BASEMENT IMPACT ASSESSMENT

155-157 REGENT'S PARK ROAD
CAMDEN

LBHGEO

LBH4540aBIA

February 2021

Document Control

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NON-TECHNICAL SUMMARY

It is proposed to demolish the existing buildings on site and to construct a new multi-storey hotel building with a double level basement.

This report provides an assessment of the potential impacts that the basement development may have upon the host building, the 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 construction to cause adverse hydrogeological impacts.

HYDROLOGICAL IMPACTS

The site is assessed as not being at current risk of flooding and there will be no change to flood risk at the sites or neighbouring sites as a result of the development.

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 basement construction methodology upon the neighbouring structures, resulting in a prediction of up to Burland Category 1 (Very Slight) damage. Negligible impact is predicted to the highway.

CONCLUSION

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

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 LBHGEO disclaims any liability to such parties.

The observations and conclusions described in this report are based solely upon the agreed scope of work. LBHGEO 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

Consideration is being given to the redevelopment of this site with a part-seven, part-four storey hotel with a double level basement. A similar application for a slightly different scheme was withdrawn in 2019.

1.2 BRIEF

LBHGEO have been appointed to prepare a Basement Impact Assessment (BIA) in support of a forthcoming planning application to be submitted to the London Borough of Camden.

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, in January 2021 Camden published updated Camden Planning Guidance (CPG) on Basements. This document does not carry the same weight as the main Camden Development Plan documents (including the above Policy A5) but it is an important supporting document and refers back to the 2010 Camden Geological, Hydrogeological and Hydrological "Arup" Study (CGHHS).

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 that may be associated with the proposed development.

A ground model is then developed, which is followed by an outline basement 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

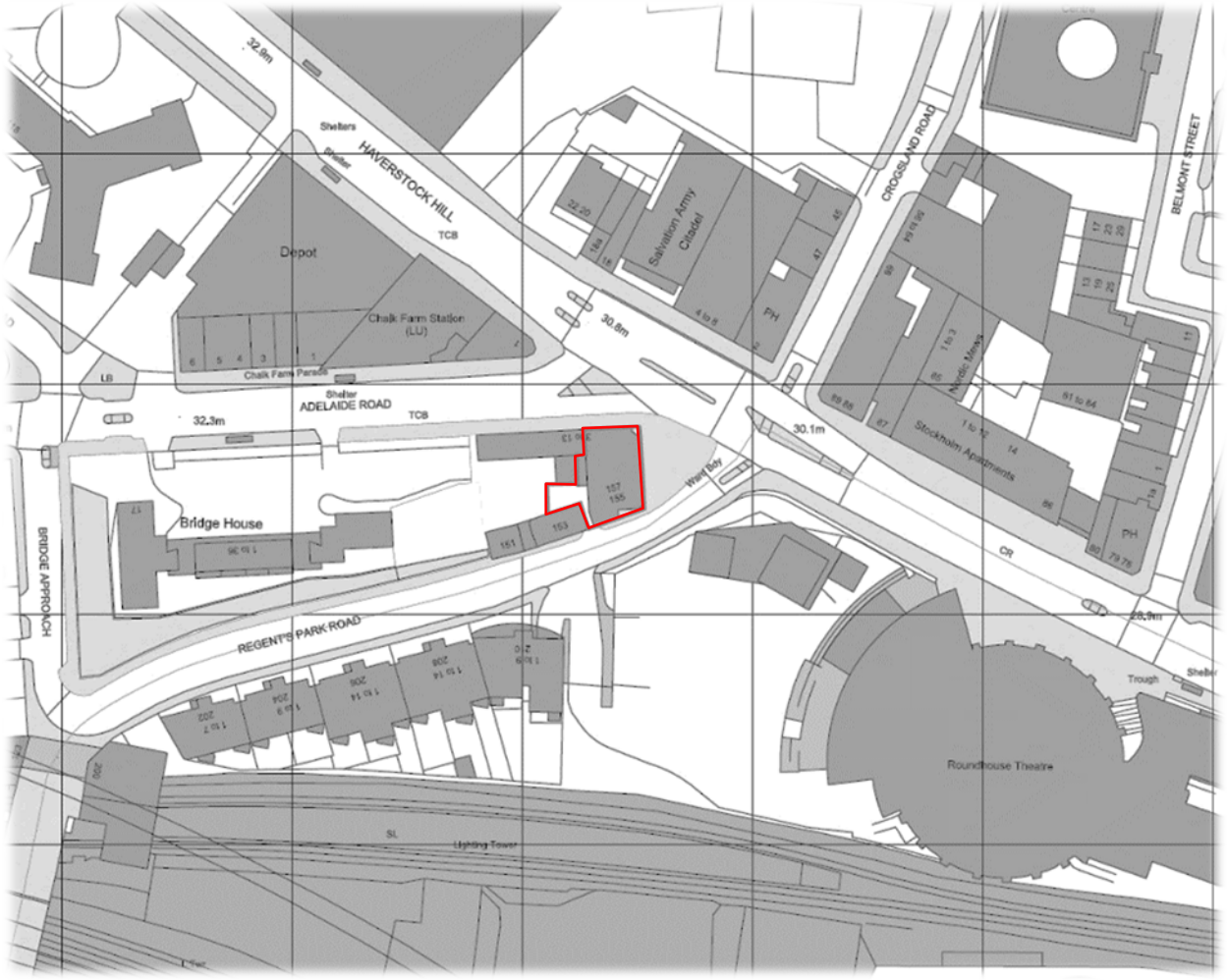
- 2021 February Structural Engineering Report by HTS
  Ref: 1872 Rev B
- 2021 January Proposed Plans & Elevations by Piercy & Company
  Ref: 13545-A- (-L00-00-100, -L01-l03-00-101-103, -L-1-00-098, -L-2-00-098, -L04-00-104, -L05_L06-00-105-106, -LR-00-107) & (LXX-04-141, -142, -143, -144)
- 2020 June Revised Design Pack by Piercy & Company
- 2019 July Arboricultural Impact Assessment by Landmark Trees
  Ref: UCX/155RPR/AIA/01
- 2018 July Factual Investigation Report by ST Consult
  Ref: JN1143

2. THE SITE

2.1 SITE LOCATION

The site is situated at the junction of Regent's Park Road, Haverstock Hill and Adelaide Road, approximately 15m to the south of Chalk Farm underground station.

The site may be located approximately by postcode NW1 8BB or by National Grid Reference 528155, 184380.



2.2 TOPOGRAPHICAL SETTING

The site lies on the lower southeastern slopes of Hampstead Hill. The site lies some distance to the west of the River Fleet, where the land is just starting to rise up towards Primrose Hill to the southwest.

The street levels around the site fall from a maximum of around +32m OD on Regent's Park Road in the southwestern corner of the site to around +31m OD on Haverstock Hill.

EXTRACT FROM FIGURE 16 OF THE CGHHS

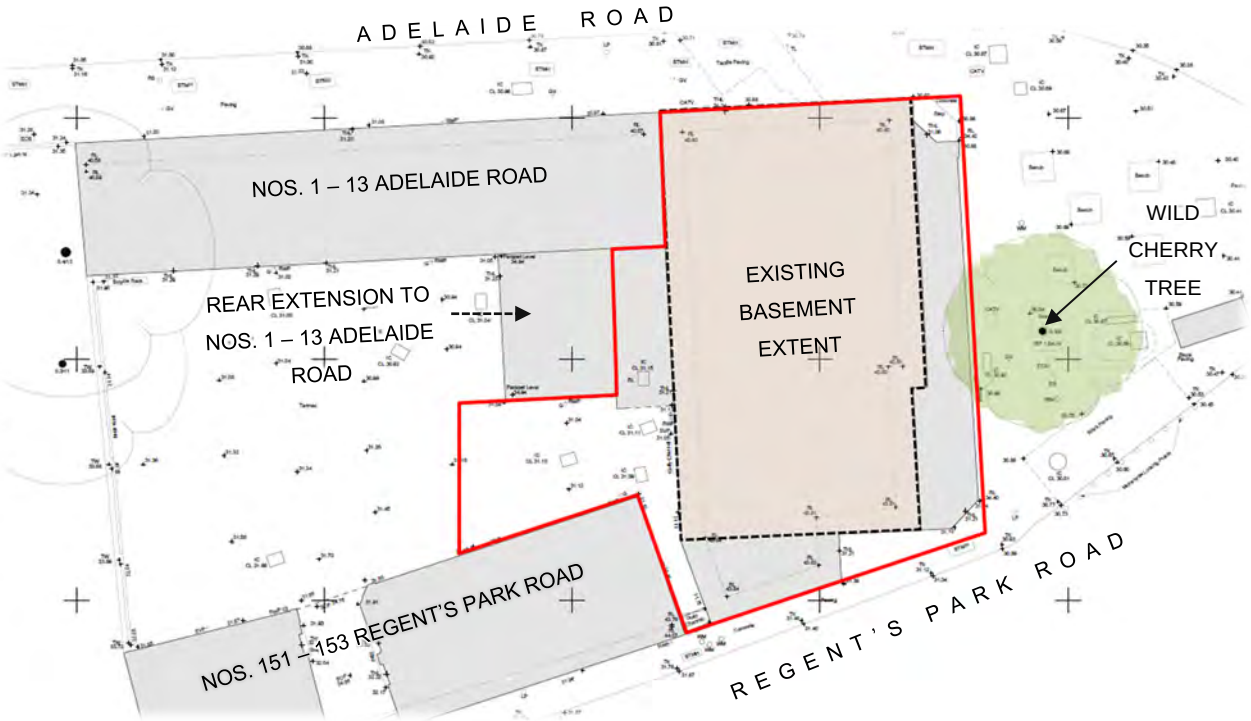
2.3 SITE DESCRIPTION

The site is occupied by a three storey terraced building with mansard roof. The building includes a single storey basement that occupies most of the building footprint. This basement extends to approximately 3.5m depth below ground level.

FRONT VIEW OF THE SITE

REAR VIEW OF THE SITE

The buildings at Nos. 1 – 13 Adelaide Road and Nos. 151 – 153 Regent's Park Road adjoin those on the site to form a U-shape. The neighbouring structures are of similar construction, with Nos. 151-153 Regent's Park Road comprising a three-storey terrace with mansard roof. Nos. 1 – 13 Adelaide Road is a two--storey terraced building with a mansard roof and a basement at a similar depth to the existing basement on site. The Adelaide Road building also has a single storey rear extension that has no basement.



