BASEMENT IMPACT ASSESSMENT

BASEMENT FLAT
39 PRIORY ROAD
CAMDEN

LBHGEO

LBH4627bia

January 20201

Document Control

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1.0	11th Jan 2021		Digitally signed by Seamus Lefroy-Brooks DN: cn=Seamus Lefroy-Brooks, o=LBHGEO Ltd., ou=LBHGEO, email=seamus@LBHGEO.co.uk, c=GB Date: 2021.01.11 16:31:36 Z

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NON-TECHNICAL SUMMARY

It is proposed to extend the basement flat at No. 39 Priory Road. This rear extension will form a new living / dining room area opening onto a basement level patio that provides access to the elevated rear garden. In addition, a basement lightwell is to be excavated at the front of the property..

This basement development will require up to 1.5m of excavation at the front and rear of the property.

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 excavations 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 construction methodology upon the neighbouring structures, resulting in a prediction of 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

It is proposed to extend the basement flat at No. 39 Priory Road. This rear extension will form a new living / dining room area opening onto a basement level patio that provides access to the elevated rear garden. In addition, a basement lightwell is to be excavated at the front of the property. A new front lightwell is also proposed.

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 2018 Camden published updated Camden Planning Guidance (CPG) on Basements and Lightwells. These 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 and refer back to the 2010 Camden Geological, Hydrogeological and Hydrological "Arup" Study.

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

- 2020 June Existing Plans 2PM Architects
  Ref: 227-2PM-XX-XX-DR-A- 00201, 00301, 00302, 00305, 00401 – 00404

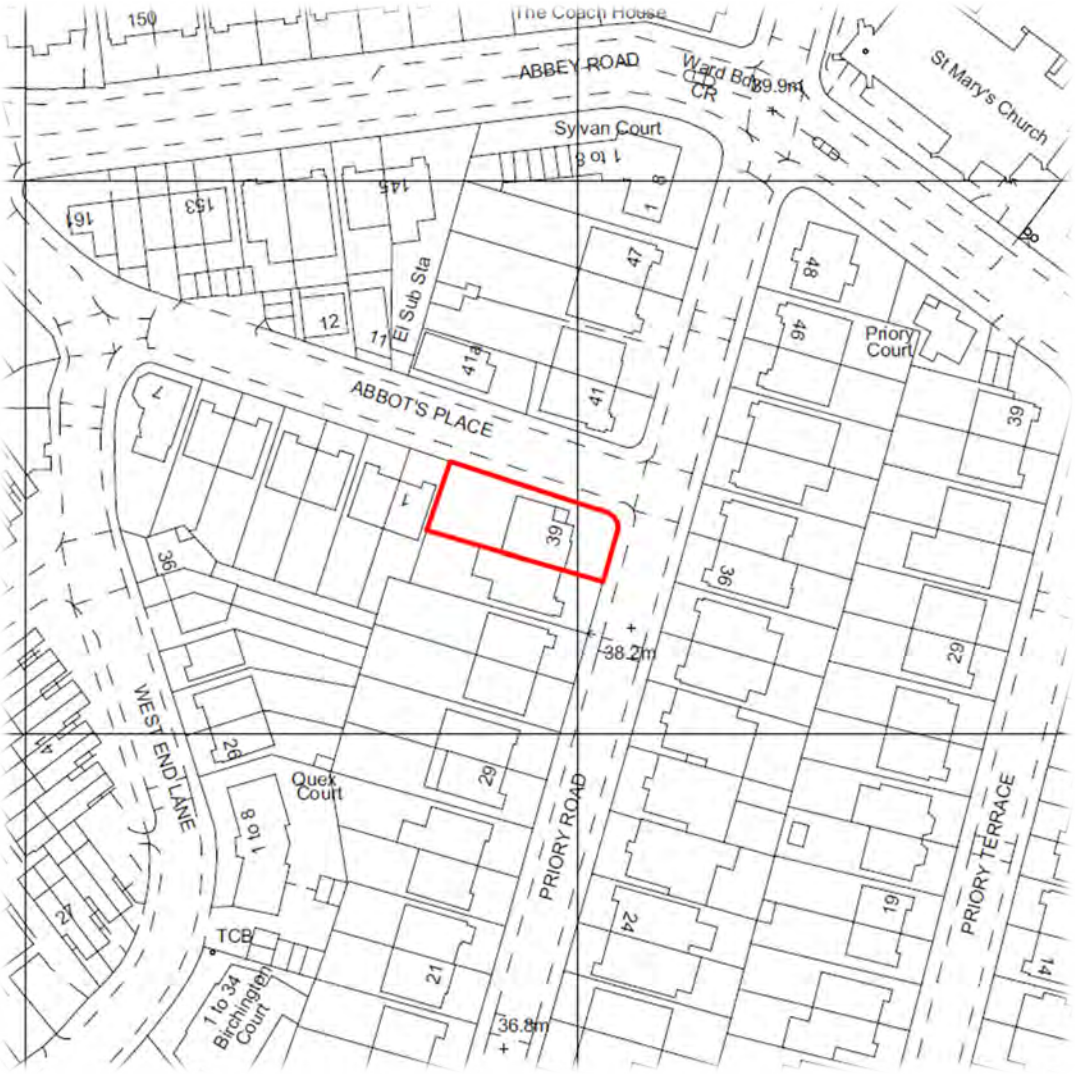
- 2020 June Proposed Plans 2PM Architects
  Ref: 227-2PM-XX-XX-DR-A- 10201, 10301, 10302, 10305, 10401 – 10404

- 2020 December Site Investigation STL
  Ref: JN1512

2. THE SITE

2.1 SITE LOCATION

The site is located at the junction of Priory Road and Abbot's Place in South Hampstead, within the Priory Road Conservation Area, and may be approximately located by the postcode NW6 4NN or by National Grid Reference 525585, 183920.



2.2 TOPOGRAPHICAL SETTING

The site lies on the lower southern slopes of Hampstead Hill on land that falls gently to the south.

Tributaries of the River Westbourne run to the west and east of the site. At its closest, the course of the river runs some 125m to the northeast of the site.

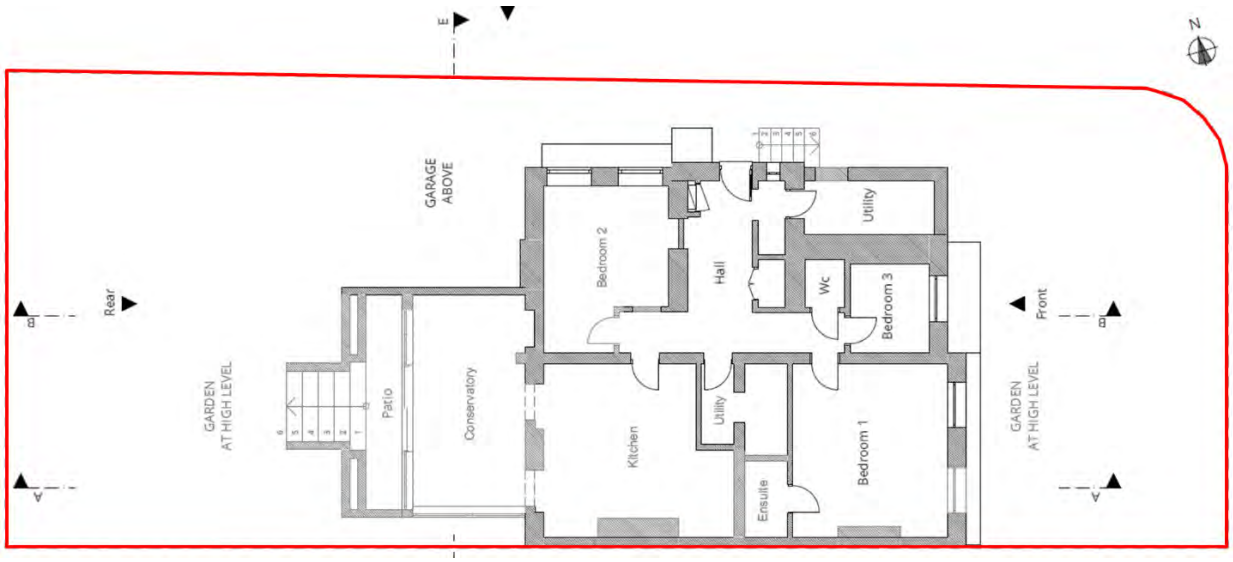
EXTRACT FROM FIGURE 16 OF THE CGHHS

2.3 SITE DESCRIPTION

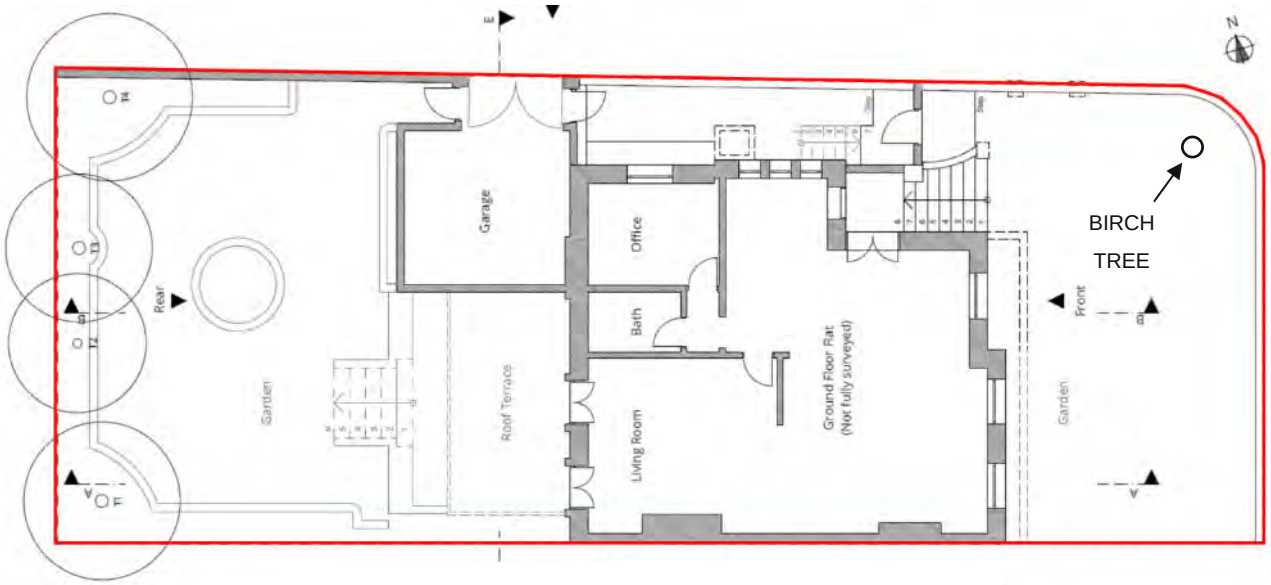
The site is occupied by a four storey Victorian semi-detached building. The property comprises a side entrance from Abbot's Place as well as garden areas to the front and rear, both bordered by tall hedgerows.

FRONT ELEVATION OF NO. 39 PRIORY ROAD

The building is understood to be divided into four residential units, each occupying a floor level. A garage, accessible from Abbot's Place, is present at ground level, while a conservatory extension is present at basement level with stepped access up to the rear garden.

