

BASEMENT IMPACT ASSESSMENT

175A NIGHTINGALE LANE
HARINGEY

LBH4651bia

SEPTEMBER 2023

LBH GEO
CONSULTING ENGINEERS

DOCUMENT CONTROL				
LBH4651bia			AUTHORISED	
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1.0	12th Nov 2021	Initial Issue		
1.1	15 th Nov 2021	Minor Amendment		
1.2	15 th Nov 2021	Issue for planning		
2.0	8 th April 2022	Issue for revised Scheme		
3.0	8 th Sept 2023	Issue for new Scheme	LB	SRLB

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CONTENTS

CONTENTS	3
NON-TECHNICAL SUMMARY	5
DISCLAIMER	6
1. INTRODUCTION	7
1.1 BACKGROUND	7
1.2 PLANNING POLICY	7
1.3 REPORT STRUCTURE	8
1.4 DOCUMENTS CONSULTED	8
2. THE SITE	10
2.1 SITE LOCATION	10
2.2 TOPOGRAPHICAL SETTING	10
2.3 SITE DESCRIPTION	11
3. DESK STUDY	15
3.1 SITE HISTORY	15
3.2 GEOLOGICAL INFORMATION	16
3.3 HYDROGEOLOGICAL INFORMATION	16
3.4 HYDROLOGICAL INFORMATION	16
4. PROPOSED DEVELOPMENT	18
5. SCREENING & SCOPING ASSESSMENTS	20
5.1 SCREENING ASSESSMENT	20
5.1.1 SCREENING CHECKLIST FOR SUBTERRANEAN (GROUNDWATER) FLOW	20
5.1.2 SCREENING CHECKLIST FOR SURFACE FLOW AND FLOODING	21
5.1.3 SCREENING CHECKLIST FOR STABILITY	21
5.2 SCOPING ASSESSMENT	23
5.2.1 SCOPING FOR SUBTERRANEAN (GROUNDWATER) FLOW	23
5.2.2 SCOPING FOR SURFACE WATER FLOW AND FLOODING	23
5.2.3 SCOPING FOR STABILITY	24
6. SITE INVESTIGATION	25
6.1 GROUND CONDITIONS	25
6.2 GROUNDWATER	25
7. GEOTECHNICAL ASSESSMENT	26
7.1 BASEMENT EXCAVATION	26
7.2 BASEMENT CONSTRUCTION	26
7.2.1 RETAINING WALLS	27
7.2.2 WATERPROOFING	27
7.3 EFFECT OF TREES	27
8. GROUND MOVEMENT ASSESSMENT	28
8.1 STRUCTURES CONSIDERED FOR EFFECT OF GROUND MOVEMENT	28
8.1.1 No. 175 NIGHTINGALE LANE	28

8.2	MODELLED GROUND CONDITIONS	29
8.3	MODELLED GROUND MOVEMENTS	29
8.3.1	MOVEMENTS DUE TO UNDERPINNING	29
8.3.2	MOVEMENTS DUE TO EXCAVATION HEAVE	30
8.4	IMPACT ON NEIGHBOURING STRUCTURES	33
8.4.1	SECTIONS OF ANALYSIS	33
8.4.2	SECTION A-A'	34
8.4.3	SECTION B-B'	34
8.4.4	SECTION C-C'	34
8.4.5	PUBLIC HIGHWAY	34
9.	IMPACT ASSESSMENT	35
9.1	HYDROGEOLOGICAL IMPACT ASSESSMENT	35
9.2	HYDROLOGICAL IMPACT ASSESSMENT	35
9.3	POTENTIAL STABILITY IMPACTS	35
9.3.1	LONDON CLAY	35
9.3.2	EFFECT OF TREES	35
9.3.3	GROUND MOVEMENTS	35
9.4	RESIDUAL IMPACTS	36
10.	STRUCTURAL MONITORING	37
11.	CONCLUSION	38

NON-TECHNICAL SUMMARY

It is proposed to construct a new two-storey home adjacent to No.175 Nightingale Lane on land that currently forms part of the garden to No. 175. The new building will include a basement extending rearwards beyond the new building footprint to include a patio area at basement level.

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

GEOLOGY

The basement excavation will extend into the impermeable London Clay Formation.

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

Given the increase in impermeable surfacing of the former garden area caused by the development, a sustainable drainage scheme design will need to be developed and produced in due course.

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.

DISCLAIMER

This document has been prepared for a specific client and to meet a specific brief.

The preparation of this document may have been affected by limitations of scope, resources or time scale required by the client.

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1. INTRODUCTION

1.1 BACKGROUND

It is proposed to construct a new, two-storey home adjacent to No. 175 Nightingale Lane on land that currently forms part of the garden to No. 175. The new building will include a basement extending rearwards to provide a basement level patio area.

A planning application for a previously proposed single-storey development on site in conjunction with a refurbishment of the existing building at No. 175 was granted permission by London Borough of Haringey in September 2022 (Planning Ref. HGY/2022/1406). A previous version (ver. 2.0) of this report was submitted as part of that application.

1.2 BRIEF

LBHGEO have been appointed to provide an updated Basement Impact Assessment in order to support a new planning application to the London Borough of Haringey. The new application considers the new house in isolation and does not include any works at No. 175.

1.3 PLANNING POLICY

The July 2017 Haringey Development Management DPD Policy DM18: Residential Basement Development and Light Wells reads as follows:

"A Householder extensions to existing basements, and the construction of new basements, including in existing dwellings will only be permitted where it can be demonstrated that the proposal:

- a. Will not adversely affect the structural stability of the application building, neighbouring buildings and other infrastructure, including the adjoining highway, having regard to local geological conditions;*
- b. Does not increase flood risk to the property and nearby properties from any source (see Policy DM24);*
- c. Avoids harm to the appearance or setting of the property or the established character of the surrounding area;*
- d. Will not adversely impact the amenity of adjoining properties by reason of noise or increased levels of internal or external activity;*
- e. Will not adversely impact the local natural and historic environment;*

And, where the proposed basement extends beneath the garden area:

- f. Will not cause loss, damage or long-term threat to trees of townscape or amenity value;*
- g. Maintains adequate soil depth satisfactory for preservation of landscaping consistent with neighbouring properties;*

And during the construction phase:

- h. Will not cause harm to pedestrian, cycle, vehicular and road safety, adversely affect bus or other transport operations, significantly increase traffic congestion, nor place unreasonable inconvenience on the day to day life of those living, working or visiting nearby; and*

i. Will minimise construction impacts such as noise, vibration and dust for the duration of the works.

B Proposals for basements must not include habitable rooms or other sensitive uses in areas prone to flooding where there is no reasonable means of escape.

C In determining applications for light wells, the Council will consider whether:

- a. The architectural character of the building is protected;*
- b. The character and appearance of the surrounding area is harmed; and*
- c. The development results in the loss of more than 50% of the front garden or amenity area.”*

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

- “Policy DM1: Providing High Quality Design”;
- “Policy DM21: Sustainable Design Layout and Construction”;
- “Policy DM24: Managing and Reducing Flood Risk”;
- “Policy DM26: Critical Drainage Areas”.

1.4 REPORT STRUCTURE

This report commences with a 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 based on available investigation data on and off-site, which is followed by an outline basement construction methodology, an assessment of the potential ground movements and the likelihood of these to affect the neighbouring structures.

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

1.5 DOCUMENTS CONSULTED

- | | | |
|----------------------------|----------------------------------|-------------------------|
| • 2021 Nov
Ref. YEX3069 | SI Factual Data | YourEnvironment |
| • 2021 Apr
Ref. 21045 | Topographical Survey | Callidus |
| • 2023 Aug
Ref. 23510 | Existing Drawings | Office S&M |
| • 2023 Aug
Ref. 23510 | Proposed Drawings | Office S&M |
| • 2022 Apr
Ref. 5230 | Structural Methodology Statement | Richard Tant Associates |

- 2022 Apr Suggested Method of Works 1 & 2 Richard Tant Associates
Ref. 5230-SM01A, 5230-SM02A

2. THE SITE

2.1 SITE LOCATION

The site is located at the northern end of Nightingale Lane, immediately adjacent to the Alexandra Palace Park.