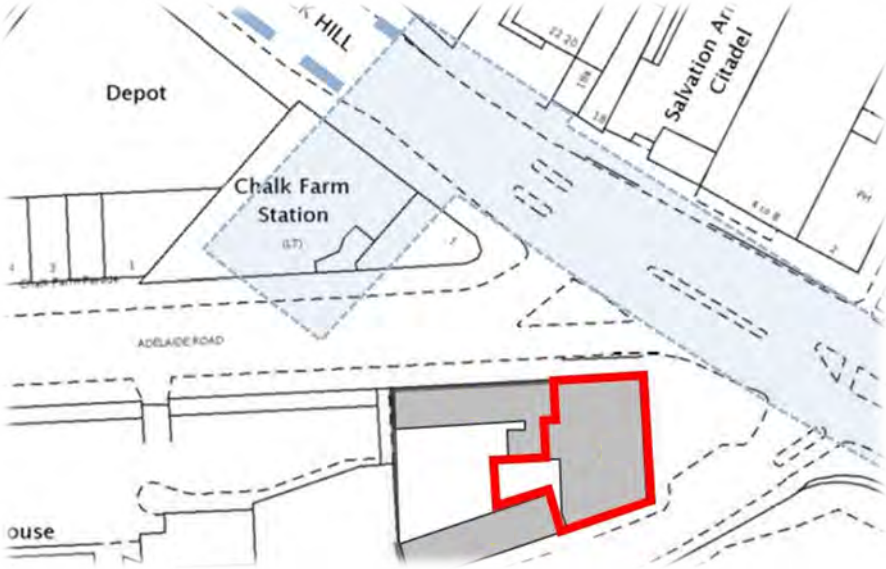
EXISTING SITE FEATURES

The site is entirely hard surfaced. The courtyard car park is accessed from Regent's Park Road via a street level access through Nos. 151 – 153 Regent's Park Road.

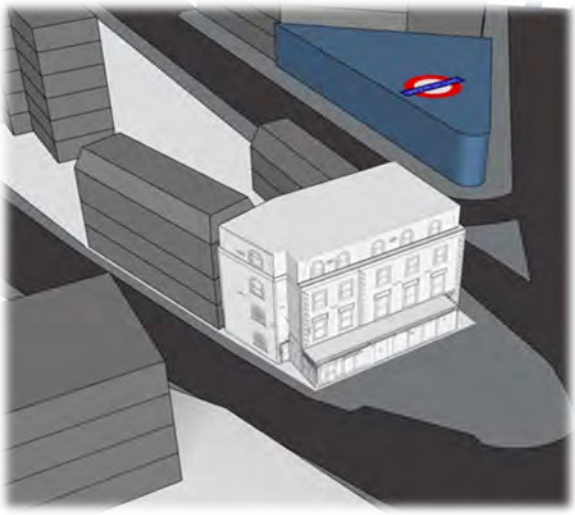
A single mature cherry tree, approximately 8m high, is present at the front of the building, outside of the site boundary.

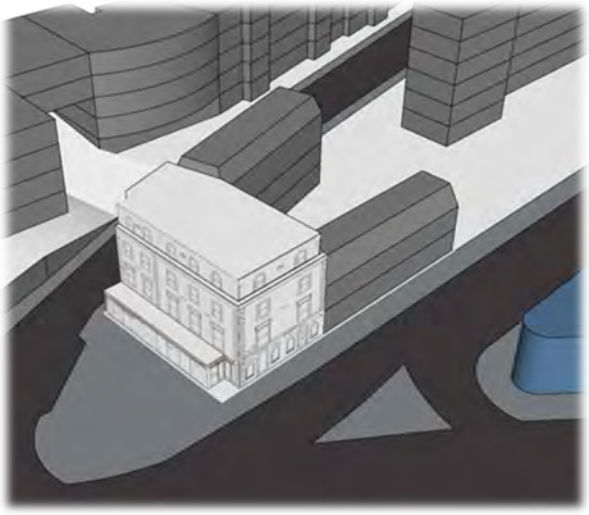
WILD CHERRY TREE AT THE FRONT OF THE SITE

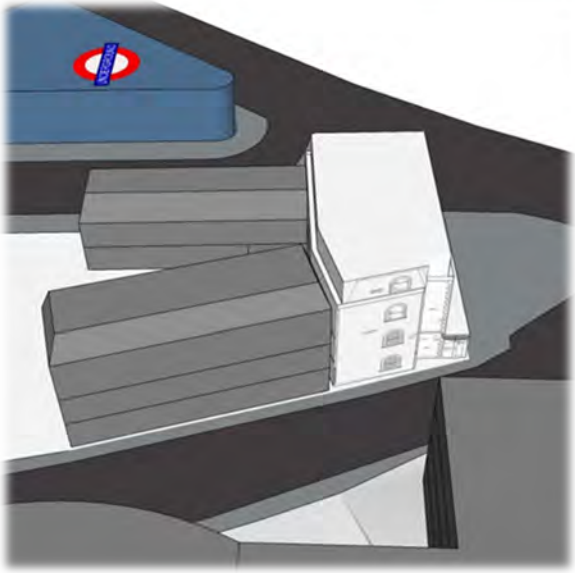
Chalk Farm Underground Station lies beneath Haverstock Hill, with the tunnels located at the closest approximately 8m laterally to the northeast of the site.

