BASEMENT IMPACT ASSESSMENT

in connection with proposed basement development

at

FLAT 1
18 PLATT'S LANE
LB CAMDEN

LBHGEO-4724-bia

FEBRUARY 2025

LBHGEO

CONSULTING ENGINEERS

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NON-TECHNICAL SUMMARY

It is proposed to construct a new basement floor beneath the existing building footprint and extending beyond this below the driveway and garden areas.

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

GEOLOGY

The site is underlain by a layer of Head Deposits with the Claygate Beds present from approximately 2.5m depth. Some water seepage may be expected from sandier seams, lenses or pockets within both soil types.

HYDROGEOLOGICAL IMPACTS

Although no evidence has been found of substantial water-bearing seams of silt or sand, the basement excavations may encounter some seepage in the Head Deposits and the Claygate Member.

Any seepage encountered during construction will be dealt with using the observational method, whereby a variety of contingent mitigation can be deployed in response to the observed rate of seepage.

HYDROLOGICAL IMPACTS

An FRA and SuDS assessment has been prepared for the development by Aegaea. The site is not indicated to be at risk of surface water flooding.

STABILITY IMPACTS

The impacts to the host building can be minimised through adoption of a careful construction methodology involving the installation of a set of rigid reinforced concrete beams below ground level to support the building and transfer the loading to the new basement perimeter walls prior to the main basement excavations.

Analysis of the potential effects of this design indicates that any movements to the neighbouring properties will be limited and induce damage no greater than Burland scale Category 1 ('Very Slight').

CONCLUSION

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

1. INTRODUCTION

1.1 BACKGROUND

No. 18 Platt's Lane is a three-storey semi-detached house in the Redington Frognal Conservation Area that was constructed at the start of the 20th Century and was converted into four flats in the 1980s.

It is proposed to construct a basement beneath the entire existing building footprint and extending out below the front driveway and below the adjoining garden area to the south of the house.

This project involves the ground floor flat only and the existing building above ground floor level is to be retained unchanged. It is noted that the upper floors are not under the same ownership as the ground floor flat.

The proposed development has the benefit of a pre-application consultation with the London Borough of Camden in July 2024 (ref: 2024/0742/PRE), with regards to the basement configuration design.

1.2 BRIEF

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

1.3 PLANNING POLICY

1.3.1 LOCAL PLANNING

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."

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 and Lightwells. This document does not carry the same weight as the main Camden Local Plan documents (including the above Policy A5) but is an important supporting document and refers back to the 2010 Camden Geological, Hydrogeological and Hydrological "Study (CGHHS) by Ove Arup.

1.3.2 NEIGHBOURHOOD PLANNING

The site is located in the Redington Frognal (RedFrog) Conservation Area and therefore, in addition to the LB Camden documents above, is also subject to the requirements of the RedFrog Neighbourhood Plan (adopted in September 2021).

The 2021 Neighbourhood Plan Policy U1 Underground Development reads as follows:

> *"UD 1 UNDERGROUND DEVELOPMENT*
>
> *i. Residential basements and other underground development, including car parking and swimming pools, should have no significant adverse impact on:*
>
> *a. the viability of garden spaces. This requires maintaining 3 metres of depth for roots of large trees and 2 metres of depth for roots of medium trees. Large and medium trees are defined as:*
>
> *• large trees (ultimate height of 15m+): a minimum of 30 m^3*
>
> *• medium trees (ultimate height of 8 -15m): a minimum of 20 m^3;*
>
> *b. the character and verdant amenity of garden spaces, including through the impact of light wells, car lifts and other surface features;*
>
> *c. the viability of trees with ecological or amenity value and potential for future tree planting. This requires maintaining 3-metres of depth for roots of large trees and 2-metres of depth for roots of medium trees;*
>
> *d. underground streams or spring lines, including through cumulative impact, and*
>
> *e. neighbouring properties, though impacts, and cumulative impacts, on ground water and land stability.*
>
> *ii. Development proposals that include new water features to manage drainage, including daylighting of underground rivers, will be encouraged.*
>
> *iii. Development proposals should be accompanied by sufficient information to allow proper assessment of impacts, including how they:*
>
> *a. will not cause cumulative erosion of garden space; and*
>
> *b. will not contribute to localised groundwater flooding."*

The neighbourhood forum has set out detailed guidance for demonstrating compliance with the above policy UD1, including a requirement for the following additional BIA content:

- Consideration of predicted ground movements in an area extending four times the basement depth or 20m distant from the excavation.
- Consideration of the forum's water features plan and of all existing and proposed basements within the relevant area.

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 basement development.

Site investigation information is then described and a ground model is developed, which is followed by a proposed outline basement construction methodology and, finally, by an assessment of the potential impacts of the proposed scheme of the issues identified in the screening and scoping phase.

1.5 DOCUMENTS CONSULTED

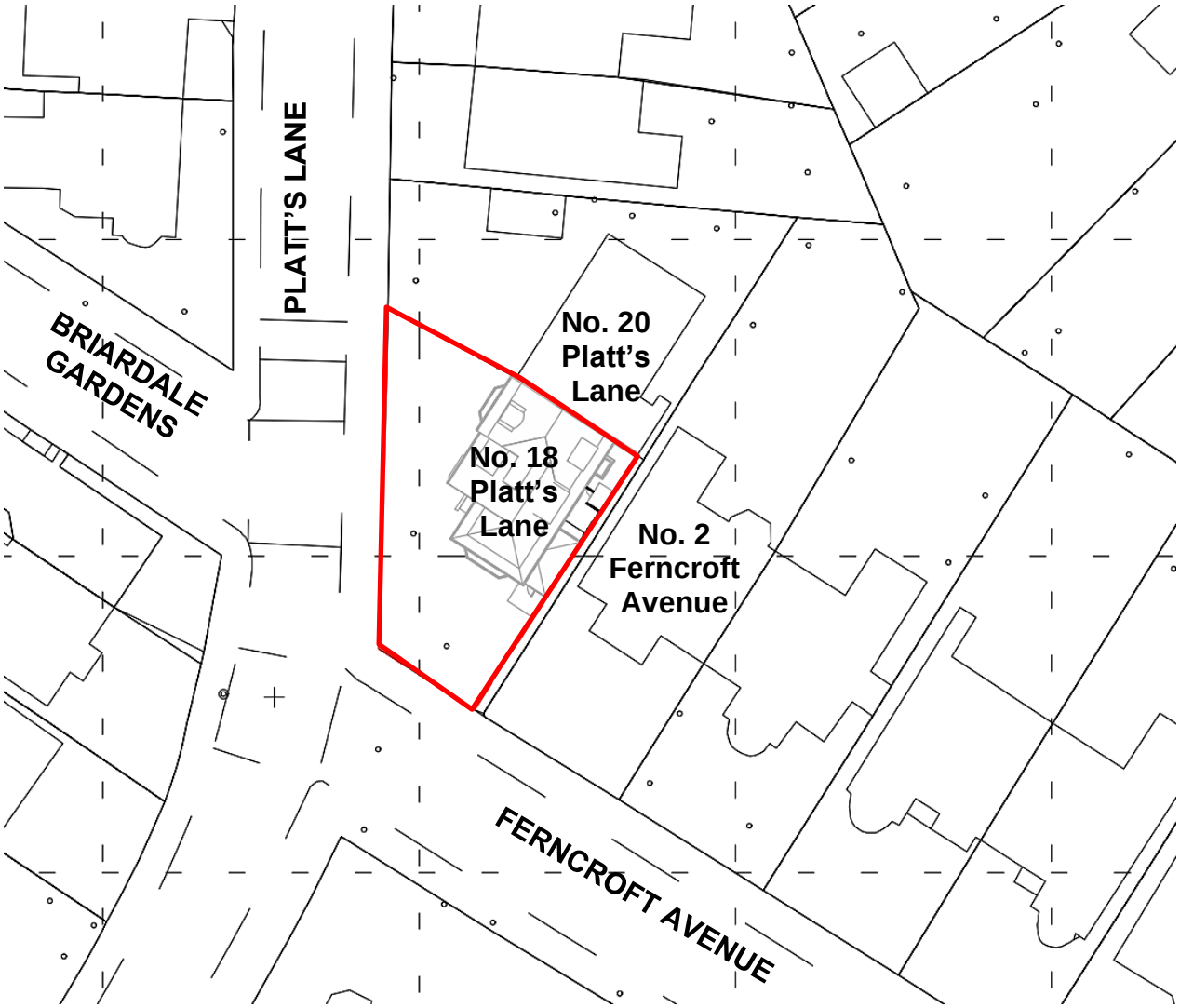
The following documents have been consulted for this assessment.

- 2025 Jan Ground Investigation (Draft Information) CDS Group
  Ref: ES0089
- 2025 Jan Proposed Plans BL Architecture
  Ref: L501 P01, P501 P01, P502 P01, S501 P01, S502 P02, P503 P01, V501 P01, E501 P01, E502 P01, DP201 P03,
- 2024 Dec Flood Risk Assessment and Surface Water Drainage Strategy Aegaea
  Ref: AEG5524_NW3_Hampstead_07, Third issue
- 2024 Nov Arboricultural Impact Assessment Report Greenwood
  Ref: 20240618-153842995, FINAL v.2.0
- 2024 Oct Topographical Survey Icelabz
  Ref: MB-SURV-PL-TS-003, Rev 02
- 2023 Nov Existing Plans BL Architecture
  Ref: E001 P01, S001, E002 P01, L001 P01, P001, V001, DP001 P01

2. THE SITE

2.1 SITE LOCATION

The site is located at the junction of Ferncroft Avenue and Platt's Lane and may be located approximately by postcode NW3 7NS or by National Grid Reference 525295, 186070.



SITE LOCATION PLAN

2.2 TOPOGRAPHICAL SETTING

The site lies on the south western slopes of Hampstead Hill at around + 91.5m OD and, as can be seen from the LIDAR imagery, the ground locally falls in a westerly direction, falling by less than 1m across the plot.

LIDAR TOPOGRAPHY (+1m OD CONTOURS)

The site is not located on a steep hillside, as indicated on the extract plan below.

EXTRACT FROM FIGURE 16 OF THE CGHHS

2.3 SITE DESCRIPTION

The property is a three-storey semi-detached building with a gravel-covered front driveway and a fenced-off garden area in the southern portion of the plot.

The property is accessed from Platt's Lane at the front but the rear can also be accessed through a narrow pathway belonging to No. 20 Platt's Lane leading from Ferncroft Avenue at the rear of the site.

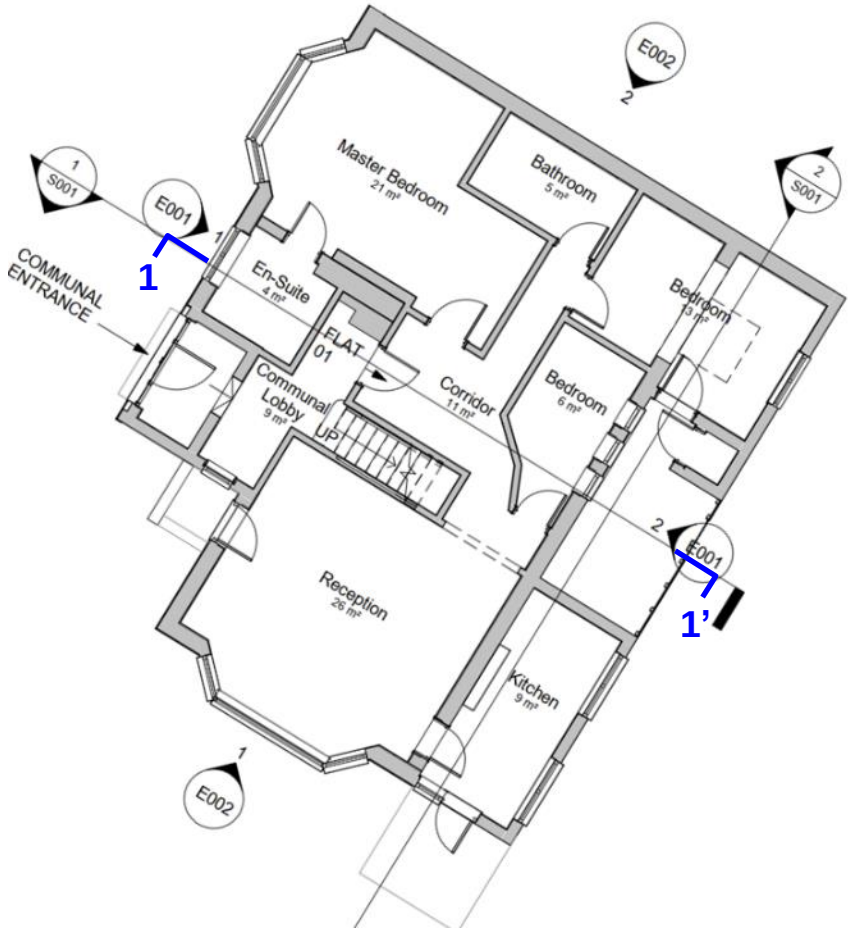
The ground floor is slightly elevated such that the front door is accessed be means of two steps.