The site may be located approximately by the postcode N8 7LJ or by National Grid Reference 530160, 189775.



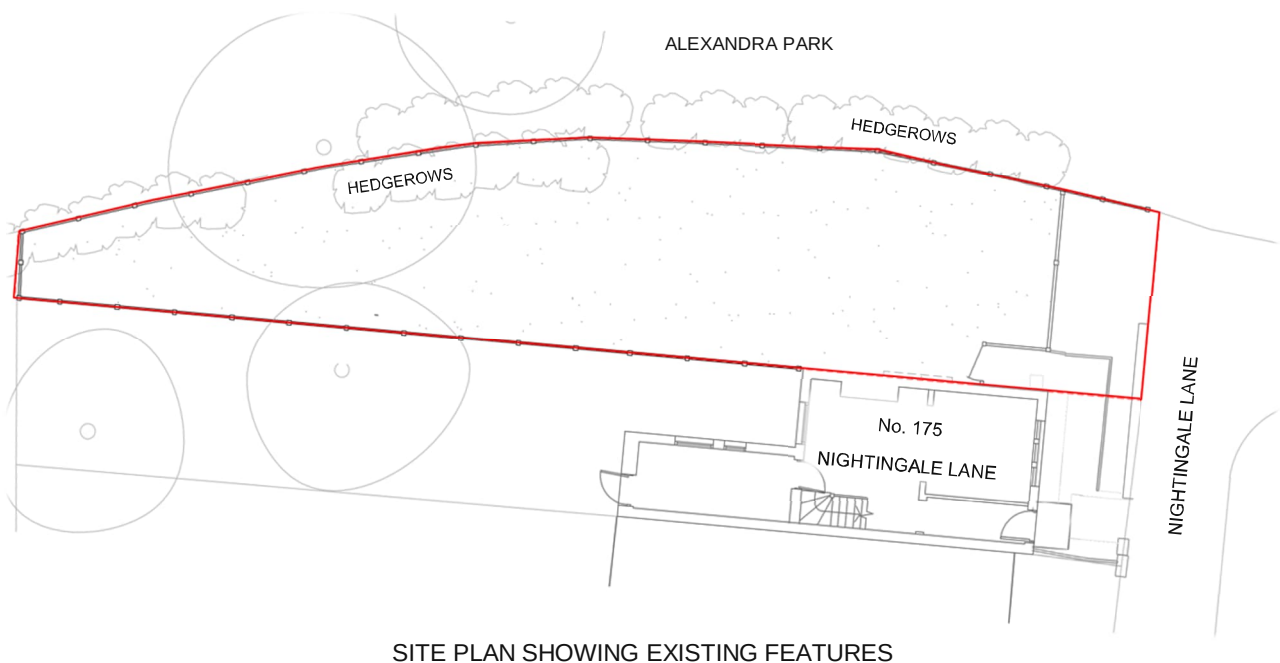
LOCATION PLAN

2.2 TOPOGRAPHICAL SETTING

The site lies on the lower southeastern slopes of Alexandra Palace at around +36m OD. The land slopes down to the now culverted Moselle Brook, which flows north-eastwards approx. 300m to the south-east of the site in the region of Brook Road.

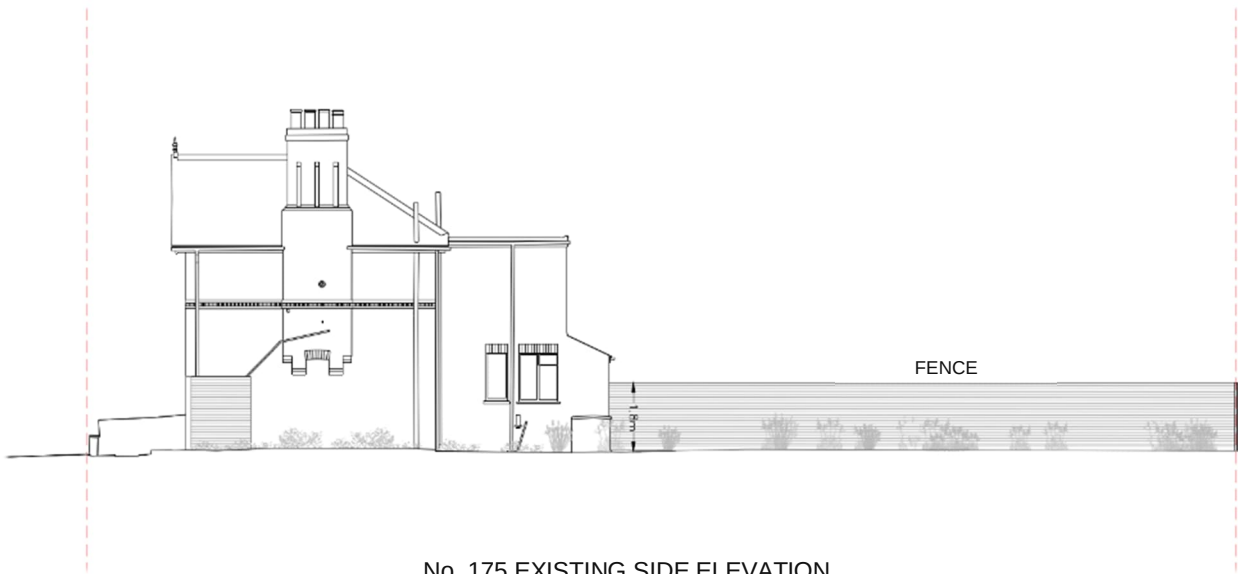
2.3 SITE DESCRIPTION

The site forms an undeveloped area, which was formerly the northern half of the No. 175 property and is understood to have now been separated from No. 175 via a fence along the southern boundary, which links with the northern elevation of the existing building.



The eastern portion of the site, to the north of No.175, is occupied by a patio with a planter, shed and a coal store. A tall hedgerow is present along the concrete fence forming the northern boundary of the site, separating it from the Alexandra Park.

The site slopes gently eastwards, falling from approximately +36.6m OD at the western end of the site to approx. +35.9m OD at Nightingale Lane.



