soiltechnics

environmental and geotechnical consultants

Proposed basement
109 King Henry's Road, London

Basement Impact Assessment Report
(Revision 01-Updated September 2015)

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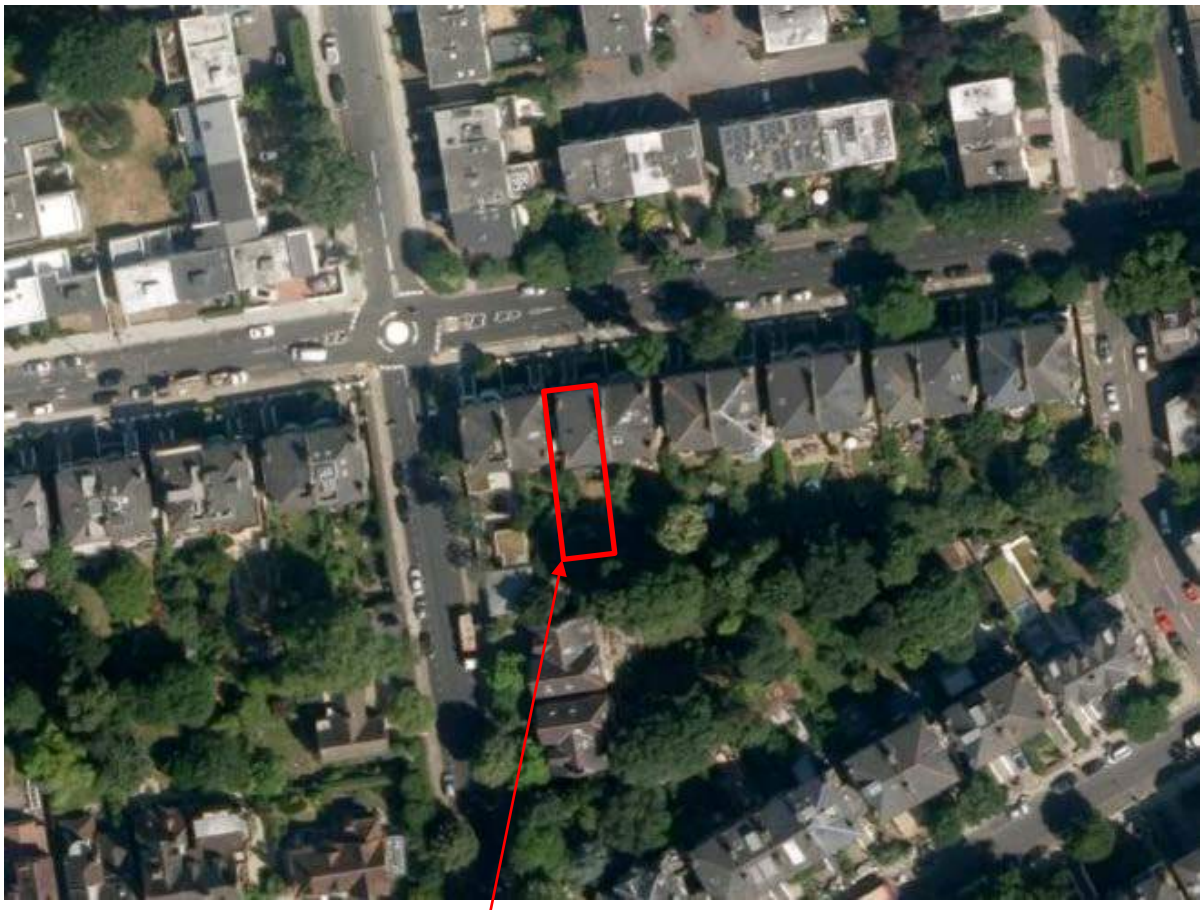
RISQS RAILWAY INDUSTRY SUPPLIER QUALIFICATION SCHEME AUDITED

ACM Registered to: ISO 9001 ISO 14001 OHSAS 18001 UKAS MANAGEMENT SYSTEMS 245 OCCUPATIONAL HEALTH & SAFETY MANAGEMENT

Aerial photograph of site



The property

Report status and format

Report section	Principal coverage	Report status	
		Revision	Comments
0	Contents page	1	Adjustment of site boundary
1	Introduction and brief		
2	Description of the property and project proposals	1	Amendments to paragraphs 2.1.1 and 2.1.2
3	Desk study information and site observations		
4	Ground Investigations		
5	External ground movements around the basement	1	Amendments to paragraph 5.2.6
6	Hardened areas		
7	Tree removal		
8	Existing damage to adjacent buildings		
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11	Subterranean (Groundwater flow) screening		
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A	Copy of drawings illustrating proposal
B	Copy of CV of Nigel Thornton and examples of Soiltechnics commissions on basement investigations and analysis
C	Copy of comments on this report by Chartered Geologist
D	Plan showing location of exploratory points (drawing 02) and borehole and trial pit records.
E	Plan showing estimated surface settlement contours as a result of basement excavations (drawing 01)
F	Calculations to determine strains in masonry
G	Copy of Network Rail showing location of rail tunnels in the area

1 Introduction and brief

1.1 Objectives

1.1.1 This report presents a Basement Impact Assessment (BIA) for a proposed basement at 109 King Henry's Road, London.

1.1.2 The principal objective of the assessment is to present evidence to support a planning application for the project as required by Camden Planning Guidance (CPG4) '*Basements and lightwells'*.

1.2 Client instructions and confidentiality

1.2.1 This report has been produced following instructions received from Starlit Properties Ltd.

1.2.2 This report has been prepared for the sole benefit of our above named instructing client, but this report, and its contents, remains the property of Soiltechnics Limited until payment in full of our invoices in connection with production of this report.

1.3 Author qualifications

1.3.1 This report has been reviewed by a Chartered Civil Engineer, (C.Eng., M.I.C.E) who is also a Fellow of the Geological Society (FGS) and a practising Civil Engineer with specialist experience (35 years) in geotechnical engineering (including basement construction), flood risk and drainage. A copy of a CV with examples of experience in basement construction is presented in Appendix B. This report has been reviewed by John Evans of Chord Environmental who is a Chartered Geologist and expertise in hydrogeology. A copy of his comments are presented in Appendix C.

1.4 Guidance used for scoping exercise

1.4.1 As described in paragraph 1.1.2 above we have followed Camden Planning Guidance (CPG4) '*Basements and lightwells'*, and Camden geological, hydrogeological and hydrological study report '*Guidance for subterranean development,*' produced by Arup on behalf of the London Borough of Camden. We have also referred to the '*Strategic Flood Risk Assessment Report for North London*' dated August 2008 prepared by Mouchel, as well as other readily available information on websites. This report has considered all four stages of the BIA process as described in CPG4. This report has also been prepared to satisfy the following parts of Camden's policy DP27, on basements and lightwells:

a) Maintain the structural stability of the building and neighbouring properties;

b) Avoid adversely affecting drainage and run-off or causing other damage to the water environment;

c) Avoid cumulative impacts upon structural stability or the water environment in the local area;

1.4.2 In order to satisfy part a) a construction method statement has been prepared by a Structural Engineer which is separately presented.

1.5 Format of this report in relation to CPG4

1.5.1 Sections 3 to 9 of this report describes project proposals and presents desk study and investigation data, information required to answer flow chart questions posed in figures 1, 2 and 3 of GPG4. Answers for these flow chart questions are provided in sections 10 to 12.

2 Description of the property and project proposals

2.1 Description of the property

2.1.1 The site is currently occupied by a four storey semi-detached residential property within an urban area of Camden. The property includes a lower ground floor as part of the four storeys. Based on inspection of old Ordnance Survey maps the building was probably constructed in the late 1800s. The building occupies much of the northern part of the property, with a gravelled garden to the front (north of the property) and rear gardens principally laid to grass with some trees to the south. General topographical levels fall in a southerly direction by about 2 degrees.

2.1.2 The lower ground floor is located marginally above rear garden levels. Main front garden levels are located about 1.6m above the rear garden levels, with a change in ground levels in this area provided by a cutting slope within the garden.

2.2 Project proposals

2.2.1 The project will comprise the construction of a new single-storey deep basement under the rear southern half of the existing house, but also extending beyond the rear south facing elevation of the house and will include new light wells.

