4 and No. 8 Kentish Town Road.

7.5 Horizontal Movements

Horizontal soil movements are expected to occur due to yielding of the soil behind the underpinned wall during the basement excavation. For embedded retaining walls, this yielding has been found to extend to a distance approximately equivalent to four times the depth of excavation in front of the wall.

As a first approximation, the magnitude of the horizontal movement at the basement perimeter is assumed to be 5mm, which is equal to the vertical movement at the underpinned wall

This horizontal movement is assumed to reduce to zero at a maximum distance of 4 x 5.5m (final basement depth in comparison with the ground level) = 22m behind the wall.

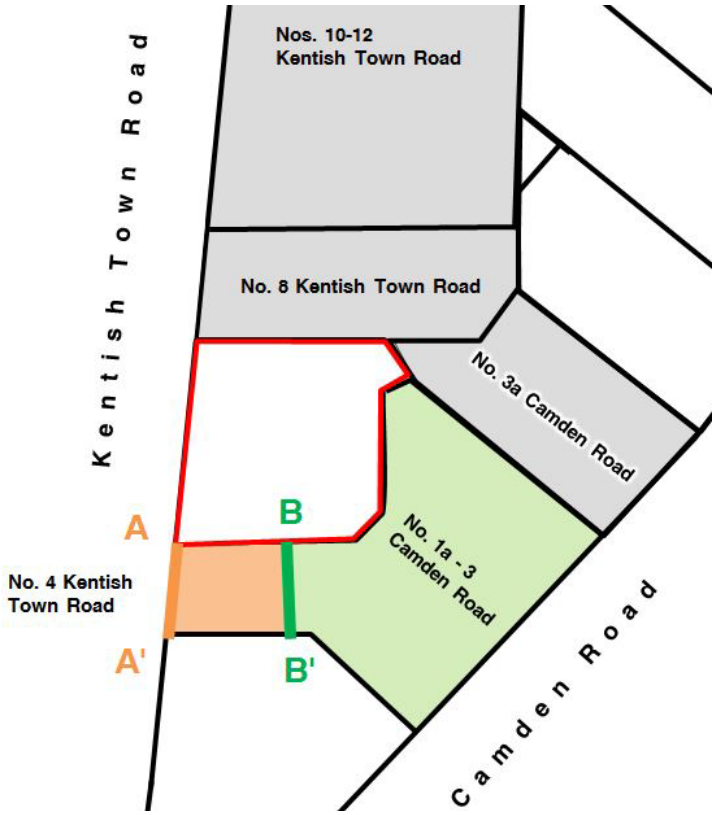
7.6 Impact on Neighbouring Structures

In practice, although the various movements described above will interact so that the soil basement heave effects will tend to counteract the underpinning wall settlement movements, it is considered prudent to ignore this counteraction for the assessment of building damage.

The effect of the predicted vertical and horizontal deflections have been assessed using the Burland damage category assessment process, which is based upon consideration of a theoretical masonry panel of a given length (L) and height (H).

The potential degree of the predicted ground movements on the assessed structures can be estimated by the correlation of maximum horizontal strain, εh, with the maximum deflection ratio, Δ/L, where Δ is the vertical distortion over the wall length under assessment (where the wall length L is actually less than the distance to the point at which zero vertical movement is assumed, a minimum distortion of 1mm is assumed).

The potential degree of damage due to the proposed basement construction has been assessed and a summary is shown below.



Plan showing line of the section used for damage category assessment

7.6.1 No. 4 Kentish Town Road – Section A-A'

The length of section (L) is taken as 5m and the wall height (H) as 10m.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.025%, producing a maximum deflection ratio Δ / L = -0.02, within a limiting tensile strain of 0.035%, for a Burland Category 0 "Negligible" condition.

7.6.2 Nos. 1-3 Camden Road – Section B-B'

The length of section (L) is similarly taken as 5m and the wall height (H) as 10m.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.025%, producing a maximum deflection ratio Δ / L = -0.02, within a limiting tensile strain of 0.035%, for a Burland Category 0 "Negligible" condition.