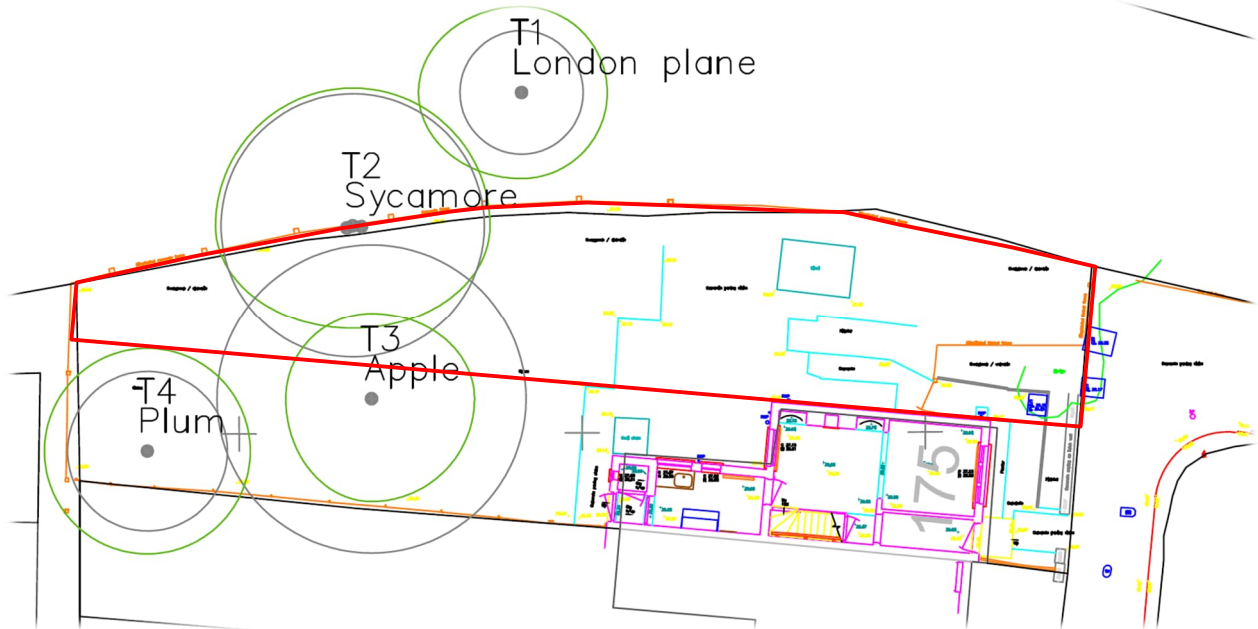
No. 175 EXISTING SIDE ELEVATION



REAR ELEVATION OF No. 175

Two trees are present within the rear garden of No. 175. The northern boundary of the site was historically marked by a line of tall trees. These old trees near the site had been felled by the 1990s (but possibly as early as the 1950s).

The locations of the existing trees on and nearby the site are shown on the Tree Constraints plan as part of the Arboricultural Impact Assessment, as reproduced below.



TREE SURVEY PLAN OF THE SITE



EXISTING REAR PATIO AND GARDEN ON SITE

The site is bordered by No. 175 Nightingale Lane to the south, which forms part of a terrace of similarly constructed buildings with no existing basements.



EXISTING FRONT ELEVATION

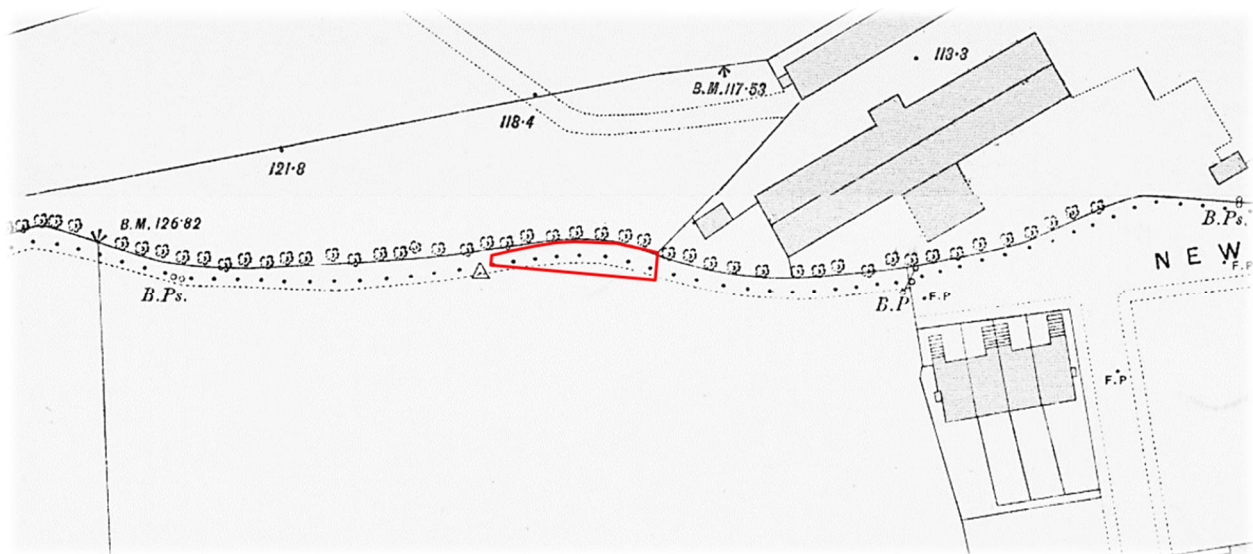


FRONT ELEVATION OF THE SITE

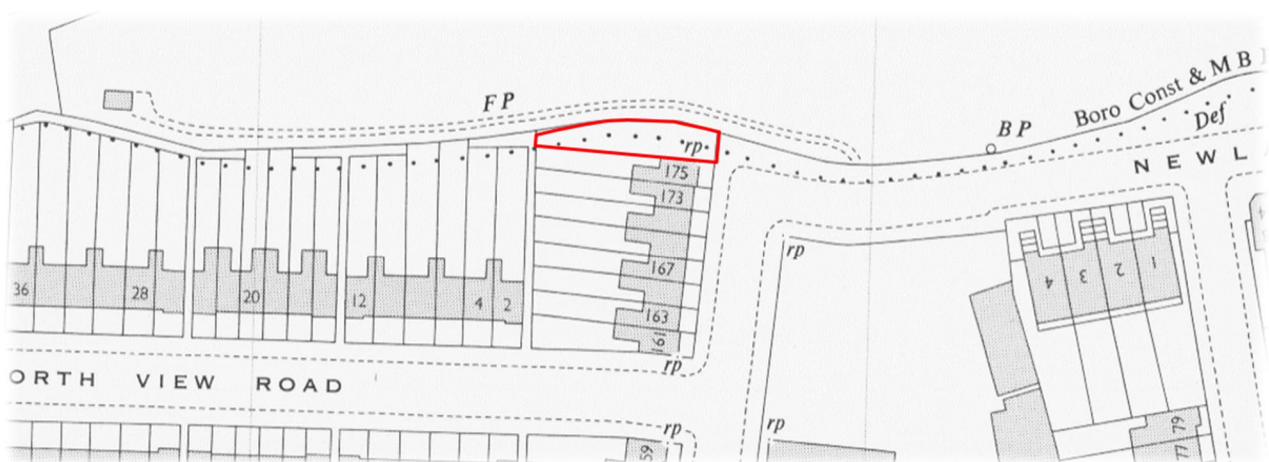
3. DESK STUDY

3.1 SITE HISTORY

The northern boundary of the site is formed by the line of an old trackway running east-west along the boundary between Wood Green and Hornsey. Although Nightingale Place was present some distance to the south, the terraced cottages on Nightingale Lane were laid out at the end of the 19th Century by Hornsey U.D.C following the construction of Alexandra Palace to the northwest of the site. A racecourse had been developed in the park immediately north of the site, with viewing stands present relatively close to the site itself.