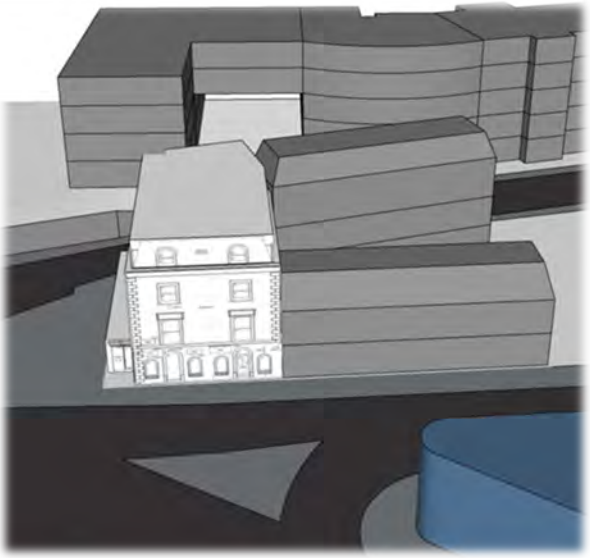


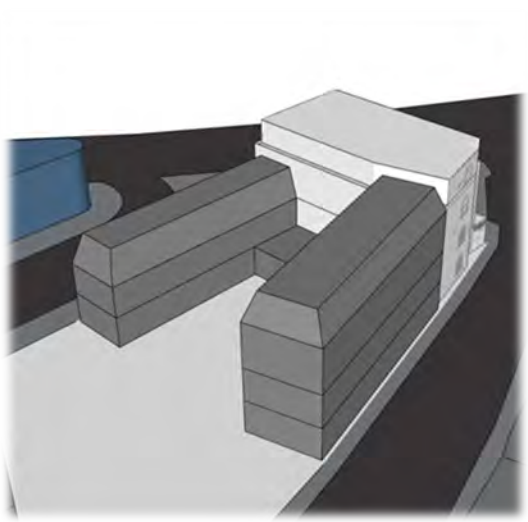
LOCATION OF CHALK FARM UNDERGROUND STATION

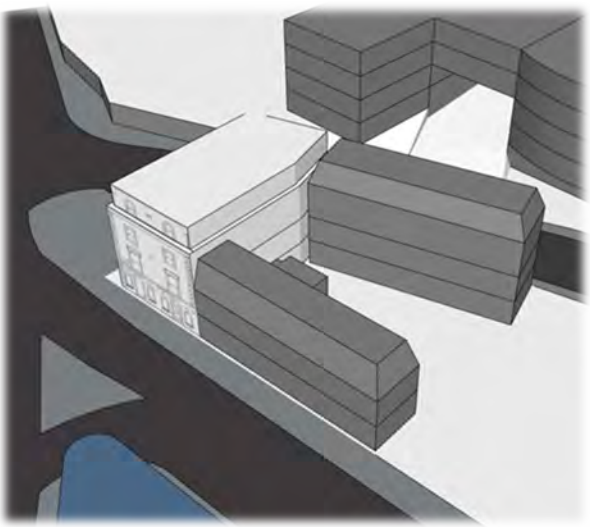










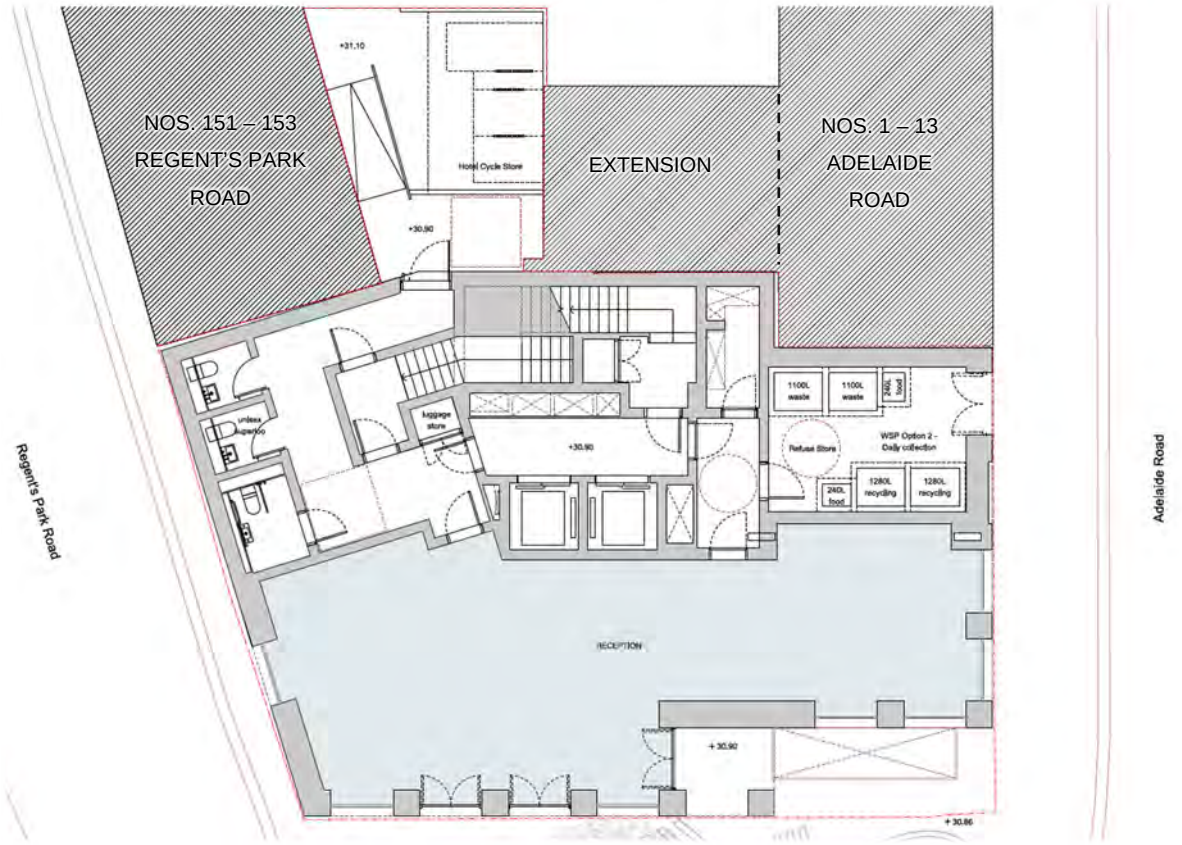


2.4 PROPOSED DEVELOPMENT

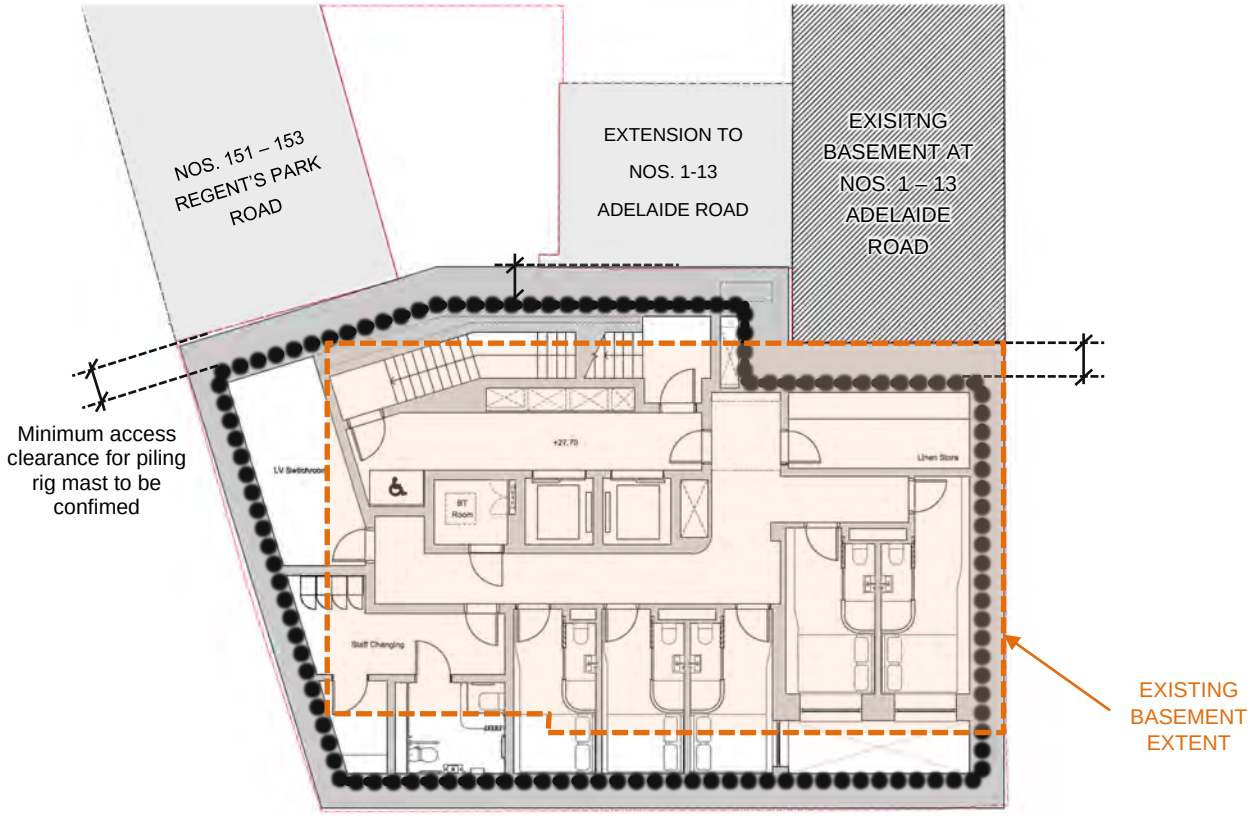
It is proposed to construct a part-seven, part-four storey hotel that will also include a two storey basement.

The proposed development necessitates the demolition of the existing four storey building at Nos. 155 – 157 Regent's Park Road down the existing basement level followed by excavation to enable the construction of a two storey basement to an approximate depth of 7m (+24m OD) below existing ground level.

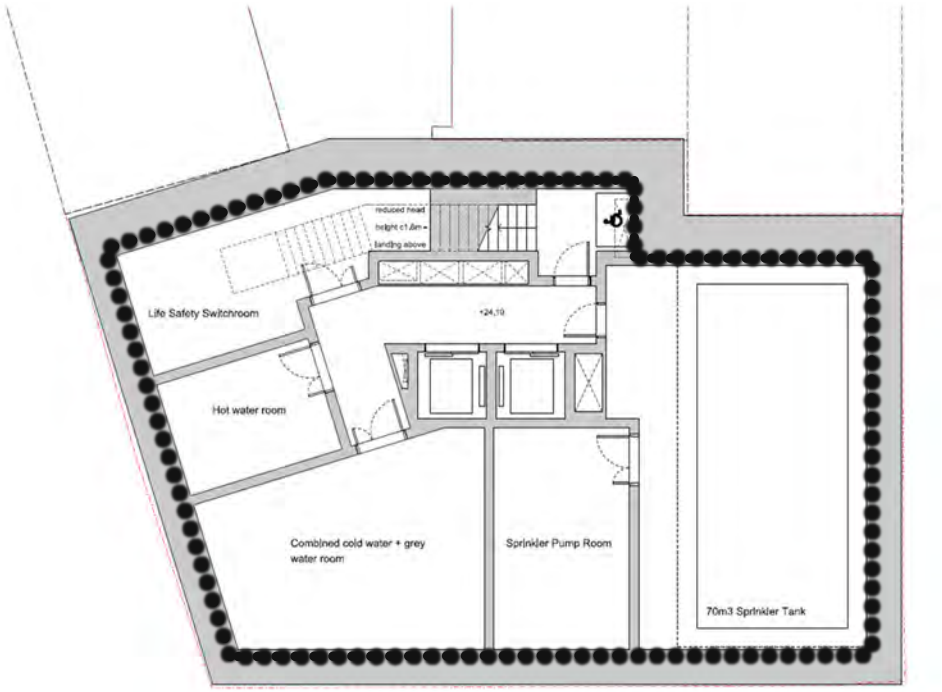
A contiguous bored pile retaining wall is to be adopted around the full perimeter of the proposed basement. Following this the ground floor of the new building will be constructed, followed by excavation below this slab using a top down construction methodology.



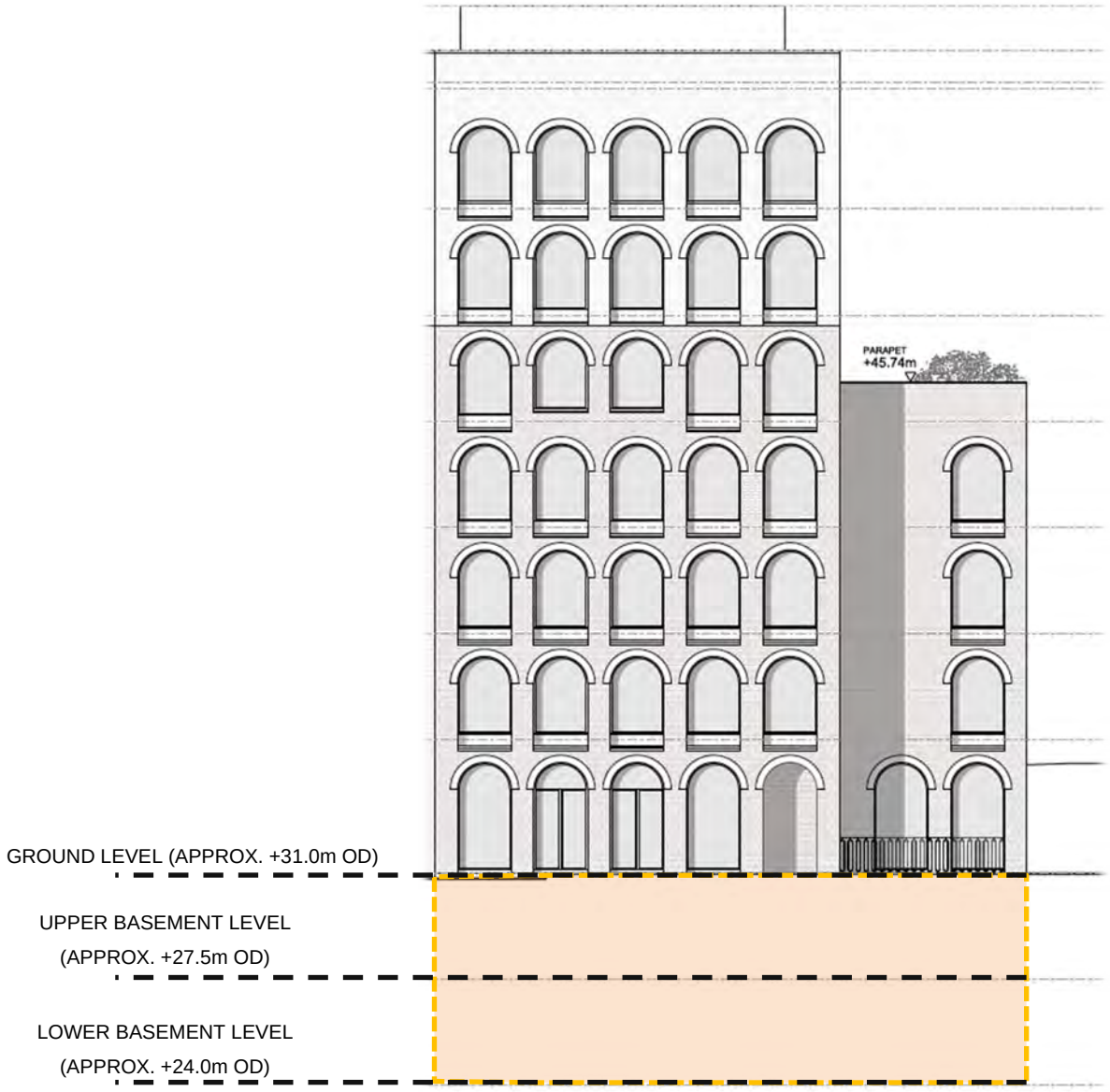
PROPOSED GROUND FLOOR PLAN



PROPOSED UPPER BASEMENT FLOOR PLAN
(SHOWING APPROXIMATE LOCATION OF THE PROPOSED PILED RETAINING WALL)