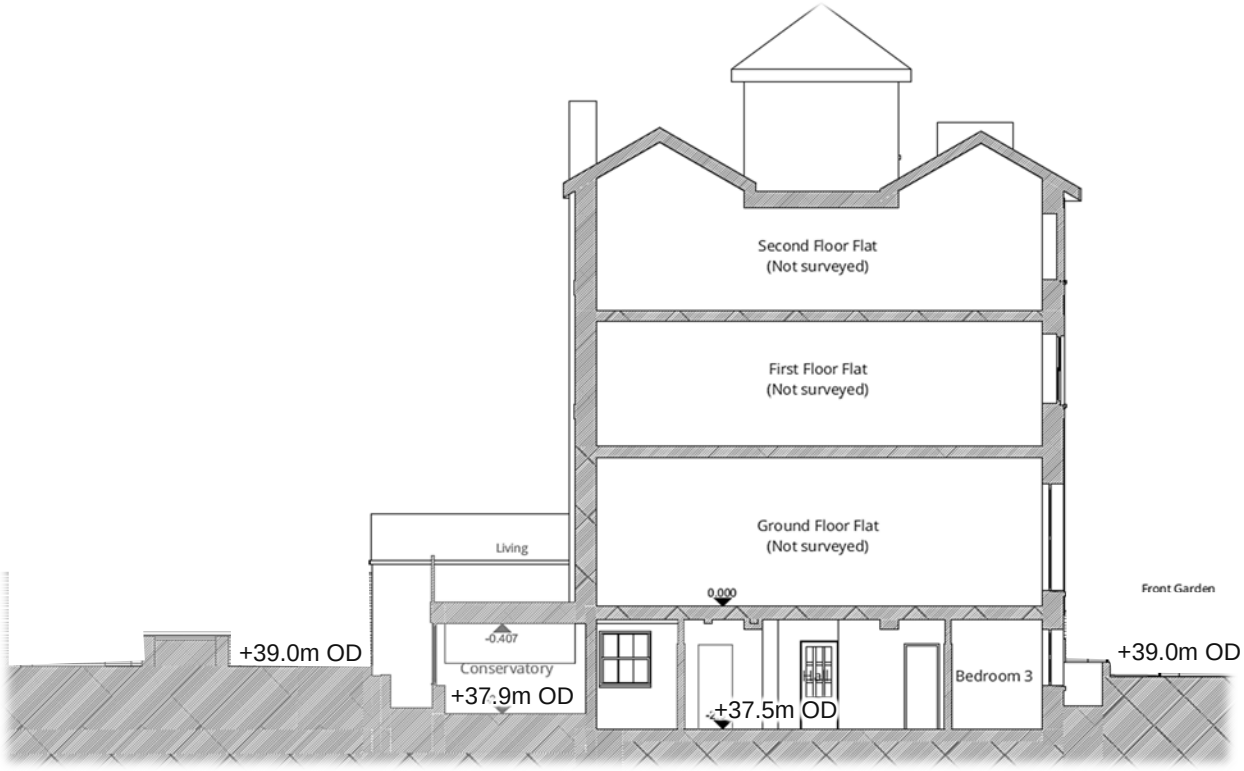


EXISTING LOWER GROUND (BASEMENT) FLOOR

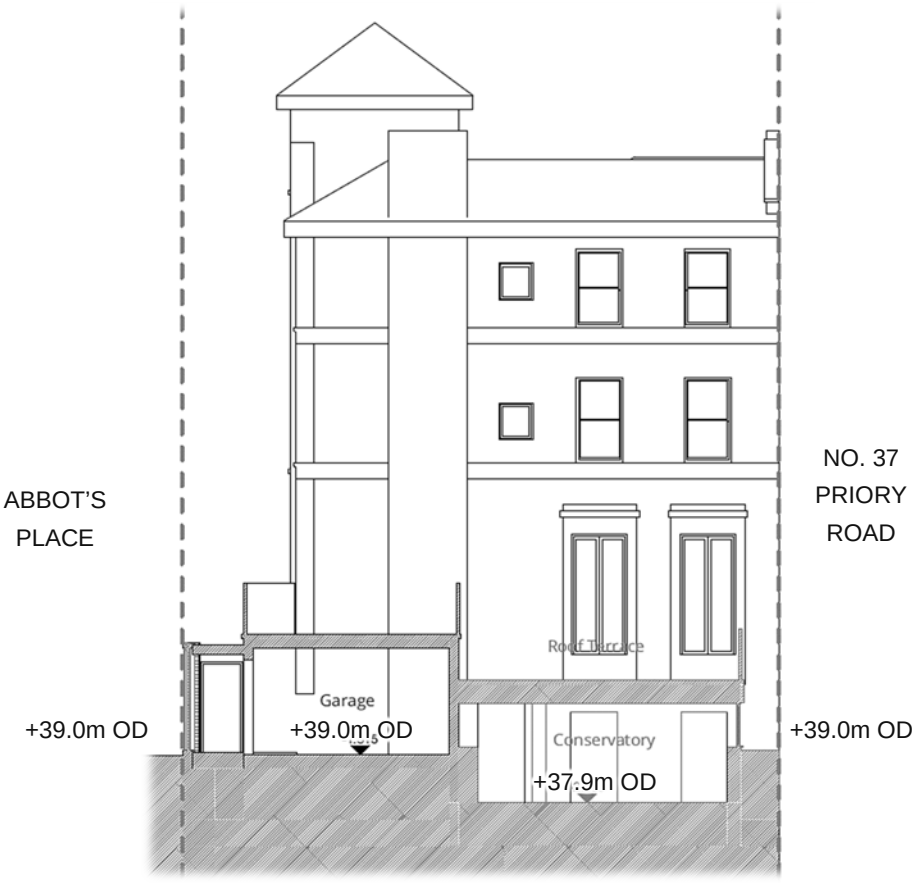


EXISTING GROUND FLOOR

The existing ground floor is elevated approximately 1.5m above street level, while the basement is set approximately 1.5m below street level. The basement conservatory is set 400mm higher than the main basement floor level.



EXISTING SECTION A-A



EXISTING SECTION E-E

EXISTING REAR GARDEN

Both the front and rear garden areas are situated at street level.

The majority of the rear garden area comprises a hard-surfaced patio with landscaped borders, including four mature trees (two cypress, two lime) at the far rear of the site. A fifth tree, adjacent to Abbot's Place, was recently felled.

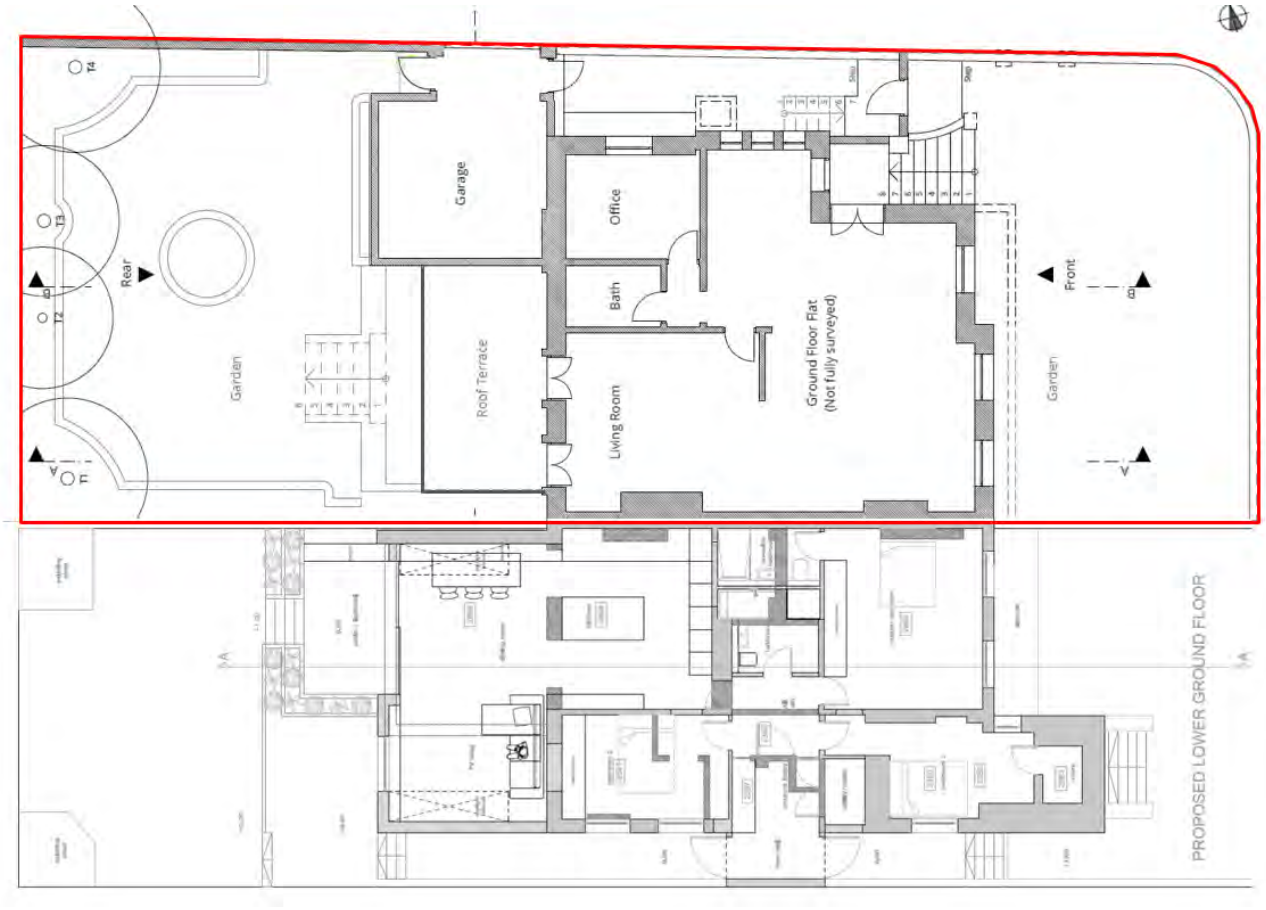
GROUND FLOOR GARAGE

BASEMENT LEVEL CONSERVATORY

The front garden area is hard-surfaced and bordered by a wide hedge. A single mature Birch tree is present in the northeastern corner.

EXISTING FRONT PATIO / GARDEN

The adjoining No. 37 Priory Road is of a similar construction to No. 39. That property includes a basement floor situated at a similar level to No. 39, with a recently-constructed rear extension with a basement level patio. Two mature sycamore trees are present in the front garden to No. 37, adjacent to the boundary with No. 35 .