2.2.2 Underpinning will be required to perimeter and load bearing walls to the existing building allowing basement excavation. Once excavation is complete, a new basement floor will be constructed together with a new reinforced concrete lower ground floor slab to essentially produce a concrete basement box.

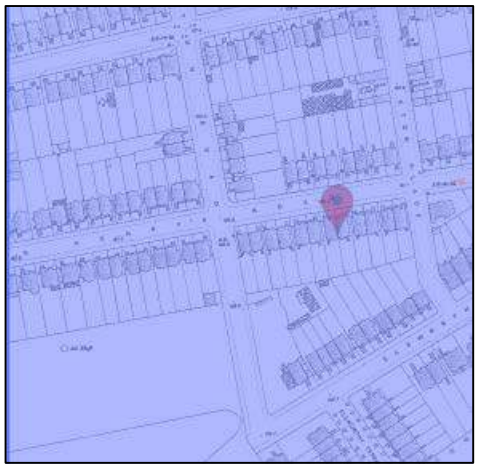
2.2.3 Copies of our client's Engineer's drawings showing project proposals outlining construction details are presented in Appendix A. A construction method statement is separately presented.

3 Desk study information and site observations

3.1 Site history

3.1.1 Review of Ordnance Survey and London town maps dating back to 1850s indicate the property was first recorded on the 1895 map. Extract copies of key mapping is presented below with property position defined by the red marker.

Extract copy of 1850 map



Extract copy of 1895 map

3.1.2 At this stage it is important to note there are no water courses recorded on the 1895 map close to the property, and no evidence of any opencast quarrying activities in the locality.

3.2 Geology and geohydrology of the area

3.2.1 Geology of the area

3.2.1.1 Inspection of the geological map of the area published by the British Geological Survey (BGS) indicates the following sequence of strata. The thickness of the strata has been obtained from a combination borehole record data formed within 500m of the property available on the BGS website, and geological sections shown on the BGS map.

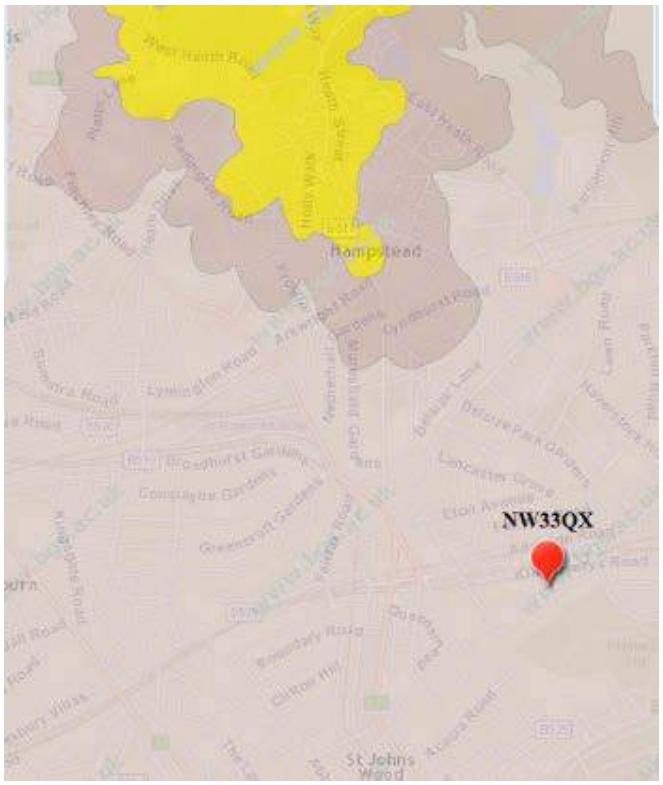
Summary of Geology and likely aquifer containing strata

Strata	Bedrock or drift	Approximate thickness	Typical soil type	Likely permeability	Likely aquifer designation
London Clay Formation	Bedrock	85m	Clays	Low	Unproductive strata
Lambeth Group	Bedrock	15	Clays, occasionally sands	Low	Unproductive strata
Thanet Sands	Bedrock	10	Fine sands	Low/moderate	Secondary Aquifer
Chalk	Bedrock	200	Chalk	High	Principal Aquifer

Table 3.2.1

3.2.1.2 Soil types and assessments of permeability are based on geological memoirs, in combination with our experience of investigations in these soil types.

3.2.1.3 An extract copy of the geological map is presented below, with brown shading representing the outcrop of the London Clay Formation. The yellow represents the Bagshot Beds which overlie the Claygate beds shaded dark brown (both on higher ground to the north) with the property located on London Clays (light brown shading). The property position is shown by the red marker.



3.2.1.4 Based on the above any excavations within the property will be located within London Clays.

3.2.2 Geohydrology

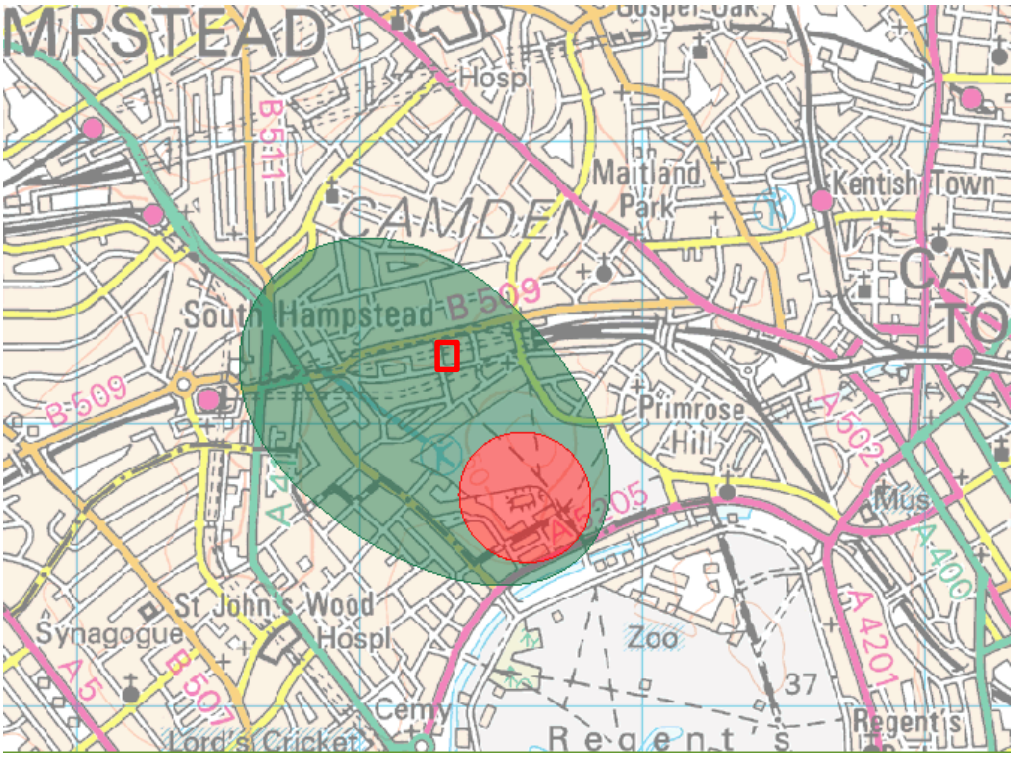
3.2.2.1 The Environment Agency website reports, the London Clay Formation deposits (bedrock) at the site are designated Unproductive strata.

3.2.2.2 Unproductive strata are defined as deposits exhibiting low permeability with negligible significance for water supply or river base flow. Unproductive Strata are generally regarded as not containing groundwater in exploitable quantities.

3.2.2.3 Chalk is classified a Principal Aquifer. Principal aquifers are defined as deposits exhibiting high permeability capable of high levels of groundwater storage. Such deposits are able to support water supply and river base flows on a strategic scale.

3.2.3 Source protection zone

3.2.3.1 The site is recorded as being located within a source protection zone 2 (outer zone) which the Environment Agency define as a 400 day travel time from a point below the water table. An extract of the plan recording source protection zones is presented below, with green shading representing outer protection zones and red inner protection zones.



This abstraction will be from the Chalk aquifer located at least 100m below the property. The basement extending to about 3.5m below lower ground floor levels in London Clays will have no influence on the Chalk aquifer.

