SUBSTRUCTURAL
VALUE ENGINEERED DESIGN

26 Lower Merton Rise

Belsize Park

London

NW3 3SP

Environmental Assessment
& Construction Method Statement.

Report October 2013

Ref: L13/097/10

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Preamble

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Contents.

1.0 Introduction

This report has been prepared to set out the proposed design philosophy and construction method statement for the proposed basement construction at 26 Lower Merton Rise. It will summarise the basis of the structural and civil engineering design and will be issued to all relevant parties including the Client, Local Planning Authority and Design Team members.

The report is based on the architectural information produced by Kasia Whitfield, and is intended to provide the basis for planning and may be subject to further design discussion and development with the successful Contractor.

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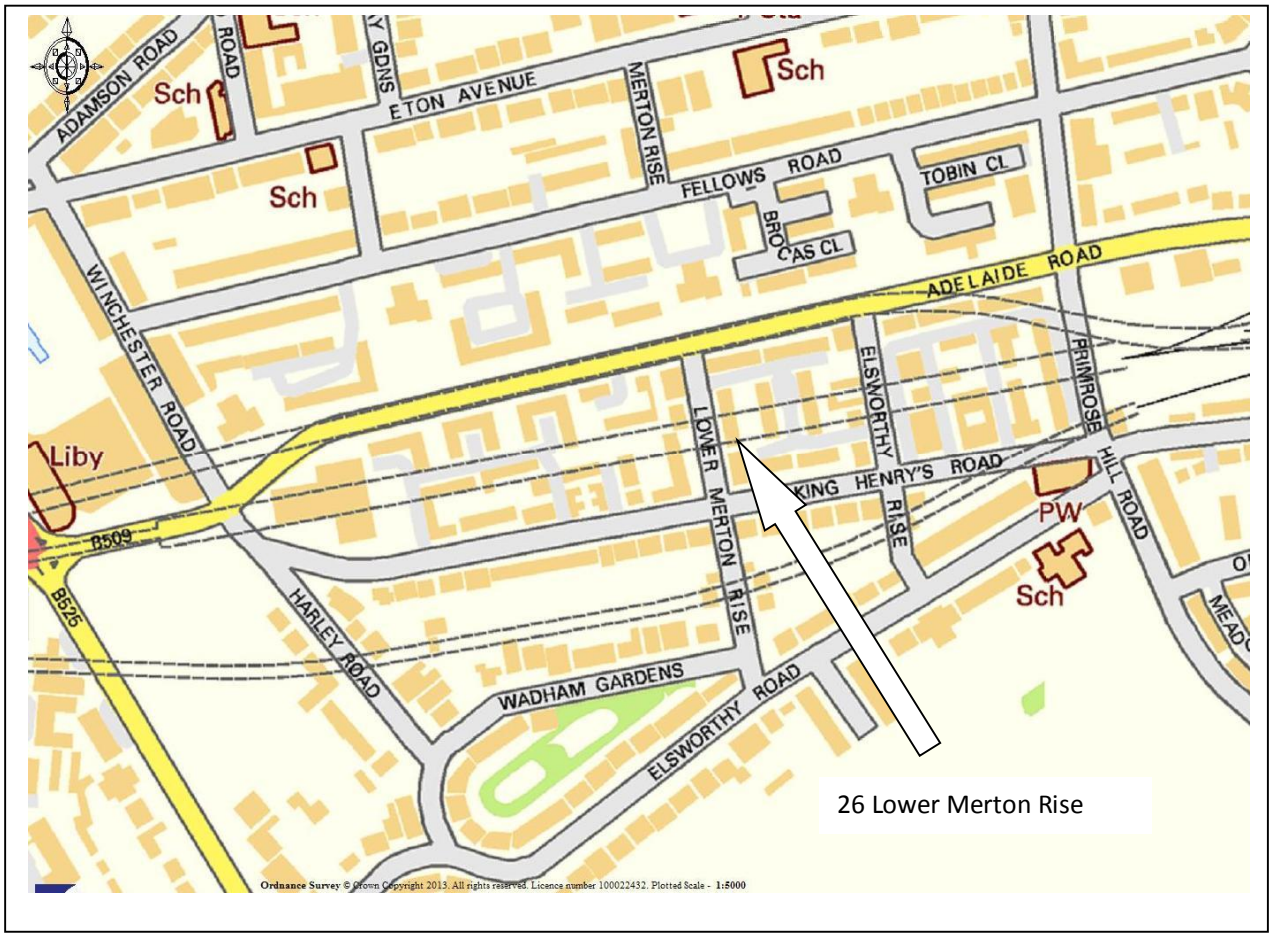
This report must be read in conjunction with SubStructural Structural Drawings and Kasia Whitfield Architectural Drawings.

The work carried out comprises a Basement Impact Assessment, which is in accordance with the procedures specified in the London Borough of Camden Planning Guidance CPG4, and a Construction Method Statement. The aim of the work is to assess if the proposed basement will have a detrimental impact on the surroundings with respect to groundwater and land stability and in particular to assess whether the development will affect the stability of neighbouring properties, local and regional hydrogeology and whether any identified impacts can be appropriately mitigated by the design of the development.

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the research carried out. The results of the research should be viewed in the context of the work that has been carried out and no liability can be accepted for matters outside of the stated scope of the research. Any comments made on the basis of information obtained from third parties are given in good faith on the assumption that the information is accurate. No independent validation of third party information has been made by SubStructural Ltd.