EXISTING SITE MODEL
(SOUTHWEST VIEW)

EXISTING SITE MODEL
(SOUTH VIEW)

EXISTING FRONT ELEVATION

FRONT ELEVATION



EXISTING GROUND FLOOR PLAN

EXISTING SECTION 1 – 1'

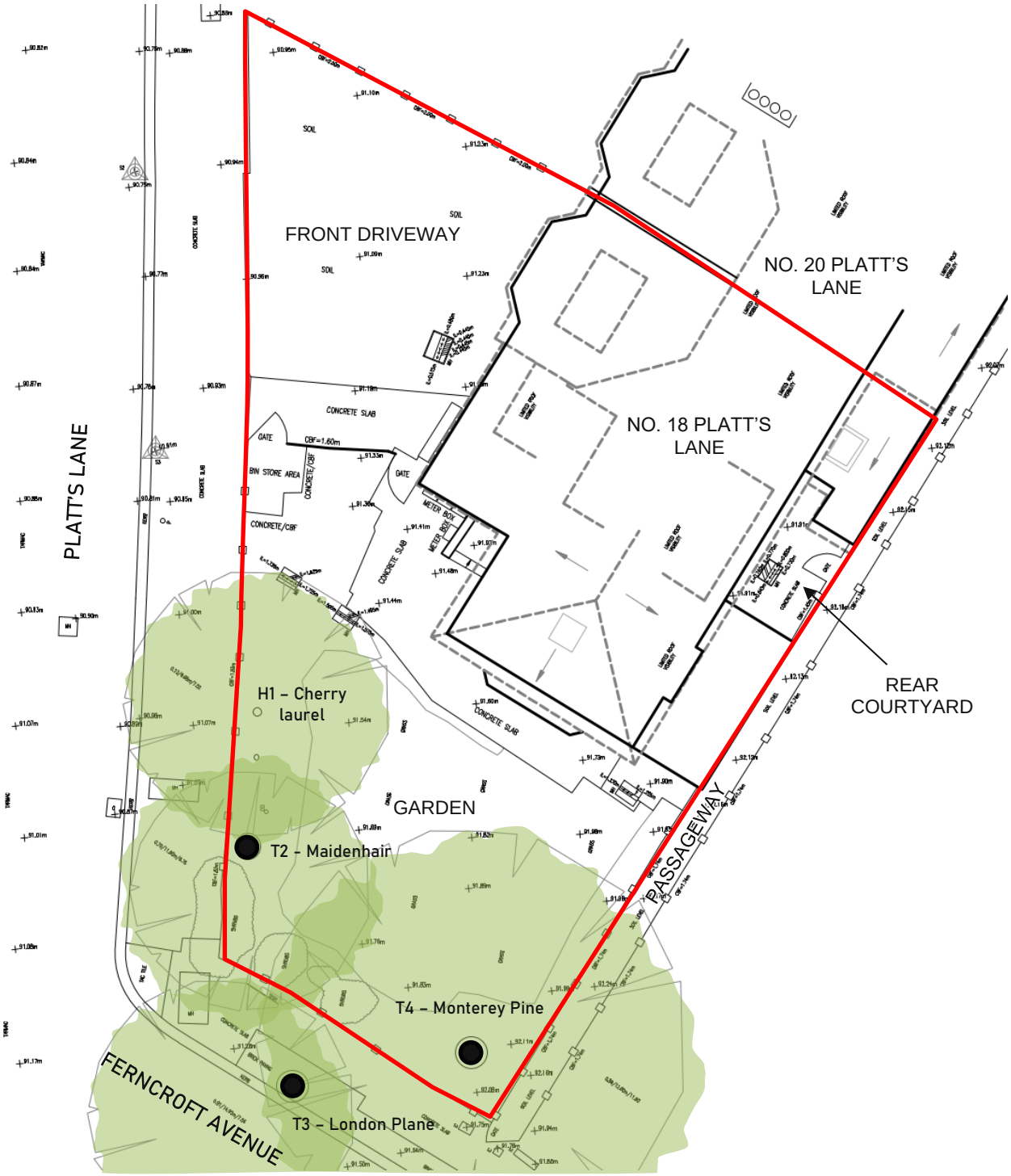
The garden area and the building are separated from the neighbouring building at No. 2 Ferncroft Avenue to the east by the narrow fenced alley leading to No 20 Platt's Lane. There is gated access to the rear yard of No. 18.

The garden area features a concrete path bedside the building and a grassed area beyond.

Early mature Cherry laurel and Maidenhair trees, and a mature Monterey Pine have been recorded in the southern portion of this garden, with a further mature London Plane present in the pavement of Ferncroft Avenue just beyond the southern boundary of the site.

PASSAGEWAY SEPARATING THE SITE (LEFT)
AND No. 2 FERNCROFT AVENUE (RIGHT)

PHOTO SHOWING THE EXISTING GARDEN AREA



TOPOGRAPHICAL SURVEY OF THE SITE

3. DESK STUDY

3.1 SITE HISTORY

The site remained undeveloped in a field on the eastern side of Platt's Lane until the early 20th Century.

1890s

A pond was present in the north of the site in the late 19th Century but this was filled in by the 1910s to permit the present residential development of the area, including Nos. 18 and 20. Given the orientation of Nos. 18 and 20, it is considered possible that the pond may have initially been left present in a triangular plot at the junction of Platt's Lane and Ferncroft Avenue and that this was then subsequently also developed some time afterwards.

1950s

No significant redevelopment of either of the buildings seems to have taken place since their construction.

To the Northeast, a basement development planning application for No. 20 was approved in 2014 (Planning Ref. 2014/6825/P) but it is believed that this adjoining basement has not yet been constructed.

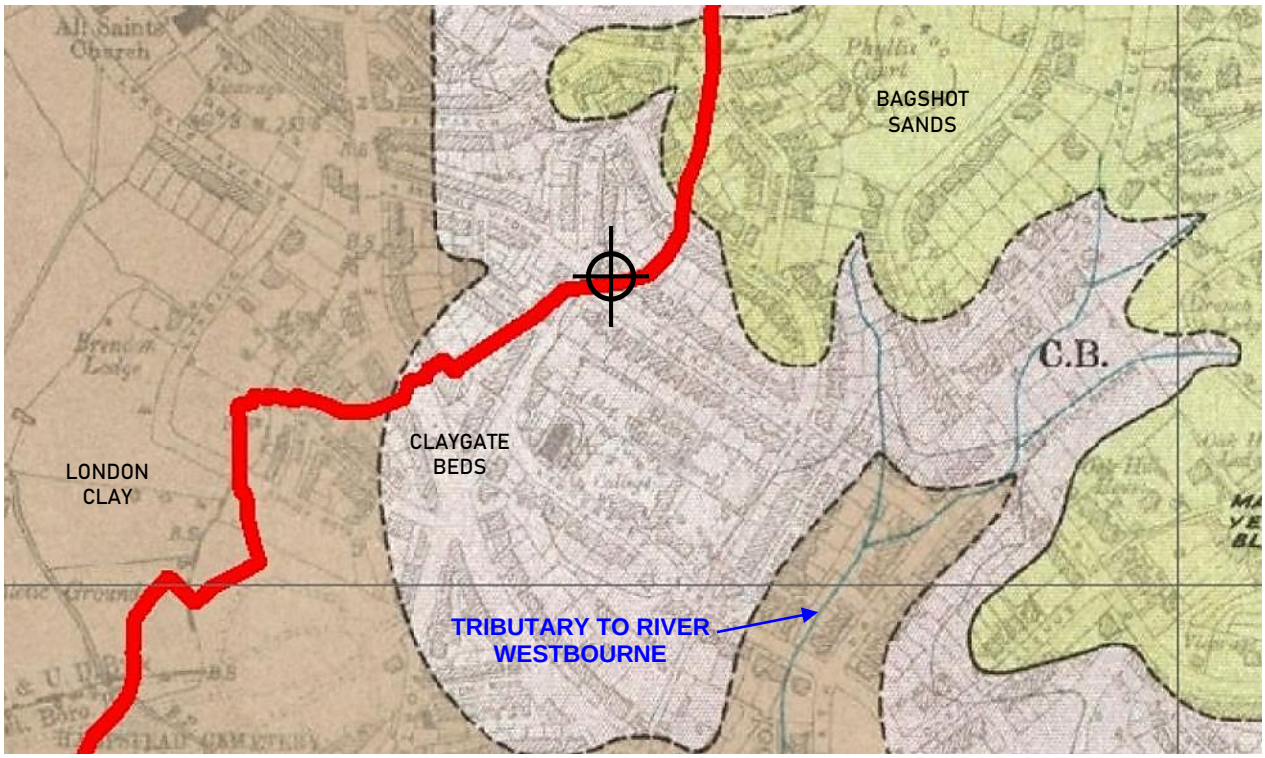
To the southeast Ferncroft Avenue rises and the neighbouring pair of houses at Nos. 2 and 4 Ferncroft Avenue was constructed at a slightly higher level, with a 1m deep cellar below the raised ground floor of No. 2. This cellar was deepened to form a full basement beneath No. 2 Ferncroft Avenue in the 1980s.

3.2 GEOLOGICAL INFORMATION

The British Geological Survey (BGS) records indicate that the site is underlain by the Claygate Member.

The Claygate Beds comprises a variable interbedded sequence of fine-grained sands, silts and clays. The geological strata are arranged in a sub-horizontal fashion and, generally speaking, while the upper sections of the Claygate sometimes contain continuous seams of sand, the lower beds of the succession are almost entirely composed of clay.

Fig. 4 of the CGHHS additionally confirms that the area is not noted to be within the worked ground area associated with the past brickfield to the west.



EXTRACT FROM FIGURE 2 OF THE CGHHS (NB. BOUNDARY OF LB CAMDEN IN RED SHOWN INCORRECTLY)

It is noted that the geological mapping does not register the presence of the superficial layer of disturbed soil, known as head, that is expected to be present as a result of the geologically recent down slope movement of the most weathered and softened near-surface soils that has occurred.

3.3 HYDROGEOLOGICAL INFORMATION

The Claygate member is identified as a Secondary A Aquifer and there can be confined groundwater found in the sandier seams that are present in the upper sections of the Claygate. Where confined, these seams can sometimes cause problems to construction if the water is pressurised as a consequence of the aquifer being hydraulic recharged by rainwater ingress higher up the hill.

Significant groundwater flow is usually limited to the identifiable thicker seams of sand that form recognisable layers in the upper Claygate. However, as a result of the relatively impermeable clays forming the lower half of the Claygate Beds, such issues are not anticipated at this site.

Indeed, it is common to find an intermitted spring line emerging from the hillside about halfway through the Claygate sequence, giving rise to small surface streams leading down over the lower Claygate and onto the London Clay. As this spring line coincides with the approximate position of the site it may therefore be conjectured that the former pond was possibly fed by such a spring.