3.3 Quarrying/mining

3.3.1 With reference to the coal mining and brine subsidence claims gazetteer for England and Wales, available on the Coal Authority web site, the area has not been subject to exploitation of coal or brine. Inspection of old Ordnance Survey maps dating back to the first editions (late 1800s) does not record any quarrying activities within 250m of the property.

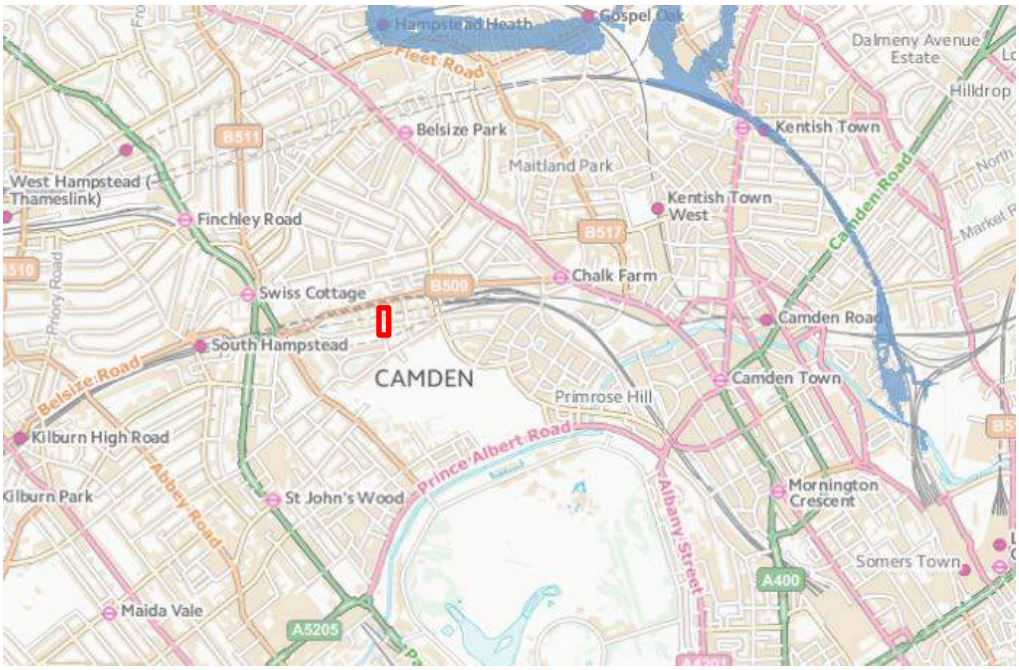
3.4 Flood risk

3.4.1 Fluvial/tidal flooding

3.4.1 The Environment Agency website indicates the site is not located within a fluvial or tidal flood plain. An extract copy of the flood risk map is presented below which shows no blue shading representative of flooding. The property is located within the red square.

3.4.2 Flooding from Reservoirs, Canals and other Artificial Sources

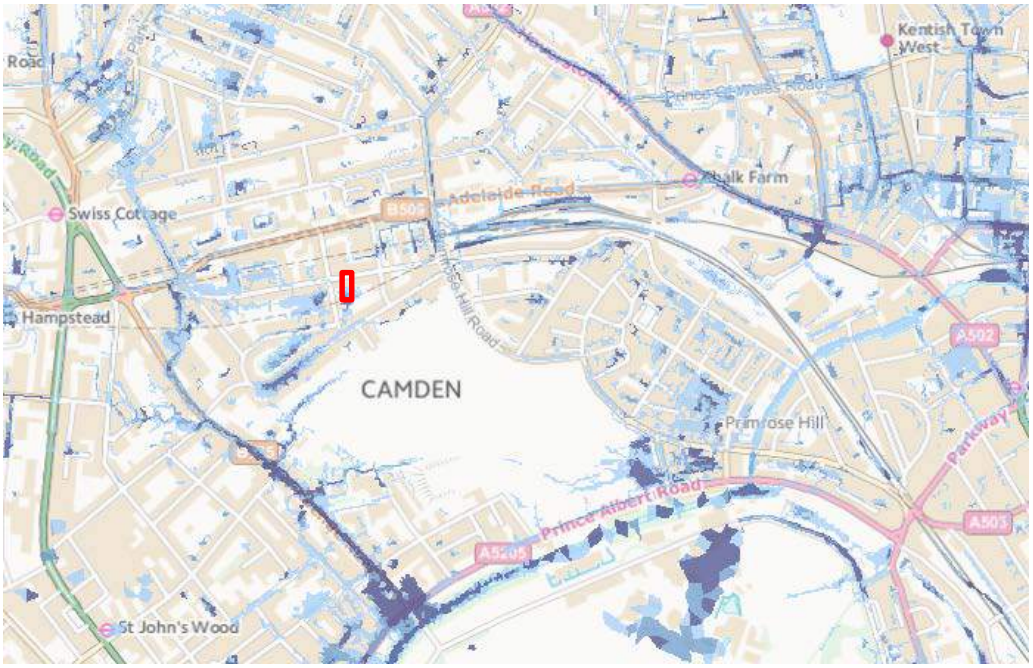
3.4.2.1 The Environment Agency website indicates the site is not located within an area considered at risk of flooding from breach of reservoir containment systems. An extract copy of the flood risk map is presented below which shows no blue shading representative of flooding as a result of failure of containment systems close to the site. The property is located within the red square.



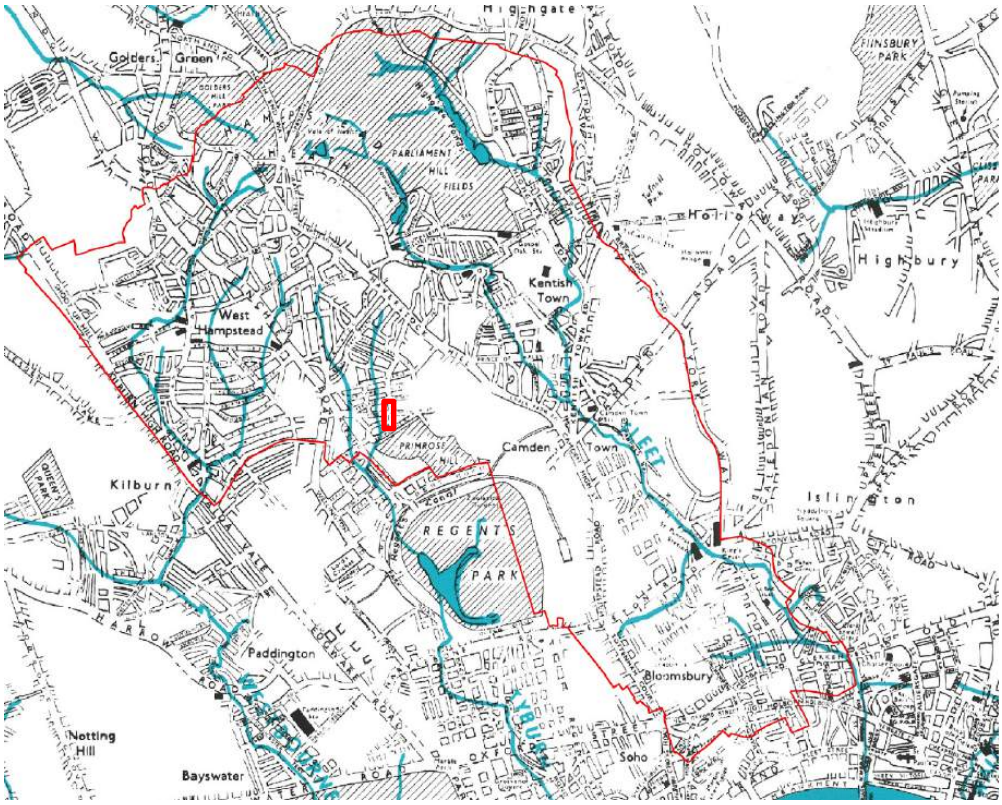
3.4.3 Flooding from Groundwater and surface waters

3.4.3.1 The site is underlain with a substantial thickness (85m) of relatively impermeable London Clay Formation. On this basis groundwater is not likely to be available at the site and thus is unlikely to present a risk of causing groundwater flooding.