2.0 The Site and Area.

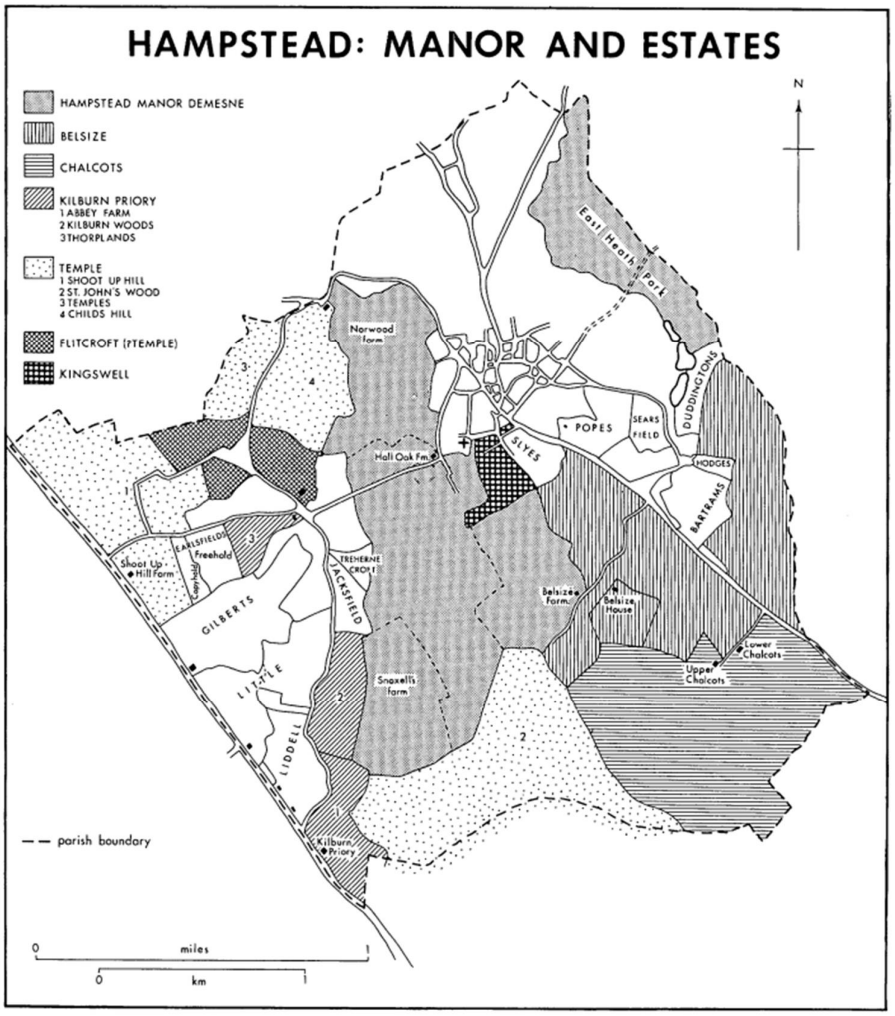
No. 26 Lower Merton Rise is currently a mid-terrace three story property which, under this project will be re-modelled to add a rear extension to the property, incorporating a basement..
This report describes the likely structural solution for constructing the below ground element of this development, the interaction of this with the local geology and its impact on surrounding buildings. Construction techniques are highlighted along with particular requirements for temporary works and excavations.



Site Location Plan

This section contains materials from The Camden Railway Heritage Trust and A History of the County of Middlesex: Volume 9: Hampstead, Paddington Author C R Elrington (Editor), T F T Baker, Diane K Bolton, Patricia E C Croot Year published 1989.

Lower Merton Rise falls within the old Chalcott Estate land which formed part of the former ñHampstead Manorò



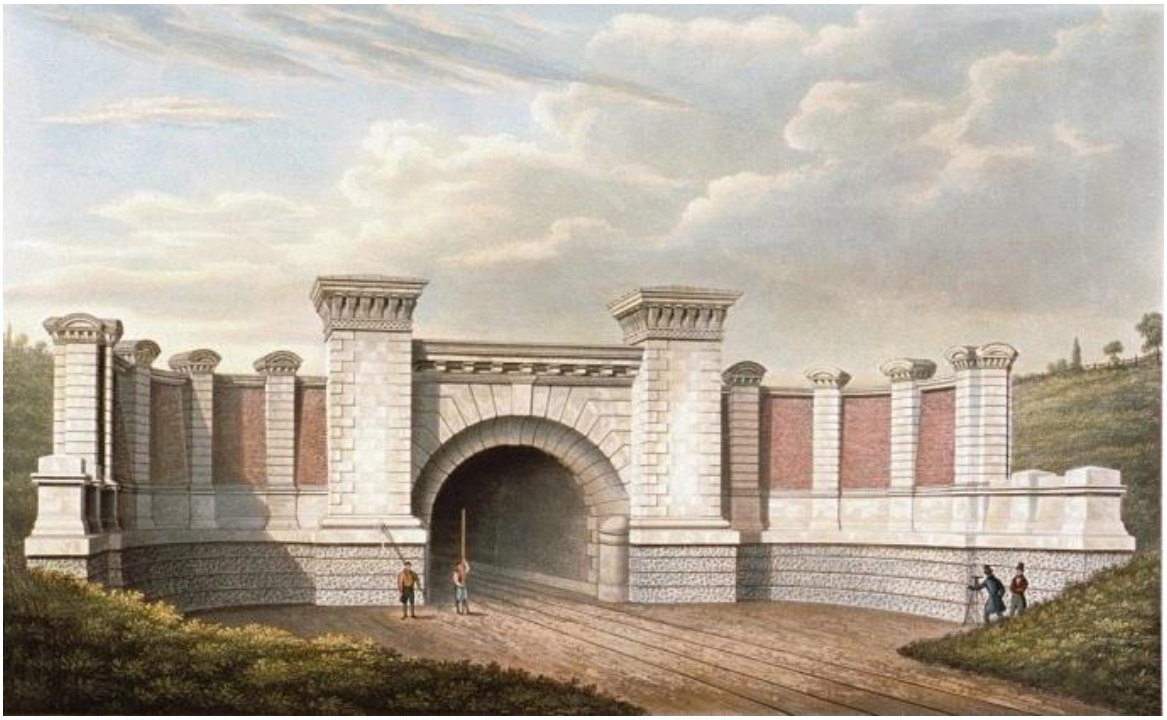
Map of Hampstead Manor & Estates

Chalcots, first named in 1253, originated in a grant, confirmed by the king in 1204 and 1242, by Alexander de Barentyn to the leper hospital of St. James, Westminster, of 1 hide in Hampstead. In 1448 Henry VI endowed his foundation of Eton College with the property of the hospital of St. James, the grant to take effect when Thomas Kempe ceased to be warden of the hospital. Eton held Chalcots from 1449 when Kempe became bishop of London. St. George's chapel, Windsor, received the revenues 1463-7 while Eton was incorporated with it. When Henry VIII, covetous of the site of the hospital, exchanged property with Eton in 1531, Chalcots was expressly reserved to the college. In 1842 Eton acquired 32 acres of Crown land in Eton in exchange for 53 acres. of the southern portion of Chalcots, which became Primrose Hill public open space. The rest of Chalcots was covered in housing in the course of the 19th century. During the 1950s and early 1960s the college sold almost half its freeholds to the sitting tenants but in 1985 it retained the freehold of some 75 acres, the western portion of the estate.