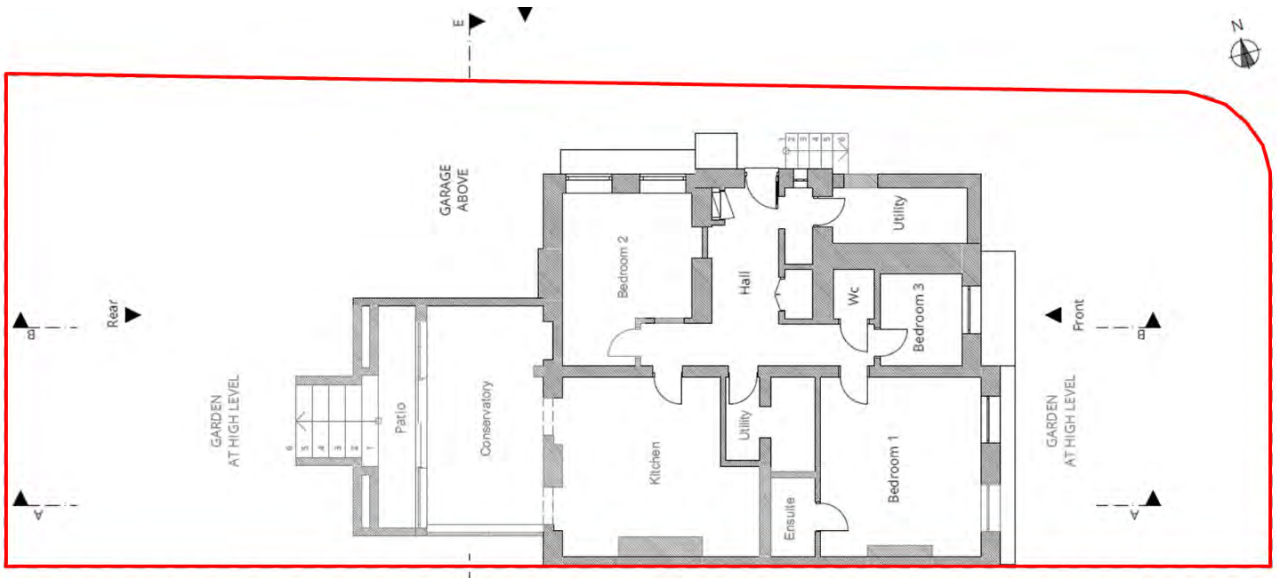
EXISTING NO. 39 & NO. 37 PRIORY ROAD

2.4 PROPOSED DEVELOPMENT

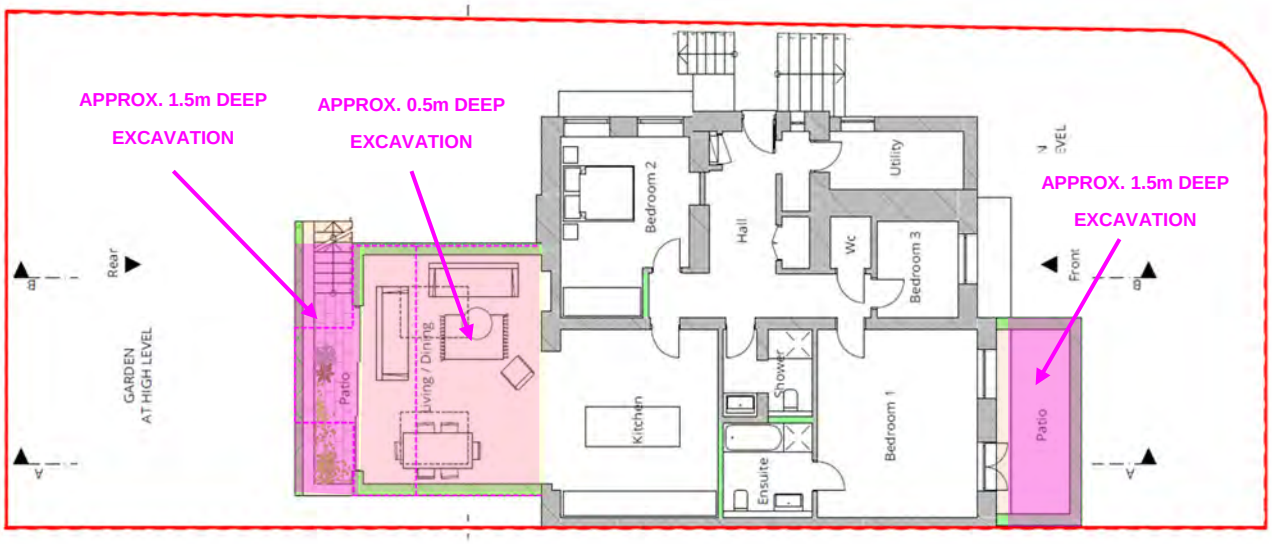
It is proposed to construct a new extension to replace the existing basement level conservatory and to reduce the floor level to that of the main building, requiring approximately 0.5m excavation.

A narrow area of basement level patio is proposed beyond the extension; which will require 1.5m excavation of the existing garden and some limited underpinning of the existing garage.

A new lightwell is to be excavated at the front of the property, requiring excavations approximately 1.5m deep.

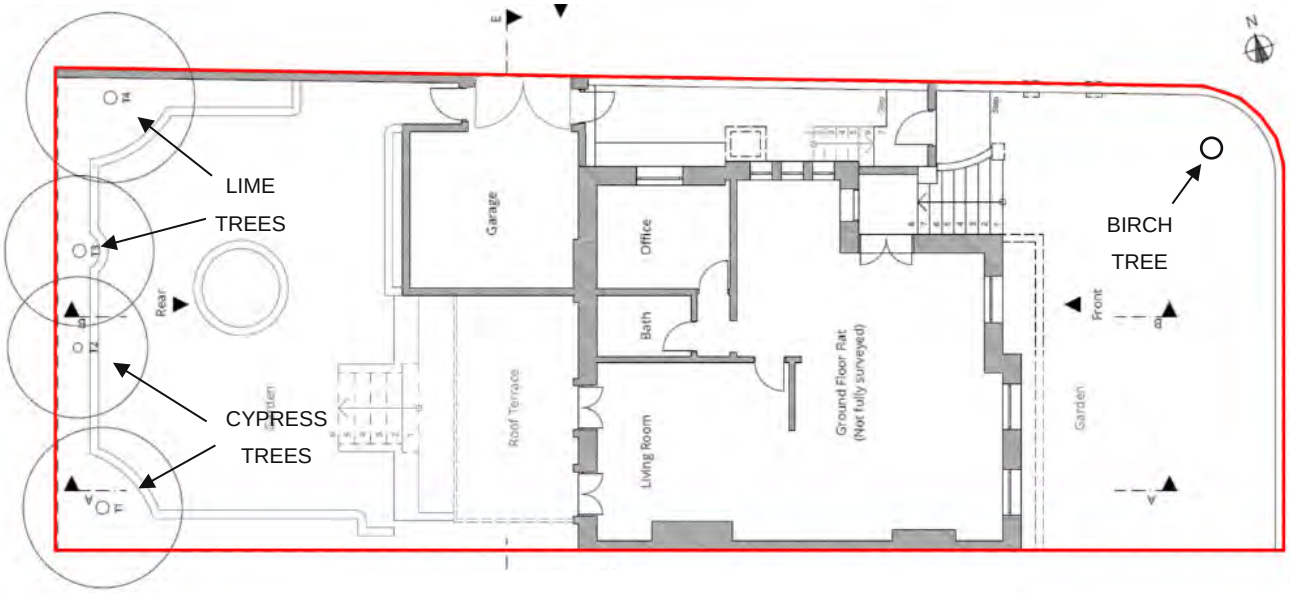


EXISTING LOWER GROUND (BASEMENT) FLOOR

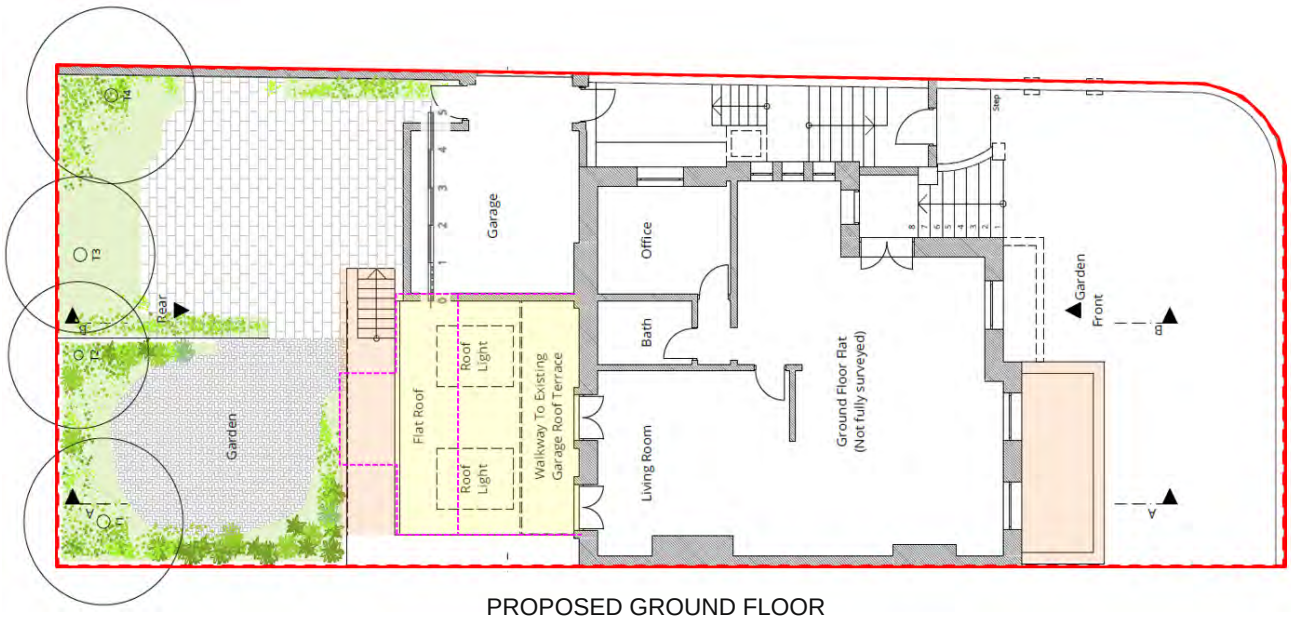


PROPOSED LOWER GROUND (BASEMENT) FLOOR

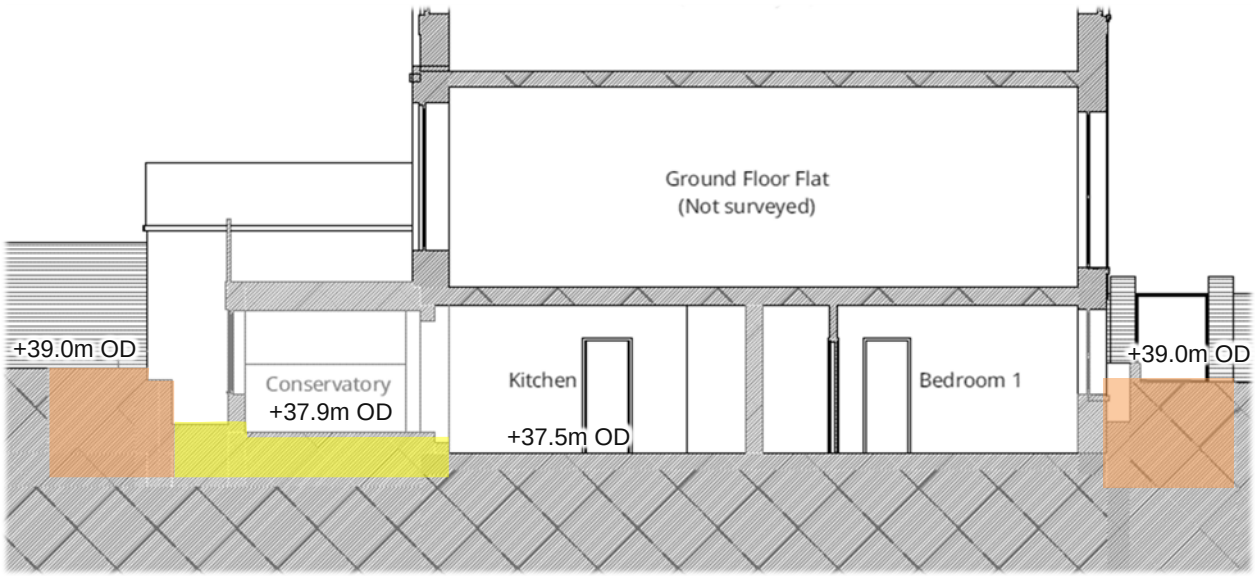
A reconfiguration of the rear garden / patio area is also proposed.