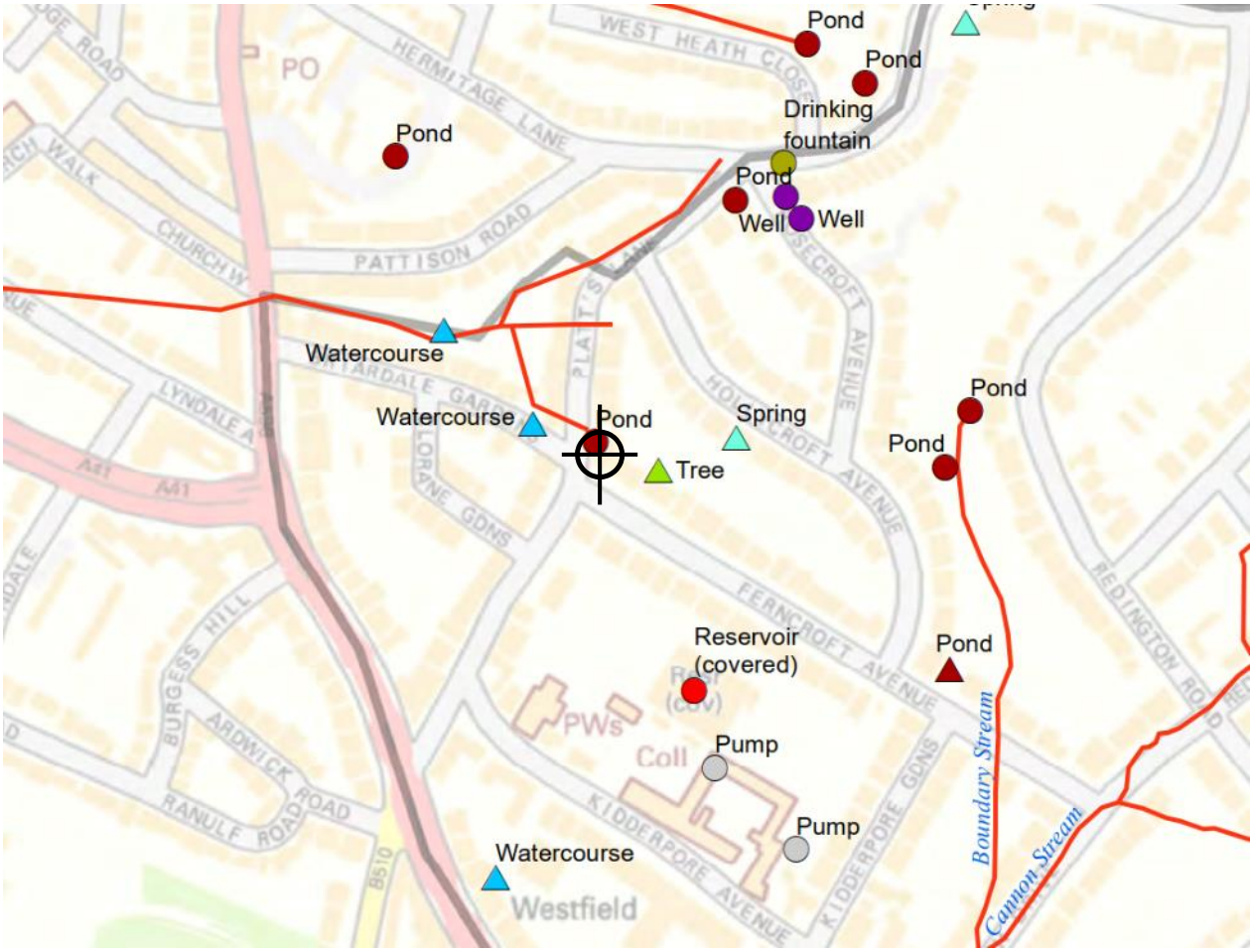
In addition to these water-bearing seams there are smaller subsidiary pockets and partings of silt and sand scattered throughout the jumbled but predominantly clayey head materials. These permeable zones are usually saturated and will release a quantity of water when encountered in an excavation, but do not

tend to give rise to any on-going discernible flow after the initial release.

3.4 HYDROLOGICAL INFORMATION

It will be seen that there is some conflicting evidence of water courses between the mapping published as part of Arup's RedFrog Sub-surface Water Features Mapping report (extract shown below), the early 20th Century geological mapping (previous page) and a mid-19th Century map (on the following page).

Nevertheless, it can be discerned that the site lies close to the watershed of the Rivers Westbourne and Brent and drains toward the latter.



EXTRACT FROM DRAWING 007 OF ARUP'S REDFROG HYDROGEOLOGICAL MAPPING

EXTRACT FROM 1851 MOGG'S MAP

POSITION OF FORMER POND

4. PROPOSED BASEMENT DEVELOPMENT

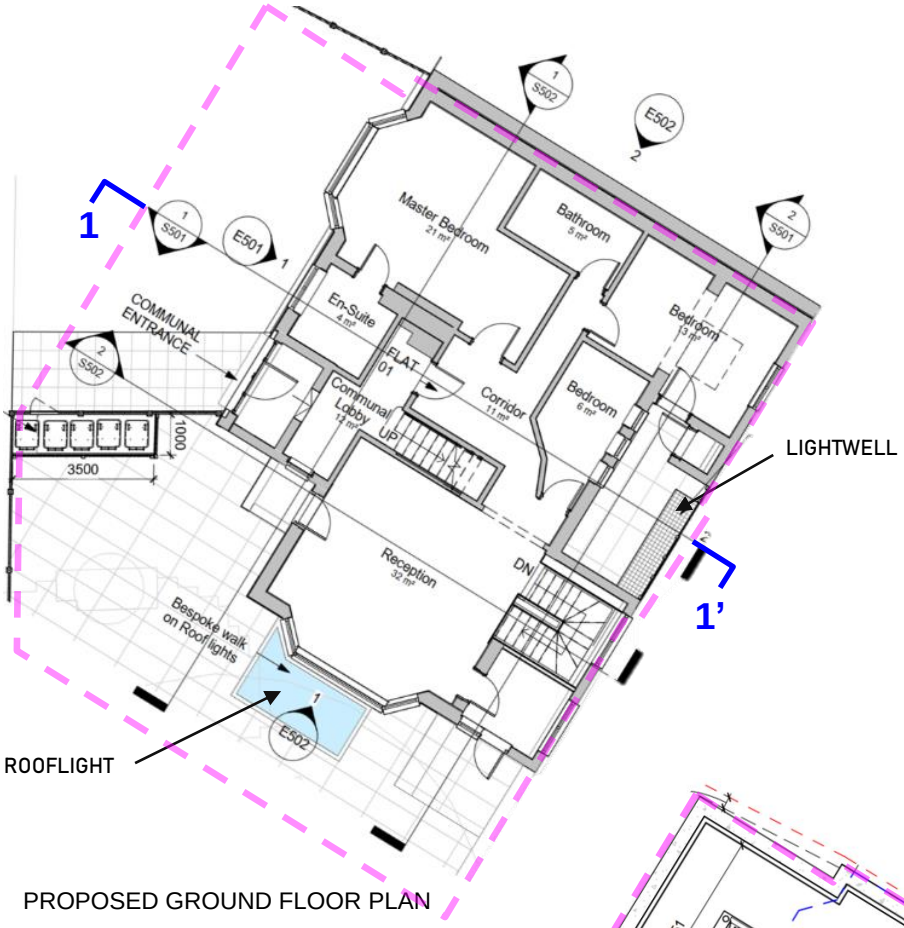
It is proposed to construct a basement underneath the existing building footprint and extending outside of this beneath driveway, rear yard and garden areas.

The basement is to feature a centrally located swimming pool and is to be connected to the ground floor flat via a staircase adjacent to the eastern basement wall. It is understood that, aside from construction of the new staircase leading down from the present kitchen, the existing ground floor is to be retained unchanged.

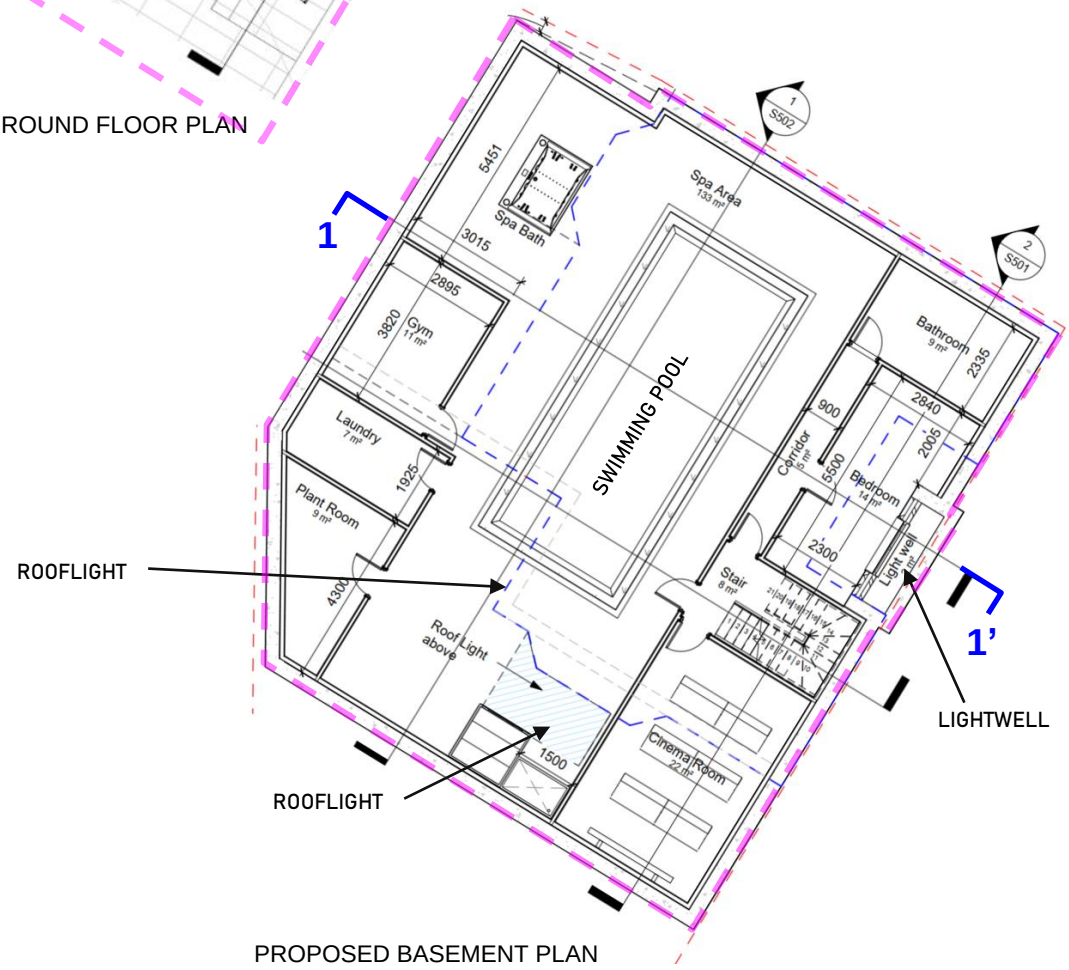
The basement excavations, including the excavations for the new basement slab are to be undertaken to approximately 5m depth, with a deeper central excavation to enable construction of the proposed swimming pool.

A rooflight is proposed in the garden area and a small lightwell is proposed in the rear yard.

PROPOSED SITE PLAN



PROPOSED GROUND FLOOR PLAN



PROPOSED BASEMENT PLAN

PROPOSED SECTION 1 – 1'

5. SCREENING & SCOPING ASSESSMENTS

The Screening & Scoping Assessments have been undertaken with reference to Appendices E and F of the CGHSS.

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 is located directly above an aquifer?	Yes	The Claygate Member is classified as a Secondary A Aquifer with groundwater intermittently present within sandier seams of the stratum.
Will the proposed basement extend beneath the water table surface?	Possibly	
Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	Yes	The site lies within a known area of springs.
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 development will not increase the hard surfaced/paved area by providing new soft landscaping at the front of the property.
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 Claygate Member is not permeable enough to allow for infiltration drainage discharge.
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?	Possibly	There was a former pond at this site.

5.1.2 SCREENING CHECKLIST FOR SURFACE FLOW AND FLOODING

QUESTION	RESPONSE	COMMENT
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	It is understood that 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 development will not increase the hard surfaced/paved area by providing new soft landscaping at the front of the property.
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	It is understood that the existing surface water 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	It is understood that the existing surface water 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?	Possibly	The site is located outside any Local Flood Risk Zones and Critical Drainage Areas identified by the Camden SFRA and is not identified by the EA modelling / mapping to be at risk of flooding from other sources. However, the proposed basement may be at risk of surface water flooding.

5.1.3 SCREENING CHECKLIST FOR STABILITY

QUESTION	RESPONSE	COMMENT
Does the existing site include slopes, natural or manmade, greater than 7 degrees?	No	The existing slope at the site is shallower than 7 degrees.
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	There are no steep, artificial slopes near the site.
Is the site within a wider hillside setting in which the general slope is greater than 7 degrees?	No	The site is located on a slope, albeit gentler than 7 degrees. See Figure 16 of the CGHHS.
Is London Clay the shallowest strata at the site?	No	The site is expected to be underlain by the Claygate Beds, present beneath a cover of Head deposits
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	Trees will not be felled but the proposed works will enter the Root Protection Areas of nearby trees.
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?	Yes	The site lies in or near a likely area of springs and the headwaters of a now-concealed former watercourse leading westwards toward the River Brent
Is the site within an area of previously worked ground?	No	See Fig. 3 of the CGHHS.
Is the site within an aquifer?	Yes	The site is indicated to be underlain by a Secondary A Aquifer in the form of the Claygate Member.
Will the proposed basement extend beneath the water table such that dewatering may be required during construction?	Possibly	There was a former pond at this site.
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	
Will the proposed basement significantly increase the differential depth of foundations relative to the neighbouring properties?	Yes	The building adjoins No. 20 Platt's Lane to the northeast and is founded at a similarly high level. The basement excavations will extend to a significant depth below this. No. 2 Ferncroft Avenue contains an existing basement, but as this is set on rising ground the proposal for No. 18 will extend significantly below this also.
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 (Section 6.3 of the CGHHS).

5.2.1 SCOPING FOR SUBTERRANEAN (GROUNDWATER) FLOW

- *The site is underlain by an aquifer.*

The guidance advises that potentially the basement may extend into the underlying aquifer and thus affect the groundwater flow regime.