Adelaide Road was one of the earliest roads to be constructed in the area, being started in 1830 before the arrival of the railway. It was named after William IVôs newly crowned queen. Having a short section of Adelaide Road actually on the ground gave credibility to Etonôs case that the railway proposed to cut through valuable building land. But it was not until 1839-40 that development really got under way.

The Company was involved in negotiations about running its line across the Eton College Estate from 1831. The College initially resisted the idea strenuously, primarily on the grounds of its adverse impact on landholders and the consequent reduction in the value of leases. However, the fact that the Collegeôs solicitors were also the agents for the L&BR (London & Birmingham Railway Company) helped the negotiations between the two parties. The Company maintained that the railway lines would be carefully fenced and that opposite ñgentlemenôs residencesòthe fencing would be ornamental. It claimed that carriages made little noise, while the engines were so clean and silent that nobody would notice they were there.

The L&BR bought off any possible College obstruction by agreeing to put the line in a tunnel through the Chalcots Estate. From an engineering viewpoint this was unnecessary as the rails were never more than 50 ft. below the ground surface, and side slopes of 1 on 2 were specified initially. A tunnel had the merit of using no land, the surface being preserved for building by a special provision in the Act that ñthe Tunnel shall be constructed of sufficient strength to admit of buildings being erected thereon, except where the crown of the Tunnel is within 15 ft. of the surfaceò To make doubly sure, it was also provided that the tunnel had to be made by tunnelling and not by ócut and coverômethods. Finally, in order to ensure the minimum interference with building values, Eton insisted that ñthe mouth of the Tunnel at the eastern end shall be made good and finished with a substantial and ornamental facing of brickwork or masonry to the satisfaction of the Provost and Collegeé òThe proud classical elevation reflects the upmarket development intended for the neighbouring Chalcots Estate.



Lith. C Rosenberg, CLSAC

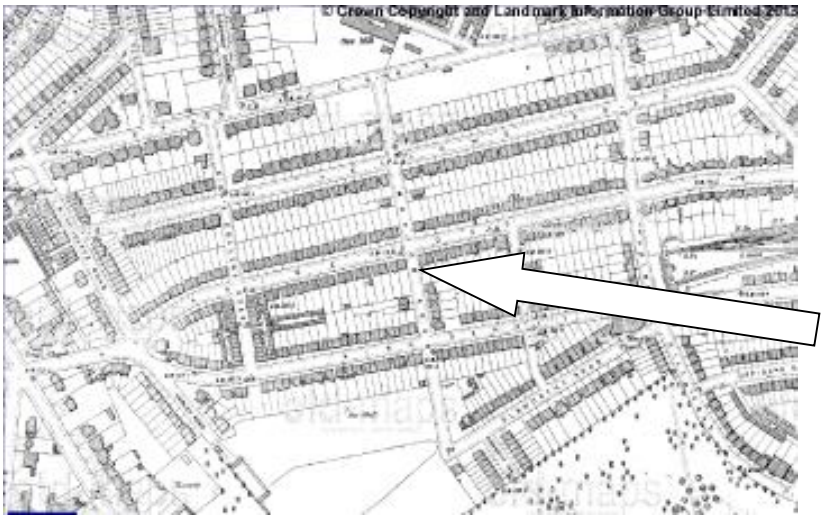
The historical maps indicate the development of this area over the period. Maps are Crown Copyright & Landmark Information Group Ltd.

Whilst Lower Merton Rise was laid out in the nineteenth century it is apparent from the 1950 map that much of the building now evident, including,16-28 Lower Merton Rise was constructed on the gardens of houses with an Adelaide Road frontage.

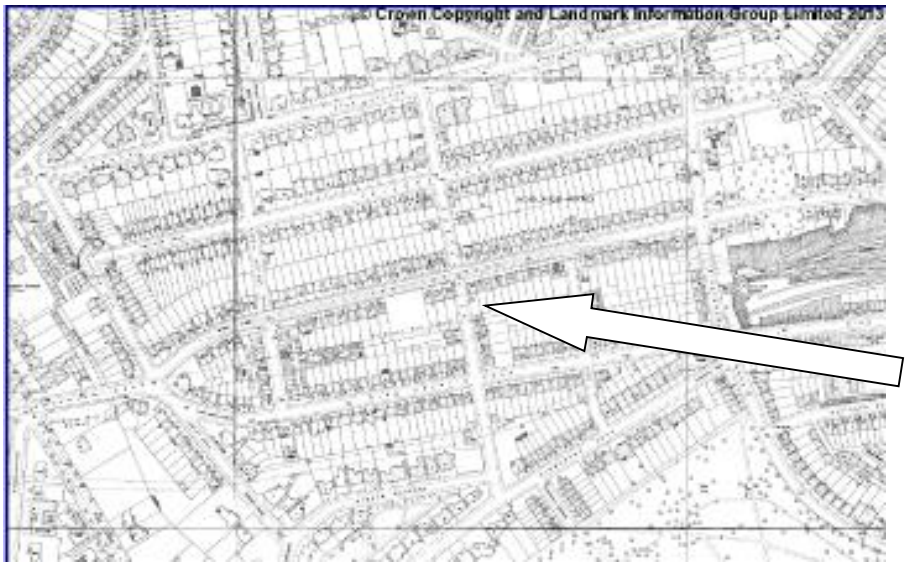
The area was likely light agricultural before it was developed, it has not been used in the past for industrial purposes, nor has it been repeatedly developed so the ground is likely to be relatively free from contamination and obstruction such as old foundations and cellars.

The area was likely light agricultural before it was developed in the late 1870s, it has not been used in the past for industrial purposes, nor has it been repeatedly developed so the ground is likely to be relatively free from contamination and obstruction such as old foundations and cellars.