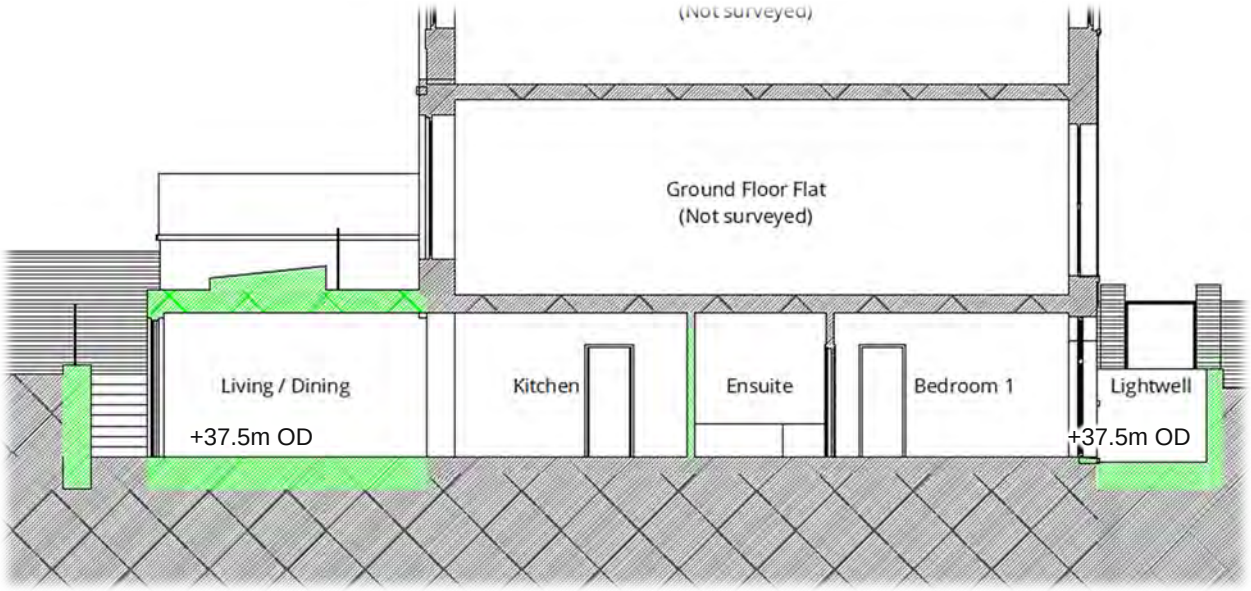
EXISTING GROUND FLOOR



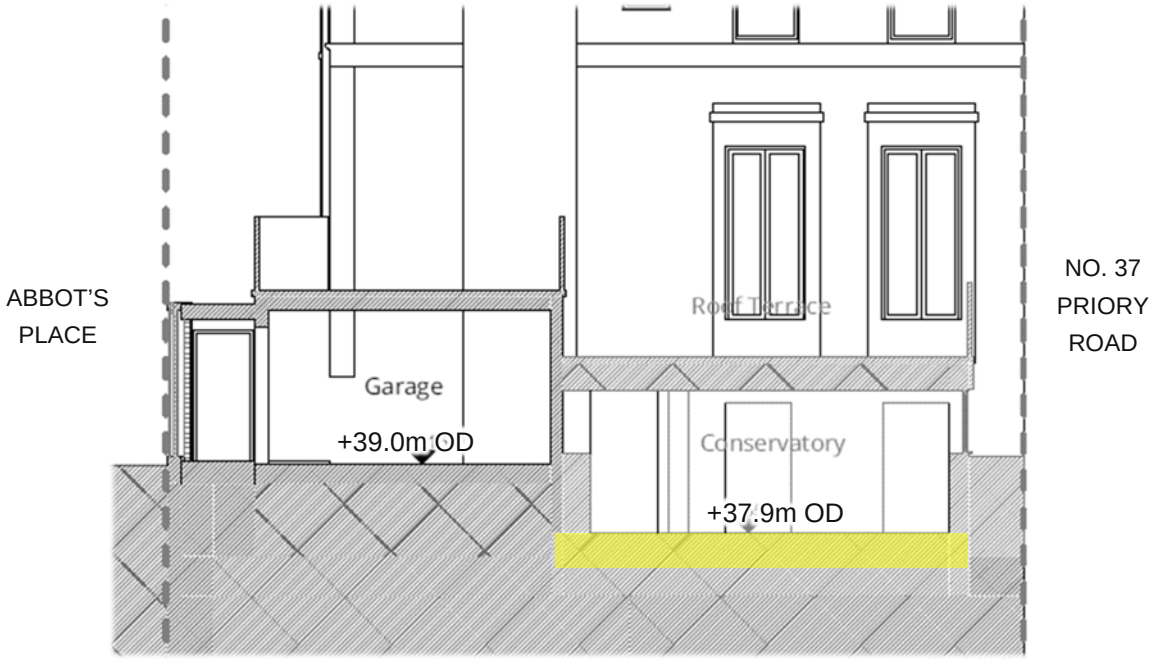
PROPOSED GROUND FLOOR



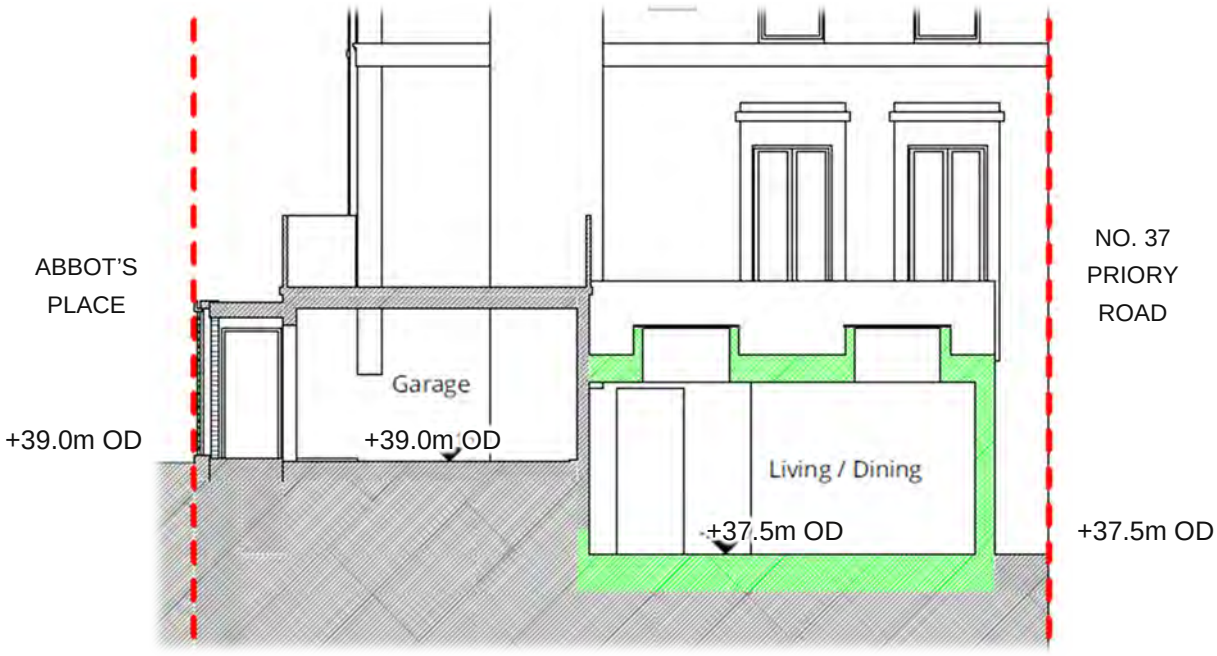
EXISTING SECTION A-A SHOWING PROPOSED EXCAVATION EXTENT



SECTION THROUGH THE PROPOSED DEVELOPMENT
(SECTION A-A)



EXISTING SECTION E-E SHOWING PROPOSED EXCAVATION EXTENT



SECTION THROUGH THE PROPOSED REAR EXTENSION
(SECTION E-E)

NO. 39 & NO. 37 PRIORY ROAD – SHOWING PROPOSED DEVELOPMENT

3. DESK STUDY

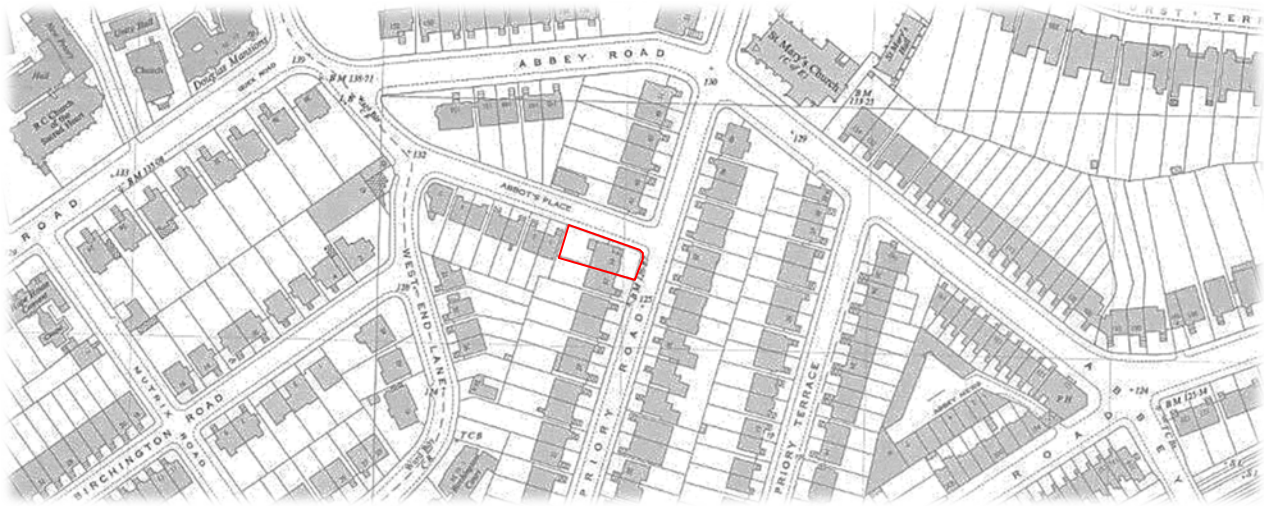
3.1 SITE HISTORY

The site itself remained an undeveloped field until the mid-19th Century.

Priory Road and Abbot's Place were established in the early 19th Century and by the mid-1860s the area experienced extensive residential development, coinciding with the development of the London & North West Railway to the south. The semi-detached properties of Nos. 37 and 39 Priory Road were constructed at this time.

1890s

The main building has since remained relatively unchanged until the present day, apart from a division into four separate residential units during the 1970s. A garage extension at the rear of the site was originally constructed in the 1910s, although it appears to have been reconstructed in the 1960s.



1960s

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

3.3 HYDROGEOLOGICAL INFORMATION

Figure 2 of the CGHHS (above) indicates that tributaries of the River Westbourne run on both sides of the site, the closest passing approximately 120m to the northeast 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 parts of the site and the surrounding area are at a low risk of surface water flooding.