- *The basement may extend beneath the water table surface.*

The guidance advises that the groundwater flow may be altered by the proposed basement. Changes in flow regime could potentially cause the groundwater level within the zone encompassed by the new flow route to increase or decrease locally. For existing nearby structures then the degree of dampness or seepage may potentially increase as a result of changes in groundwater level.

- *The site is within 100m of a watercourse, well (used/disused) or potential spring line.*

The guidance advises that flow from a spring, well or watercourse may increase or decrease if the groundwater flow regime which supports that water feature is affected by a proposed basement.

If the flow is diverted, it may result in the groundwater flow finding another location to issue from with new springs forming or old springs being reactivated.

A secondary impact is on the quality of the water issuing or abstracted from the spring or water well respectively.

- *The lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) is close to or lower than the mean water level in any local pond.*

The guidance advises that groundwater may drain from the pond or spring and flow into the basement/excavation space.

5.2.2 SCOPING FOR SURFACE WATER FLOW AND FLOODING

- *The site is 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.*

The guidance advises that the developer should undertake a Flood Risk Assessment (FRA).

5.2.3 SCOPING FOR STABILITY

- *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 may be within 100m of a watercourse, well (used/disused) or potential spring line.*

The guidance advises that seasonal spring lines and changes to groundwater regimes within slopes can affect slope stability.

- *The site is underlain by an aquifer, and;*
- *The basement may extend beneath the water table surface.*

The guidance advises that dewatering can cause ground settlement. The zone of settlement will extend for the dewatering zone, and thus could extend beyond a site boundary and affect neighbouring structures. Conversely, an increase in water levels can have a detrimental effect on 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.*

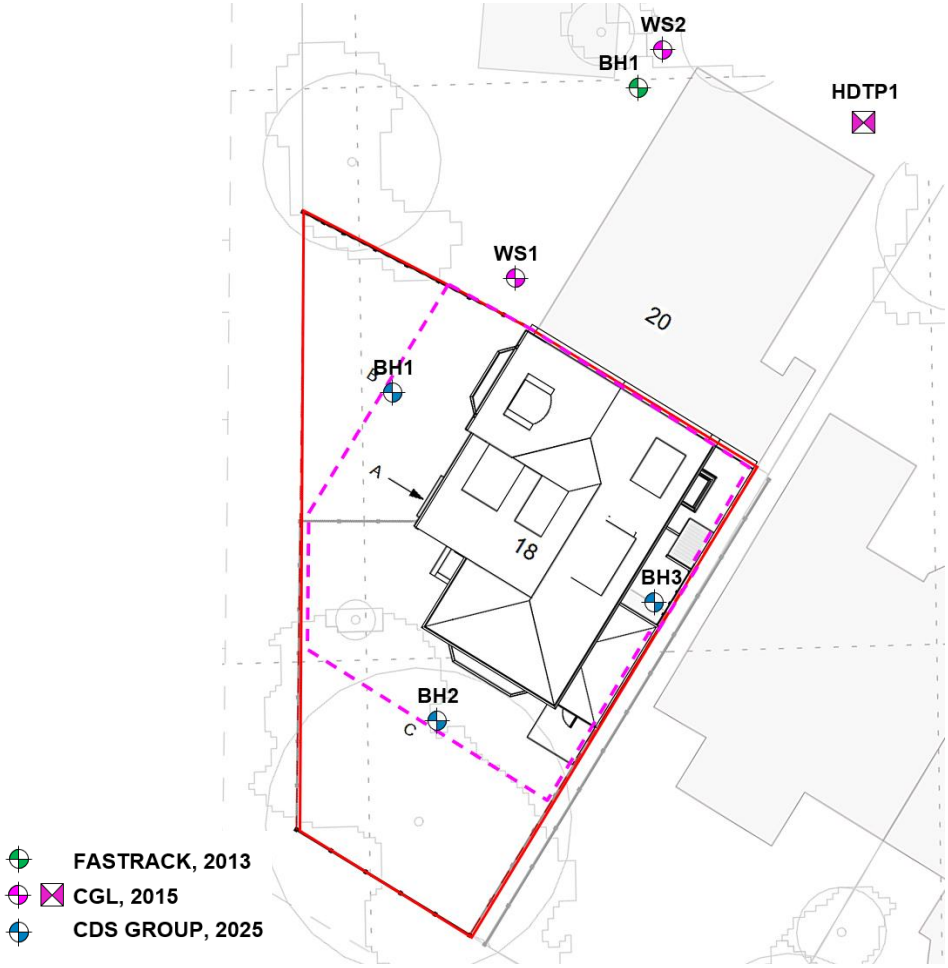
The guidance advises that excavation for a basement may result in structural damage to neighbouring properties if there is a significant differential depth between adjacent foundations.

6. SITE INVESTIGATION

6.1 GROUND INVESTIGATION DATA

Two rounds of ground investigation were previously undertaken at the neighbouring No. 20 Platt's Lane to inform the impact assessment for a proposed basement scheme at the site. These comprised a total of three window sample boreholes and a hand-dug trial pit. Two structural trial pits were also constructed to ascertain the configuration of the existing foundations.

A site-specific ground investigation was undertaken at No. 18 Platt's Lane in January 2025, comprising three window sample boreholes constructed to a maximum depth of 6m below ground level. Groundwater monitoring standpipes were installed at BH1 and BH2.



6.2 GROUND CONDITIONS

Beneath a limited cover of made ground (generally <0.5m depth), the site appears to be underlain by a mantle of head deposits extending to around +89m OD (approx. 2.5m depth), with the Claygate Member present below this.

6.2.1 HEAD DEPOSITS

The Head deposits, recognisable by the presence of a scattered gravel, comprise a melange of soft to firm orange-brown and grey mottled clay with a variable sand and silt content. A seepage was noted at the base of the head in BH2, emanating from a pocket of sand and gravel at approximately 2.5m depth below ground level.

6.2.2 CLAYGATE MEMBER

The underlying Claygate Beds comprise firm to stiff silty and sometimes sandy clay. The upper layers are weather to a brown colour, but below around +87m OD the beds assume a less weathered unoxidised grey colouration.

An SPT-Cohesion plot is presented on the next page, based upon the in-situ SPT and vane testing at this site and the neighbouring No. 20 Platt's Lane.

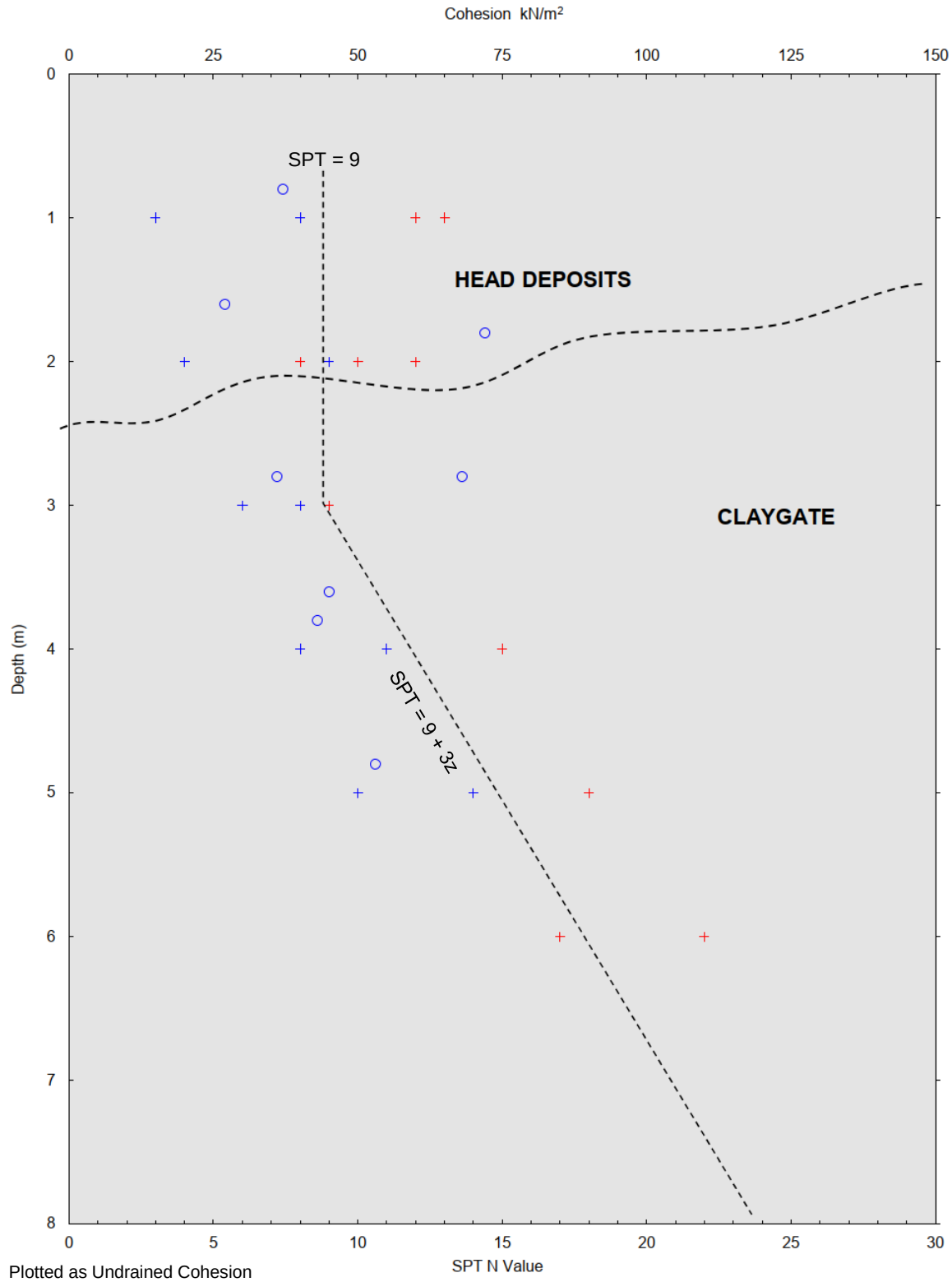
6.3 GROUNDWATER

A seepage was noted at the base of the head in BH2, emanating from a pocket of sand and gravel at approximately 2.5m depth below ground level. Although such porous zones are usually saturated and will release a quantity of water when encountered, they do not tend to give rise to an on-going flow after the initial release of trapped water.

Although any percolation of surface water into the more permeable zones of soil may be expected to give rise to seepage, there is not expected to be any water table at this site. For example, the recent 2025 BH1 was completed without encountering any sign of water, as was the 2013 BH1 on the adjacent site.

6.4 EXISTING FOUNDATIONS

Trial pitting undertaken at the neighbouring No. 20 Platt's Lane has confirmed that the building is supported on traditional shallow spread foundations bearing at approximately 700mm depth below ground level.

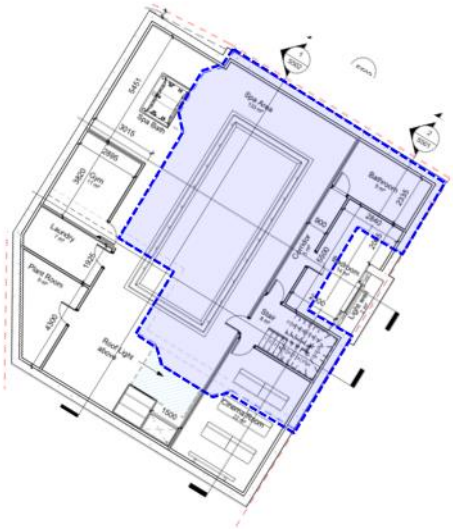


DESIGN SOIL STRENGTH PROFILE

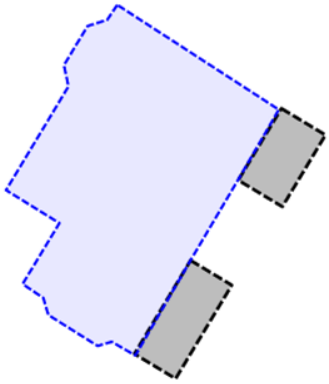
7. GEOTECHNICAL ASSESSMENT

7.1 BASEMENT CONSTRUCTION METHODOLOGY

The basement will extend beyond the structure of the existing three storey structure on three sides and the existing three storey house will need to be carefully preserved above the works throughout the construction project. The upper floors are understood to contain three flats that are under separate ownership and will potentially remain fully occupied throughout.



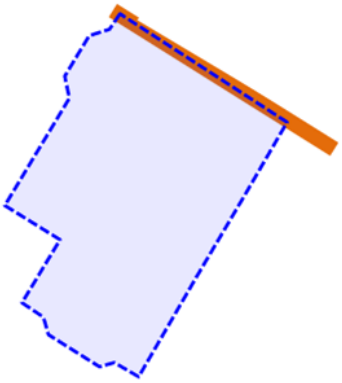
The proposed basement layout can be seen to be unrelated to the overlying building that is to be retained. Consequently, it will be necessary to construct a supporting structure for this building as a precursor to any basement construction. This will need to transfer the loading of the existing building to the ground beneath the new basement and for simplicity and the purposes of this assessment it is assumed that this would be accomplished by means of the basement perimeter walls.