Extract from Ordnance Survey Map of 1850



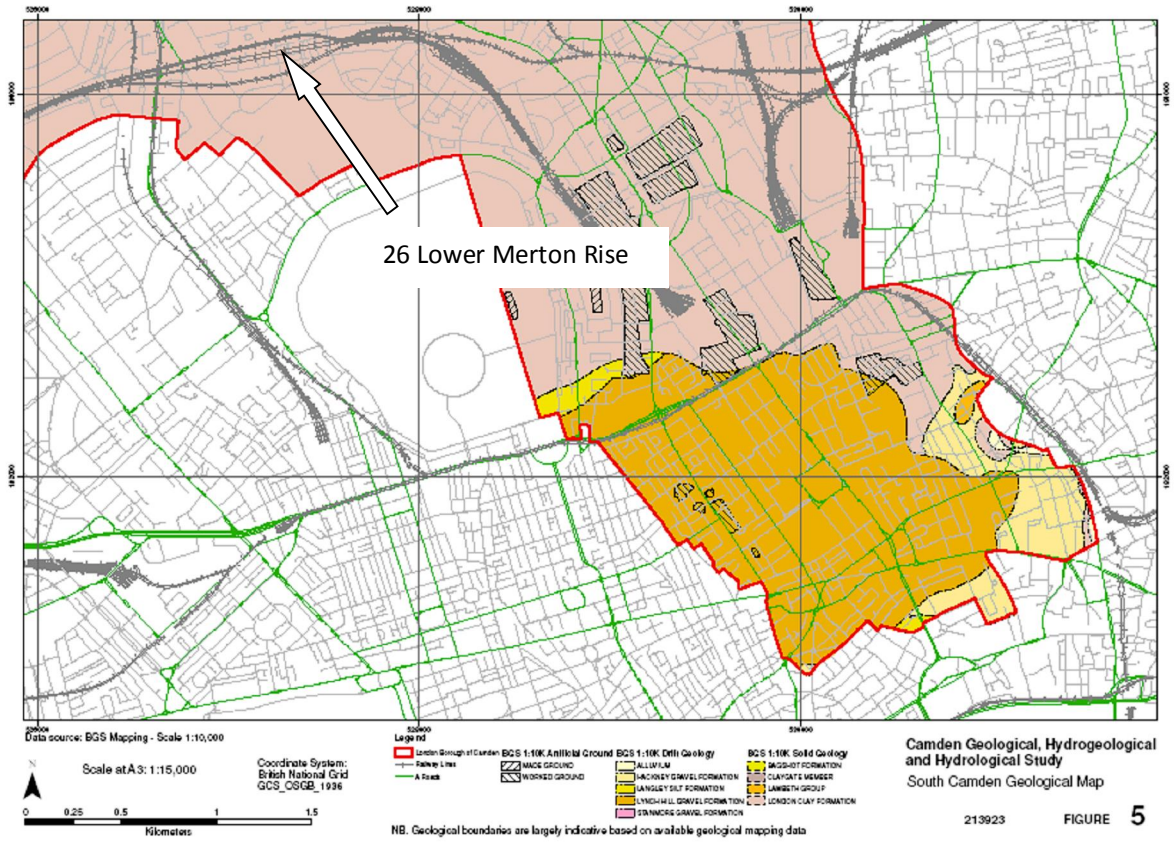
Extract from Ordnance Survey Map of 1896



Extract from Ordnance Survey Map of 1950

3.0 Site Geology

Geological records in the vicinity of Lower Merton Rise record the near-surface geology to comprise of London Clay, which is the prevailing profile in this area of London. The British Geological Survey quotes London Clay Formation as: Fine sandy, silty clay/silty clay (Generic description).

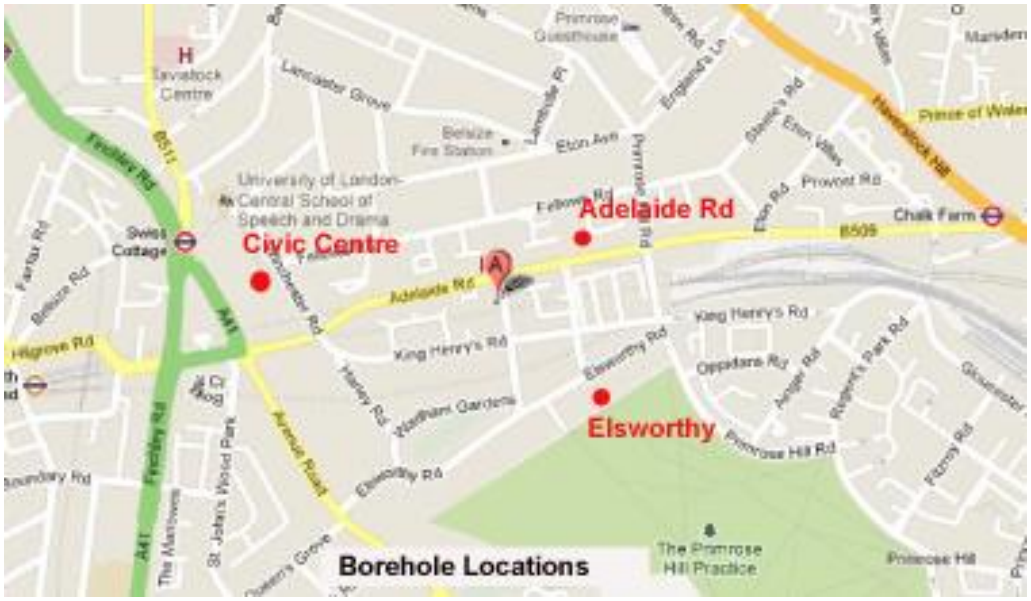


Using British Geological Survey historical records, three boreholes within the near vicinity indicate:

From a Borehole in Adelaide Road (1962)	BGS Ref TQ28SE2009	0.15m of made ground, over London Clay to >25m
From a Borehole in Elsworthy Road (1990)	BGS Ref TQ28SE2060	3.30m of made ground, over London Clay to > 9m
From a Borehole at Civic Centre (1960)	BGS Ref TQ28SE334	0.45m of made ground, over London clay >19m

The deeper London Clay is classified as Unproductive Strata and is unlikely to contain significant quantities of groundwater