1890s



1950s

3.2 GEOLOGICAL INFORMATION

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

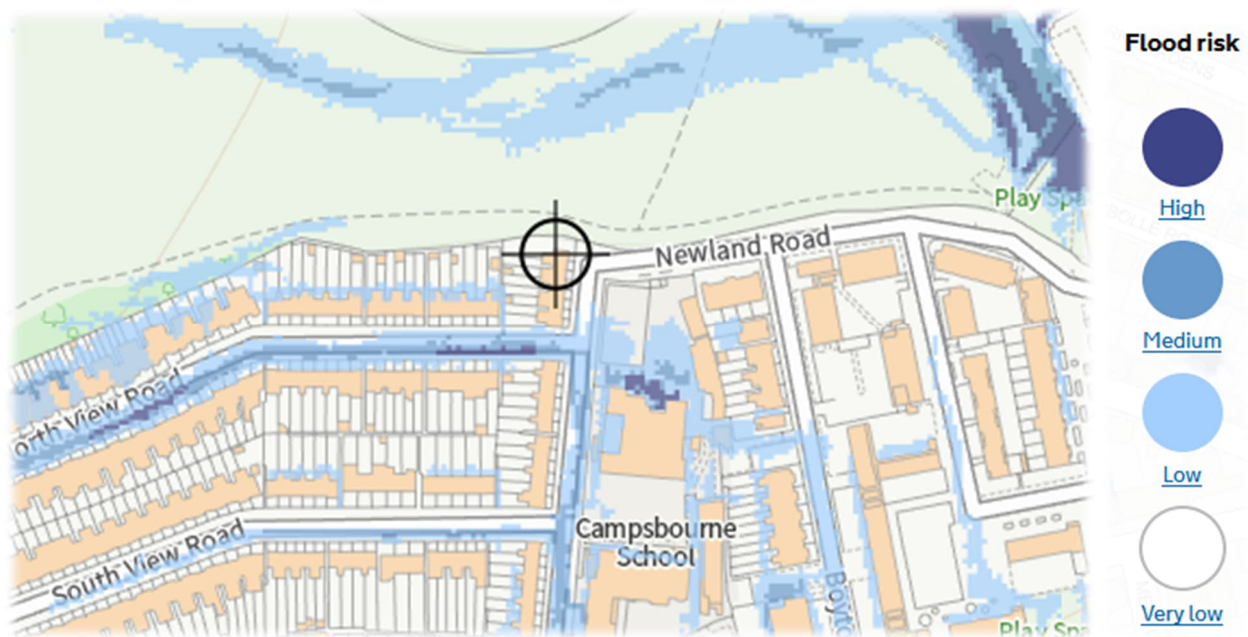
3.3 HYDROGEOLOGICAL INFORMATION

The London Clay Formation directly underlying the site is virtually impermeable; hence no significant groundwater presence is to be expected beneath this site.

3.4 HYDROLOGICAL INFORMATION

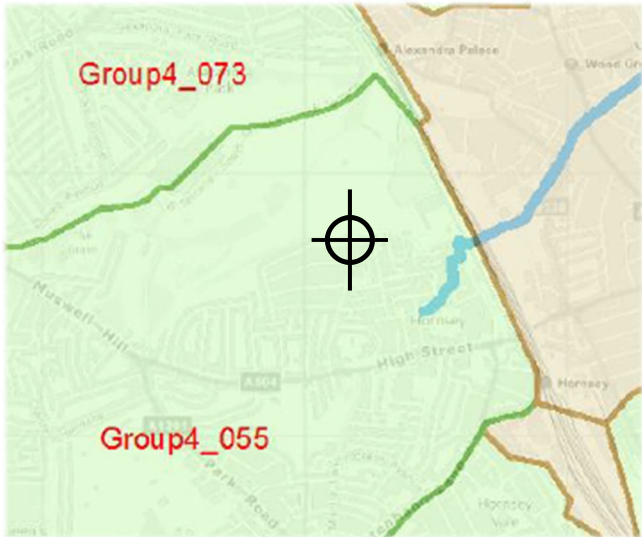
The site drains south-eastwards towards the Moselle Brook.

Environment Agency (EA) surface water flood maps suggest that the site and the immediately surrounding area are at a very low risk of surface water flooding.

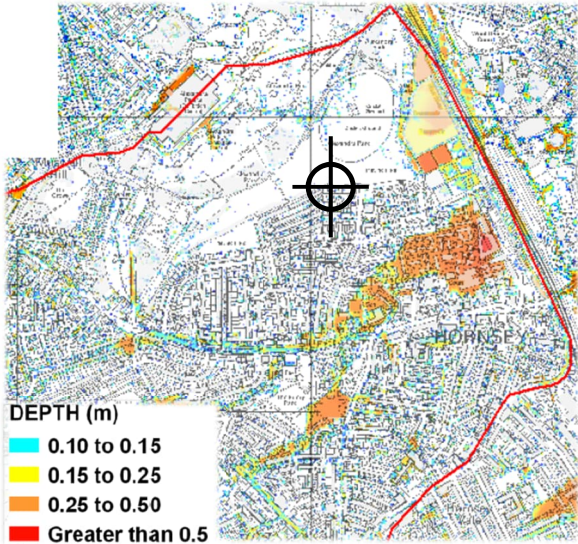


EXTRACT OF EA SURFACE WATER FLOOD RISK MAP

The site is identified to lie within a Critical Drainage Area by the Haringey Strategic Flood Risk Assessment (SFRA), but is not located within any Local Flood Risk Zone specified by the Haringey Surface Water Management Plan (SWMP).



EXTRACT OF FIGURE 2-6 OF HARINGEY SFRA
CRITICAL DRAINAGE AREAS IN HARINGEY

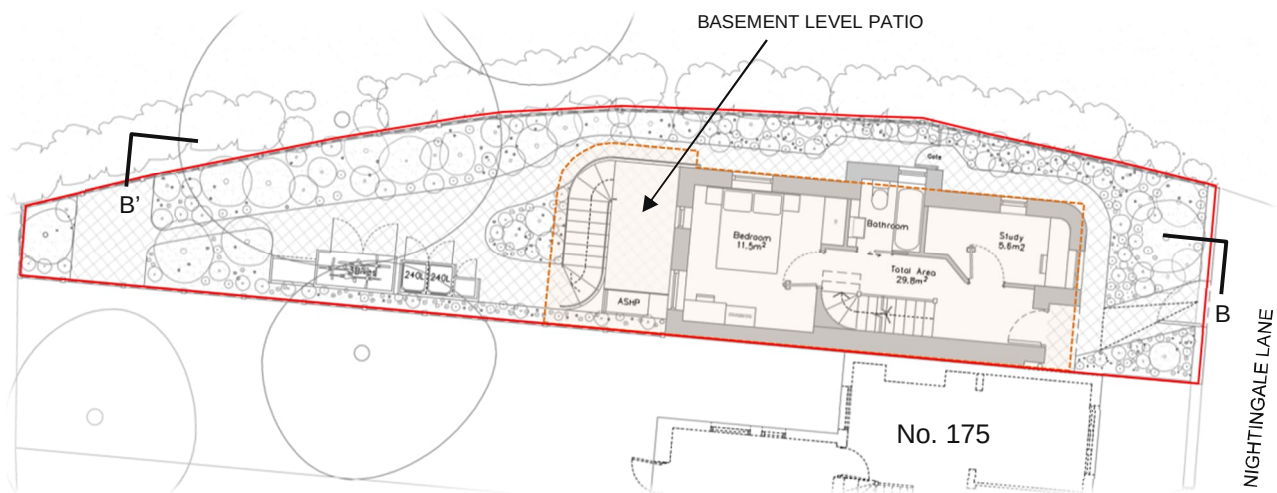


EXTRACT FROM HARINGEY SWMP (P.39)
PREDICTED DEPTH OF FLOODING IN CDAs

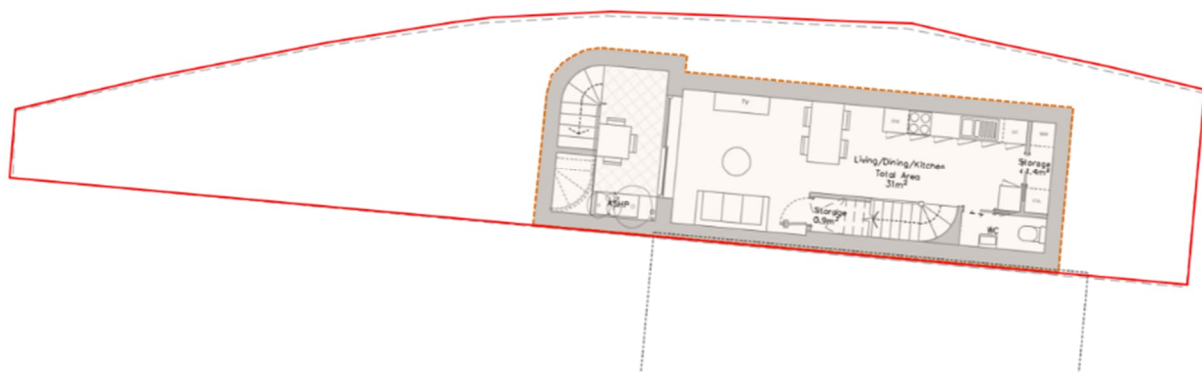
4. PROPOSED DEVELOPMENT

It is proposed to construct a new, two-storey building with a basement, adjacent to the neighbouring No. 175. The front elevation of the new building is to be set back from the terrace line and the adjacent No. 175 and the rear elevation is to be in line with the rearmost elevation of No. 175.