Figure 6 of the Camden SFRA (overleaf) indicates that the site lies within a Critical Drainage Area (Group 3_010), but outside of 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 120m to the southwest of a now culverted tributary to River Westbourne.
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	The proposed reconfiguration of the garden areas does not result in a change in area of hard-surfaced areas.
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 as per the existing arrangement. 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. 39 Priory Road is at 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	
Does the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7 degrees?	No	
Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees?	No	
Is the site within a wider hillside setting in which the general slope is greater than 7 degrees?	No	See Figure 16 of the CGHHS.
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?	No	No tree removal is proposed and the proposals do not extend into any tree protection zones.
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 site is located approximately 12pm to the southwest of the now culverted tributary to River Westbourne.
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 excavations for the front lightwell will be undertaken within 5m of the Priory Road pavement
Will the proposed basement significantly increase the differential depth of foundations relative to the neighbouring properties?	No	The neighbouring property at 37 Priory Road includes a basement floor at a similar level to the basement floor at this property. The recent rear basement extension to No. 37 extends further rearwards than the proposed excavations at this property. A front lightwell is also present to a similar extent at the neighbouring building.
Is the site over (or within the exclusion zone of) tunnels, e.g. railway lines?	No	

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).

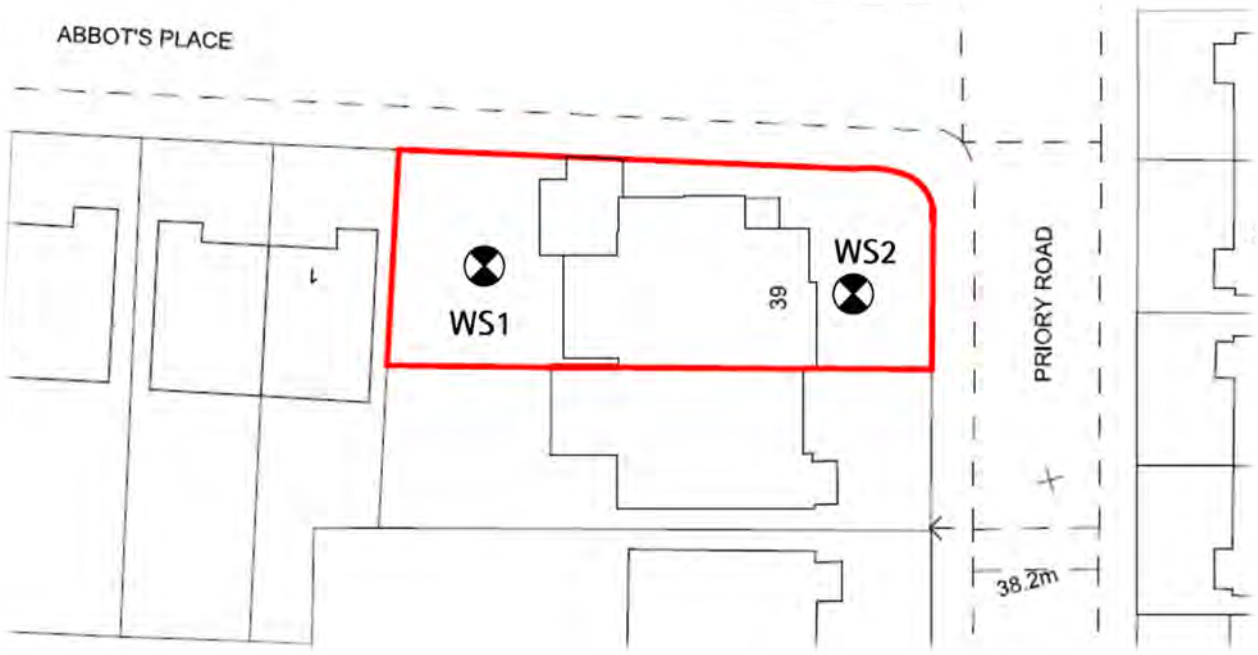
- *The site is within 5m of a highway or pedestrian right of way.*

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.

5. SITE INVESTIGATION

An intrusive investigation comprising two small diameter window sampler boreholes was undertaken by STL in December 2020 to confirm the ground conditions at the site. Their site investigation report accompanies this document.

The boreholes were located at the front and rear of the building, as shown on the plan below.



5.1 GROUND CONDITIONS

The London Clay is present at shallow depth below the front and rear patio of the site, beneath less than a metre of made ground. The material is recorded to comprise typical firm, becoming stiff, brown / grey silty London Clay.

The London Clay is of high volume change potential.

5.2 GROUNDWATER

No shallow groundwater table is present beneath the site.

6. BASEMENT CONSTRUCTION

6.1 EXCAVATION AND FOUNDATION CONSTRUCTION

The proposed development will require excavations down to the existing basement level at both the front and rear of the site. This is expected to amount to approx. 0.5m deep excavations below the footprint of the proposed rear extension and approx. 1.5m deep excavations to form the rear sunken patio. The front lightwell / sunken patio is also expected to require 1.5m deep excavations.

The new rear extension will replace the existing conservatory; hence the northern retaining wall that supports the ground floor garage can be extended and deepened where necessary, requiring less than 1m of underpinning.

It is envisaged that the southern retaining wall of the conservatory, set back from the property boundary, will be removed and reconstructed at the required depth.

Where the excavation extends further towards the rear, a new retaining wall will be required to be constructed to support the retained high level garden.

The new rear extension and front lightwell external perimeter walls will be formed by conventional L-shaped reinforced concrete segments excavated and cast in-situ in a ‘hit and miss’ sequence of approximately 1m wide sections.

During the excavations, temporary high and low level propping will be installed to ensure that lateral ground movements are minimised. Following the construction of the perimeter walls it is envisaged full width propping will be provided to restrain the new walls during the main excavations. As the main basement excavation proceeds, additional temporary propping is to be installed to ensure lateral ground movements are prevented.

In the permanent situation the reinforced L-shaped segments will connect to the basement slab. The basement raft slab may be expected to act as a horizontal prop, with the whole extension or lightwell structure forming a rigid concrete, U-shaped box.

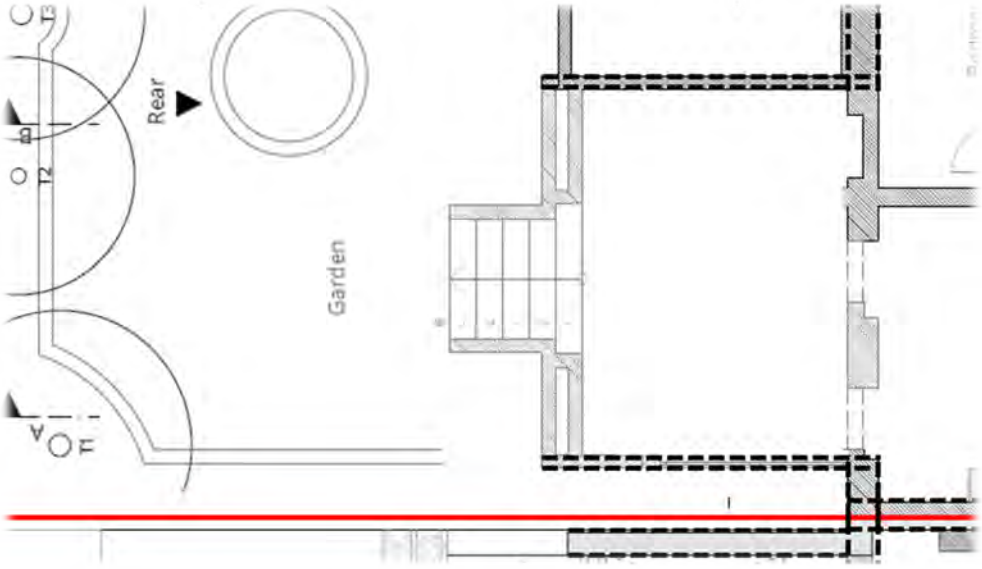
An assessment of the likely extent of any long term uplift is made in Section 7 of this report.

6.2 OUTLINE CONSTRUCTION SEQUENCE

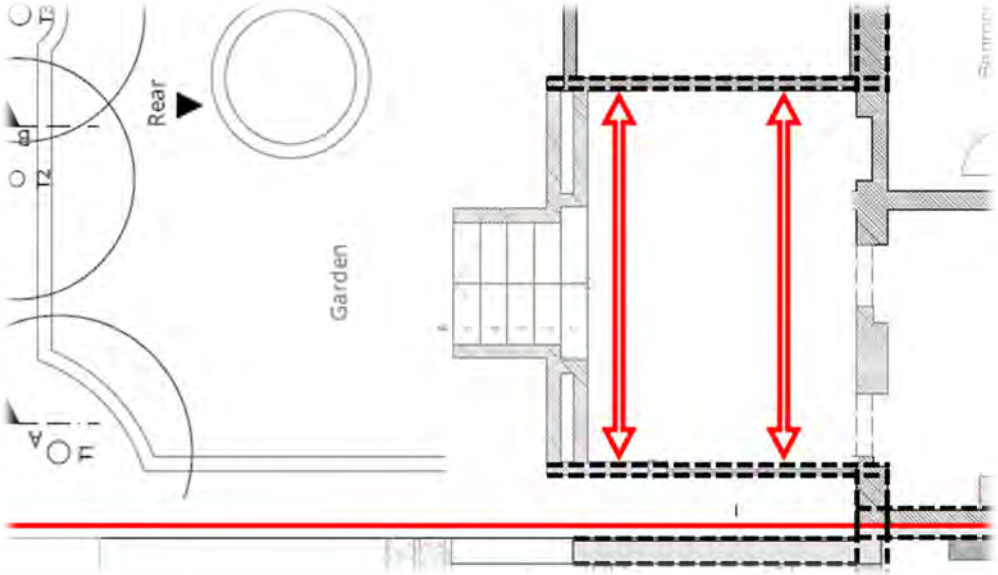
An indicative construction sequence is provided below, but will be subject to detailed design by a structural engineer.

6.2.1 REAR EXTENSION

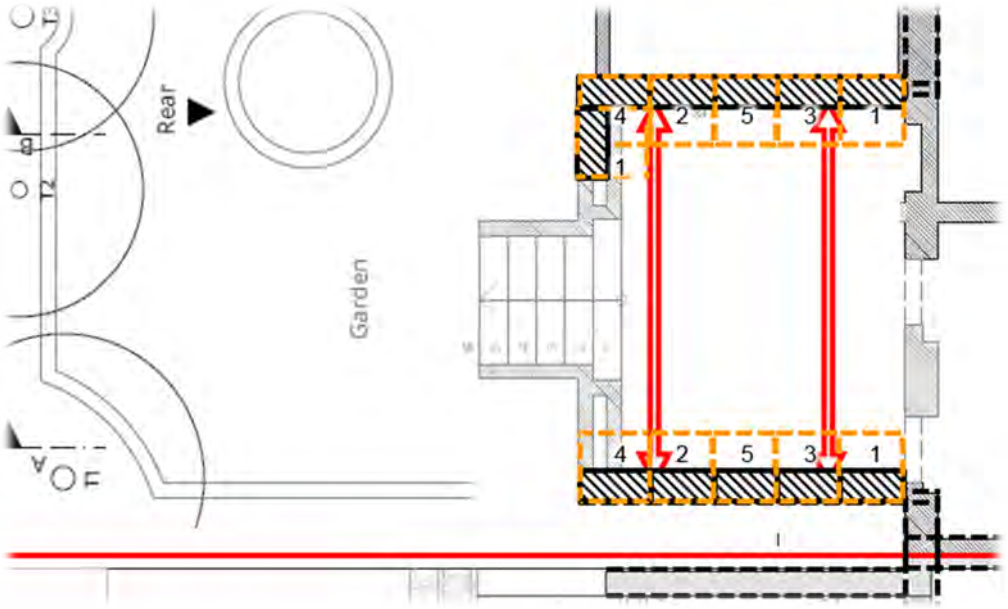
1. Remove the superstructure of the existing rear conservatory, leaving the retaining walls in place.