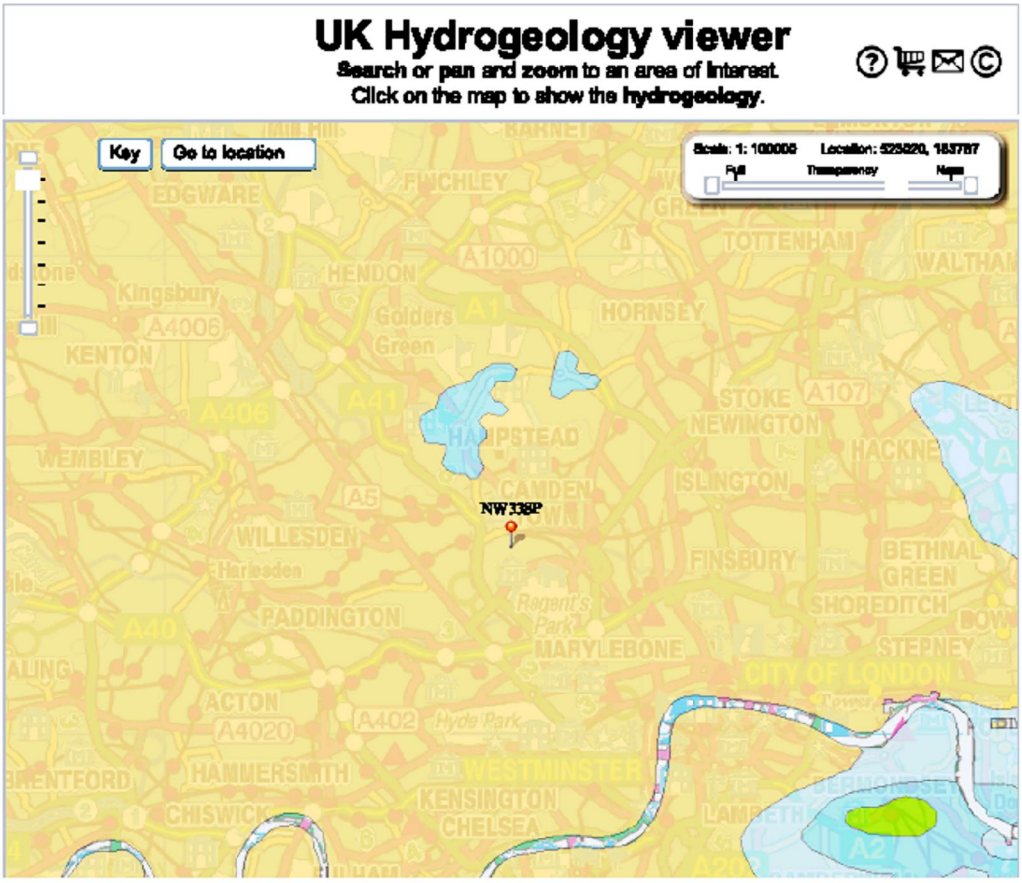
The Borehole Records are appended as Appendix A, 'Reproduced with the permission of the British Geological Survey ©NERC. All rights Reserved'



Approximate Locations of Boreholes
Mapping Copyright Google Maps

The proposed construction of the basement will result in an unloading of the London Clay at formation level. The excavations will result in approximate unloading of the soil, which will result in an elastic heave and long term swelling of the London Clay. These movements will be mitigated to some extent by the applied structural loads but the basement floor slab will need to be designed to accommodate heave movements or suspended accordingly.

4.0 Hydrogeology



British Geological Society ï Hydrogeology Map

The British Geological Society hydrogeology map 1:625,000 scale for the property gives the rock as Thames Group predominantly clayey sequence up to 140m thick confining underlying aquifers.

These soils have essentially no groundwater and, hence, no measurable flows. The permeability for natural London Clay is in the order of 3 x 10-10 metres /second.

The influence of this basement on the geohydrology of the London Basin is not significant and, hence, not considered further.

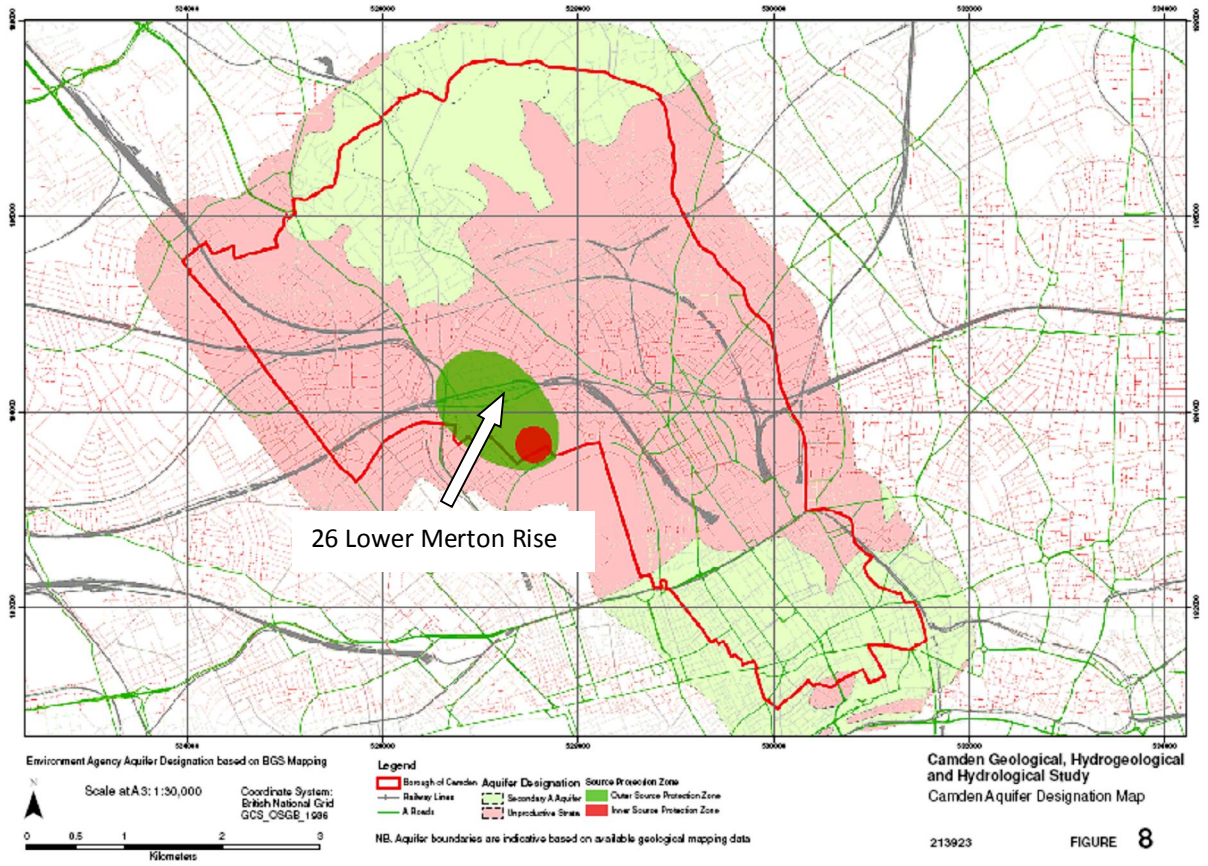
5.0 CPG4 Screening Flowcharts

For the purposes of this report reference has been made to Appendix E of the Arup document screening tools, which includes a series of questions within a screening flowchart for three categories; groundwater flow; land stability; and surface water flow.