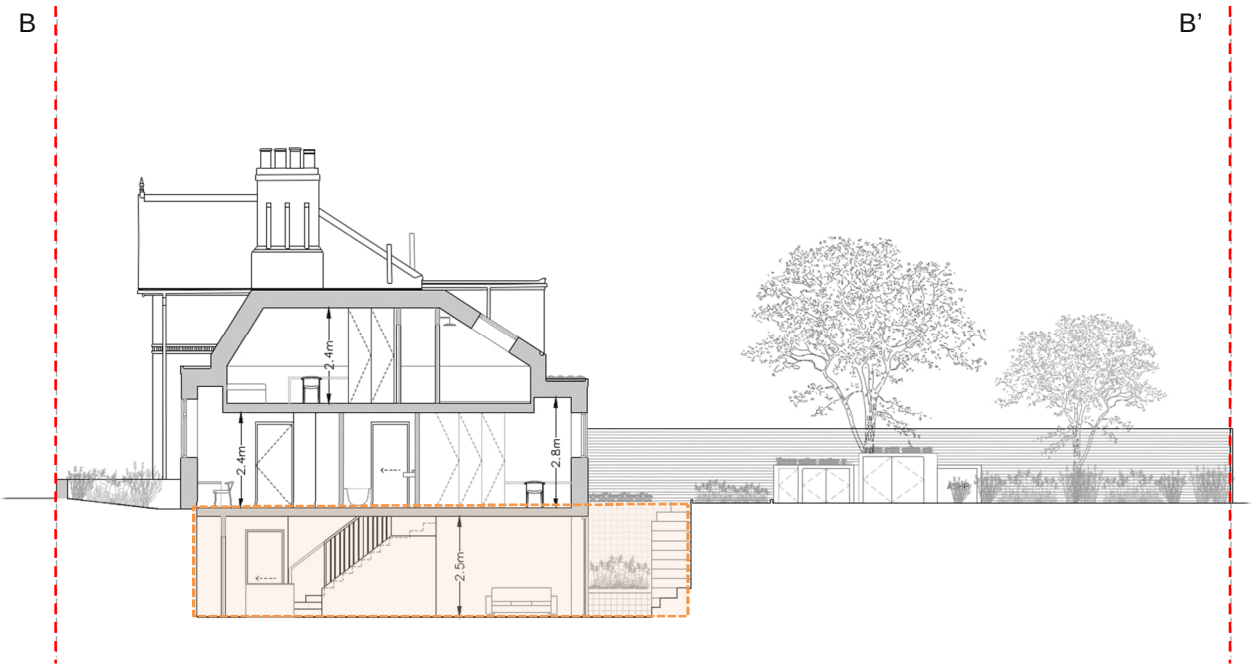
The proposed basement will be excavated immediately beside the existing house at No. 175 and is to extend to the rear to provide a basement patio with stepped access up to the garden. The new basement excavation will extend to approximately 2.8m depth (approx. +33.4m OD), to provide an internal headroom of approximately 2.5m.



PROPOSED GROUND FLOOR PLAN
(SHOWING PROPOSED BASEMENT EXTENT IN ORANGE DASH)



PROPOSED BASEMENT PLAN



PROPOSED SECTION



PROPOSED FRONT ELEVATION

5. SCREENING & SCOPING ASSESSMENTS

5.1 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

5.1.1 SCREENING CHECKLIST FOR SUBTERRANEAN (GROUNDWATER) FLOW

QUESTION	RESPONSE	COMMENT
Is the site located directly above an aquifer?	No	The site is underlain by the London Clay Formation, which is identified as an Unproductive Strata.
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	
Will the proposed development result in a change in the area of hard-surfaced/paved areas?	Yes	The proposed development comprises a new house in an area of former garden.
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	The shallow geology is impermeable; hence all surface water will need to be discharged to the sewer via a new drainage scheme.
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	

5.1.2 SCREENING CHECKLIST FOR SURFACE FLOW AND FLOODING

QUESTION	RESPONSE	COMMENT
As part of the site drainage, will surface water flows (e.g. rainfall and run-off) be materially changed from the existing route?	Yes	Rainwater falling within the footprint of the new building will need to be directed via suitable attenuation to the public sewer.
Will the proposed basement development result in a change in the proportion of hard-surfaced/paved areas?	Yes	The proposed development comprises a new house in an area of former garden.
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	All surface water will be discharged to the sewer via a new drainage scheme.
Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No	
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	

5.1.3 SCREENING CHECKLIST FOR STABILITY

QUESTION	RESPONSE	COMMENT
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	
Is London Clay the shallowest strata at the site?	Yes	
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	There are a number of mature trees on and nearby the site. All of these trees are to be retained.
Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	No	We are not aware of any evidence of subsidence issues at the site.
Is the site within 100m of a watercourse or a potential spring line?	No	
Is the site within an area of previously worked ground?	No	
Is the site within an aquifer?	No	The site is underlain by the London Clay Formation, which is identified as an Unproductive Strata.
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	
Is the site within 5m of a highway or pedestrian right of way?	Yes	The proposed excavations for the basement will be undertaken approximately 3m back from the pavement of Nightingale Lane.
Will the proposed basement significantly increase the differential depth of foundations relative to the neighbouring properties?	Yes	The proposed basement will be constructed adjacent to the existing No. 175 Nightingale Lane, which does not include a basement.
Is the site over (or within the exclusion zone of) tunnels, e.g. railway lines?	No	

5.2 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.

5.2.1 SCOPING FOR SUBTERRANEAN (GROUNDWATER) FLOW

- *The proposed basement development will result in a change in the proportion of hard surfaced / paved areas.*

The guidance advises that the sealing off of the ground surface by pavements and buildings to rainfall will result in decreased recharge to the underlying ground. In areas underlain by an aquifer, this may impact upon the groundwater flow or levels. In areas of non-aquifer (i.e. on the London Clay), this may mean changes in the degree of wetness which in turn may affect stability. The guidance advises that a change in the in proportion of hard surfaced or paved areas of a property will affect the way in which rainfall and surface water are transmitted away from a property. This includes changes to the surface water received by the underlying aquifers, adjacent properties and nearby watercourses. Changes could result in decreased flow, which may affect ecosystems or reduce amenity, or increased flow which may additionally increase the risk of flooding.

5.2.2 SCOPING FOR SURFACE WATER FLOW AND FLOODING

- *As part of the site drainage, surface water flows (e.g. rainfall and run-off) will be materially changed from the existing route.*

The guidance advises that basement development may increase the load on the sewer and drainage systems if it leads to increased occupancy of dwellings. In turn this may increase the risk of flooding should the sewer and drainage systems become overwhelmed. Constructing a basement, either beneath or adjacent to an existing building will typically remove the permeable shallow ground that previously occupied the site footprint. This reduces the capacity of the ground to allow rainfall to be stored in the ground (which in essence acts as a natural SUDS, or sustainable urban drainage system). This runoff must then be managed by other means (eg through construction of SUDS), to ensure that it doesn't impact on adjoining properties or downstream watercourses.