The following provisional outline construction sequence and methodology has been devised in order to permit the potential impacts of the project to be analysed.

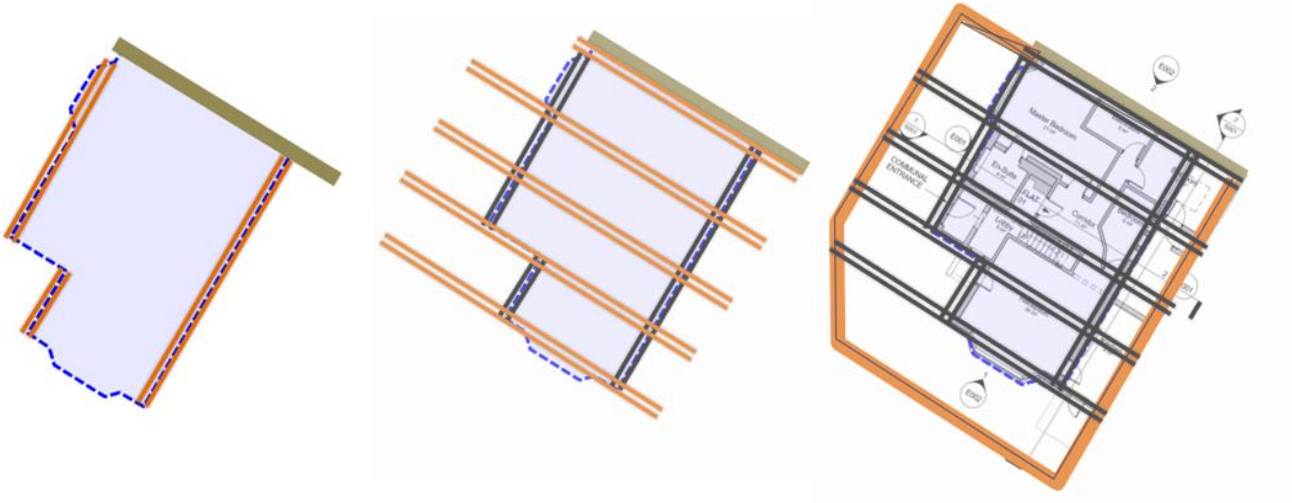
For ease of access it may be considered prudent to temporarily remove the two existing single storey rear extensions and to replace these on completion of the basement.

It is understood that it is intended to form the basement without piling and hence it is envisaged that the perimeter basement walls will be formed as conventional L-shaped sections of cast-in-situ reinforced concrete retaining wall, excavated using a "hit-and-miss" excavation sequence for stability.

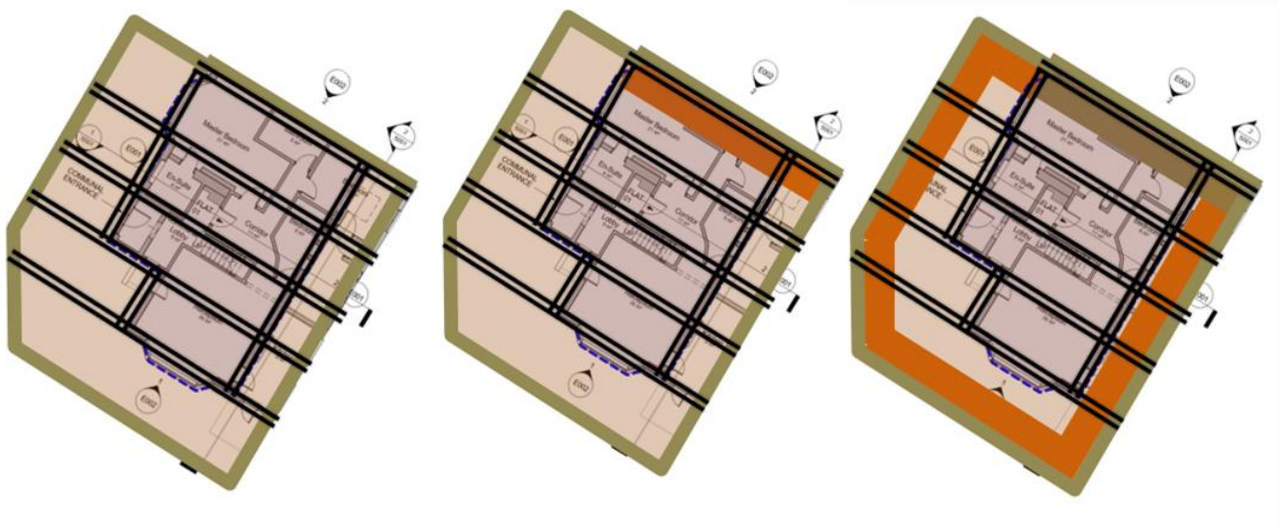


Excavations of approximately 5m depth will be required to construct the proposed basement reaching a general level of approximately +86.5m OD, but with a central deepening to approximately 6.5m depth (+85m OD) to accommodate the swimming pool. This will require two stages of excavation.

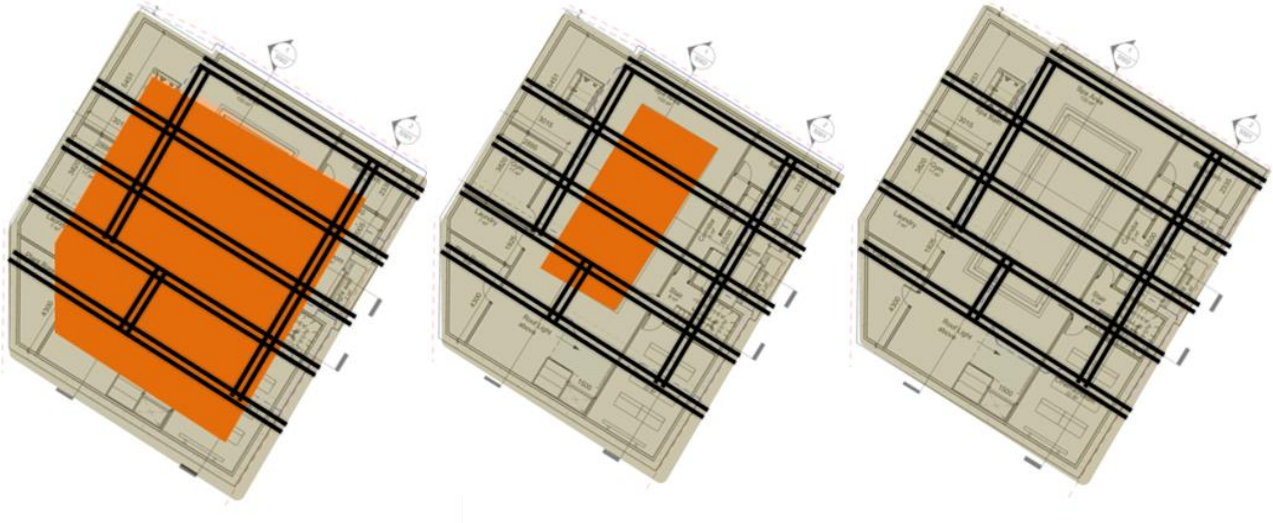
The first exercise will be to remove the ground flooring and install the first stage of traditional underpinning that will be required to the party wall with No. 20.



Following this it is envisaged that three sections of reinforced concrete ground beam will be formed to strengthen/replace the existing foundations. A series of deep section cross beams will then be installed to support these initial beams and then the first stage of the basement perimeter wall can be constructed to in turn support these cross beams. At this stage the existing building will be effectively supported on a stiff "grid-iron" structure permitting the more extensive excavations to be safely undertaken.



Having reduced the full basement excavation to the first stage level (around 2.5m or 3m depth) and installed temporary low level propping across the full width of the basement, the second stage party wall underpinning can be completed followed by the second stage excavation of the basement perimeter walls and formation of the L-shaped sections.



The central area of the new basement will then be reduced to the second stage and the basement floor and pool surround cast. Finally, the pool itself will be excavated and formed.

7.2 FOUNDATIONS

An assessed net allowable bearing pressure of 150kN/m^2 may be used for the design of the new underpinning/ wall foundations. However, it is envisaged that on completion of the perimeter walls, these will be structurally combined with the new reinforced concrete floor slabs to form a rigid concrete 'box' structure.

Installation of the cross beams will produce concentrated structural loading on the upper levels of the basement walls, but, subject to structural analysis, it is envisaged that these concentrated point loads may be adequately dissipated through the basement depth without the need for introducing a discrete ring beam.

7.3 BASEMENT CEILING

A significant depth of section is expected to be required to form cross beams spanning the full basement width, requiring an appropriate distance between the basement ceiling and the ground floor in order to accommodate these.

However, it is noted that the basement areas extending outside of the existing basement footprint will in any case require to be overlain by a 1m thickness of ground cover.

7.3.1 EXCLUSION OF GROUNDWATER

Site-specific and nearby investigations provide evidence that some groundwater seepage may be expected in the Head Deposits between the ground surface and as deep as 2.5m depth below ground level.

However, on the basis of the various ground investigations that have now been completed it is envisaged that any seepage may be relatively slow and hence where it occurs it may potentially be controlled by the

use of sacrificial trench sheeting installed around any excavation where this is encountered combined with pumping of any collected water from sumps.

It is proposed that an observational method should be employed such that the construction methodology can be revised to accommodate any significant groundwater ingress (e.g. ingress greater than 4l/h/m run) in the event that unexpected water-bearing seams or lenses of sand are encountered.

A contingency plan is to be prepared allowing for continuous monitoring of the ground conditions during excavations. Should significant ingress be encountered, the engineer is to be informed immediately with all works stopped in order to enact appropriate contingency measures.

These contingency measures could include measures to seal off the groundwater ingress pathways through localised sheet piling or permeation grouting.

7.3.2 TEMPORARY WORKS

High level propping will be provided in the temporary and permanent scenario by the new ground beams installed to ensure stability of the existing structure.

A second, lower level of temporary propping is to be introduced just above the first stage excavation level as the main excavations proceed and these can only be removed after the new reinforced concrete basement slab is completed.

In the permanent situation it is envisaged that the proposed new lower ground floor slab will provide high-level lateral resistance to the basement structure and following completion of this, the temporary propping cam be removed.

7.4 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)
Made Ground	17	Zero	12
Head Deposits	18	Zero	20
Claygate Member	20	Zero	20

As the excavations will be advanced in the Claygate Member, a degree of heave movement due to soil unloading is expected. The potential effect of this heave is analysed in the ground movement assessment presented in Section 8.

7.5 WATERPROOFING

There is potential for water to collect behind the new retaining walls in the long term. The new below-ground structure is therefore to be waterproofed and designed to withstand hydrostatic pressures in accordance with BS8102:2022, Code of Practice for the Protection of Below-Ground Structures against Water from the Ground.

A design hydrostatic level of +91.0m OD should be used, approximately equal to the ground level on site and a check will need to be made to confirm no risk of global hydrostatic uplift to the structure when the pool is empty.

7.6 EFFECT OF TREES

Two mature and two early mature trees are present to the south of the proposed basement, the mature Monterey Pine and a London plane (located at Ferncroft Avenue pavement) and the early mature Maidenhair and a cherry laurel.

The proposed works will enter the Root Protection Zones of the trees present in the southern garden of the site. An arboricultural impact assessment has been prepared for the development by Greenwood and is presented in a separate document to accompany this BIA. The assessment concludes that the impact on the trees from the development is acceptable provided safe construction methods are employed.