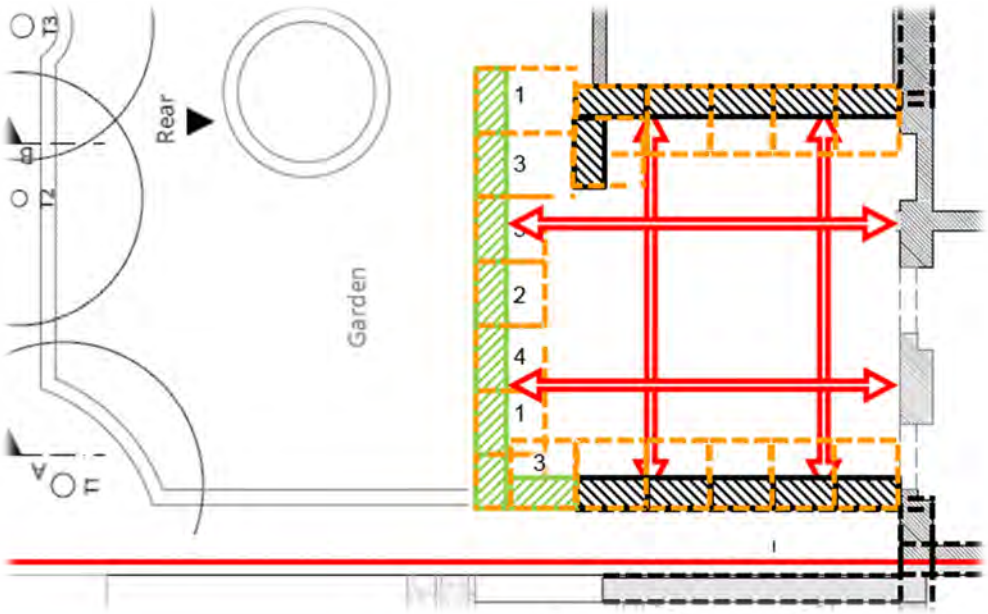
2. Install propping to the rear conservatory walls at existing floor level.



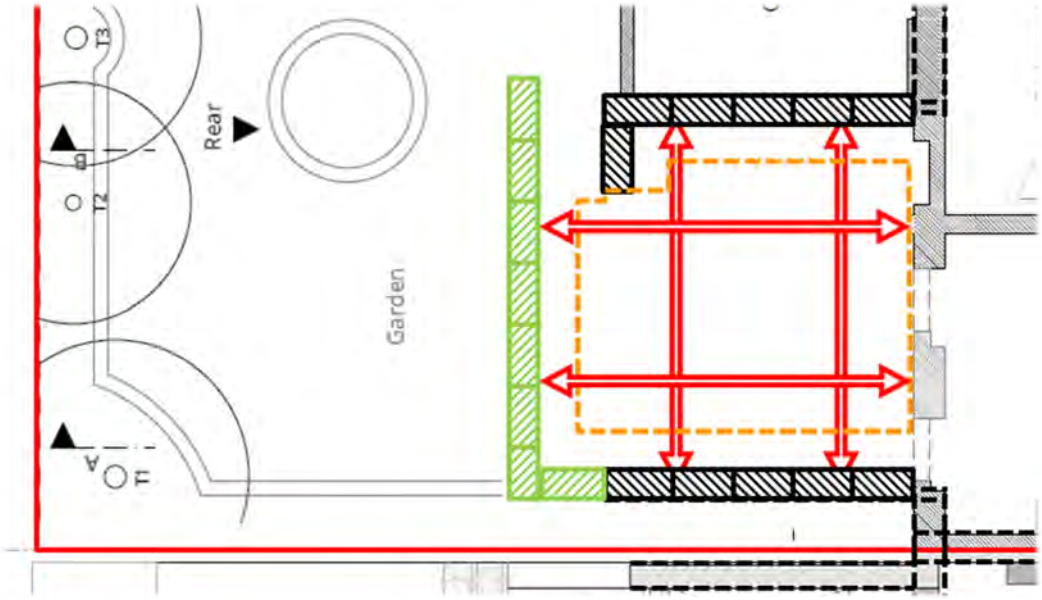
3. Extend the excavation from the existing lower ground floor towards the rear, undertaking deepening of the foundations to the ground floor garage constructed by hit-and-miss methods and designed for soil retaining where necessary.



4. Construct the rear retaining wall to the sunken patio using a similar method described for the front lightwell walls above.

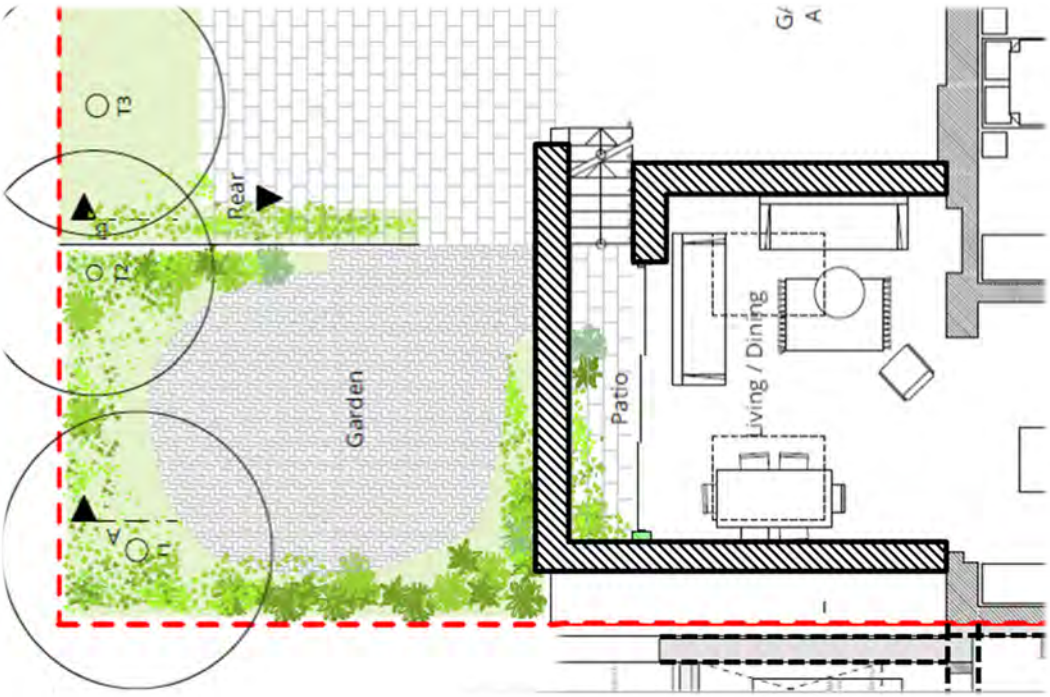


5. Place slab reinforcement and cast the remainder of the new floor slabs between the walls, ultimately forming the rigid U-shaped extension structure.



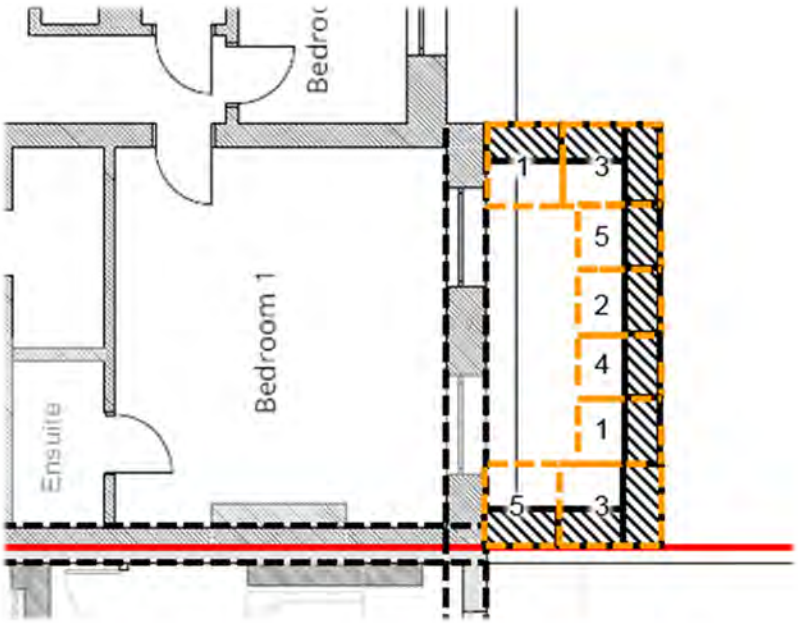
6. Remove temporary propping.

7. Construct the extension superstructure and finishing and paving to the patio. Undertake reconfiguration and finishing to the retained high-level garden.

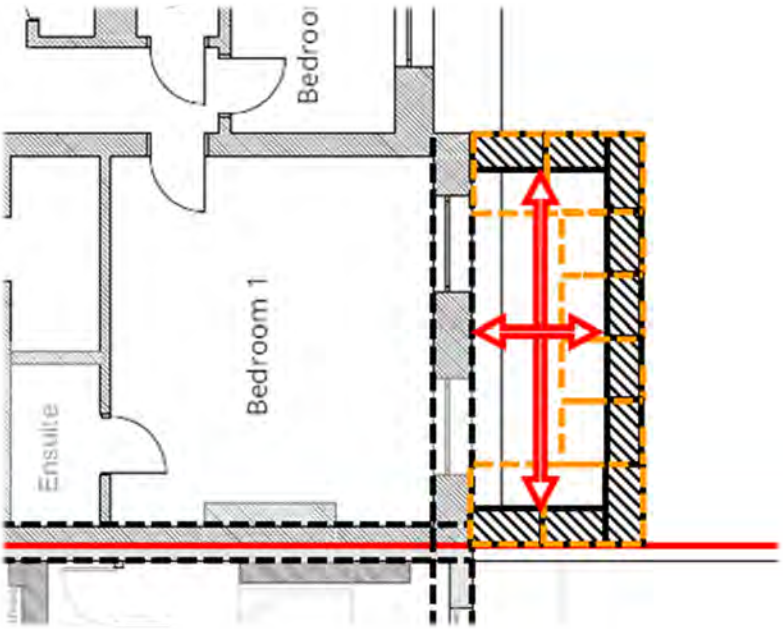


6.2.2 FRONT LIGHTWELL

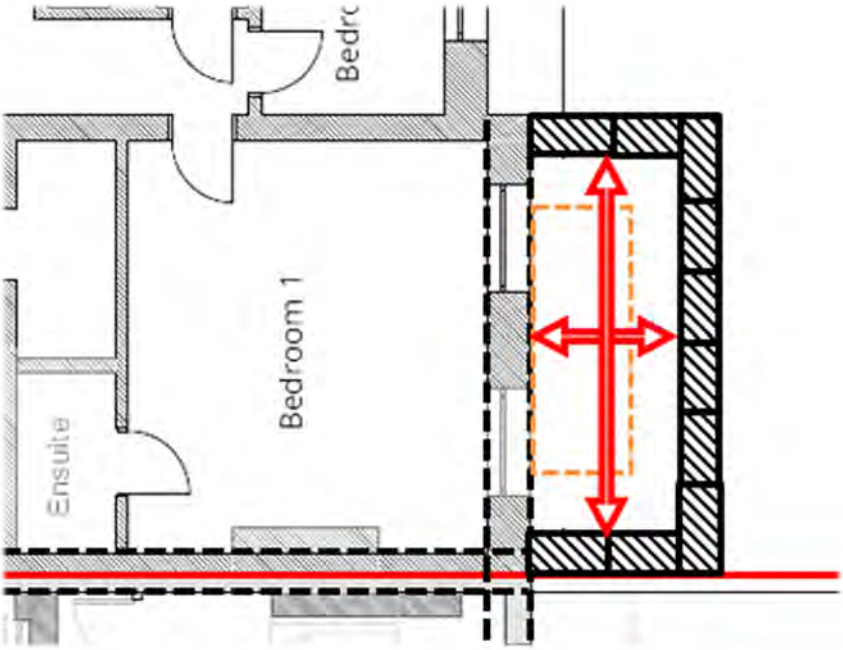
1. Construct the new front lightwell walls using hit-and-miss method with L-shaped reinforced concrete segments.