- *The proposed basement development will result in a change in the proportion of hard surfaced / paved areas.*

The guidance advises that a change in the proportion of hard surfaced or paved areas of a property will affect the way in which rainfall and surface water are transmitted away from a property. This includes changes to the surface water received by the underlying aquifers, adjacent properties and nearby watercourses. Changes could result in decreased flow, which may affect ecosystems or reduce amenity, or increased flow which may additionally increase the risk of flooding.

5.2.3 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).

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

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 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.

- *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.

6. SITE INVESTIGATION

A ground investigation comprising two windowless sample boreholes, drilled to a maximum depth of 5.45m below existing ground levels, and two hand-dug trial pits was undertaken at the site on 3rd of November 2021. The locations of these in relation to the existing site features and the proposed basement extent are shown below.



The trial pits indicated that the existing foundations at No. 175 Nightingale Lane extend to approx. up to 1m below the ground level on site.

6.1 GROUND CONDITIONS

Made ground is present to approximately 1.5m – 2m depth below the site, comprising a firm clay fill with stones and brick fragments.

The London Clay is present directly below the made ground and comprises typical firm, becoming stiff, brown grey silty London Clay.

The London Clay is of high volume change potential.

6.2 GROUNDWATER

No shallow groundwater table is present beneath the site.

7. GEOTECHNICAL ASSESSMENT

7.1 BASEMENT EXCAVATION

The development will require excavations of up to approximately 2.8m depth over the entire footprint of the proposed building and extending into the proposed rear basement level patio.

The party wall with No. 175 will require underpinning to form the southern wall of the basement. It is envisaged that this new basement perimeter walls will be formed by the construction of L-shaped reinforced concrete segments excavated and cast in-situ. For this southern perimeter section these segments will be excavated in a 'hit and miss' sequence of approximately of 1m wide sections. The sequence of the underpinning will be an extended 1, 3, 5, 2, 4 & 6 type numbering, such that any given underpin will be completed, dry packed, and a minimum of 48 hours lapsed before an adjacent excavation is commenced to form another underpin.

For safety, all of the remaining basement perimeter walls may also need to be constructed in similar braced excavations. However, it is possible that, subject to the actual conditions prevailing during construction, greater widths of excavation may be possible where adjacent ground movement is permissible.

Following the construction of basement perimeter walls it is envisaged that high level temporary propping will be introduced across the excavation prior to commencement of main excavations in order to restrain the new basement walls during the main basement dig. As the main basement excavation proceeds, an additional low level of temporary propping may be required to ensure movement of the underpinning is prevented. This low level propping will be replaced by the basement floor construction in reinforced concrete.

A nominal 150kN/m² net foundation bearing pressure may be assumed for the initial design of the underpinning.

7.2 BASEMENT CONSTRUCTION

The basement is to be formed as a locally thickened raft so that a 200mm thick reinforced concrete basement floor slab will connect with the deeper perimeter foundation strips and wall L-sections, which will be designed to act as cantilevered retaining wall in the permanent situation such that a lightweight ground floor will be possible.

7.2.1 RETAINING WALLS

The following parameters may be considered in the design of new basement 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	20

7.2.2 WATERPROOFING

The entirety of the 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 equivalent to the existing ground level (approx. +36.0m OD) is to be adopted.

7.3 EFFECT OF TREES

Four individual trees are located on and nearby to the site, as reported by the Arboricultural Report and Tree Condition Survey by Ruskins Tree Consultancy. All of the trees are proposed to be retained and protected throughout the works, as outlined in that report.

All of the trees identified by the survey are of moderate water demand and the London Clay Formation is of high volume change potential.

On this basis, it is assessed that the influence of trees at the location of the proposed basement is not expected to extend deeper than a maximum of approx. 2.2m.

Therefore, the proposed depth of basement excavation is expected to obviate any concerns associated with ground heave due to the potential impact of excavation within the zone of soil that may have been affected by historical water extraction by tree roots.

8. GROUND MOVEMENT ASSESSMENT

Haringey Council will seek to ensure that harm will not be caused to neighbouring properties by basement development. No set guidelines for damage limits is provided by the documents by London Borough of Haringey; however it is common practice to 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.

8.1 STRUCTURES CONSIDERED FOR EFFECT OF GROUND MOVEMENT

8.1.1 No. 175 NIGHTINGALE LANE

The only structure that will be conceivably affected by the new construction is the adjacent structure at No. 175, which forms the northern end of a line of terraced properties along the western side of Nightingale Lane. The northern wall of this building will be underpinned as part of the proposed development.

Although No. 175 was proposed to be refurbished with a new ground floor extension as part of a previously approved planning application (Planning Ref. HGY/2022/1406), it is conservatively assumed that this is not carried out for the purpose of the analysis. Should this be undertaken following basement excavation, this will allow for repair or resetting of any movement experienced by the walls.

The proposed underpinning will not affect any other properties. Any heave ground movement to No. 173, present further to the south, as well as further properties of this terrace is also expected to be negligible.



8.2 MODELLED GROUND CONDITIONS

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

For design purposes a conservative undrained strength profile has been adopted for the London Clay, assuming an average Undrained Cohesion (C_u) of 50kN/m^2 at the surface of the stratum (approx. +34.5m OD, at a shallow depth below the site), increasing by 6.7kN/m^2 per m depth.

STRATUM:	UNDRAINED ELASTIC MODULUS E_u (kN/m^2)	DRAINED ELASTIC MODULUS E' (kN/m^2)
London Clay Formation	$25,515\text{kN/m}^2$ at proposed excavation level increasing linearly to $94,860\text{kN/m}^2$ at 28m depth	$14,175\text{kN/m}^2$ at proposed excavation level increasing linearly to $52,700\text{kN/m}^2$ at 28m 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 28m depth.

8.3 MODELLED GROUND MOVEMENTS

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

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

8.3.1 MOVEMENTS DUE TO UNDERPINNING

Underpinning will be required to the entire length of the northern wall of the adjacent No. 175 Nightingale Lane to the full basement depth of approximately 3m.

It is not possible to rigorously model the extent of party wall 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 party wall can reasonably be expected to be a maximum of 5mm per stage of underpinning. Note that these movements are independent on the ground conditions at the site.

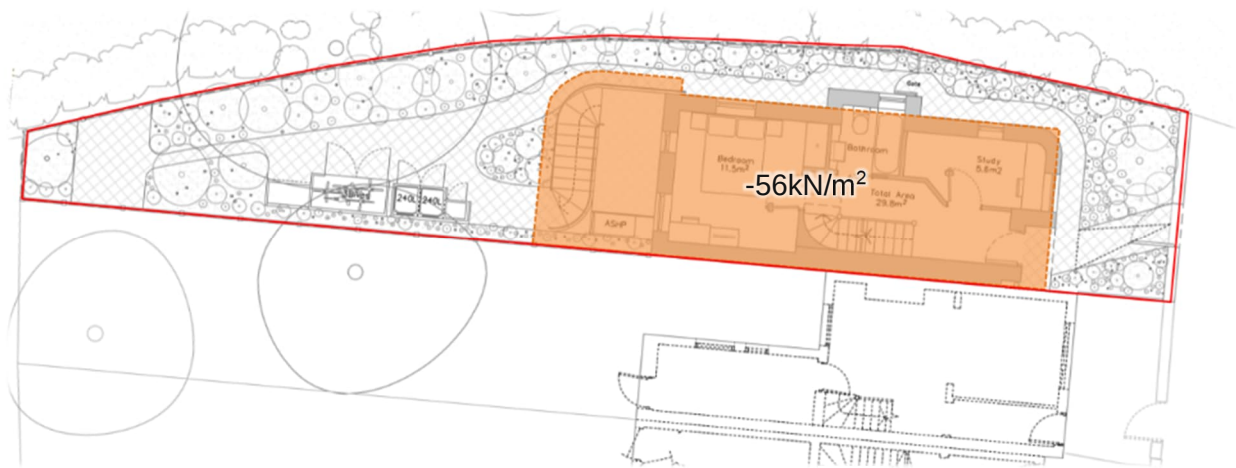
As a first approximation, the movements are considered to gradually decrease linearly with distance from the wall, using the decay set out in CIRIA 760 – Guidance on embedded retaining wall design.