3.4.3.2 We have viewed the Environment Agency web site which provides maps showing areas at risk of flooding from surface waters. An extract of the map is presented below. The property is located within the red square and blue shading represents areas at risk of surface water flooding. The property is located in a low risk area, shown by the light blue shaded areas.

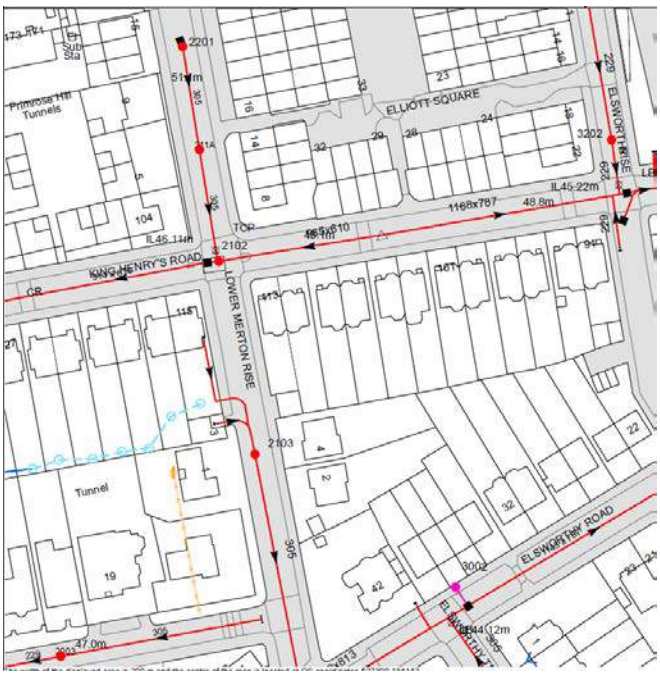


3.4.3.3 An extract of figure 11 from the Camden Geological, Hydrogeological and Hydrological Study (referenced in Section 1.4) is presented below. The blue lines show the locations of branches of formers in the area. The property is located within the red box and seems to be at the head waters of an upper branch of the River Tyburn.

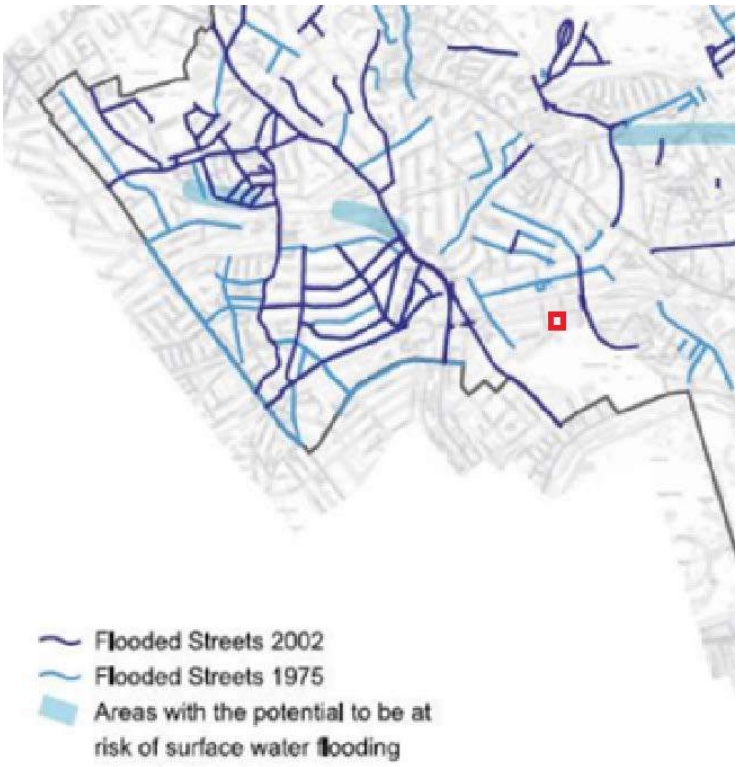


3.4.3.4 With reference to old mapping of the area described in section 3.1 above, the 1850 map (predevelopment) does not record any water courses close to or within the immediate area of the property. Development of London has resulted in original watercourses being culverted, with culverts following, in the majority of cases, road infrastructure routes.

3.4.3.5 There is a 965 x 610 culvert in King Henry's Road recorded on Thames Water Asset register, an extract copy of which is presented below. The culvert follows a westerly route from the property.



3.4.3.6 An extract of figure 15 from the Camden Geological, Hydrogeological and Hydrological Study (referenced in Section 1.4) is presented below (property marked in a red box). The map records King Henry's Road has not historically been subject to flooding or is within an area with the potential to be at risk from surface water flooding.



Extract copy of figure 15 from the Camden Geological, Hydrogeological and Hydrological Study

3.4.3.7 There is a 4" below ground water supply pipe operated by Thames Water in King Henry's Road to the north of the property. It is considered that the property is unlikely to be at enhanced risk of flooding due to ruptures in the potable water supply system in the area.

3.4.4 Conclusions

3.4.4.1 Based on the above, in our opinion, the property is considered unlikely to be at enhanced risk of being flooded by exceedances in capacity of sewers or water supply pipes. Evidence presented above demonstrates the property is not at an enhanced risk of being affected by tidal or fluvial flooding or indeed from artificial sources. The property and indeed proposals will not be affected by groundwater flooding.

4 Ground investigations

4.1 Scope

4.1.1 Two boreholes have been excavated at the property; both in rear gardens to 7m depth A series of four hand dug trial pits was also excavated externally to expose foundation arrangements both the house and boundary walls in the vicinity of the proposed basement. The scope of the investigations was determined by our Client's Structural Engineer

4.1.2 Fieldwork records are presented in Appendix D. Drawing 02 (also presented in Appendix D) shows the location of the exploratory points.

4.2 Ground conditions encountered

4.2.1 Each of the two boreholes encountered a similar soil profile of naturally deposited London Clays capped with a thin covering of made ground extending to depths of between 1 and 1.5m. The London Clays essentially comprised medium strength brown grey silty clays. No groundwater was encountered in the excavations. A water level monitoring standpipe was installed to 7m depth in borehole BH02 and on a return visit to site no water was observed in the standpipe.

4.2.2 The investigations confirmed published geological maps for the near surface geology.

4.3 Foundations

4.3.1 Trial pit excavations exposed corbelled brickwork foundations to the house and boundary walls to depths of between 0.23 and 0.55m below ground levels constructed on made ground overlying London Clays.

4.3.2 Based on investigations completed to date we are of the opinion that the London Clays will adequately support new spread type foundations including traditional underpinning to existing spread type foundations to facilitate lowering of existing basement floor levels.

5 External ground movements around basement

5.1 Construction proposals

5.1.1 Proposals are to construct of a new single-storey basement under the rear half of the existing house, but also extending beyond the rear south facing elevation of the house by up to 6m. On this basis, basement excavation will extend into the rear garden resulting in an excavation of around 3.5m deep. Our client's Structural Engineer proposes to underpin load bearing walls to the existing building.

5.2 Settlement around and inward yielding of basement excavations

5.2.1 The following analysis is based on observations of ground movements around basement excavations in clays as reported in Tomlinson 'Foundation design and construction' (seventh Edition).

5.2.2 It is recognised that some inward yielding of supported sides of strutted excavations and accompanying settlement of the retained ground surface adjacent to the excavation will occur even if structurally very stiff piles and props / strutting is employed. The amount of yielding for any given depth of excavation is a function of the characteristics of the supported soils and not the stiffness of the supports. Based on observations of other excavations in over consolidated clay soils (which will be the case at this site) the average maximum yield / excavation depth (%) was 0.16, with a range of 0.06 to 0.3. Assuming a maximum excavation depth of 3.5m then the likely inward yield will be in the order of 3.5 x 0.16/100 x1000 = 5.6mm.

5.2.3 Coincidental with the inward yield, some settlement of the retained soils around the excavation will occur. Again, based on published observations, the ratio of surface settlement to excavation depth in over consolidated clays is about 0.3% (range 0.1 to 0.6). Adopting the average of 0.3, and a maximum 3.5m deep excavation, then surface settlement in the order of 3.5 x 0.3/100 x 1000 = 10mm will occur. Importantly, whilst some surface settlement will occur around the excavation, this settlement profile will extend for a distance of about 4 times the depth of excavation i.e. about 14m in a reasonably linear fashion.