Fig 1 Subterranean (Groundwater) Flow

1A: Is the site located directly above an aquifer?

YES. The Camden Aquifer Designation Map shows the site to lie on the fringe of an Outer Source Protection zone. (ARUP Report Fig. 8). The Environment Agency has indicated it will respond during the planning process.

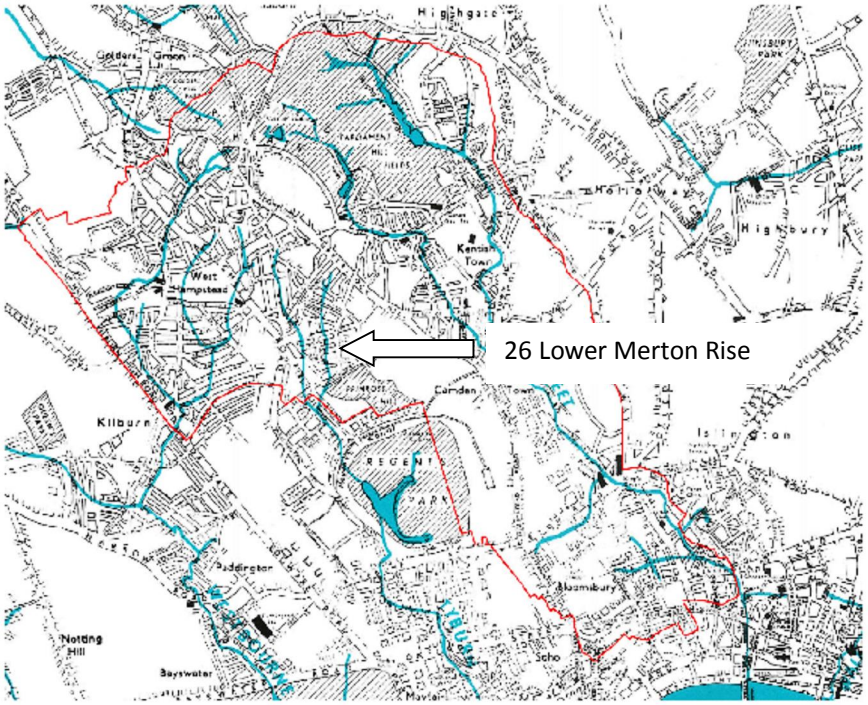


1B: Will the proposed basement extend beneath the water table surface?

No. Groundwater was not encountered any of the Borehole data records for nearby boreholes. (Source British Geological Survey)

2: Is the site within 100m of a watercourse, well (used/disused) or potential spring line?

No. The ARUP report for Camden Fig 11 Watercourses indicates that the proposed development does not conflict with any ancient watercourses.



Source – Barton, Lost Rivers of London

Camden Geological, Hydrogeological and Hydrological Study
Watercourses

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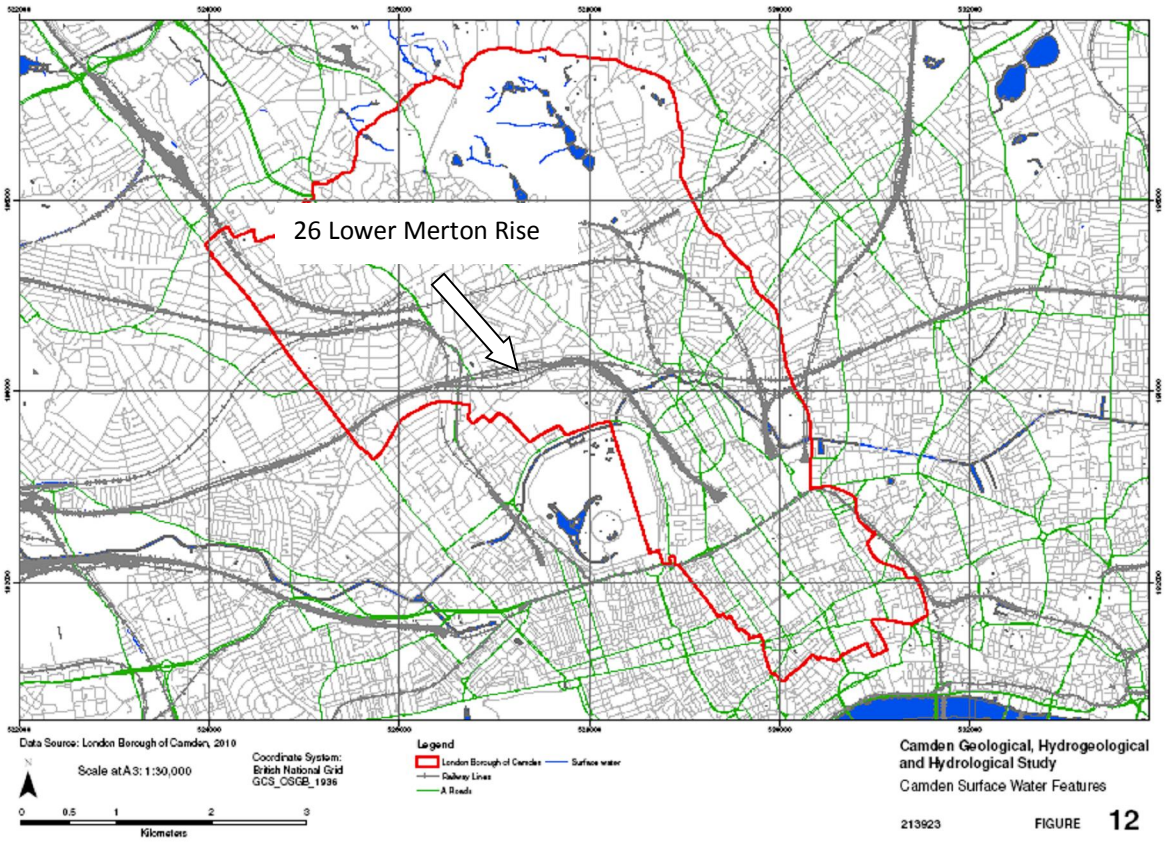
3: Is the site within the catchment of the pond chains on Hampstead Heath?