- For settlement, an assumption of zero movement at a distance equal to 3.5 times the new excavation depth is used.

- For horizontal movement, an assumption of zero movement at a distance equal to 4 times the new excavation depth is used.

8.3.2 MOVEMENTS DUE TO EXCAVATION HEAVE

Excavations of up to 2.8m depth are expected to be undertaken to form the 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

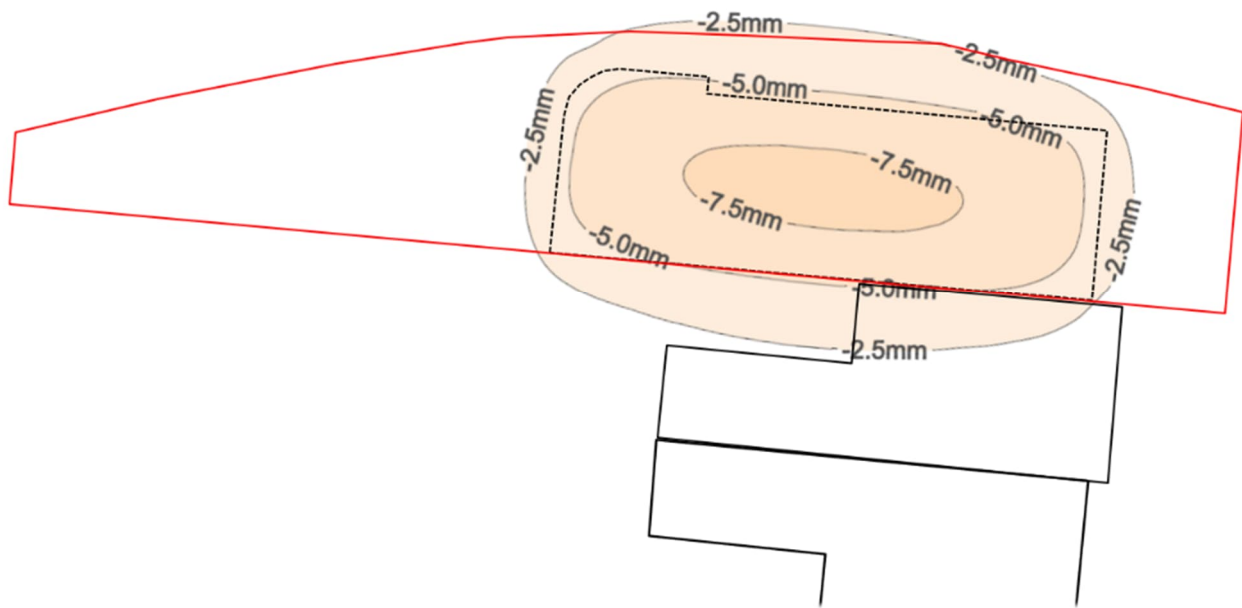
As the basement will be excavated fully within the London Clay Formation, a heave elastic response of the ground as a result of unloading can be expected to occur both immediately following the basement excavations and in the post-construction long-term scenario.

An assessment of these heave movements has been undertaken using classic Boussinesq elastic stress distributions applied to the elastic model described in section 8.2 above.

8.3.2.1 SHORT TERM MOVEMENTS DUE TO EXCAVATION HEAVE

As can be seen from the following plan, the analysis suggests that up to approximately 5mm of theoretical short term heave could occur below the perimeter wall of No. 175 Nightingale Lane.

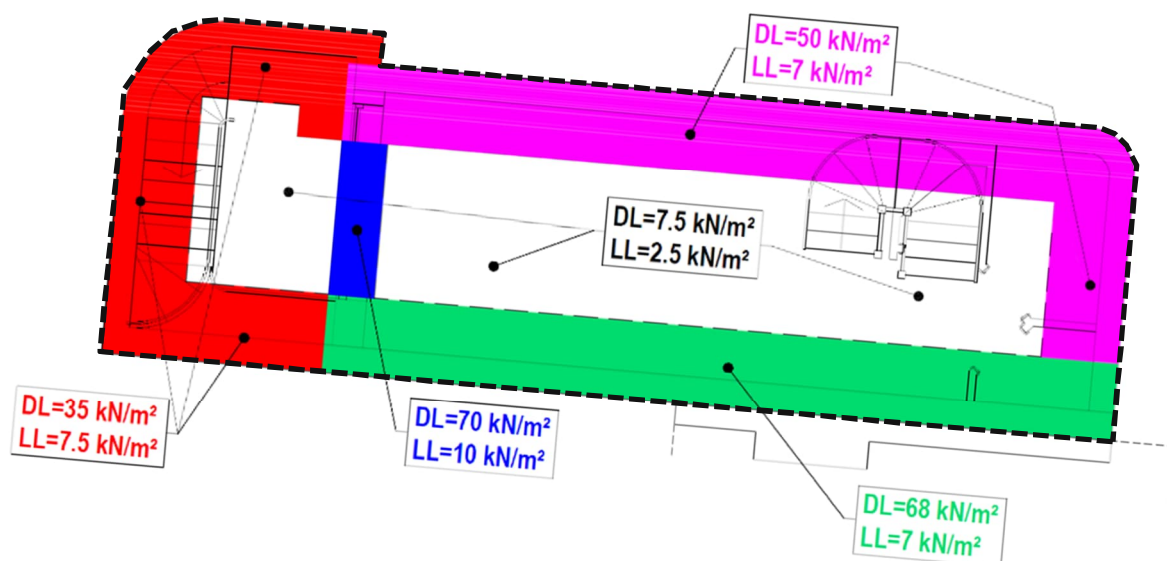
Negligible movement is expected to affect No. 173 further to the south and the Nightingale Lane pavement or carriageway.



8.3.2.2 POST CONSTRUCTION VERTICAL MOVEMENTS

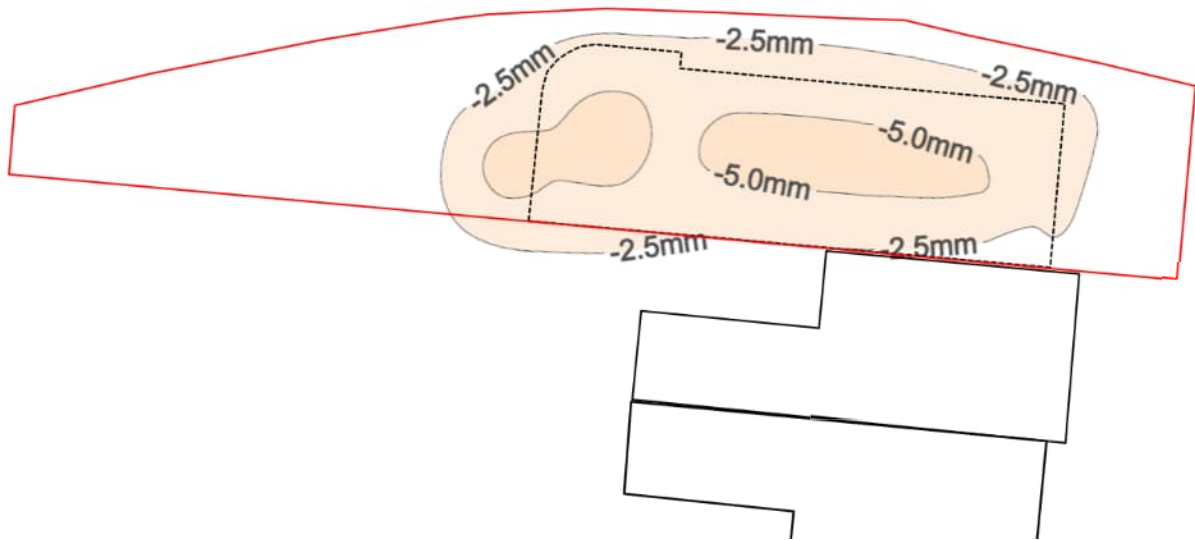
A degree of soil re-loading due to the new structure of the basement and the overlying two storey building following the excavation unloading is expected, resulting in counteraction of the unloading forces.