PROPOSED LOWER BASEMENT FLOOR PLAN
(SHOWING APPROXIMATE LOCATION OF THE PROPOSED PILED RETAINING WALL)

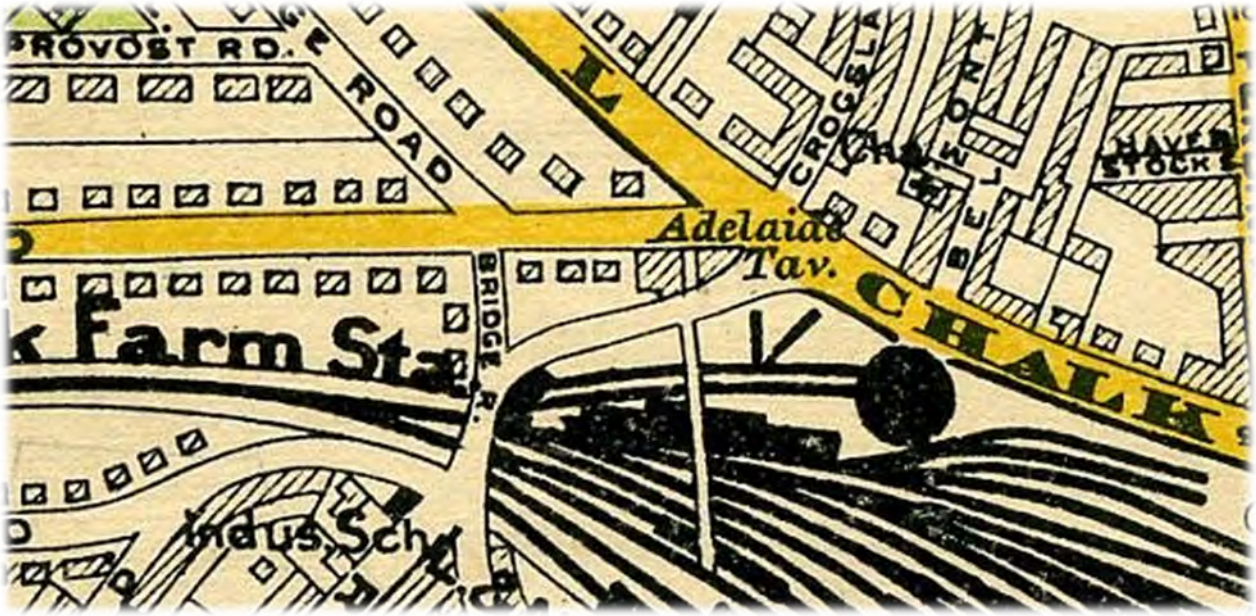


PROPOSED FRONT ELEVATION (APPROXIMATE BASEMENT EXTENT SHADED)

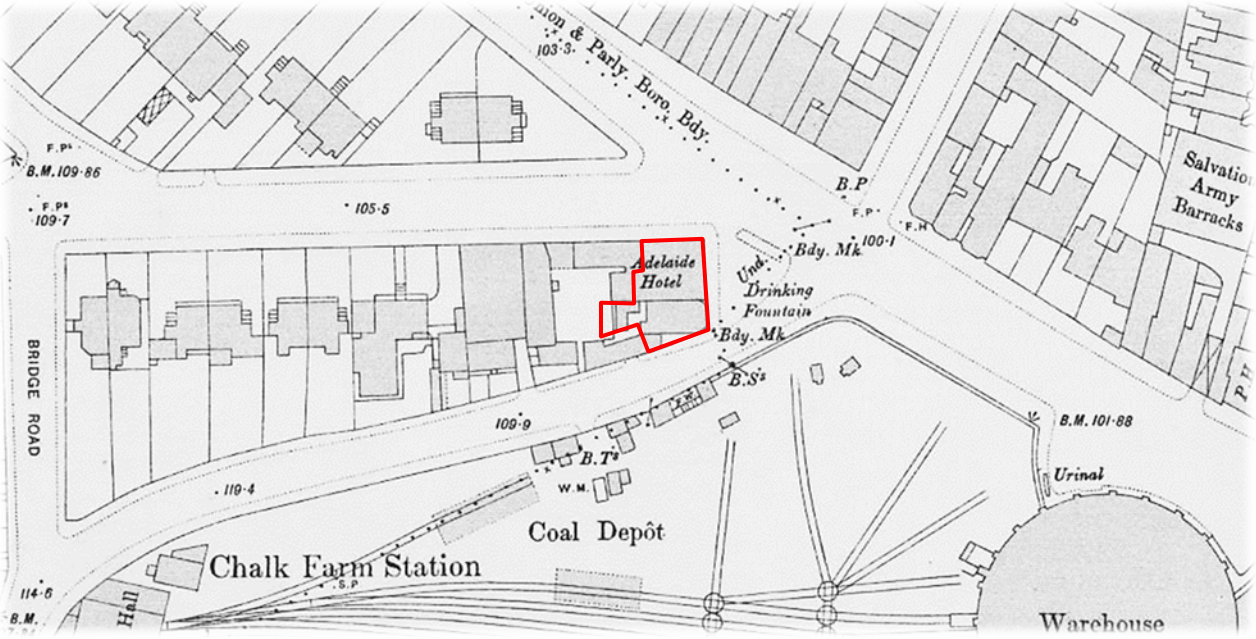
3. DESK STUDY

3.1 SITE HISTORY

The site remained undeveloped until the early 19th Century, when the Adelaide Tavern, later becoming the Adelaide Hotel) was constructed on the corner of Regent's Park Road and Adelaide Road.



STANFORD MAP OF LONDON, 1897

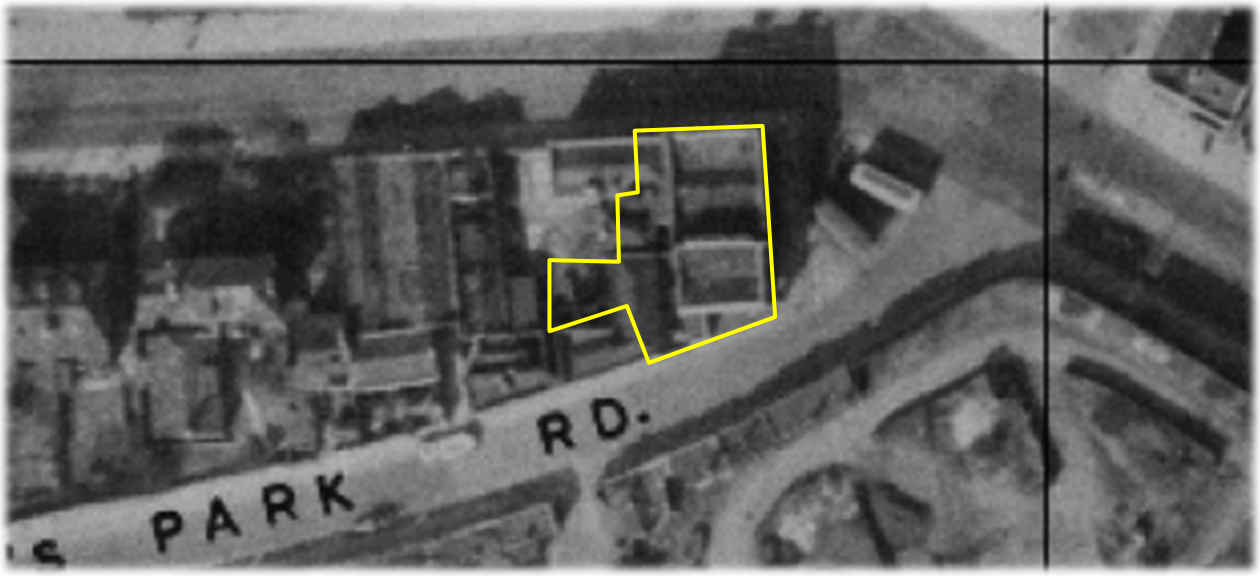


LATE 19TH CENTURY

The coal depot for Chalk Farm railway station was situated to the south of the site across Regent's Park Road and the Ricketts coal merchant's offices were located in the building at 155 adjacent to the hotel.

The Northern underground line was constructed beneath Haverstock Hill and Chalk Farm underground station open in the early 1900s adjacent to the site.

The area suffered heavy bombing during the Second World War and the site is understood to have received a direct hit.



AERIAL PHOTO, 1945

After many years of dereliction the existing buildings on site were constructed, together with those at Nos. 1 – 13 Adelaide Road and Nos. 151 – 155 Regent's Park Road.

FRONT ELEVATION OF ADELAIDE TAVERN, 1903

FRONT ELEVATION OF NOS. 155 – 157 REGENT'S PARK ROAD, 21ST CENTURY

3.2 GEOLOGICAL INFORMATION

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

EXTRACTS OF FIGURE 3 (LEFT) AND FIGURE 2 (RIGHT) OF THE CGHHS

3.3 HYDROGEOLOGICAL INFORMATION

Figure 2 of the CGHHS (above) indicates that the River Fleet passes approximately 350m to the east of the site.