5.2.4 Whilst it is acknowledged that settlement and inward yielding movement observations are generally for embedded piled or diaphragm retaining walls, we are not aware of any published observational data for underpinning walls and insitu concrete retaining walls, but consider a propped embedded piled wall would afford more onerous movements. The value of making a finite element analysis to determine the amount of inward yielding of excavation supports in all routine cases of basement excavations is questionable requiring estimates of soil moduli and other factors such as poisons ratio.

5.2.5 We have produced a plan showing estimated surface settlement contours considering the basement excavation which is presented on Drawing 01 in Appendix E.

5.2.6 The adjoining properties at No107 and No111 will be mostly affected (in terms of the effects of surface settlement) by the basement excavations. We understand that properties No107 and No111 do not have existing basements. We have produced a set of calculations to estimate the tensile strain on masonry forming the rear elevation walls resulting from movements derived above. These calculations are presented in Appendix F. The calculations indicate damage would generally fall into category 0 as described in the following table (extract from CIRIA report 580). If both surface settlement and inward yielding movements are taken in combination there is a risk that damage could fall into category 2 (slight damage). In order to reduce this risk, monitoring of the basement walls will be required during basement excavation works and the walls propped with adjustable props. If horizontal movement exceeds values in the range of 2 to 4mm (refer calculation sheet 4) then props will require adjustment to compensate for this movement and maintain potential damage to adjacent properties within damage category 0 or 1.

Table 2.5 *Classification of visible damage to walls (after Burland* et al, *1977, Boscardin and Cording, 1989; and Burland, 2001)*

Category of damage	Description of typical damage (ease of repair is underlined)	Approximate crack width (mm)	Limiting tensile strain ε_{lim} (per cent)
0 Negligible	Hairline cracks of less than about 0.1 mm are classed as negligible.	< 0.1	0.0–0.05
1 Very slight	Fine cracks that can easily be treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection.	< 1	0.05–0.075
2 Slight	Cracks easily filled. Redecoration probably required. Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure weathertightness. Doors and windows may stick slightly.	< 5	0.075–0.15
3 Moderate	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable linings. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5–15 or a number of cracks > 3	0.15–0.3
4 Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 but also depends on number of cracks	> 0.3
5 Very severe	This requires a major repair involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.	usually > 25 but depends on number of cracks.	

Notes

1. In assessing the degree of damage, account must be taken of its location in the building or structure.
2. Crack width is only one aspect of damage and should not be used on its own as a direct measure of it.

6 Hardened areas

6.1 We understand there will be an increase in hardened and drained areas resulting from the extension of the basement into the rear garden area. The property is underlain with a substantial thickness of relatively impermeable London Clays, which is not amenable to disposal of stormwater using soakaways. Proposals are to intercept roof drainage systems (rain water down pipes), and install a hydrobrake limiting flows to match current rain water runoff, and attenuate any additional water on site in a below ground storage facility, probably located in rear gardens. On this basis the development will not increase that rate of discharge to stormwater to sewers and thus not contribute to flood risk downstream of the property.

7 Tree removal

7.1 No major vegetation will be removed to accommodate the extension of the building.

8 Existing damage to adjacent buildings

8.1 We are not aware of any subsidence damage to existing buildings.

9 Railway Tunnels

9.1 We have contacted Network Rail and obtained a plan showing the location of rail tunnels in the area. A copy of the plan is presented in Appendix G. Primrose Hill railway tunnel follows a route just to the south of the rear gardens some 17m to south of the southern extent of the proposed basement. On this basis the basement construction will not affect rail tunnels.

10 Summary of screening

10.1 The above report sections present factual data to demonstrate there are no areas of concern which require investigation to support a planning application.

11 Subterranean (Groundwater) flow screening

11.1 General overview

11.1.1 The property is positioned on gently sloping ground (approximately 2^{o}) to the north west of central London. The property is outside areas considered to be at risk of being affected by tidal and fluvial flooding associated with the Thames or its tributaries, or artificial water sources (canals/reservoirs). In addition the property is not considered to be at enhanced risk of flooding from sewers or water supply pipes.

11.1.2 Geological records indicate the site is underlain by deposits of London Clay Formation extending to depths of approximately 85m. Borehole excavtions within the property confirm published geological records. The property (being underlain with a substantial thickness of London Clay Formation) is not considered to be at risk of flooding from groundwater and the proposals will not affect any groundwater flows.

11.2 Responses to flow chart questions

The following provides site specific responses to questions posed in figure 1 of CPG4

Question and response		Text reference
Question 1a	**Is the site located directly above an aquifer?**	
Response.	No. The property is directly underlain by over 80m thickness of London Clays which are classified Unproductive Strata (formerly Non Aquifer) by the Environment Agency.	3.2
Question 1b	**Will the proposed basement extend beneath the water table surface?**	
Response	No. The London Clay Formation comprises reasonably homogenous relatively impermeable clays which are not able to transmit groundwater under normal hydraulic gradients.	3.2
Question 2	**Is the site within 100m of a watercourse, well or potential spring line?**	
Response	No. Although the property is recorded to be relatively close to a tributary of the River Tybury, (based on historical maps) Ordnance Survey records of the area prior to development do not record any watercourses in the area and indeed Thames Water asset maps do not record any significant surface water sewers in the area. Additionally, the geology of the area is not conducive to spring lines or wells for extraction of water. Based on this there are no matters of concern.	3.4.3

Question 3	**Is the site within the catchment of the pond chains on Hampstead Heath?**	
Response	No. Based on figure 14 within the Camden geological, hydrogeological and hydrological study report, the property is not within the catchment of the pond chains on Hampstead Heath. The property is located about 1.75km distance from the pond chains on Hampstead Heath	3.4.2
Question and response		**Text reference**
Question 4	**Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?**	
Response	Yes. The extensions to the property will increase the hardened area of the site, however proposal are to manage on site stormwater collected by the development so as not to increase the rate of stormwater discharge to sewers off site.	5
Question 5	**As part of the site drainage, will more surface water (e.g. rainfall and run off) than present be discharged to the ground (e.g. via soakaways/SUDS)?**	
Response	No. The site is underlain by London Clays which are not amenable to disposal of stormwater using infiltration systems. Rainwater falling onto the garden area will be disposed of using natural absorption and natural run off (which is currently the case).	5
Question 6	**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 (not just the pond chains on Hampstead Heath) or spring line?**	
Response	No. The London Clay Formation comprises reasonably homogenous relatively impermeable clays which are not able to transmit groundwater under normal hydraulic gradient. Basement excavations will be formed in the London Clays. Based on this there are no matters of concern.	3.4.3

12 Stability impact identification

12.1 General overview

12.1.1 The property is positioned on gently sloping ground in the north west of central London. Ground levels in the area fall in a general southerly direction (to the south of King Henry's Road) at a slope of approximately 2 degrees.

12.1.2 No trees will be removed as part of the development.

12.1.3 Proposals are to construct of a new single-storey basement under the rear half of the existing house, but also extending beyond the line of the rear of the house by around 5m, forming new lightwells in the rear garden. Our client's Structural Engineer proposes to underpin load bearing walls to the existing building

12.2 Responses to flow chart questions

The following provides site specific responses to questions posed in figure 2 of CPG4

Question and response		Text reference
Question 1	**Does the existing site include slopes, natural or manmade greater than 7° (approximately 1 in 8).**	
Response	No. The topography of the area falls by about 2 degrees in a southerly direction. Based on this there are no matters of concern.	2.1
Question 2	**Will the proposed profiling of landscaping at the site change slopes at the property boundary to more than 7°?**	2.2
Response	No. The proposed basement will not change the current topographical conditions. Based on this there are no matters of concern.	
Question 3	**Does the development neighbour land including railway cuttings and the like with slopes greater than 7° (approximately 1 in 8)?**	
Response	No. The topography of the area falls by about 2 degrees in a southerly direction, and there are no manmade cuttings in the area. Based on this there are no matters of concern.	2.2