Information on the configuration of the proposed loading on the foundations has been based on the following extract of a proposed basement loading plan provided by Richard Tant Associates, dated 7th April 2022, Ref: 5230-SK04A



BASEMENT LOADING PLAN

Although the analysis suggests that up to 5mm of post-construction heave movement could be theoretically expected beneath the central and rear part of the basement, in practice the basement floor will transfer and redistribute any upward forces to the wider basement structure and hence negligible movement can be expected.



8.4 IMPACT ON NEIGHBOURING STRUCTURES

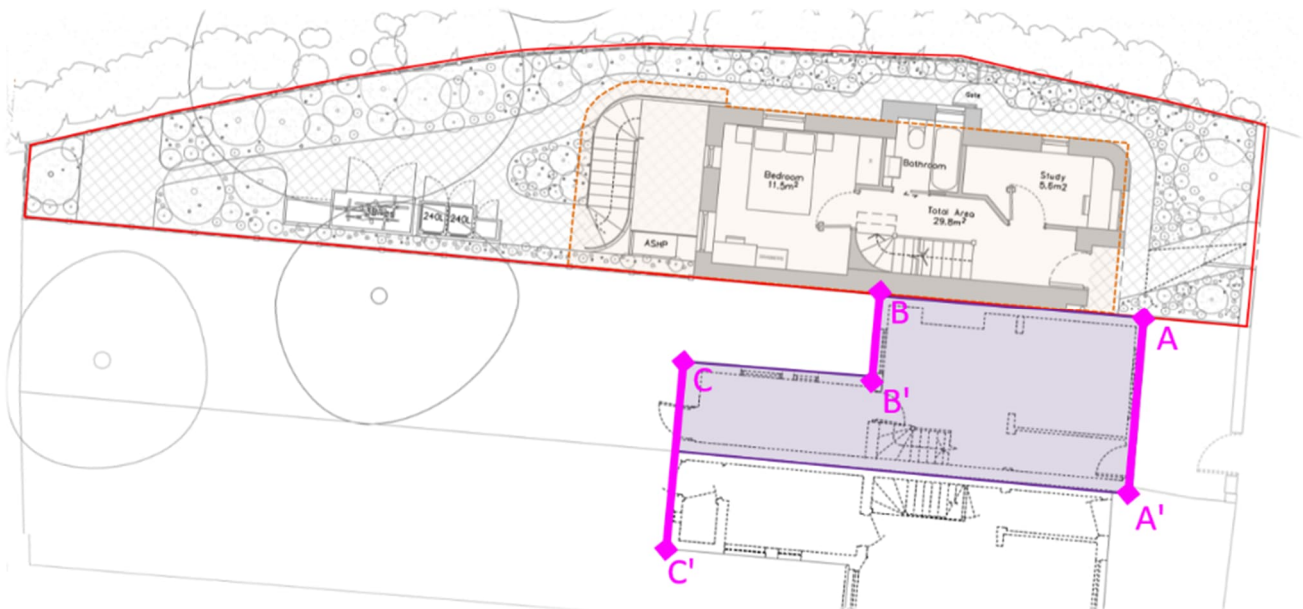
The effect of the predicted vertical and horizontal deflections has been assessed using the Burland damage category assessment process, which is based upon consideration of a theoretical masonry panel of a given length (L) and height (H).

The assessment is undertaken for wall 'sections' which are perpendicular to the underpinned wall.

The Burland Damage Assessment uses the assumption of a masonry panel (beam) for the entire sections analysed in order to assess the potential damage based on the observed crack width in the masonry. The assessment of damage is then made based on the observed crack width or on the Limiting tensile strain (ϵ_{lim}).

The potential degree of the predicted ground movements on the assessed structures can be estimated by the correlation of maximum horizontal strain, ϵ_h , 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).

8.4.1 SECTIONS OF ANALYSIS



PLAN OF SECTIONS ASSESSED FOR DAMAGE

8.4.2 SECTION A-A'

The length (L) of the wall is taken as 4.4m and the wall height (H) as 5m.

The maximum horizontal strain, ϵ_h ($\Delta h / L$) is assessed as 0.0446%, producing a maximum deflection ratio $\Delta / L = -0.02273$, within a limiting tensile strain of 0.060%, for a Burland Category 1 'Very Slight' condition.

8.4.3 SECTION B-B'

The length (L) of the wall is taken as 2.2m and the wall height (H) as 5m.

The maximum horizontal strain, ϵ_h ($\Delta h / L$) is assessed as 0.0446%, producing a maximum deflection ratio $\Delta / L = -0.04545$, within a limiting tensile strain of 0.070%, for a Burland Category 1 'Very Slight' condition.

8.4.4 SECTION C-C'

Due to this wall extending across to No. 173 Nightingale Lane as shown on the plan, the length (L) of the wall is taken as 4.4m and the wall height (H) as 2.24m. The closest edge of the wall is located approx. 2m away from the proposed 'hit and miss' wall construction and therefore up to 4mm of settlement and 4.1mm of horizontal movement is predicted at this wall.

The maximum horizontal strain, ϵ_h ($\Delta h / L$) is assessed as 0.0445%, producing a maximum deflection ratio $\Delta / L = -0.02273$, within a limiting tensile strain of 0.070%, for a Burland Category 1 'Very Slight' condition.

8.4.5 PUBLIC HIGHWAY

The proposed front wall of the basement will be constructed approx. 3m away from the site boundary with the pedestrian pavement at Nightingale Lane.

Given reasonable standards of workmanship during the 'hit and miss' construction of the front perimeter basement wall, negligible movement (<5mm settlement) is anticipated and this may be counteracted in practice by the similar, small amounts of heave as described above.

There is hence negligible impact expected on any potential utilities present beneath the highway.

9. 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.

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

9.2 HYDROLOGICAL IMPACT ASSESSMENT

The proposed development will increase the impermeable areas on the site and therefore a surface water drainage scheme should be designed to compensate for this.

A separate Surface Water Drainage Assessment & SuDS Strategy has been prepared by LBHGEO (LBH4651suds, ver. 2.0) to consider sustainable drainage on site and to provide a strategy for an overall reduction in discharge rates as per the planning policy requirements to protect against the effects of climate change.

9.3 POTENTIAL STABILITY IMPACTS

9.3.1 LONDON CLAY

The London Clay soils are of high volume change potential.

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

9.3.2 EFFECT OF TREES

The basement excavations will be undertaken to a sufficient depth to obviate the potential adverse effect of trees.

It is understood that the impact of the basement upon the trees to be retained has been assessed separately by an arboriculturist.

9.3.3 GROUND MOVEMENTS

The predicted neighbouring building damage levels due to ground movements associated with the proposed development have been analysed and found to be limited to Burland scale Category 1 'Very Slight'.

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

9.4 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.

10. STRUCTURAL MONITORING

Structural monitoring of the host building and neighbouring properties should be undertaken throughout the basement development in order to enable additional mitigation to be effectively implemented in the event of observed movement approaching the maximum predicted.

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

11. CONCLUSION

The assessment has demonstrated that the proposed development can be constructed without any adverse stability, hydrological or hydrogeological impacts to neighbouring properties or the local environment.