No. The site is not within the catchment area of the ponds.



The ARUP report for Camden Fig 12 Surface Water Features indicates that there are no significant water features near to the applicant site.

4: Will the proposed basement development result in a change in the proportion of hard surface/paved areas?

YES. The amount of hard standing areas will increase.

5: As part of the site drainage, will more surface water (e.g. rainfall and run off) than at present be discharged to ground (e.g. via soakaways and/or SUDS)?

No. All of the run□off will discharge to the nearby public sewer as per the current scheme.

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 of any local pond (not just the chain of ponds in Hampstead Heath) or spring line?

No. The site is not located close to any existing waterways and relevant mean levels.

Fig 2. Slope Stability

1: Does the existing site include slopes, natural or manmade, greater than 7 ° (approximately 1 in 8)?

No. The topography of the site is flat with no surface features above a fall of 1 in 50.

2: Will the proposed re profiling of landscaping at site change slopes at the property boundary to greater than 7 ° (approximately 1 in 8)?

No. The proposal does not include landscaping that affects the boundaries.

3: Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 °?

No. The neighbouring sites are at a similar gradient.

4: Is the site within a wider hillside setting in which the general slope is greater than 7° (Approximately 1 in 8)?

No. The wider gradient is less than 1:8.

5: Is London Clay the shallowest stratum on the site?

Yes. London Clay is the shallowest stratum ï carry forward to scoping stage.

6: Will any trees be felled as part of the proposed development and/or are there any proposed works within any tree protection zones where trees are to be retained?

No. No trees are to be felled.

7: Is there a history of shrink swell subsidence in the local area and/or evidence of such effects at the site?

No. There is no such evidence to the existing building or neighbouring properties.

8: Is the site within 100m of a watercourse, or spring line?

No. The Environmental data outlined in the Site Investigation Report indicates no notable water related listings within 250m of the site.

9: Is the site within an area of previously worked ground?

No. Historic records indicate that the site has only been built on once in the late 19th Century & was built on parkland with an agricultural or horticultural use.

10: Is the site within an aquifer? If so, will the proposed basement extend beneath the water-table such that dewatering will be required during construction?

YES. The site is just within an aquifer outer source protection zone. The proposed basement does not extend beneath the existing water table. Minor dewatering may be required to deal with perched water locally.

11: Is the site within 50m of the Hampstead Heath ponds?

No. The site is outside of a 50m zone of the ponds.

12: is the site within 5m of a public highway or pedestrian right of way?

Yes. The site abuts the pavement & public highway

13: Will the proposed basement significantly extend the differential depth of basements relative to neighbouring properties?

Yes. The proposed basement does not abut existing cellars.

14: Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?

YES. The site is close to existing railway infrastructure tunnels. Network rail have been contacted and relevant forms obtained to notify them of the proposed works. It is anticipated that Network Rail will respond as part of the planning process

Fig 3.Surface Flow and Flooding

1: Is the site within the catchment of the pond chains on Hampstead Heath?

No. The site is outside the catchment area.

2: As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run off) be materially changed from the existing route?

No. It will be largely unaffected or reduced compared to current open ground..

3: Will the proposed basement development result in a change in the proportion of hard surfaces/paved external areas?

YES. The amount and proportion of hard standing areas will increase.

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 watercourses?

No. There will be no change in the surface water flow off□site as a result of this proposal. Surface water will be discharged via existing connection.

5: Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?

No. There will be no change in the surface water flow off□site as a result of this proposal.

6: Is the site in an area known to be at risk from surface water flooding, such as Hampstead Heath, Gospel Oak and King's Cross, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature?

No. The site is not in an area susceptible to surface water flooding from static surface water features. Lower Merton Rise is not listed in the CPG4 Streets at Risk list.

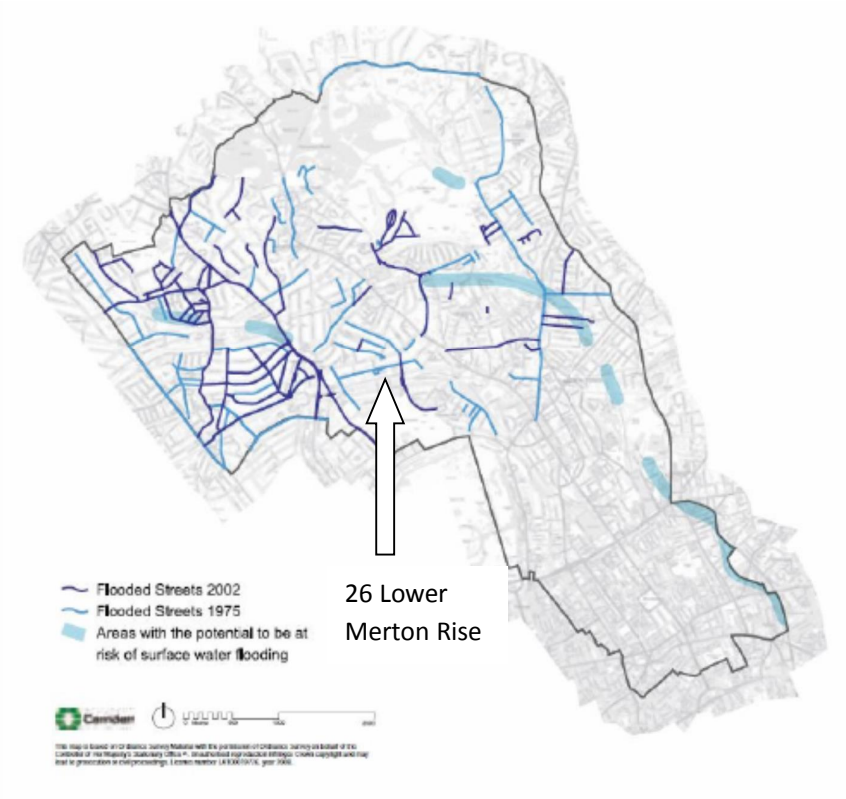


Figure 5 from Core Strategy, London Borough of Camden

Camden Geological, Hydrogeological and Hydrological Study
Flood Map

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Flood Map produced for LB Camden indicates that surface water flooding is not an issue in this road based on recent flood events

6.0 Scoping

The purpose of scoping is to assess in more detail the factors to be investigated in the impact assessment. Potential consequences are assessed for each of the identified potential impact factors.