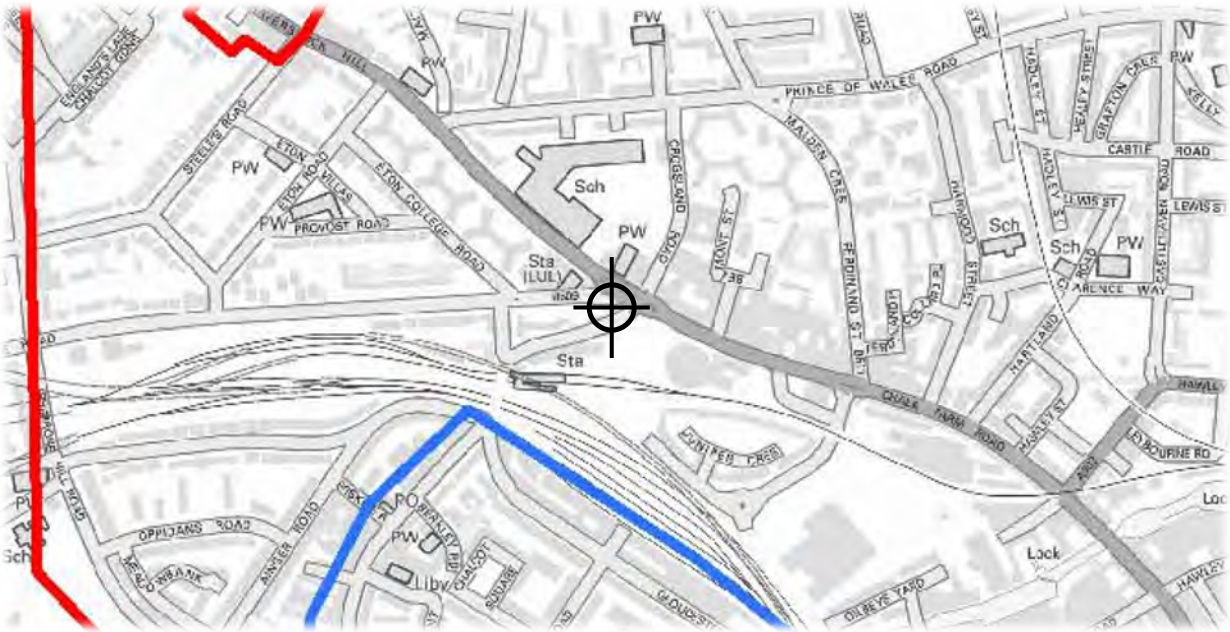
The London Clay formation is virtually impermeable; hence no significant groundwater presence is to be expected beneath this site.

3.4 HYDROLOGICAL INFORMATION

Environment Agency (EA) surface water flood maps suggest that the site is at a low risk of surface water flooding. The neighbouring Adelaide Road and Haverstock Hill roads appear to act as conduits for overland flooding, with indicated up to high risk of surface water flooding.

Figure 6 of the Camden SFRA (overleaf) indicates that the site lies within a Critical Drainage Area (Group 3_003), but outside any Local Flood Risk Zone.

EXTRACT OF EA SURFACE WATER FLOOD RISK MAP



EXTRACT OF FIGURE 6 OF THE CAMDEN SFRA

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 full BIA is 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 site is underlain by the impermeable London Clay Formation.
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 site is located approximately 350m to the southwest of the (now culverted) River Fleet.
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 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, as per the existing. Advice on the incorporation of SUDS at the development is provided in the Surface Water Drainage Assessment.
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, there are no nearby ponds.

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 discharging to the public sewer will be maintained.
Will the proposed basement development result in a change in the proportion of hard-surfaced/paved areas?	No	The proposed reconfiguration of the garden areas does not result in a change in area of hard-surfaced areas.
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 discharging to the public sewer 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 discharging to the public sewer 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	The EA Long Term Flood Risk service indicates the area of No. 155 Regent's Park Road is at a low risk of surface water flooding.

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	Although Figure 16 of the CGHHS indicates that part of the general slope to the south of the site is greater than 7 degrees, a visual inspection indicates that the surrounding area is generally flat.
Is London Clay the shallowest strata at the site?	Yes	The site is directly underlain by the 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?	Yes	While no trees are present on site, a mature Cherry tree is present in close proximity to the front of 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 350m to the northeast of the site.
Is the site within an area of previously worked ground?	No	See Fig. 3 of the CGHHS.
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 is adjacent to the pavement.

Will the proposed basement significantly increase the differential depth of foundations relative to the neighbouring properties?	Yes	The proposed basement will likely increase the differential depth to foundations to both Nos. 1 – 13 Adelaide Road and Nos. 155 – 157 Regent's Park Road.
Is the site over (or within the exclusion zone of) tunnels, e.g. railway lines?	Yes	The TfL Northern Line of the London Underground runs beneath the Haverstock Hill to the northeast of 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 SUBTERRANEAN (GROUNDWATER) FLOW

No issues have been identified by the Screening assessment. The site is underlain by the impermeable London Clay Formation and therefore no significant groundwater flow will be present.

4.2.2 SCOPING FOR SURFACE WATER FLOW AND FLOODING

No issues have been identified by the Screening assessment. Nevertheless, a Surface Water Drainage Assessment has been undertaken by LBHGEO to provide an outline drainage strategy incorporating Sustainable Drainage Systems (SuDS).

4.2.3 SCOPING FOR STABILITY

- *London Clay is 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.

- *Works may be proposed within tree protection zones where trees are to be retained.*

The guidance advises that the soil moisture deficit associated with felled tree will gradually recover. In high plasticity soils (such as London Clay) this will lead to gradual swelling of the ground until it reaches a new value. This may reduce the soil strength which could affect slope stability. Additionally the binding effect of the tree roots can have a beneficial effect on stability and the loss of a tree may cause loss of stability.

- *The proposed basement will 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.

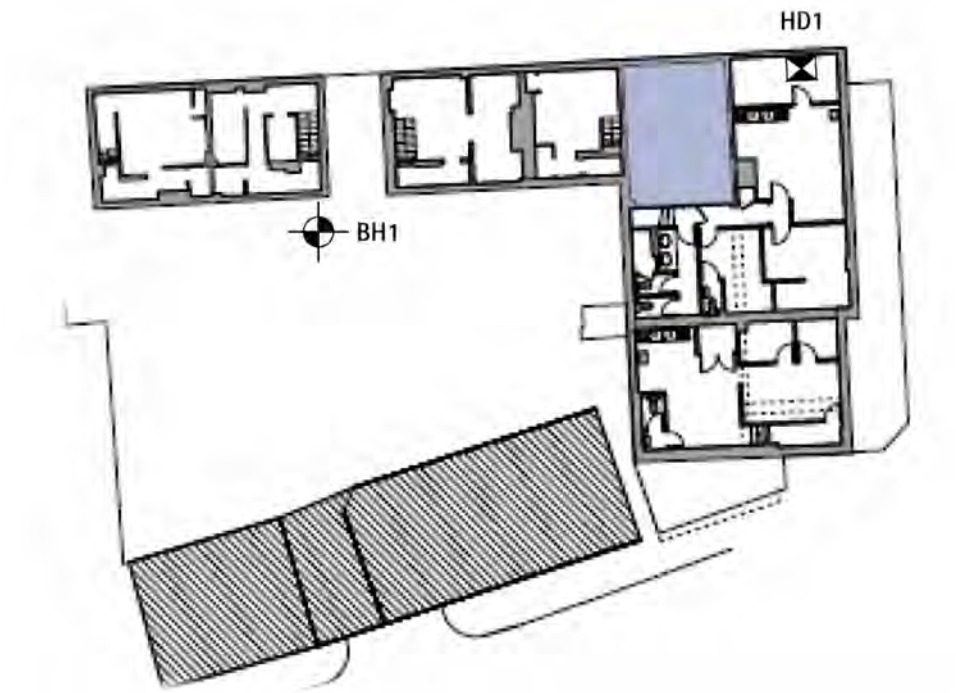
- *The site is within the exclusion zone of a London Underground railway tunnel.*

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

5. SITE INVESTIGATION

A ground model has been developed on the basis of an intrusive site investigation undertaken in July 2018 by ST Consult and from other nearby boreholes. The investigation comprised a single trial pit and a single 30m deep cable percussion borehole.

The site plan below indicates the approximate exploratory positions.



5.1 GROUND CONDITIONS

The London Clay is present at a shallow depth below the surface level areas, beneath up to approximately 1m of made ground. The material is recorded to comprise typical firm, becoming stiff, brown / grey silty London Clay with occasional claystones. The London Clay is of high volume change potential.

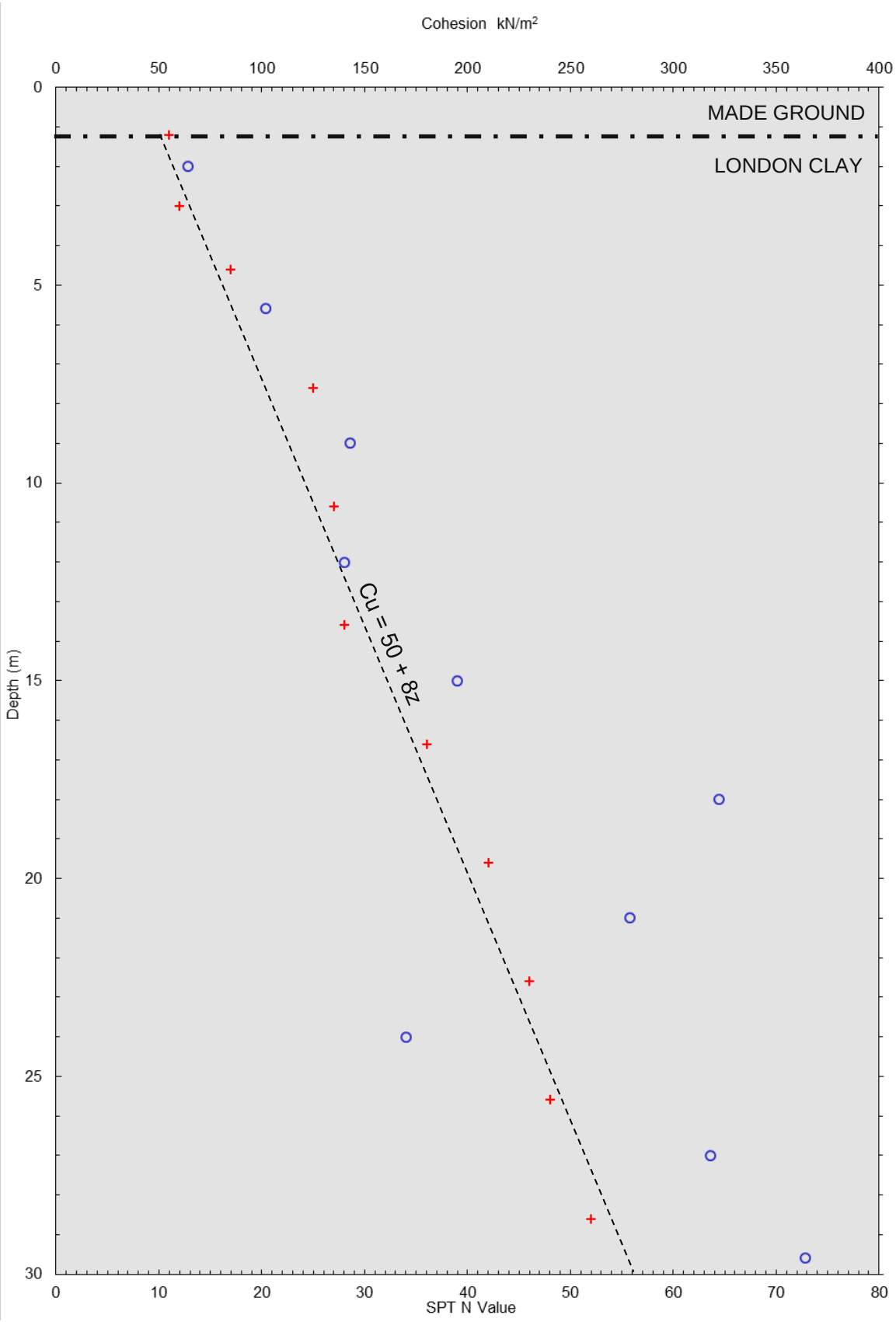
An SPT – Cohesion plot of London Clay, based on the deep borehole is presented overleaf.