Question and response		Text reference
Question 4	**Is the site within a wider hillside setting in which the slope is greater than 7^{o}?**	
Response	No. The topography of the area falls by about 2 degrees in a southerly direction with the slope (to the south of King Henry's Road) being reasonably uniform. Based on this there are no matters of concern.	2.1
Question 5	**Is the London Clay the shallowest strata at the site?**	
Response	Yes. The property is underlain with London Clays, extending to depths of over 80m in the area. Given the shallow (natural) slope angles in the area, the property is not considered to be at risk of slope instability. Based on this there are no matters of concern.	2.1
Question 6	**Will any trees be felled as part of the development and/or are there any works proposed within any tree protection zones where trees are to be retained?**	
Response	No trees will be removed as part of the development.	6
Question 7	**Is there a history of any seasonal shrink swell subsidence in the local area and/or evidence of such effects on site?**	
Response	No. We are not aware of any evidence of damage attributable to subsidence either on the subject property or on adjacent properties. Based on this there are no matters of concern.	
Question 8	**Is the site within 100m of a watercourse, well or potential spring line?**	
Response	No. Although the property is recorded to be relatively close to a tributary of the River Tybury, (based on historical maps) Ordnance Survey records of the area prior to development do not record any watercourses in the area and indeed Thames Water asset maps do not record any significant surface water sewers in the area. Additionally, the geology of the area is not conducive to spring lines or wells for extraction of water. Based on this there are no matters of concern.	3.4.3

Question and response		Text reference
Question 9	**Is the site within an area of previously worked ground?**	
Response	No. There is no evidence to indicate the site has been subject to quarrying activities in the area. Based on this there are no matters of concern.	3.3.1
Question 10	**Is the site located above an aquifer? If so will the proposed basement extend beneath the water table such that dewatering may be required during construction?**	
Response	No. The property is directly underlain by over 80m thickness of London Clays which are classified Unproductive Strata (formerly Non Aquifer) by the Environment Agency. The London Clay Formation comprises reasonably homogenous relatively impermeable clays which are not able to transmit groundwater under normal hydraulic gradient. New basement excavations will be formed in the London Clays. Based on this there are no matters of concern.	3.2
Question 11	**Is the site within 50m of Hampstead Heath ponds?**	
Response	No. The property is located about 1.75km to the south of the pond chain on Hampstead Heath. Based on this there are no matters of concern.	3.4.2
Question 12	**Is the site within 5m of a public highway or pedestrian right of way?**	
Response	No. The proposed basement will not be located within 5m of a public highway/footway. Based on this there are no matters of concern.	2.2

Question and response		Text reference
Question 13	**Will the proposed basement significantly increase the differential depth of foundations relative to adjacent properties?**	
Response	No. Traditional underpinning will be used to extend existing foundations down to proposed lower ground floor levels, possibly extending existing foundation depths down by around 0.2m. Although there will be differences in ground / basement level floors between the new build and adjacent properties, the proposed basement construction solution will not affect neighbouring properties, and estimates of movements which may occur during the construction phase are described in section 5 which indicate acceptable levels of differential movement. Based on this there are no matters for concern. A copy of the project Engineer's drawings illustrating proposed foundations for the basement are presented in Appendix A.	4
Question 14	**Is the site over (or within the exclusion zone of) any tunnels e.g. Railway lines?**	
Response	We have contacted Network Rail and obtained a plan showing the location of rail tunnels in the area. A copy of the plan is presented in Appendix G. Primrose Hill railway tunnel follows a route just to the south of the rear gardens some 17m to south of the southern extent of the proposed basement. On this basis the basement construction will not affect rail tunnels.	9

13 Surface flow and flooding impact identification

13.1 General overview

13.1.1 There will be an increase in hardened and drained areas resulting from the development. The property is underlain with a substantial thickness of relatively impermeable London Clays, which is not amenable to disposal of stormwater using soakaways. Proposals are to intercept roof drainage systems (rain water down pipes), and install a hydrobrake limiting flows to match current rain water run-off, and attenuate any additional water on site in a below ground storage facility, probably located in rear gardens. On this basis the development will not increase that rate of discharge to stormwater to sewers and thus not contribute to flood risk downstream of the property.

13.2 Responses to flow chart questions

The following provides site specific responses to questions posed in figure 3 of CPG4

Question and response		Text reference
Question 1	**Is the site within the catchment of the pond chains on Hampstead Heath?**	
Response	No. The property is not located within the catchment of the pond chains.	3.4.2
Question 2	**As part of the site drainage, will surface water flows (e.g. rainfall and run off) be materially changed from the existing route?**	
Response	No. Proposals will not have a material impact on surface water flows.	5
Question 3	**Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?**	
Response	Yes. Refer 13.1 above.	13.1

Question and response		Text reference
Question 4	**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 water courses?**	
Response	No. Proposals will have no impact on surface water received by adjacent properties or downstream watercourses.	11.1
Question 5	**Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream water courses?**	
Response	No. Proposals will have no impact on surface water flows to adjacent properties or downstream water courses.	11.1

14 Summary and Conclusions

14.1 Scheme proposals comprise the construction of a new single-storey basement under the rear half of the existing house, but also extending beyond the south facing rear elevation of the house, forming new lightwells in the rear garden.

14.2 Ordnance Survey mapping of the area records the site undeveloped prior to 1895, after which the existing residential property is recorded.

14.3 Published BGS maps of the area record topography local to the property is formed in deposits of London Clays which probably extend depths of over 80m in the area. Borehole excavations on site confirm London Clays below a thin covering of made ground. The London clays are classified as unproductive strata by the Environment Agency. The London Clay Formation comprises reasonably homogenous relatively impermeable clays which are not able to transmit groundwater under normal hydraulic gradient. Basement excavations will be formed in the London Clays and based on the above, not affected by groundwater. Similarly, installation of the proposed basement will not affect any subterranean ground water flows.

14.4 Ground levels do fall in a southerly direction by about 2 degrees, and slope instability is not considered to present a risk. Installation of the basement will not induce any slope instability.

14.5 There is no evidence of any subsidence to any adjacent properties or indeed the existing buildings on the site.

14.6 No trees will be removed as part of the development.

14.7 Installation of the basement will generate some ground movement close to the perimeter of the basement excavation. The amount of movement has been predicted based on records of observed movement in other basements during construction. If both surface settlement and inward yielding movements are taken in combination there is a risk that damage could fall into category 2 (slight damage). In order to reduce this risk monitoring of the basement walls will be required during basement excavation works and the walls propped with adjustable props. If horizontal movement exceeds values in the range of 2 to 4mm then props will require adjustment to compensate for this movement and maintain potential damage to adjacent properties within damage category 0 or 1.

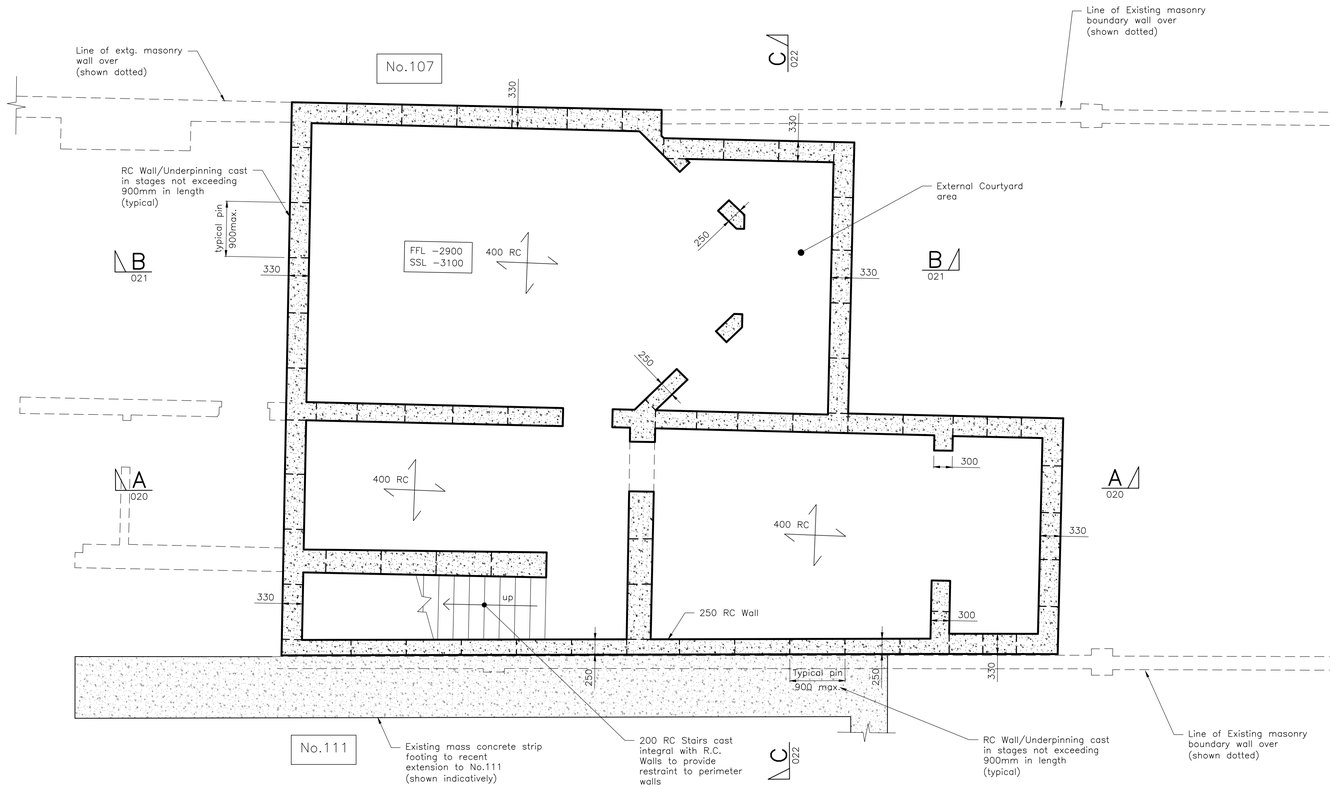
14.8 The property is considered to be at no enhanced risk of being subject to flooding.