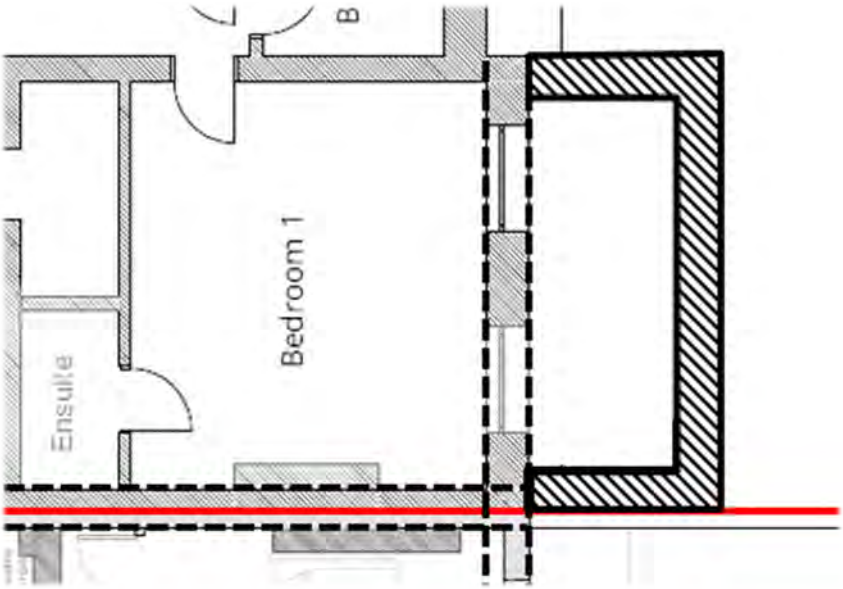
2. Install high level propping to the newly constructed walls, using the existing structure and opposite walls for support.
3. Install low level propping to the wall, using narrow trenches excavated down to proposed slab level.



4. Undertake the full lightwell excavations.
5. Place slab reinforcement and cast the remainder of the new floor slabs between the walls, ultimately forming the rigid U-shaped extension structure.



6. Remove the temporary propping.



6.3 RETAINING WALLS

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)
London Clay	20	Zero	25

6.3.1 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 +39.0m 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.

6.4 EFFECT OF TREES

Four mature trees (two cypress, two lime) are present along the rear, western boundary of the site approximately 7m from the proposed rear patio retaining wall. A single birch tree is also present approximately 6m from the proposed front lightwell.

The depth of foundations required in order to bypass the soils potentially influenced by the trees may be estimated using the approach described in Chapter 4.2 ‘Building Near Trees’ of the NHBC Guidance.

On the basis of a high water demand Cypress of 20m height, the NHBC indicates that the foundations of the rear retaining wall will need to be extend 0.7m below the basement level.

The proposed depth of the front lightwell is expected to obviate any concerns with respect to a low water demand Birch of 14m height.

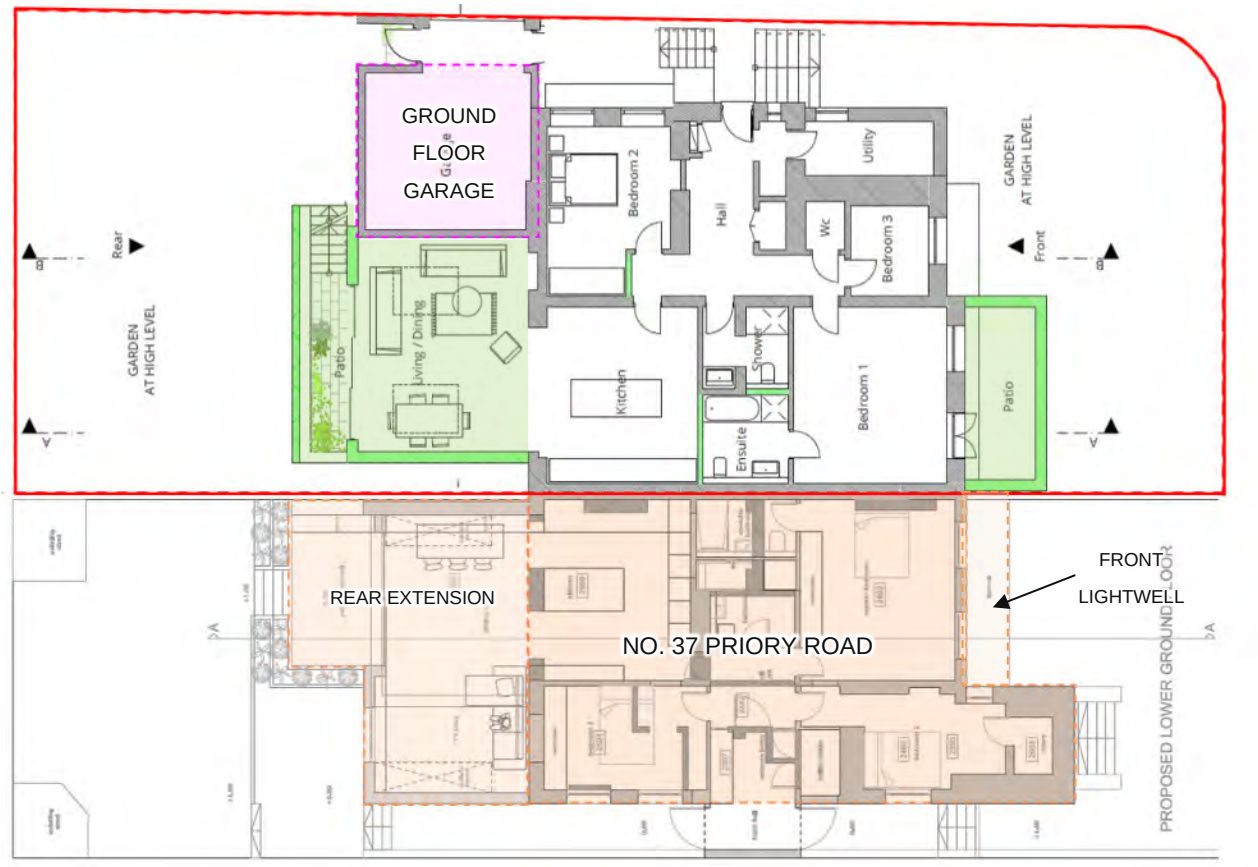
7. GROUND MOVEMENT TO NEIGHBOURING PROPERTIES

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 both the proposed underpinning and as a result of unloading due to soil excavation.

7.1 STRUCTURES CONSIDERED FOR EFFECT OF GROUND MOVEMENT



STRUCTURES ASSESSED FOR DAMAGE

7.1.1 NO. 39 PRIORY ROAD

The host property for the proposed development, is a four-storey terraced property with an existing basement floor set some 1.5m lower than the street level at approximately +37.5m OD.

7.1.2 GROUND FLOOR GARAGE AT NO. 39

A small garage structure, of breeze block construction, is present at No. 39 Priory Road, adjacent to the

north of the proposed rear extension. The garage is understood to be part of the ground floor flat property and is owned by the applicant. Although in practive the most effective construction option might be to demolish and reconstruct the garage, for the purpose of this assessment it is assumed the structure will be retained and the shared side wall will be underpinned by up to 1m to enable the basement level rear extension.

7.1.3 NO. 37 PRIORY ROAD

No. 37 Priory Road adjoins No. 39 to the south and includes a basement floor situated at a similar level to the one at No. 39, extending to both the front and rear, as shown above.

The rear extension to the structure extends to a similar distance as the proposals for No. 39, albeit the sunken patio extends further to the rear.

Conversely, the front lightwell extends to approximately half the distance of the proposed lightwell at No. 39.

7.2 MODELLED GROUND CONDITIONS

Excavation for the new extensions 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 below.

For design 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 20m depth.

STRATUM:	UNDRAINED ELASTIC MODULUS Eu (kN/m^2)	DRAINED ELASTIC MODULUS E' (kN/m^2)
London Clay	27,000kN/m^2 at proposed excavation level increasing linearly to 79,800kN/m^2 at 20m depth	15,000kN/m^2 at proposed excavation level increasing linearly to 44,325kN/m^2 at 20m depth

7.3 MODELLED GROUND MOVEMENTS

There are two components of vertical movement that could potentially interact to affect the neighbouring structures.

These components are firstly progressive sagging movements of the underpinned wall due to imperfections in the underpinning process itself, then secondly elastic heave of the ground in and around the new excavations as a direct response to the net unloading of the weight of soil removed.

7.3.1 MOVEMENTS DUE TO UNDERPINNING

It is expected that underpinning will be required only at the existing wall shared by the rear extension and the ground floor garage; hence movement due to underpinning is expected to only affect the ground floor garage on site and will not affect the neighbouring property at No. 37 Priory Road.

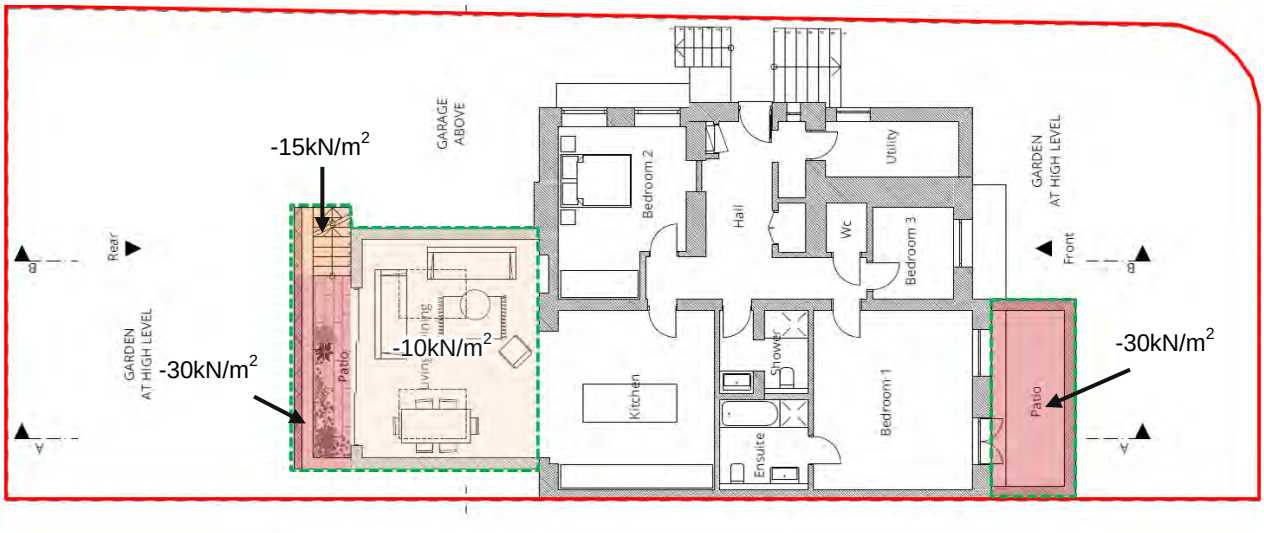
It is not possible to rigorously model the extent of settlement arising from underpinning and experience indicates that the amounts of any movement are very much dependent on workmanship. However, it is considered that given dry conditions and good workmanship, the amount of vertical movement of the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

A single stage of underpinning is envisaged.