5.2 GROUNDWATER

No groundwater table is present beneath the site.

5.3 EXISTING FOUNDATIONS

The basement perimeter walls appear to be supported by shallow concrete strip foundations that extend to around 0.3m depth below existing basement level.



Cohesion = 5 N

o = Cohesion

+ = SPT

6. BASEMENT CONSTRUCTION

6.1 EXCAVATION AND FOUNDATION CONSTRUCTION

The proposed development will require excavations down to approximately 7m depth, (some 3.5m below the existing basement).

A key issue to be considered as part of the design of the basement construction methodology at this site is the maintenance of structural integrity of the neighbouring structures, Nos. 151 – 153 Regent's Park Road and Nos. 1 – 13 Adelaide Road.

To this end the basement construction is to be facilitated by a bored pile wall constructed at the entire perimeter of the basement, together with a top down construction methodology.

Installation of both the perimeter and internal low level cut-off piles will be undertaken following demolition of the existing structure at the site and filling of the existing basement with crushed demolition material. The existing basement structure is expected to be initially retained in order to preserve the stability of the soil retained by this and prevent movement to neighbouring structures. A detailed methodology and sequence is set out in the Heyne Tillett Steel (HTS) structural engineer's report.

Following installation of the perimeter walls, ground beams and reinforced concrete ground floor slab, the basement construction is to be undertaken using a top-down construction method, with two subsequent levels of internal propping progressive installed as the basement excavation proceeds.

These props will only be removed once the permanent propping in the form of upper and lower basement level reinforced concrete slabs are completed.

6.1.1 BORED PILED FOUNDATIONS

The advice of a specialist piling contractor should be sougth both in the selection of pile type and to provide a suitable pile design for the proposed scheme.

It should be noted that the piles will need to be designed to avoid any load shedding onto the nearby LUL Northern Line assets..

6.2 RETAINING WALLS

The retaining walls should be designed to prevent any significant lateral movement in both the temporary and permanent situation.

It will be therefore important to design for k_0 rather than conventional k_a conditions, in order to preserve in-situ stress conditions and to limit movements behind the walls. The required stiffness will be achieved through the provision of a top-down excavation methodology and continuous positive propping throughout the basement construction.

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

RETAINING WALL DESIGN PARAMETERS			
STRATUM	BULK UNIT WEIGHT	EFFECTIVE COHESION	EFFECTIVE FRICTION ANGLE
	(kN/m^3)	(c' - kN/m^2)	(ϕ'- degrees)
Made Ground	17	Zero	20
London Clay	20	Zero	25

Initial retaining wall design calculations have been provided by the structural engineer, Heyne Tillett Steel (HTS), as part of their Structural Engineering Report.

6.2.1 WATERPROOFING

There is potential for water to collect behind the new retaining walls in the long term; hence the whole new below-ground structure is to be 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. A design hydrostatic level of +31.0m OD, approximately equal to the street level at the front of the site, is to be adopted for the purposes of assessing these hydrostatic pressures.

6.3 EFFECT OF TREES

A single, 8m high, mature wild cherry tree is present at the front, outside of the extent of the site. The tree is located approximately 3m away from the boundary of the site and, therefore, approx. 3.5 – 4m away from the proposed basement pile retaining wall.

An arboricultural survey undertaken by Landmark Trees in 2019 concludes that the tree can be either left in place or felled and replaced following development with *'no significant impact on either the retained tree or wider landscape'*.

The impact of the tree on the basement structure itself will be obviated by the depth and the use of piled foundations at the proposed basement.

6.4 LONDON UNDERGROUND TUNNEL

An important factor for the proposed development is the need to avoid any undue loading of the nearby London Underground infrastructure.

The piled foundations will need to be designed to transfer the structural loading to the soil at depth and not to shed any appreciable load within the zones of soil that might transfer this loading to the tunnels or station.

An Asset Impact Assessment is to be undertaken in due course to provide assurance to LUL that the proposed excavation and construction methodology will not produce any unacceptable impact upon the structure of the tunnels.

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'.

There will be potential ground movement associated with the proposed installation and yielding following excavation of the bored pile retaining wall.

STRUCTURES CONSIDERED FOR GROUND MOVEMENT

7.1 STRUCTURES CONSIDERED FOR EFFECT OF GROUND MOVEMENT

7.1.1 NOS. 151 – 153 REGENT'S PARK ROAD

Nos. 151–153 Regent's Park Road is a 1980s residential four storey terraced building including a mansard roof. This building lies to the southwest of the proposed building. This building is not expected to include a basement and it should be therefore conservatively assumed that the building is founded at a shallow depth (1m) below the ground level.

7.1.2 NOS. 1 – 13 ADELAIDE ROAD

Nos. 1 – 13 Adelaide Road is a similar 1980s residential terraced building, but of three storeys including a mansard roof. This building is understood to possess a basement that extends to approximately 3.5m depth below ground level.

7.1.3 NOS. 1 – 13 ADELAIDE ROAD: EXTENSION

A single storey extension is present to the rear of Nos. 1 – 13 Adelaide Road and lies approximately 0.5m to the north of the proposed basement. This extension does not have a basement and for the purpose of this assessment it has been assumed that the foundations to this extension are situated at approximately 1m depth.

7.2 MODELLED GROUND CONDITIONS

The ground movement analysis has been carried out using the soil stiffness model detailed below.

For ground movement modelling purposes a conservative undrained strength profile has been adopted for the London Clay, assuming an average Undrained Cohesion (Cu) of 50kN/m^2 at the surface of the stratum, increasing by 6.7kN/m^2 per m depth.

Poisson's Ratios of 0.5 and 0.1 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 below the proposed basement excavation level.

STRATUM:	UNDRAINED ELASTIC MODULUS Eu (kN/m^2)	DRAINED ELASTIC MODULUS E' (kN/m^2)
London Clay	43,605kN/m^2 at proposed excavation level increasing linearly to 103,905kN/m^2 at 30m depth below this	24,225kN/m^2 at proposed excavation level increasing linearly to 57,725kN/m^2 at 30m depth below this

7.3 MODELLED GROUND MOVEMENTS

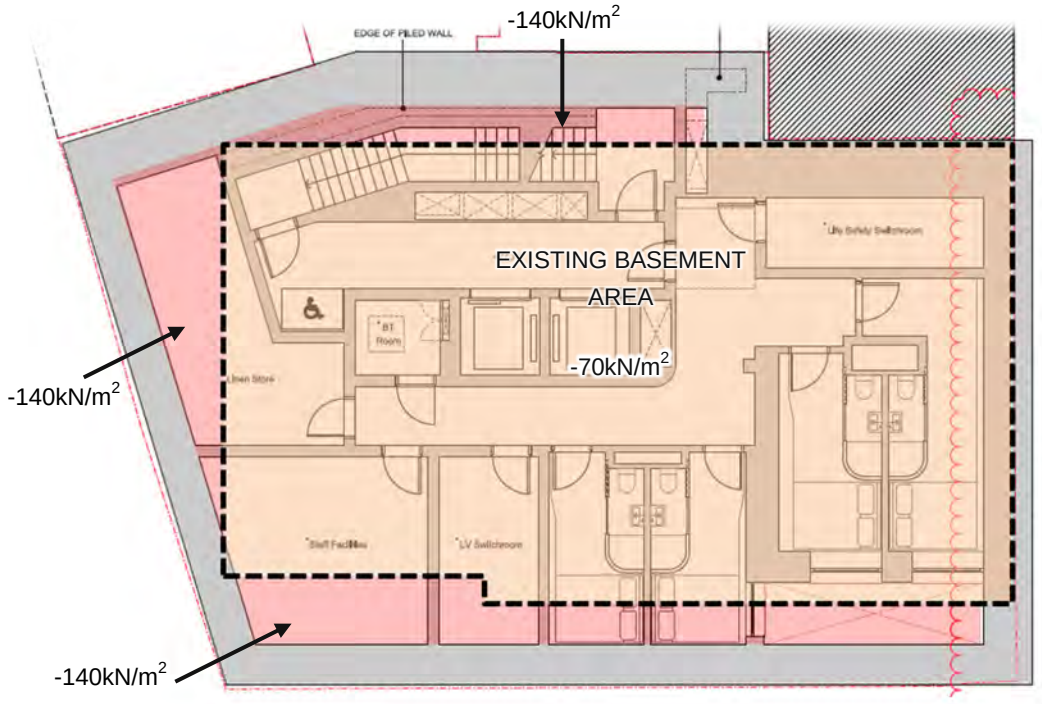
Both vertical and horizontal movements are predicted to affect the neighbouring structures as a result of the proposed development. These will originate from both the construction of the piled basement retaining wall as well subsequent excavation in front of the wall.