14.9 There will be an increase in hardened and drained areas resulting from the development. The property is underlain with a substantial thickness of relatively impermeable London Clays, which is not amenable to disposal of stormwater using soakaways. Proposals are to intercept roof drainage systems (rain water down pipes), and install a hydrobrake limiting flows to match current rain water runoff, and attenuate any additional water on site in a below ground storage facility, probably located in rear gardens. On this basis the development will not increase that rate of

discharge to stormwater to sewers and thus not contribute to flood risk downstream of the property.

14.10 We have contacted network Rail and obtained a plan showing the location of rail tunnels in the area. A copy of the plan is presented in Appendix G. Primrose Hill railway tunnel follows a route just to the south of the rear gardens some 17m to south of the southern extent of the proposed basement. On this basis the basement construction will not affect rail tunnels.

14.11 In overall conclusion there are no outstanding issues of concern (singularly or cumulatively) from a stability, groundwater or surface water perspective.



NOTES:

1. All structural engineering drawings are to be read with the specification and with all relevant Architect's and Service Engineer's drawings and specifications.
2. Do not scale from this drawing in either paper or digital form. Use written dimensions only.
3. All dimensions are in millimetres and levels in metres.

LEGEND:–

Denotes existing masonry wall.

Denotes new brick wall.

Denotes new R.C. walls.

400 R.C. — Denotes new 400 thick R.C. Insitu solid slab on 50 thick mass concrete blinding

NOTE:–
LIGHTWEIGHT NON–LOADBEARING PARTITIONS ARE NOT SHOWN ON THIS DRAWING REFER TO ARCHITECTS DRAWINGS FOR DETAILS

Rev	Date	Issued	Amendment
A	07.10.15	DJP	UPDATED
–	18.06.15	DJP	ISSUED FOR PLANNING

Status: PLANNING

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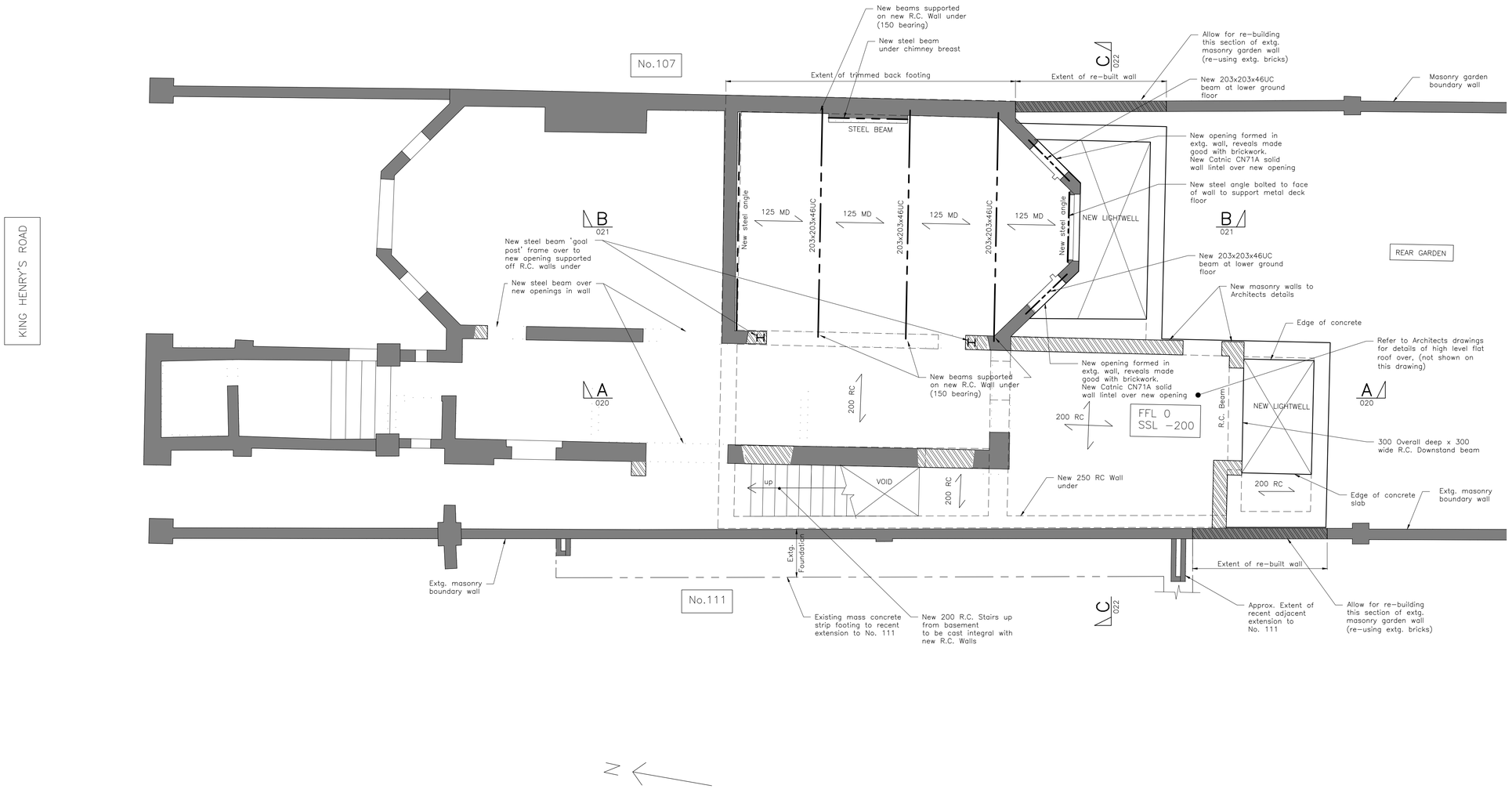
109 KING HENRY'S ROAD LONDON NW3

PROPOSED BASEMENT FLOOR PLAN

Drawn: D Phillips | Scale: 1:50 at A1

Project No./Drawing No.: 8438/008 | Rev: A



NOTES:

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2. Do not scale from this drawing in either paper or digital form. Use written dimensions only.
3. All dimensions are in millimetres and levels in metres.