As a first approximation, the magnitude of the vertical movement associated with this underpinning is assumed to be a function of the excavation depth and in this case to reduce to zero at an estimated distance of approximately 3.5 times the excavation depth (in this case up to approx. 3.5m) behind the new basement walls.

7.3.2 MOVEMENTS DUE TO EXCAVATION HEAVE

Excavations of up to 1.5m depth are expected to be undertaken to form the front lightwell and the rear sunken patio, reducing to an assumed approx. 0.5m depth below the existing basement. The magnitude of resulting unloading within the proposed excavation, under an assumption of a bulk weight of soil of 20kN/m^3, is presented below.

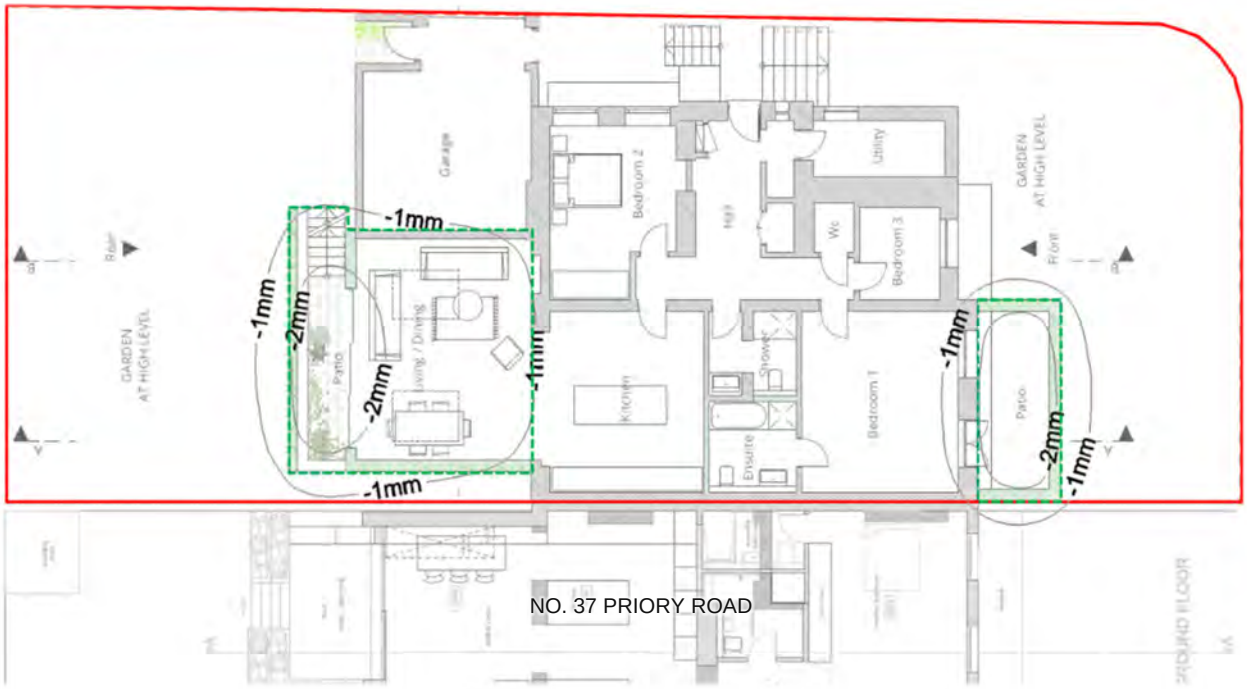


PROPOSED EXCAVATION UNLOADING

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.

7.3.2.1 SHORT TERM MOVEMENTS DUE TO EXCAVATION HEAVE

The analysis suggests that up to 3mm of short term heave is expected.



THEORETICAL PREDICTED SHORT TERM HEAVE CONTOURS

7.3.2.2 POST CONSTRUCTION VERTICAL MOVEMENTS

There will be a permanent mismatch between the weight of soil that is removed and the weight of the new structure. In this situation, long term heave will occur, amounting to a similar figure to the short term.

Only the post construction heave (of <5mm) will affect the host property, whereas the neighbouring properties will be affected by both components amounting to a predicted maximum of approximately 1 mm + 1mm = 2mm, which may be considered negligible.

7.4 HORIZONTAL MOVEMENTS

Horizontal soil movements are expected to occur due to yielding of the soil behind the underpinned walls.

As a first approximation, the magnitude of the horizontal movement at the underpinned wall is assumed to be 5mm, equal to the vertical movement at the wall, reducing in this case to zero at a distance of 4 times the excavation depth (up to approx. 4m) behind the wall.

7.5 IMPACT ON NEIGHBOURING STRUCTURES

As demonstrated above, the excavations and subsequent construction of the proposed development are not predicted to result in any appreciable ground movement to either the host building or to the neighbouring No. 37 Priory Road.

Therefore, the potential degree of damage to these structures can be assessed as Burland Category 0 - 'Negligible'.

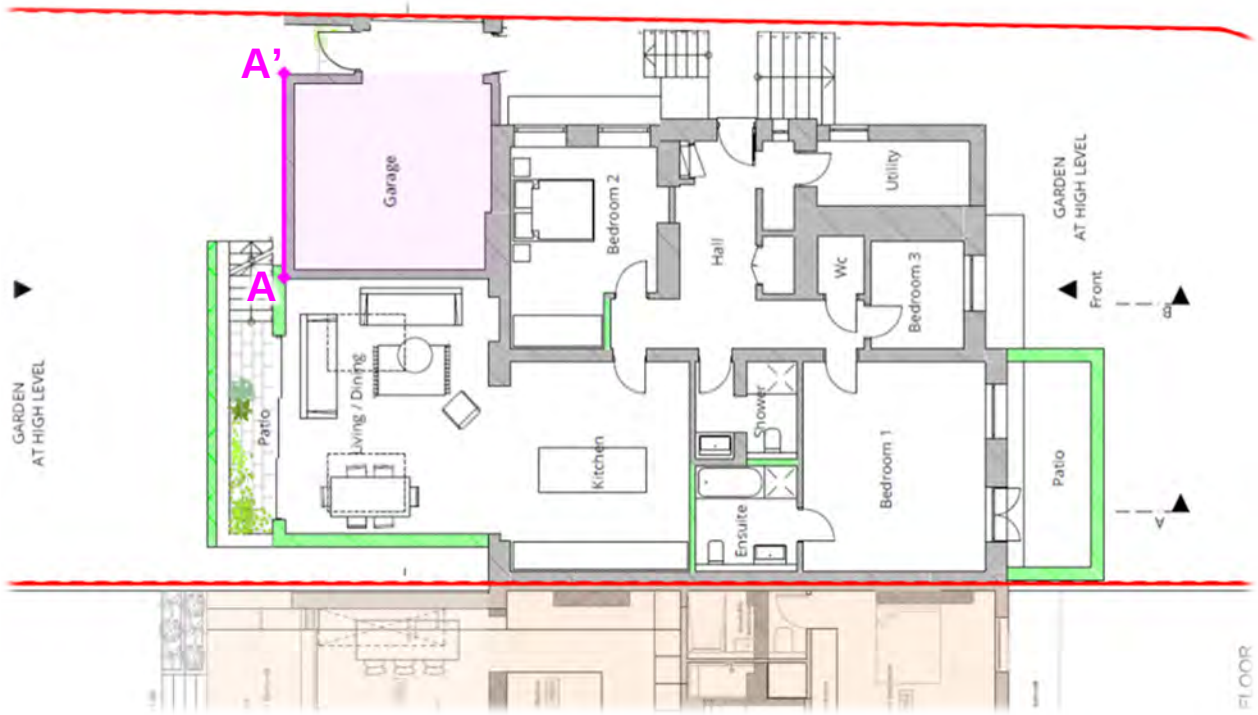
7.5.1 REAR WALL TO GROUND FLOOR GARAGE (NO. 39)

The only affected structure is hence the directly underpinned ground floor garage.

The effect of the predicted vertical and horizontal deflections on the garage has 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 section used for assessment is presented on the plan below.



The length (L) of the wall is taken as 5m and the wall height (H) as 2m.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.05%, producing a maximum deflection ratio Δ / L = -0.02, within a limiting tensile strain of 0.075%, for a Burland Category 1 'Very Slight' condition.

7.5.2 PUBLIC HIGHWAY

The proposed rear extension is located approximately 7m from pavement of Abbot's Place, while the proposed front lightwell is approximately 5m from the pavement of Priory Road. Various buried utilities are expected to be located beneath the highways.

The numerical analysis indicates that negligible heave movement will occur at these distances.

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 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 HYDROLOGICAL IMPACT ASSESSMENT

There will be a need to maintain the present water discharge regime and provide Sustainable Drainage Systems (SuDS) to provide an overall reduction in discharge rates as per the planning policy requirements. A SuDS Assessment is presented as a separate report (LBH4627suds).

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 foundation construction below the existing rear and front gardens will be sufficient to obviate any concerns regarding potential seasonal movement.

8.3.2 EFFECT OF TREES

The foundations to the proposed extension will be advanced sufficiently deep in order 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.

8.4 RESIDUAL IMPACTS

As a result of this assessment, it is apparent that the proposed development will have no unacceptable residual impacts upon the surrounding structures, infrastructure or the environment.

9. STRUCTURAL MONITORING

The ground movement assessment suggests Burland Scale Category 1 (very slight) damage may be expected at the ground floor garage present at the site of No.39 Priory Road. Burland Scale Category 0 (negligible) damage is expected at the neighbouring No. 37 Priory Road.

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 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.

At least two monitoring positions should be located along the rear elevation of the existing garage.

Monitoring positions should also be located at the front and rear elevations of the neighbouring property at No. 37 Priory Road. The targets should be set at both a low and high level and a minimum of four targets should be installed at each elevation (two targets near party wall and two targets at the far end of the elevation).

Before any excavation or construction works commence, monitoring over a period of at least a month is to be undertaken in order to establish a baseline situation and record any seasonal movement trends that may also affect measurements during the development.

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.

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 CRITERA	
RECORDED MOVEMENT	STATUS
Total cumulative movement < 5mm in any direction	Green
Total cumulative movement >5mm <7mm in any direction	Amber
Total cumulative movement >7mm in any direction	Red

Contingency actions should be undertaken using the following decision table:

PROPOSED CONTINGENT ACTIONS	
Green	None
Amber	Notify Structural Engineer and Party Wall Surveyor.
Red	Cease any excavation work immediately. Notify Structural Engineer and Party Wall Surveyor immediately. Provide additional support / backfill excavation pending review by Structual 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.