However, as the bored pile wall will be constructed prior to the excavations for the basement, it is expected that heave movement of the London Clay due to excavation of the basement will be contained to the area within the basement perimeter. Hence, while heave protection measures will be required for the proposed basement slab, negligible heave movement is expected to occur at the neighbouring structures.

7.3.1 MOVEMENTS DUE TO EXCAVATION UNLOADING

The basement excavation will extend to approximately 7m depth below the existing ground level over the entire building footprint. A reduced excavation depth of approximately 3.5m will apply within the footprint of the existing single storey basement.

The effect of the excavation has accordingly been considered as an unloading of -70kN/m^2 within the existing basement area, increasing to -140kN/m^2 outside of this. As the basement will be excavated within the London Clay Formation, a heave elastic response of the ground as a result of unloading can be expected to occur both immediately following the basement excavations and in the post-construction long-term scenario.

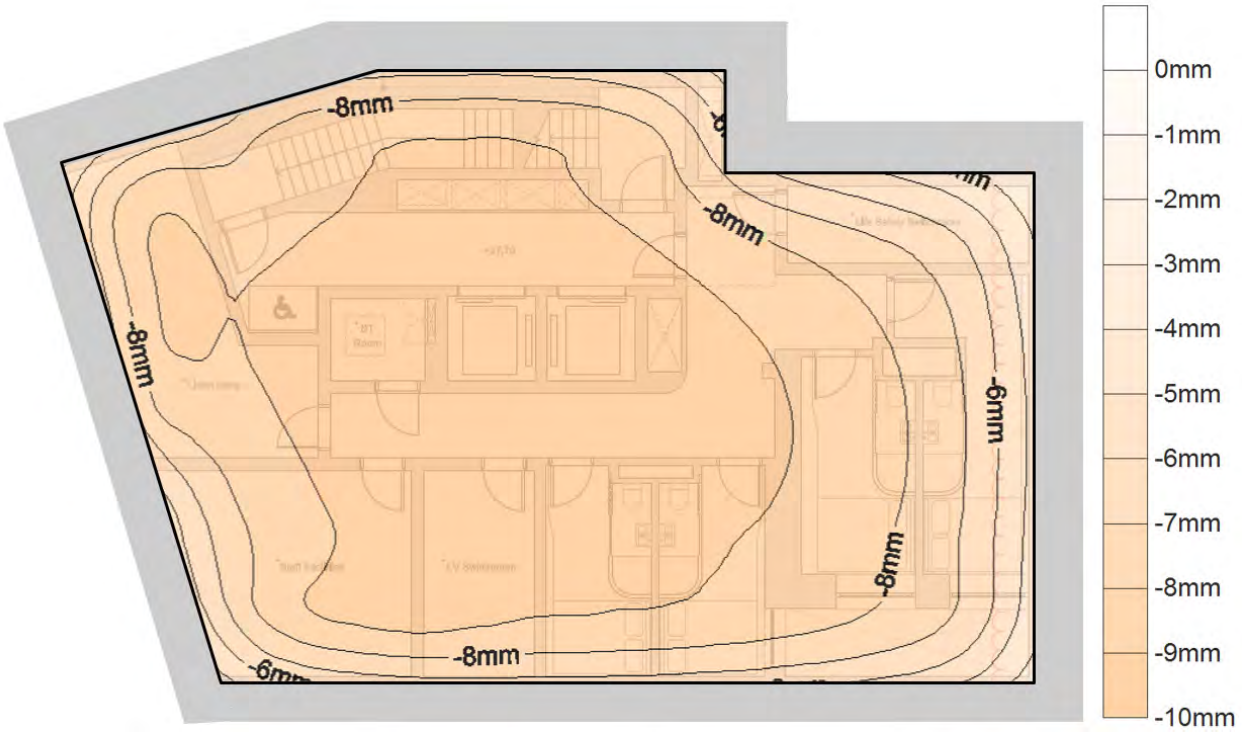


APPROXIMATE EXCAVATION UNLOADING

The ground heave movements due to soil unloading are not expected to have any discernible impact on the neighbouring structures as the heave movements will be largely confined by the perimeter retaining walls.

7.3.2 SHORT TERM MOVEMENTS DUE TO EXCAVATION HEAVE

The analysis suggests that up to around 10mm of short term heave is expected at the centre of the excavated basement, reducing to approximately 6mm or less at the basement perimeter.



7.3.2.1 POST CONSTRUCTION VERTICAL MOVEMENTS

The basement slab is to be constructed as suspended, with loads transferred to soil at depth through internal pile foundations and the piled retaining wall. Therefore, there will be a permanent mismatch in loading caused by the excavations that will lead to long-term post construction heave.

Up to around 15mm of post construction heave is predicted to occur at the centre of the excavated basement.

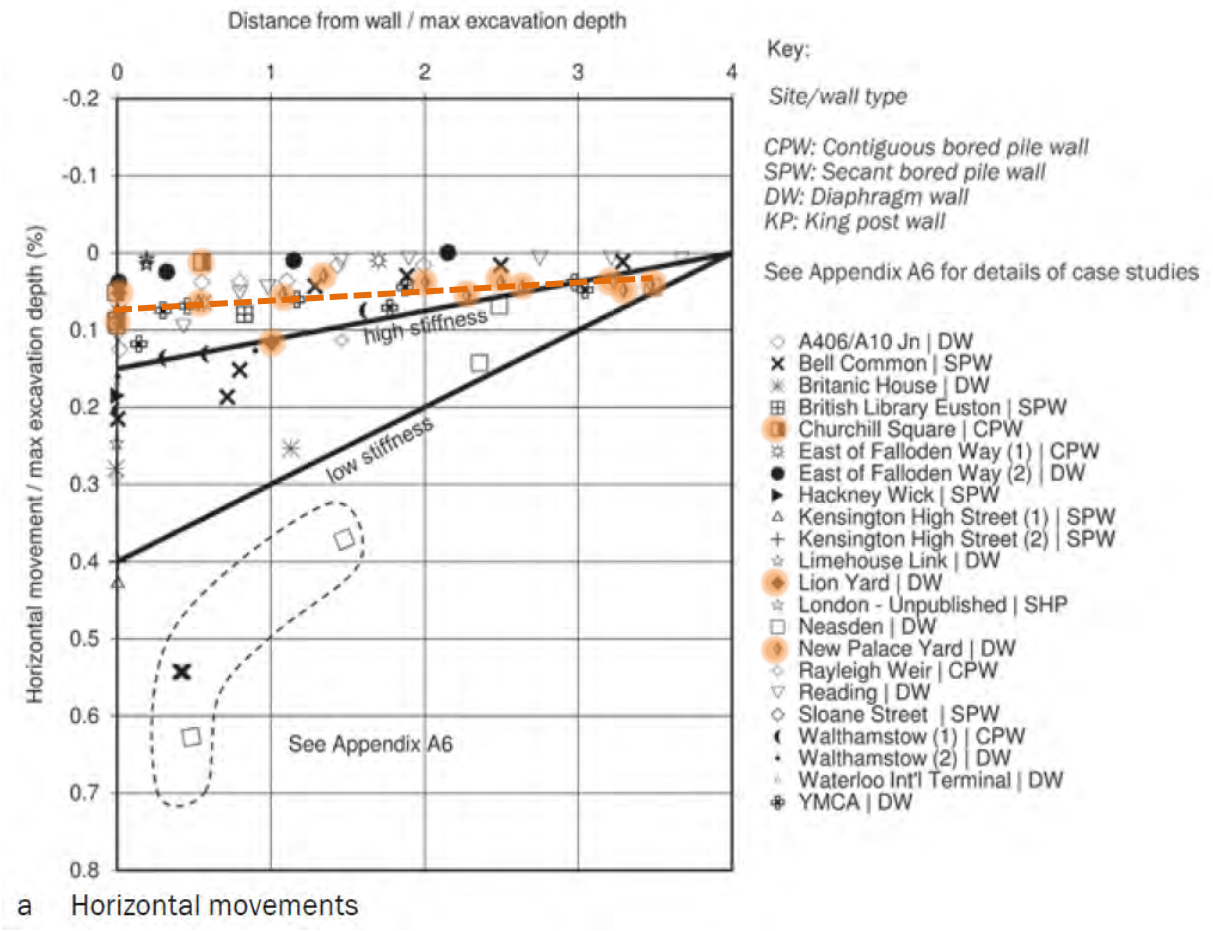
7.4 MOVEMENT DUE TO PILE INSTALLATION AND YIELDING

In order to provide a prediction of the potential magnitude of ground movement behind the bored pile retaining wall, the guidance provided by CIRIA 760: 'Guidance on embedded retaining wall design' has been followed.