LEGEND:–

- Denotes existing masonry wall.
- Denotes new brick wall. (to be fully tooth bonded into existing)
- Denotes new structure under
- Denotes walls to be demolished
- Denotes new steel beam
- 200 R.C. — Denotes new 200 thick R.C. Insitu suspended solid slab
- 125 M.D. — Denotes span of new 125 overall thick R.C. Insitu metal deck slab comprising of 51 deep metal deck 0.9mm gauge reinforced with one layer of A193 mesh in top with 25 top cover

NOTE:–
LIGHTWEIGHT NON–LOADBEARING PARTITIONS ARE NOT SHOWN ON THIS DRAWING REFER TO ARCHITECTS DRAWINGS FOR DETAILS

Rev	Date	Issued	Amendment
A	07.10.15	DJP	UPDATED
–	18.06.15	DJP	ISSUED FOR PLANNING

Status
PLANNING

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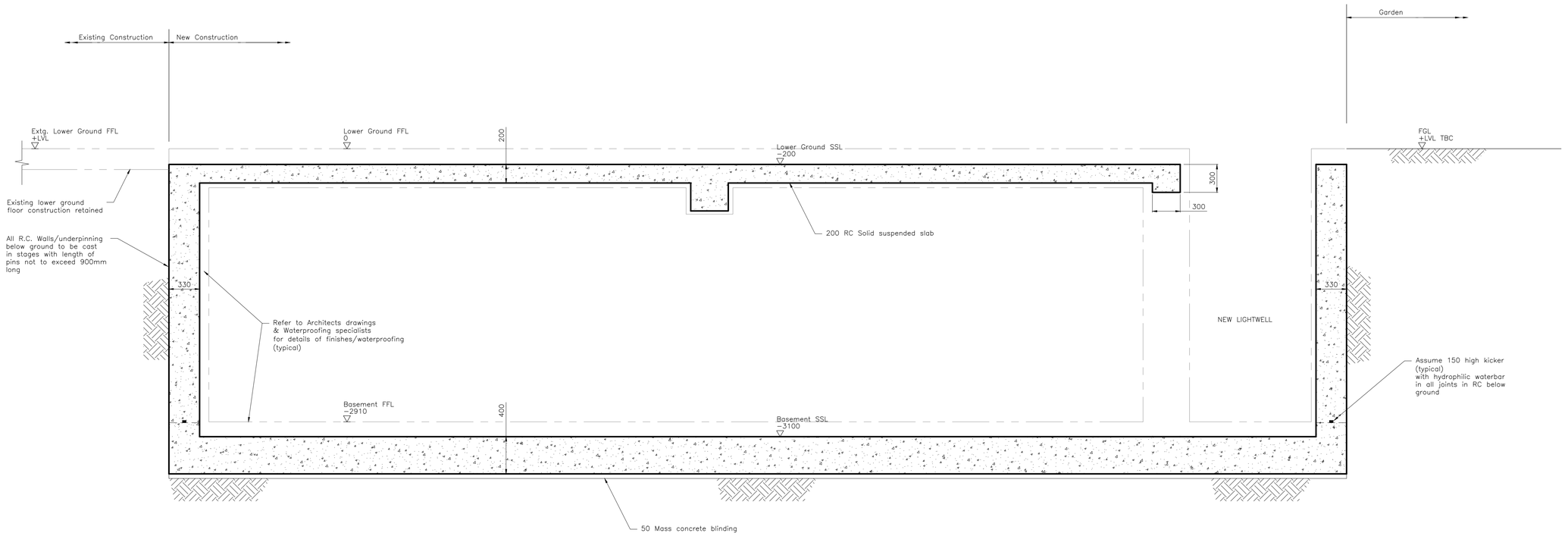
109 KING HENRY'S ROAD LONDON NW3

PROPOSED LOWER GROUND FLOOR PLAN

Drawn D Phillips
Scale 1:50 at A1

Project No./Drawing No.
8438/009

Rev
A



SECTION A−A

NOTES:

1. All structural engineering drawings are to be read with the specification and with all relevant Architect's and Service Engineer's drawings and specifications.
2. Do not scale from this drawing in either paper or digital form. Use written dimensions only.
3. All dimensions are in millimetres and levels in metres.

LEGEND:−

Denotes existing masonry wall.

Denotes new brick wall.
(to be fully tooth bonded into existing)

Denotes new reinforced concrete

NOTE:−
WATERPROOFING TO BE TO ARCHITECTS DETAILS TO BE CARRIED OUT BY SPECIALIST.

Rev	Date	Issued	Amendment
A	07.10.15	DJP	UPDATED
−	18.06.15	DJP	ISSUED FOR PLANNING

Status
PLANNING

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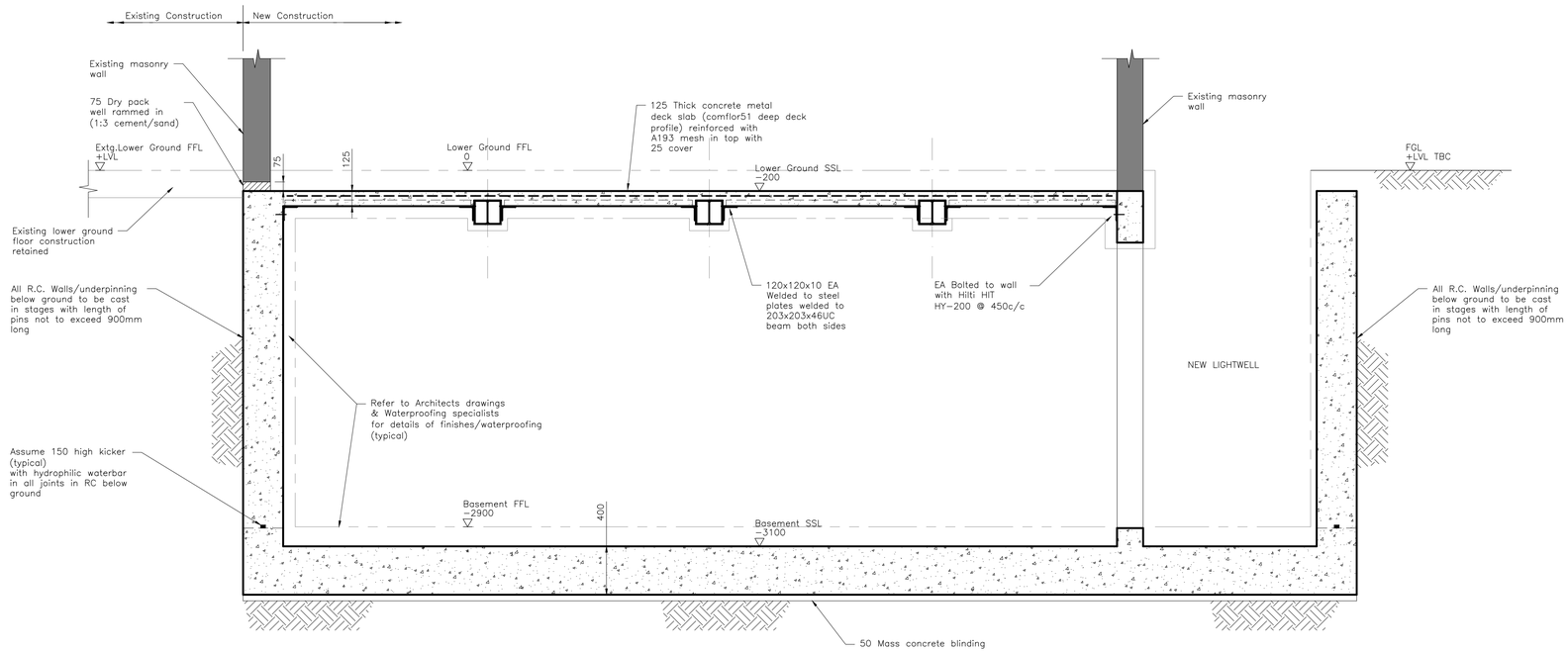
PROPOSED SECTION A−A

Drawn D Phillips
Scale 1:25 at A1

Project No./Drawing No. 8438/020
Rev A



SECTION B−B

NOTES:

1. All structural engineering drawings are to be read with the specification and with all relevant Architect's and Service Engineer's drawings and specifications.
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3. All dimensions are in millimetres and levels in metres.

LEGEND:−

Denotes existing masonry wall.

Denotes new brick wall. (to be fully tooth bonded into existing)

Denotes new reinforced concrete

NOTE:−
WATERPROOFING TO BE TO ARCHITECTS DETAILS TO BE CARRIED OUT BY SPECIALIST.

Rev	Date	Issued	Amendment
−	18.06.15	DJP	ISSUED FOR PLANNING

Status: PLANNING

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PROPOSED SECTION B−B

Drawn D Phillips | Scale 1:25 at A1

Project No./Drawing No. 8438/021 | Rev −