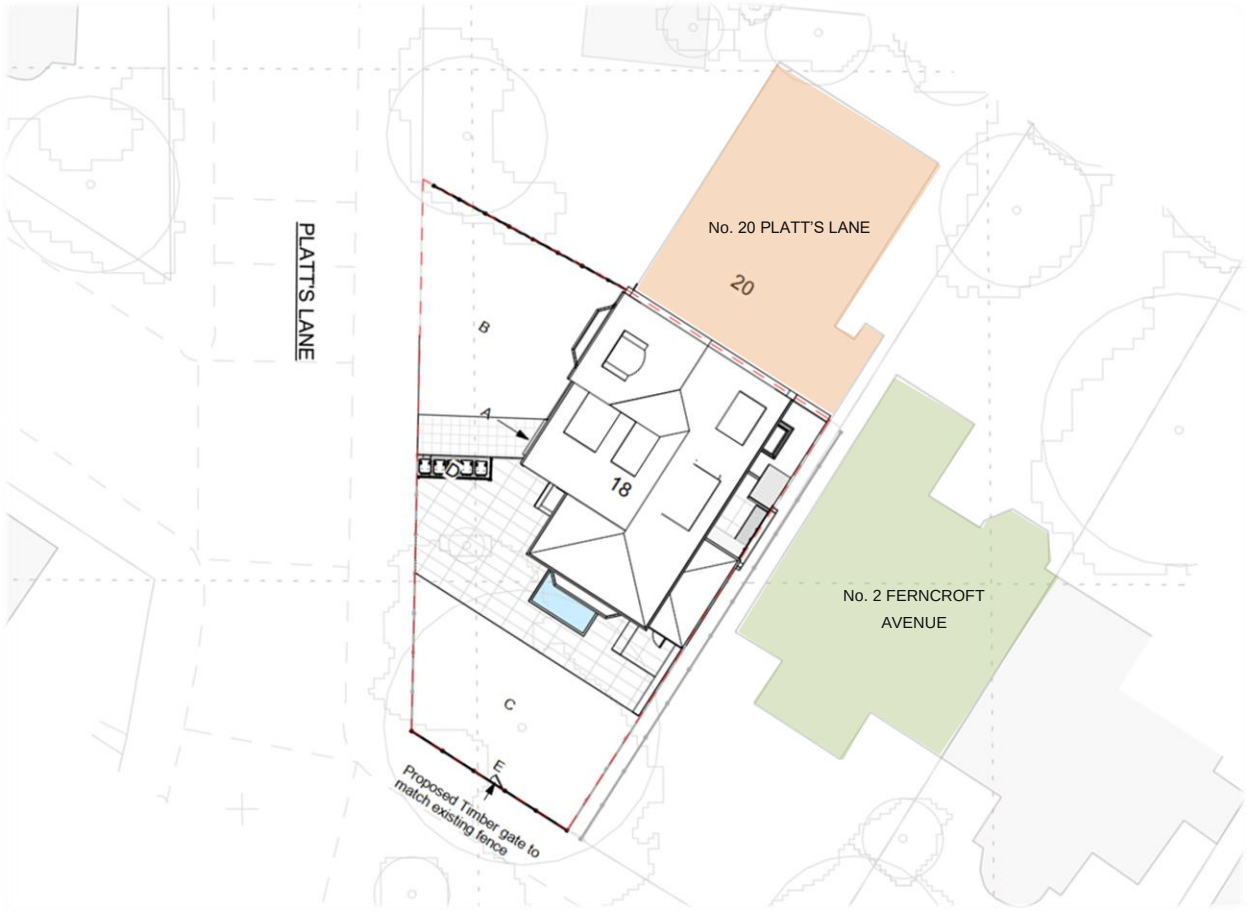
As the proposed basement excavations will extend to a depth of around 5m, no additional deepening of the new foundations will be required in order to protect the new structure against soil movements due to moisture extraction by tree roots.

8. GROUND MOVEMENT ASSESSMENT

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 could be potential ground movement associated with the construction of the basement perimeter wall (including underpinning of the party wall) and excavation soil unloading.



8.1 STRUCTURES CONSIDERED FOR EFFECT OF GROUND MOVEMENT

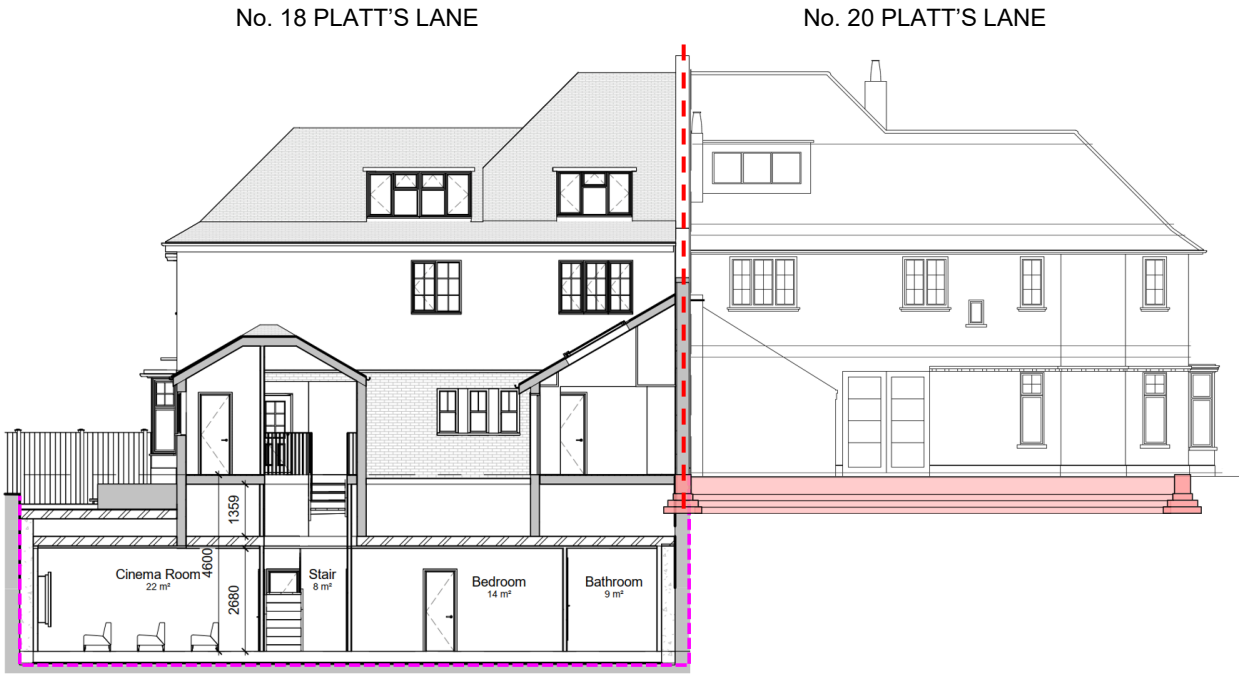
8.1.1 No. 18 PLATT'S LANE (UPPER FLOOR FLATS)

The two upper floors of No. 18 Platt's Lane are under separate ownership and are accessed through a staircase located behind a communal entrance at ground floor, at the western wall of the building.

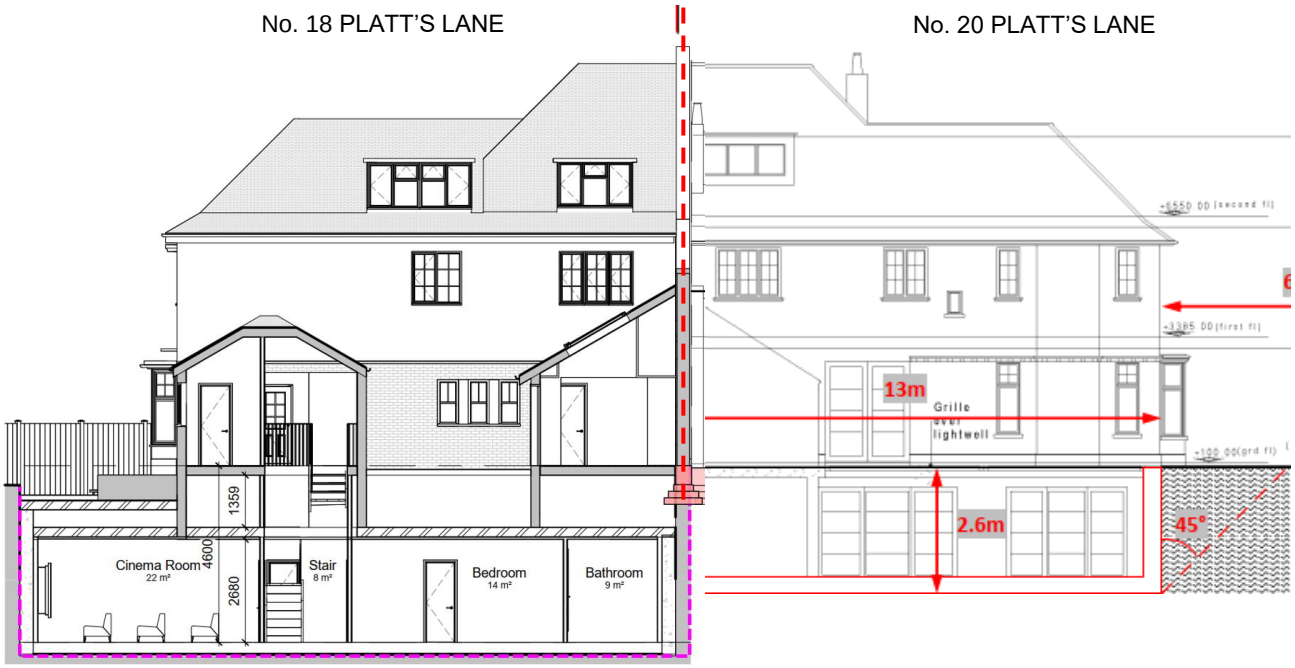
8.1.2 No. 20 PLATT'S LANE

No. 20 is adjacent to the north of the site and forms the second half of the three-storey semi-detached

building. Despite being granted approval for a basement in 2014, this has not yet been constructed and hence the property features a ground floor and foundations situated at similar levels to No. 18 Platt's Lane.



SECTION DRAWING SHOWING THE PROPOSED BASEMENT

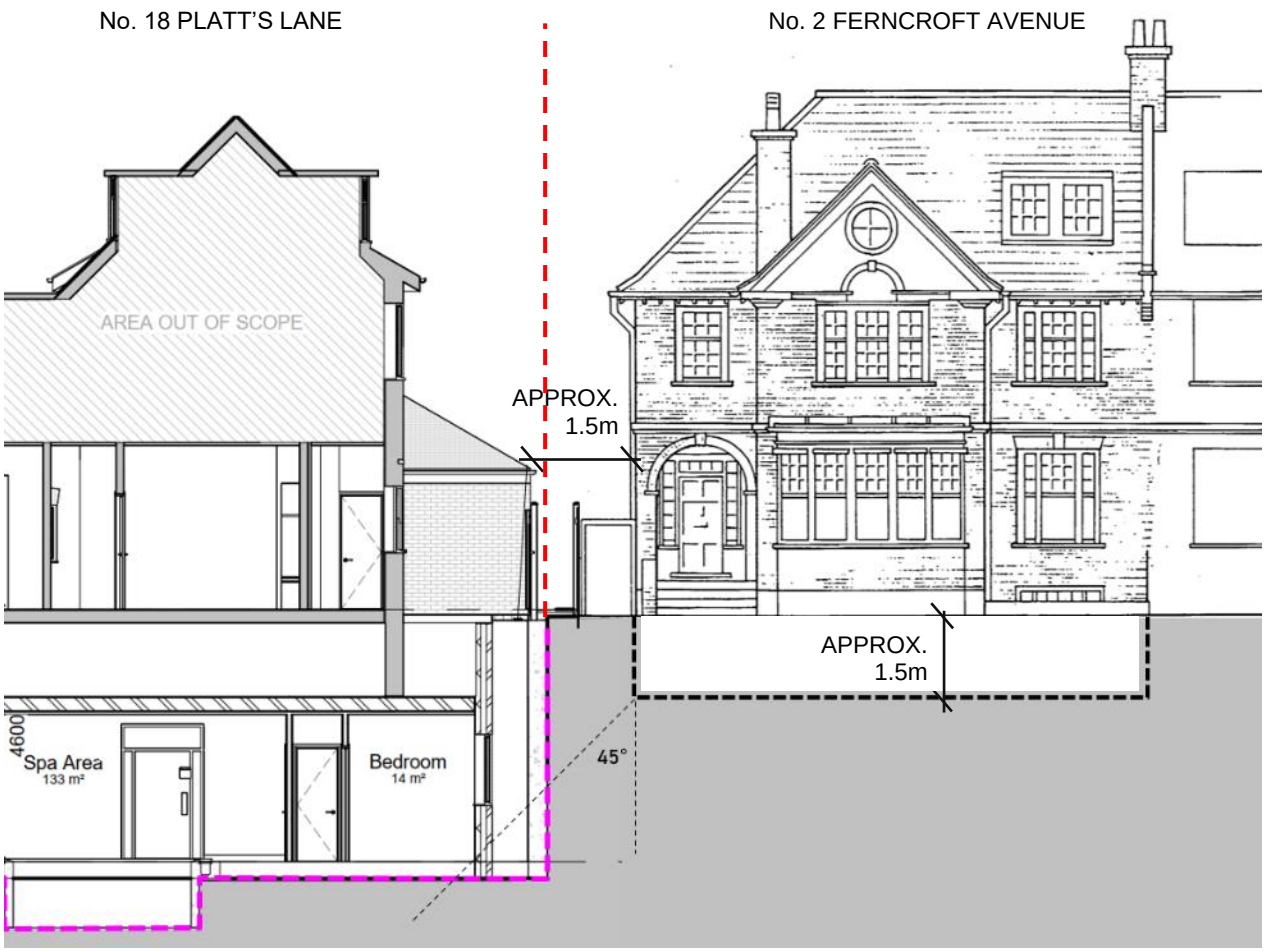


SECTION DRAWING SHOWING THE APPROVED BASEMENT TO No. 20

8.1.3 No. 2 FERNCROFT AVENUE

Present to the east of the site, behind two narrow passageways, No. 2 Ferncroft Avenue is a four storey semi-detached property, with a raised ground floor and a lower ground floor / basement opening up onto front lightwells.