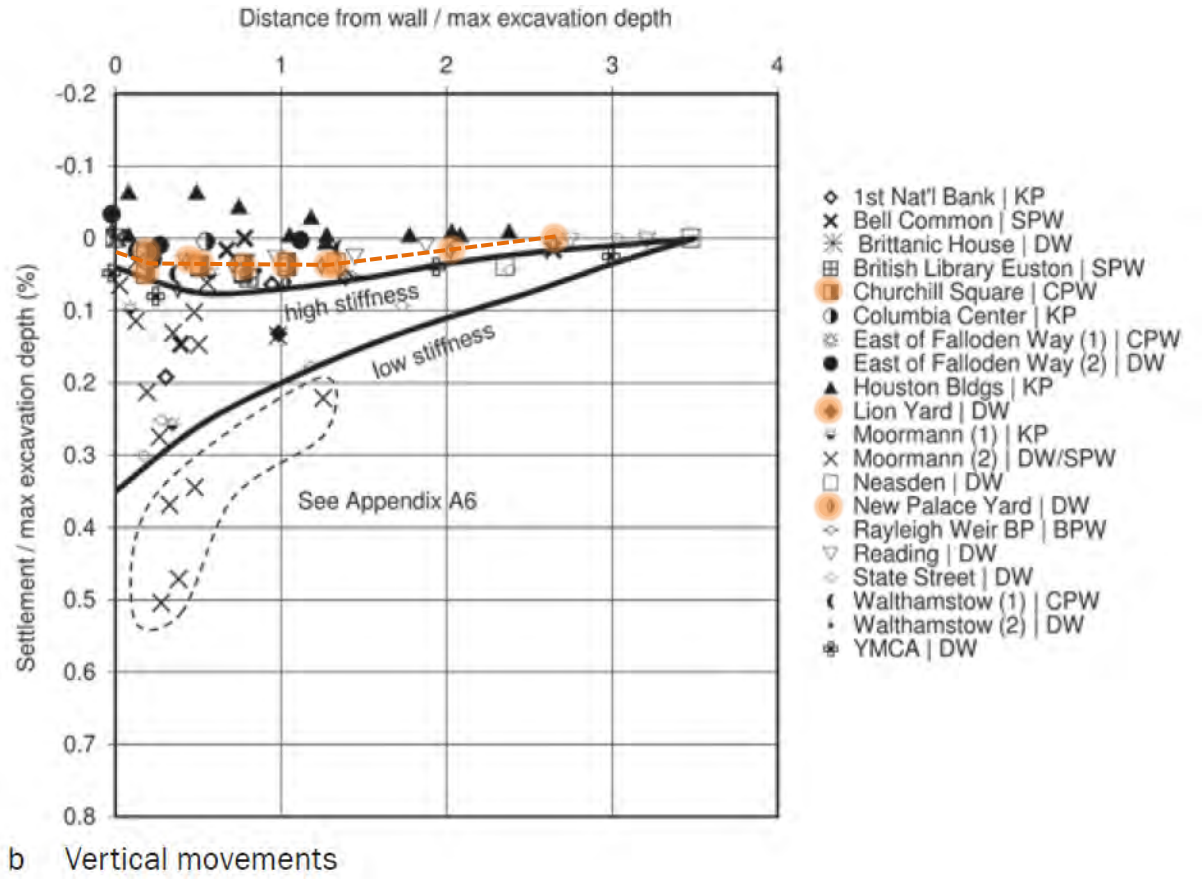
The prediction of movement using this guidance is highly dependent on the stiffness assumptions for the proposed retaining wall. Given the proposed top-down construction of the basement, utilising the ground floor slab as initial propping for the excavation and with subsequent lower level propping added as required, the proposed basement wall can be classed as a very stiff retaining wall scenario.

It is noted that the high stiffness factors provided by Figures 6.8 and 6.15 of CIRIA 760 reflect a variety of construction methods. For the purpose of this assessment only the stiffness factors drawn from the reported case studies for top-down construction methods have been adopted.

The below reproductions of figure 6.15 a) and b) highlight the data for top-down construction.



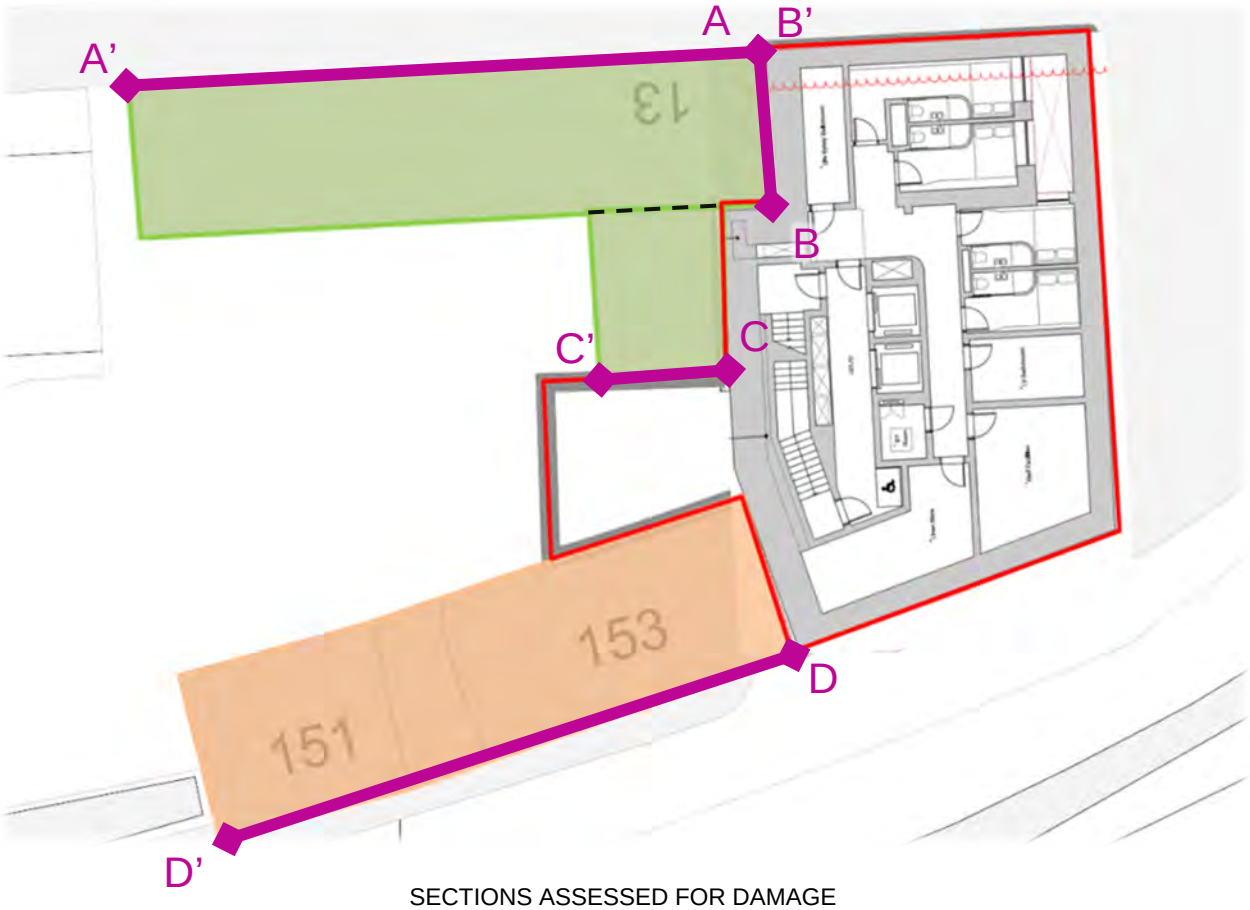
a Horizontal movements



b Vertical movements

7.5 IMPACT ON NEIGHBOURING STRUCTURES

7.5.1 SECTIONS USED FOR ANALYSIS



SECTIONS ASSESSED FOR DAMAGE

7.5.1.1 SECTION A-A' – NOS. 1 – 13 ADELAIDE ROAD

The length of section (L) is taken as 24m and the wall height (H) as 7m. As this section includes an existing 3.5m deep basement, the scale of movements affecting this section have been proportionately reduced from the predicted surface level movement predictions.

The analysis suggests that as a result of pile wall construction and subsequent yielding, the section may experience up to 3mm of settlement, in conjunction with up to 4mm of horizontal movement.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.016042%, producing a maximum deflection ratio Δ / L = -0.00417, within a limiting tensile strain of 0.020%, for a Burland Category 0 "Negligible Damage" condition.

7.5.1.2 SECTION B-B' – NOS. 1 – 13 ADELAIDE ROAD

The length of section (L) is taken as 6m and the wall height (H) as 7m. This section is similarly underlain by an approximately 3.5m deep basement.

The analysis here suggests that as a result of pile wall construction and subsequent yielding perpendicular to the section, the section may experience up to 3mm of settlement, in conjunction with up to 4mm of horizontal movement.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.0315%, producing a maximum deflection ratio Δ / L = -0.01667, within a limiting tensile strain of 0.045%, for a Burland Category 0 "Negligible Damage" condition.

7.5.1.3 SECTION C-C' – REAR EXTENSION TO NOS. 1 – 13 ADELAIDE ROAD

The length of section (L) is taken as 7m and the wall height (H) as 3m. The extension structure is not underlain by an existing basement.

The analysis here suggests that as a result of pile wall construction and subsequent yielding perpendicular to the section, the section may experience up to 6mm of settlement, in conjunction with up to 8mm of horizontal movement.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.043%, producing a maximum deflection ratio Δ / L = -0.01714, within a limiting tensile strain of 0.065%, for a Burland Category 1 "Very Slight Damage" condition.

7.5.1.4 SECTION D-D' – NOS. 151 – 153 REGENT'S PARK ROAD

The length of section (L) is taken as 23m and the wall height (H) as 10m.

The analysis here suggests that as a result of pile wall construction and subsequent yielding perpendicular to the section, the section may experience up to 5mm of settlement, in conjunction with up to 8mm of horizontal movement.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.033478%, producing a maximum deflection ratio Δ / L = -0.00435, within a limiting tensile strain of 0.040%, for a Burland Category 0 "Negligible Damage" condition.

7.5.2 PUBLIC HIGHWAY

The proposed basement development is located adjacent to both Regent's Park Road and Adelaide Road, where there is expected to be various buried utilities.

Given reasonable standards of workmanship during the piling works, together with the adoption of top-down construction, negligible movement is anticipated to any buried services located beneath these streets or pavements.

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 POTENTIAL HYDROGEOLOGICAL IMPACTS

The site is underlain by essentially impermeable 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 POTENTIAL HYDROLOGICAL IMPACTS

There will be no change to the flood risk at the site or at neighbouring sites as a result of the proposed basement.

There will be a need to maintain the present water discharge regime and to provide Sustainable Drainage Systems (SuDS) to meet planning policy requirements. A SuDS Assessment is presented as a separate report (LBH4540aSUDS).

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 basement will obviate concerns regarding potential seasonal movement.

8.3.2 EFFECT OF TREES

The proposed basement is sufficiently deep to obviate the effect of trees.

8.3.3 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 and found to be acceptable (limited to Burland scale Category 1 'Very Slight'). Negligible movement to the public highway is predicted.

8.3.4 LONDON UNDERGROUND

An Asset Impact Assessment of the London Underground Chalk Farm station tunnels will be undertaken in due course and will be submitted to Transport for London (TfL) to ensure that the proposed scheme will not adversely impact the structure of the tunnels.

8.4 RESIDUAL IMPACTS

As a result of this assessment, it is concluded that the proposed basement will have no residual unacceptable impacts upon the surrounding structures, infrastructure and environment. No cumulative impacts are envisaged.

9. STRUCTURAL MONITORING

The ground movement assessment suggests Burland Scale Category 1 (Very Slight) damage may be expected at the rear extension to Nos. 1 – 13 Adelaide Road. Negligible damage is predicted to other neighbouring structures.

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

The final extent of the structural monitoring will be a matter for agreement with the neighbours as part of the Party Wall Agreements.

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

During all demolition, piling 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.

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	No action	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

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.