7.6.3 Public Highway

The proposed basement lies directly adjacent to the pavement, where there is expected to be various buried utilities located.

Given reasonable standards of workmanship during the underpinning works, negligible movement (<5mm settlement) is anticipated and this may be counteracted in practice by some small amounts of heave.

8. Impact Assessment

The screening and scoping stages identified potential aspects of the geological, hydrogeological and hydrological environment that could lead to the development having an unacceptable impact.

This stage is concerned with evaluating the direct and indirect implications of each of these potential impacts.

8.1 Hydrogeological Impact Assessment

The site is underlain by clay soils and there is consequently no shallow groundwater table at this site.

It is therefore considered that the development will not have any impact upon groundwater flow and there is additionally no scope for any cumulative impact.

8.2 Hydrological Impact Assessment

There will be no change to the flood risk at the site or neighbouring sites.

Nevertheless, there will be a need to maintain the present water discharge regime and provide Sustainable Drainage Systems (SuDS) to meet the planning policy requirements.

An Outline SuDS Strategy is presented as a separate report (LBH4581suds).

8.3 Potential Stability Impacts

8.3.1 London Clay

The London Clay soils are of high volume change potential.

However, the depth of the proposed construction will obviate any concerns regarding potential seasonal movement.

8.3.2 Ground Movements

The Local Plan states that proposed basements should pose a risk of damage to neighbouring properties no higher than Burland scale Category 1 ‘Very Slight’, and mitigation measures should be incorporated if the assessed damage is not acceptable.

The predicted neighbouring buildings damage levels due to ground movements associated with the proposed development have been analysed in section 7 and found to be acceptable (Limited to Burland scale Category 0 ‘Negligible’).

In addition, negligible movement to the public highway due to the proposed basement development is predicted.

8.4 Residual Impacts

The proposed basement will have no residual unacceptable impacts upon the surrounding structures, infrastructure and environment. The cumulative impact of this development, in conjunction with the recent developments at No. 8 and Nos. 10-12 Kentish Town Road as well as the proposed basement development at No. 3a Camden Road, have been analysed and are assessed to be acceptable.

9. Outline Structural Monitoring Plan

The ground movement assessment suggests Burland Scale Category 0 (negligible) damage may be expected to the neighbouring properties.

Nevertheless, structural monitoring should be undertaken to ensure the movements remain within acceptable limits and to enable mitigation to be effectively implemented in the event of agreed trigger values for movement being exceeded.

Monitoring positions should be located along all the perimeter party walls.

Before any excavation or construction works commence, monitoring is to be undertaken in order to establish a baseline situation.

During all underpinning works and basement excavation works, monitoring should be undertaken daily at the start and end of every work shift. At other times monitoring should be undertaken weekly to cover a period prior to commencement of any works and ceasing after completion of the works, by agreement of all interested parties.

Precise survey equipment should be used to record all vertical and horizontal components of movement (in three perpendicular directions) to a minimum accuracy of 1mm.

9.1 Criteria for assessment of Monitoring data and Comparison with Predicted Movements

The cumulative movements in any direction of any monitoring point are to be compared with the predicted movements at any stage and using the following decision table:

MONITORING CRITERIA		
Total movement less than 5mm in any direction		Green
Total movement in excess of 5mm in any direction or additional movement of 5mm in any direction	Notify Structural Engineer and Party Wall Surveyor	Red

9.2 Contingent Actions

Contingency actions should be undertaken using the following decision table:

CONTINGENT ACTIONS	
Green	None
Red	Cease work and Notify Structural Engineer and Party Wall Surveyor immediately. Commence backfilling / installation of additional propping. Undertake repeated monitoring as necessary to ensure that movement has ceased. Works to commence only once a revised construction methodology has been agreed with the Structural Engineer

10. Conclusion

The assessment has demonstrated that no adverse residual or cumulative stability, hydrological or hydrogeological impacts are expected to either neighbouring structures or the wider environment as a result of this development.