The basement at this property was deepened in the late 1980s and is now estimated to be founded at a level of approximately 1.5m below the level at the passageway separating this property and No. 18 Platt's Lane.



SECTION DRAWING SHOWING No. 2 FERNCROFT AVENUE IN RELATION TO THE PROPOSED BASEMENT

8.2 GROUND HEAVE

The basement excavations will result in unloading of the clay leading to theoretical heave movement of the underlying soil in both the short and in the post-construction scenario. An analysis of the vertical movements has been carried out using the soil stiffness model detailed in the table below.

STRATUM:	UNDRAINED ELASTIC MODULUS Eu (kN/m^2)	DRAINED ELASTIC MODULUS E' (kN/m^2)
Claygate Member	31,000kN/m^2 at proposed basement excavation level increasing linearly to 145,500kN/m^2 at 25m depth	17,000kN/m^2 at proposed basement excavation level increasing linearly to 81,000kN/m^2 at 25m depth

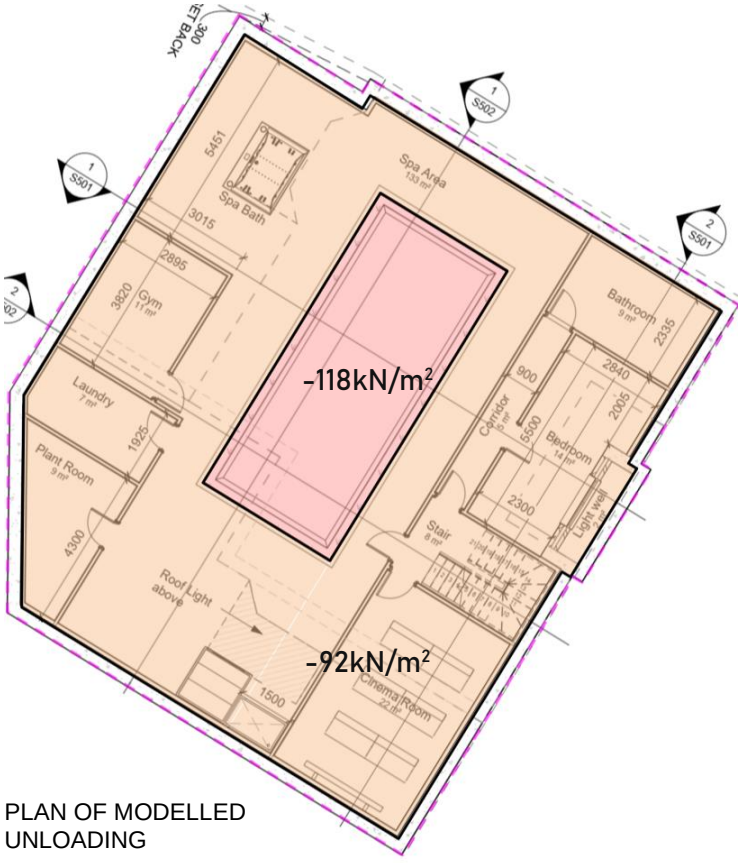
The design line presented in section 6 was used to estimate the increase in elastic moduli of Claygate with depth, using a conservative conversion ratio between Cohesion and SPT N as Cu = SPT N × 4.5. The undrained modulus line can be expressed as Eu = 20250+6750z, where z is depth in metres. The drained modulus was estimated using E' = Eu × 0.555.

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 25m depth.

8.2.1 MODELLED UNLOADING

The new basement excavations will generally extend to approximately 4.6m depth below the existing ground level. The depth of excavations will increase to an estimated 5.9m in order to enable construction of the swimming pool.

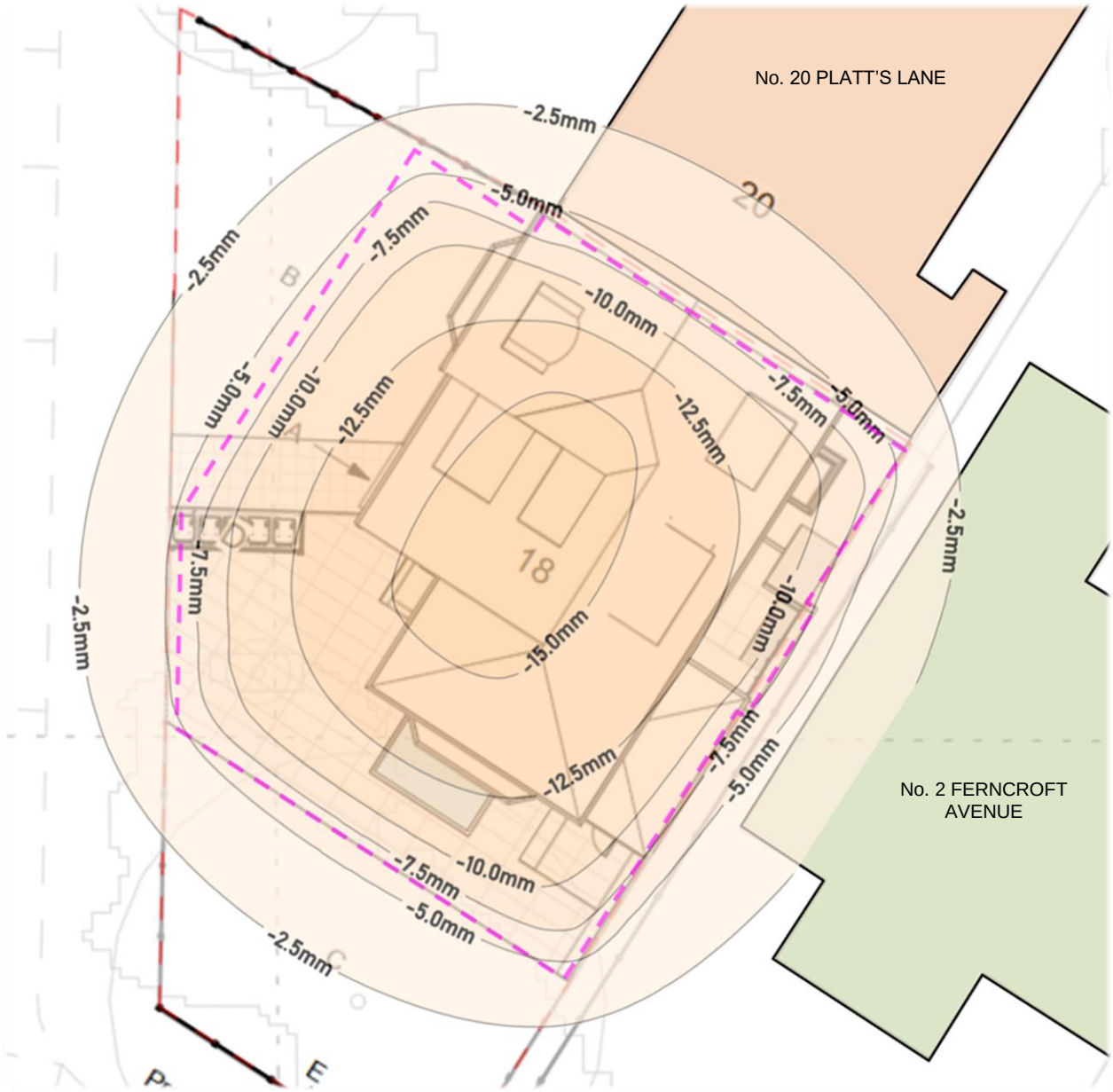
Applying a bulk weight of soil of 20kN/m^3, the effects of the planned excavation have been considered as an unloading of approximately between -92kN/m^2 and -118kN/m^2 within the proposed basement.



PLAN OF MODELLED UNLOADING

8.2.2 ANALYSIS RESULTS

The analysis suggests up to 15mm of immediate heave movement to occur below the centre of the proposed basement excavations, reducing to approximately less than 7.5mm at the basement perimeter walls, including the party wall with No. 20 Platt's Lane. Negligible (<5mm) short-term movement is predicted to No. 2 Ferncroft Avenue and the Platt's Lane pavement.

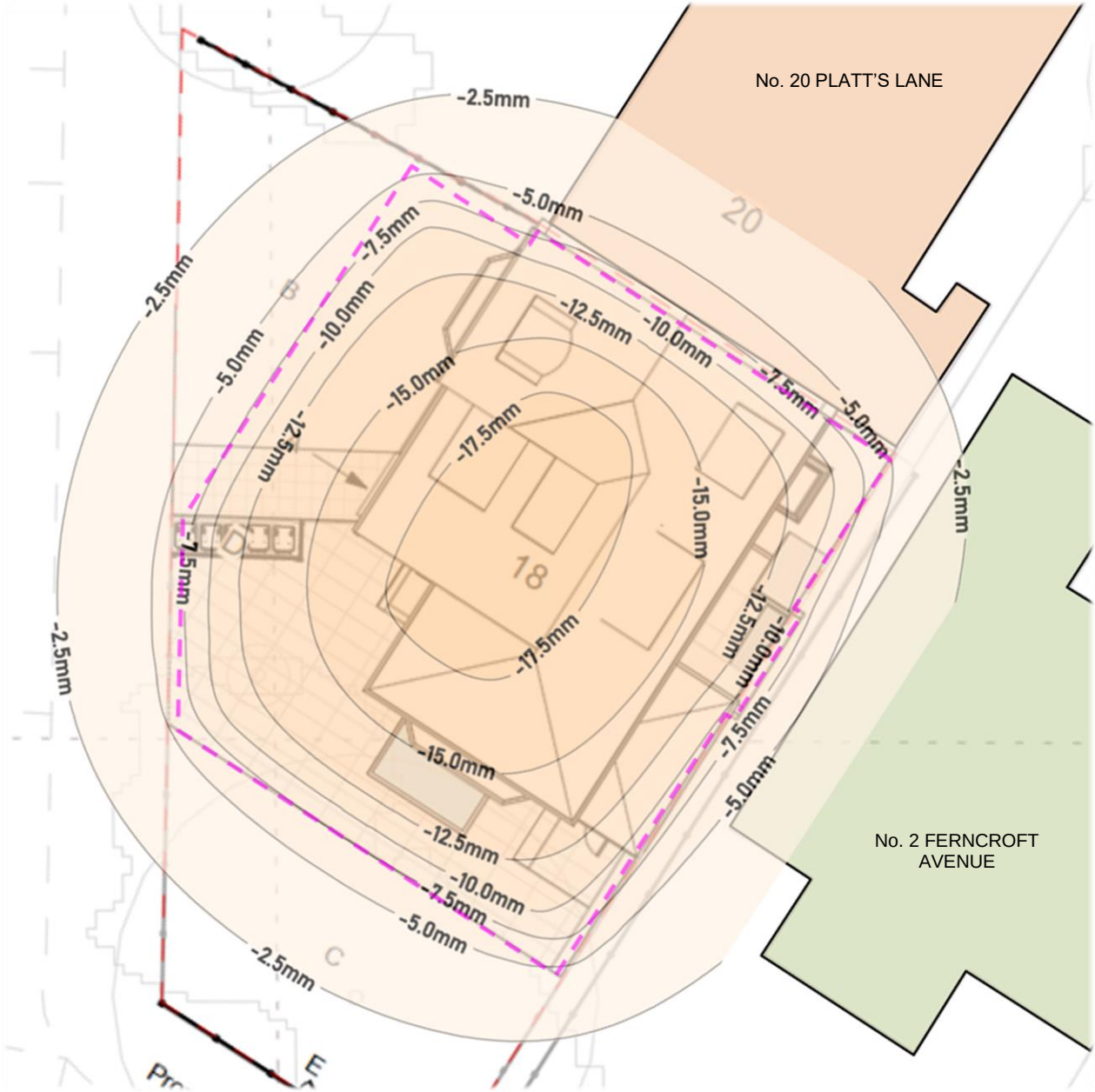


PREDICTED THEORETICAL SHORT TERM HEAVE MOVEMENT CONTOURS

In practice experience suggest that any short-term heave movements within the site itself are not likely reach the theoretical predictions and will not be noticed.

A long term post-construction heave prediction was undertaken by applying an assumed reloading of the basement box raft foundation with a uniform loading representative of the new structure and the redistribution of the existing structural loading as well as the modelled unloading as before.

The post-construction scenario analysis predicts the net unloading of the soil to result in a similar heave pattern to the short term prediction, with slightly increased magnitude. However, owing to the rigidity of the new basement box the maximum heave movement will likely not exceed 10mm, reducing to less than 5mm outside of the basement footprint.



PREDICTED THEORETICAL LONG TERM HEAVE MOVEMENT CONTOURS

8.3 UNDERPINNING & BASEMENT PERIMETER WALL CONSTRUCTION

It is not possible to rigorously model the extent of party wall settlement arising from excavation and underpinning but experience indicates that the amount of any movement is dependent upon workmanship as much as ground conditions. It is conventionally considered that given dry conditions and good workmanship, the amount of structural sagging of underpinned walls can be expected to reach a maximum of approximately 5mm per stage of underpinning and it is noted that these movements are essentially independent of the depth of underpinning and the ground conditions at the site.

In addition to vertical movement, horizontal wall movements are expected to occur at surface level due to yielding and these will permit movement of the soil behind the wall during the basement excavation. As a conservative estimation, the magnitude of the inward horizontal movement associated with the hit and miss construction of the perimeter walls will be approximately equal to the vertical movement of the wall.

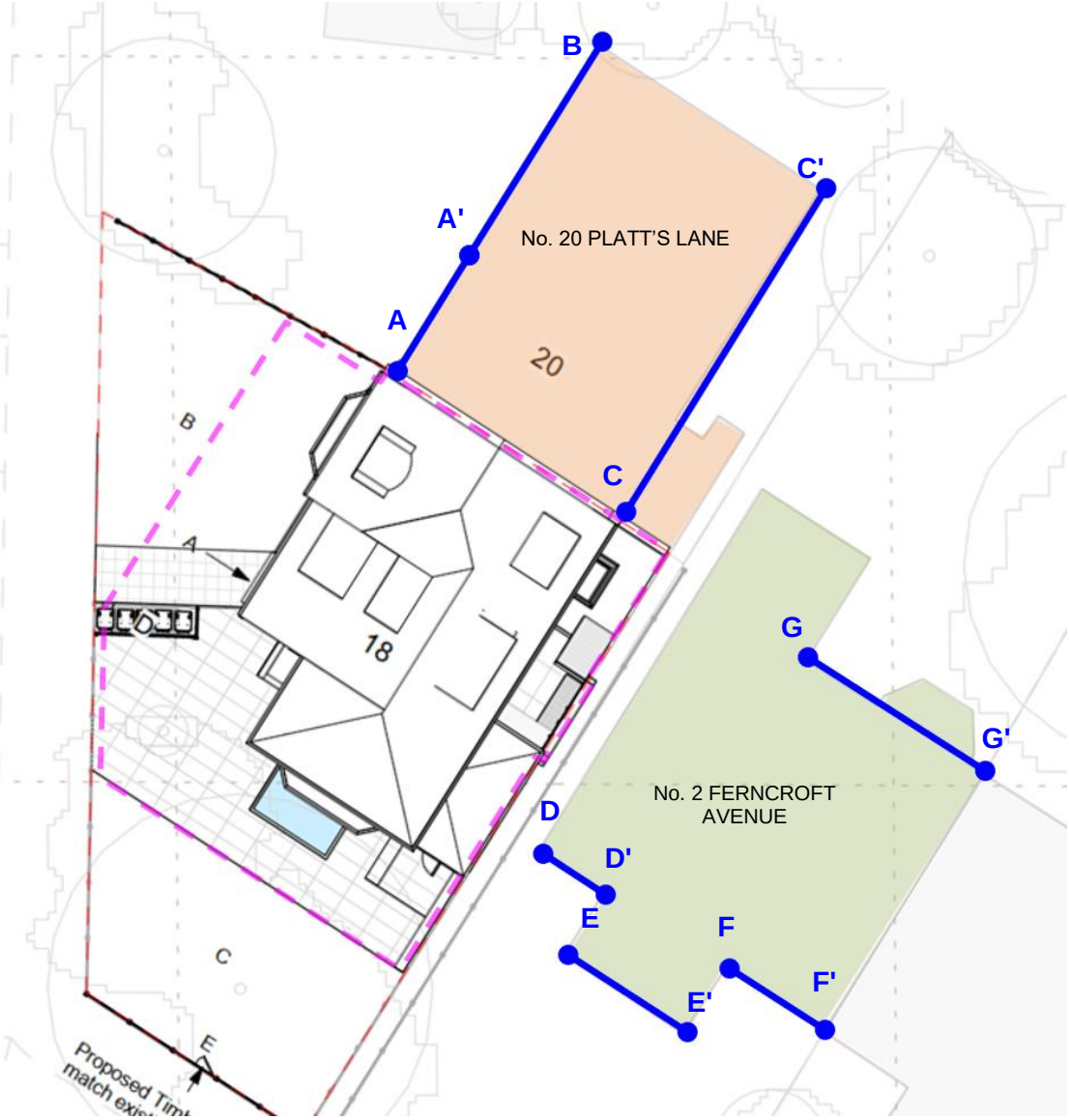
Due to the depth of the proposed excavations, it is expected that the perimeter wall will require two stages of hit and miss construction. Hence, a maximum of 10mm of settlement is predicted at the top of the new retaining walls due to the underpinning process. A maximum of 5mm of horizontal yielding is predicted.

As a first approximation, the vertical and horizontal ground movements are considered to gradually decrease linearly with distance from the excavation, using the decay rates set out in CIRIA 760. The following assumptions are made:

- For settlement, an assumption of zero movement at a distance equal to 2 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.

8.4 IMPACT ON NEIGHBOURING STRUCTURES

The impact of basement perimeter wall construction (including underpinning) on No. 20 Platt's Lane and No. 2 Ferncroft Avenue was assessed at the following sections, perpendicular to the new basement perimeter walls.



8.4.1 No. 20 PLATT'S LANE - TWO STOREY FRONT ELEVATION (SECTION A - A')

This section represents the two storey portion of the front elevation of No. 20 Platt's Lane.

The length (L) of this wall is taken as 4.8m with the wall height (H) of 6.6m.

The modelled section is adjacent to the party wall to be underpinned. Hence a maximum of 10mm of vertical movement and 5mm of horizontal movement was modelled.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.0272%, producing a maximum deflection ratio Δ / L = -0.02083, within a limiting tensile strain of 0.040%, for a Burland Category 0 'Negligible' condition.

8.4.2 No. 20 PLATT'S LANE - SINGLE STOREY FRONT ELEVATION (SECTION A - B)

This section represents the single storey portion of the front elevation of No. 20 Platt's Lane.

The length (L) of this wall is taken as 13m with the wall height (H) of 3.5m.

The modelled section is adjacent to the party wall to be underpinned. Hence a maximum of 10mm of vertical movement and 5mm of horizontal movement was modelled.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.0272%, producing a maximum deflection ratio Δ / L = -0.02308, within a limiting tensile strain of 0.060%, for a Burland Category 1 'Very Slight' condition.

8.4.3 No. 20 PLATT'S LANE - TWO STOREY REAR ELEVATION (SECTION C – C')

This section represents the entire rear elevation of No. 20 Platt's Lane.

The length (L) of this wall is taken as 13m with the wall height (H) of 6.265m.

The modelled section is adjacent to the party wall to be underpinned. Hence a maximum of 10mm of vertical movement and 5mm of horizontal movement was modelled.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.0272%, producing a maximum deflection ratio Δ / L = -0.01923, within a limiting tensile strain of 0.050%, for a Burland Category 0 'Negligible' condition.

8.4.4 No. 2 FERNCROFT AVENUE - SECTION D – D'

This section represents a portion of the front elevation of No. 2 Ferncroft Avenue.

The length (L) of this wall is taken as 2.8m with the wall height (H) of 8.5m.

The wall is located away from the underpinned party wall, and hence the movement experienced by the section will be reduced to a maximum of 8.4mm settlement and 4.6mm horizontal movement.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.0272%, producing a maximum deflection ratio Δ / L = -0.03571, within a limiting tensile strain of 0.050%, for a Burland Category 0 'Negligible' condition.

8.4.5 No. 2 FERNCROFT AVENUE - SECTION E – E'

This section represents a portion of the front elevation of No. 2 Ferncroft Avenue.

The length (L) of this wall is taken as 5.5m with the wall height (H) of 8.5m.

The wall is located away from the underpinned party wall, and hence the movement experienced by the section will be reduced to a maximum of 5.3mm settlement and 3.8mm horizontal movement.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.0272%, producing a maximum deflection ratio Δ / L = -0.01818, within a limiting tensile strain of 0.035%, for a Burland Category 0 'Negligible' condition.

8.4.6 No. 2 FERNCROFT AVENUE - SECTION F – F'

This section represents the furthest portion of the front elevation of No. 2 Ferncroft Avenue.

The length (L) of this wall is taken as 3.5m with the wall height (H) of 8.5m.

The wall is located away from the underpinned party wall, and hence the movement experienced by the section will be reduced to 2.3mm horizontal movement. No settlement is predicted to be experienced by this section due to the distance to the excavations.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.0272%, producing a maximum deflection ratio Δ / L = -0.02857, within a limiting tensile strain of 0.045%, for a Burland Category 0 'Negligible' condition.

8.4.7 No. 2 FERNCROFT AVENUE - SECTION G – G'

This section represents the entire rear elevation of No. 2 Ferncroft Avenue, excluding the extension, the perpendicular wall of which being located away from the proposed basement excavations. .

The length (L) of this wall is taken as 6.8m with the wall height (H) of 8.5m.

The wall is located away from the underpinned party wall, and hence the movement experienced by the section will be reduced to 2.3mm horizontal movement. No settlement is predicted to be experienced by this section due to the distance to the excavations.

The maximum horizontal strain, εh (Δh / L) is assessed as 0.0272%, producing a maximum deflection ratio Δ / L = -0.025, within a limiting tensile strain of 0.045%, for a Burland Category 0 'Negligible' condition.

8.4.8 ADJACENT HIGHWAY

The numerical analysis indicates that negligible (<5mm) heave movement will occur as result of the excavations at the Platt's Lane highway.

In addition, given reasonable standards of workmanship during the underpinning and 'hit and miss' construction of the external walls of the basement, relatively limited movement (<10mm settlement) is anticipated and this will be in practice counteracted 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.

The identified issues have been addressed in this report where appropriate through the construction methodology recommendations and the ground movement assessment.

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

9.1 HYDROGEOLOGICAL IMPACT ASSESSMENT

No evidence of significant water-bearing sandier seams was recorded. The assessment concludes that the excavations may encounter some minor seepage but that contingency plans should be drawn up for the possibility of encountering of more significant seepage.

The contingency plan will be enforced should significant seepage (4l/hr/m run) be encountered at any point during the basement excavation.

There is no evidence of a general groundwater table that could be disturbed or stopped by basement construction and hence the new basement construction is not expected to impede and subterranean flow of water. There are therefore no concerns in regard to any potential cumulative effects of adjoining basement construction.

9.2 HYDROLOGICAL IMPACT ASSESSMENT

An FRA and SuDS assessment has been prepared for the development by Aegaea and is presented in a separate document to accompany this BIA.

The site is not indicated to be at risk of surface water flooding or from other sources.

There will be a need to maintain the present water discharge regime and to provide a Sustainable Drainage System (SuDS) designed to reduce discharge volumes and rates as per the planning policy requirements.

9.3 STABILITY IMPACT ASSESSMENT

9.3.1 EFFECT OF TREES

The foundations to the proposed extension will be advanced sufficiently deep in order to obviate the potential effect of trees on the basement structure.

9.3.2 GROUND MOVEMENT

A Ground Movement Assessment (GMA) has been undertaken for the proposed basement development. The assessment has indicated that the proposed excavations will generate no significant heave movement affecting the neighbouring buildings.

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 design of the basement retaining walls will limit the movements to the neighbouring structures to induce damage no greater than Burland scale Category 1 'Very Slight'.

The impacts to the host building will be minimised through careful construction methodology and implementation of ground beams prior to basement perimeter wall excavations.

9.4 RESIDUAL IMPACTS

It is concluded that the proposed development will have no unacceptable residual impacts upon the surrounding structures, infrastructure or the environment.

10. STRUCTURAL MONITORING

It is recommended that, in addition to manual groundwater monitoring undertaken by the site team, automated structural monitoring is undertaken before and during the excavation, in association with a scheme of contingent remedial actions should trigger levels be exceeded.

STATUS	ACTION
Green	• No action – works can continue.
Amber	• Structural Engineer and Geotechnical Engineer to be alerted.

Red	• Excavations and construction works to cease immediately
	• Immediate Mitigation measures to be applied, which may include:
	  ○ Backfilling of excavations
	  ○ Installation of temporary propping
	• Following immediate mitigation the construction / excavation procedure is to be suitably reviewed and altered with input from the Structural Engineer and Geotechnical Engineer prior to any recommencement.

The trigger levels are to correspond to the predictions of movement as described in section 8 of this report and the proposed values are set out in the tables below:

Horizontal movement trigger levels		
GREEN	AMBER	RED
<3mm	3mm to 5mm	>5mm

Vertical movement trigger levels		
GREEN	AMBER	RED
<3mm	7mm to 10mm	>10mm

11. CONCLUSION

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