Groundwater Flow

The site is on the fringe of an Outer Source Protection zone. It should be noted that the area is criss-crossed by railway tunnels where it has historically been custom to discharge raw effluent from trains directly onto the track bed.

The area of hard standing will increase from current by virtue of paved area externally. The architectôs specification document stipulates water run-off to be discharged to either the existing estate drainage system.

Slope Stability

London Clay is the shallowest stratum on the site and the structural design of the retaining walls and slabs will take this into account.

The site is on the fringe of a Souter Source Protection Zone. The proposed development should not have any residual impact on this zone.

The basement is close but not immediately adjacent to the public highway. It is bounded by existing properties and gardens. A design loading surcharge pressure of 10kN/m^2 will be incorporated into the retaining wall design where the wall is within 5m of the public highway. All temporary works will be designed to limit any local movements that may impact on the existing highway. All works will be monitored for movement. All temporary works will be agreed prior to construction in accordance with Building Control requirements and approval.

The proposed construction method of underpinning to form the basement structure adjacent to the existing neighbouring buildings will take account of the neighbouring property foundations, and any potential issues with undermining, or altering of the current ground stabilisation and equilibrium.

The site is close to a railway tunnel although investigations indicate to a depth of 10.0 metres below existing ground level.

Surface Flow and Flooding

The property discharges foul and storm water to the main sewer. It is proposed to use the existing connections where possible; howeverôthe level of the proposed basement slab will be below ground level so it may be necessary to create a new pumped route for this.

7.0 Risks to & Impact on Surrounding Buildings

The proposed development is a relatively low-level, low-density construction and it will occupy the same overall footprint above ground and will incorporate the existing boundaries in its envelope.

- Although the construction will be further below ground level than the existing building it will not be significantly deeper than the lowest level of the surrounding buildings.
- The basement construction will not be lower than the prevailing groundwater level in this area so will not interfere with the natural flow of the groundwater.
- The building will be formed off of London clays, which have a significant bearing capacity, and the foundations will be designed to reflect the recommended permissible pressures and ensure they will not be compressed by more than 15mm
- The boundary walls on three sides can be retained safely and easily following industry-standard practices and, by following a pre-determined sequence will allow the basement wall to be constructed without detriment to the existing, surrounding construction.
- Excavations for the deep footings that will form the new basement walls can be undertaken using a small excavators, which will be low-impact technique and unlikely to generate excessive vibration.
- The basement construction will not be lower than the prevailing groundwater level in this area so will not interfere

The proposed basement construction is indicated on all plans as being in close proximity to the Primrose Hill railway tunnels. These are at unknown depth relative to this property and we advise that further investigation of this should be undertaken.

8.0 Construction Method Statement

This method statement has been prepared to provide information on the likely methods for Basement Construction, subject to confirmation of details and final input from the successful contractor.

The final methods will be subject to the limitations and constraints noted in this document. Any revised matters associated with the Method Statement will be issued for review and comment prior to any site construction works.

1) Prior to Commencement of Work

The method of construction is to be agreed by all parties, with specific reference to the potential for vibrations and noise from the underpinning process.

A detailed method statement for means of access, site logistics and intended vehicle movements, particularly spoil removal, will be agreed with the main contractor prior to commencing any site works and any variations reported accordingly.

Agreed working zones in relation to the existing building and the Highways will be agreed prior to commencing any site works.

All services/utility surveys, diversion agreements and temporary supply requirements will be agreed and approvals will be in place prior to commencement of the works on site.

2) Sequence of Work

The key stages forming the core of the Construction Method Statement are:

1. Establish site access & hoarding..
2. Carry out any investigatory works as required for the completion of the full detailed design.
3. Underpinning to existing building.
4. Excavation and construction of basement and capping slabs.
5. Internal waterproofing membranes, screeds and finishes.

The final sequence/program of works in detail will be agreed with the successful main contractor and any variations reported accordingly. The following is an indication of the likely process for the substructure works, subject to completion of all intrusive surveys, all agreements being in place and selection of the agreed final construction process subject to those intrusive site findings.

3) Establish Access & Hoarding

The hoarding will be located around the property to enclose all works. All set up works to facilitate access will take account of the Method Statement for the project.

A plywood hoarding, or similar will be erected with vertical standards, anchored to the ground. The hoarding will be fully secure with a lockable door for access. Suitable heights and colours will be in accordance with the Local Authority requirements. If a conveyor is to be used, then suitable protection to public will be provided where the conveyor extends over any external footpath.

4) Investigation Works

The excavation to approximately 3.5m deep for basement construction will result in a formation level in the stiff London Clay. Significant groundwater inflows are not anticipated in the basement excavation although some dewatering may well be required due to the potential for perched water locally within the made ground. Prior to construction, further investigation works may be required in order that heave movements may be checked for further analysis based on final loadings and levels. It would also be prudent to carry out a number of additional trial excavations, to depths as close to the full basement depth as possible to confirm the groundwater conditions and the potential for perched water.

5) Installation of Underpinning & Retaining Walls

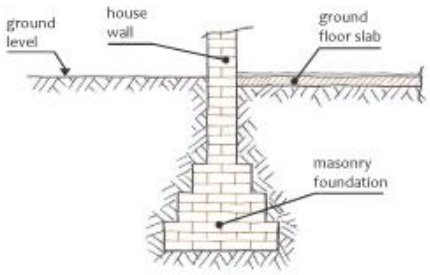
The proposed development will construct a basement beneath the new single storey extension, including a new ground bearing slab at -1 level. The terraced nature of this building requires the construction method to maintain stability of both the adjoining properties & this property.

The formation of the basement can be achieved by conventional deep footings to the three faces away from the existing structure with the existing back wall & the neighbouring extension wall underpinned in a hit & miss sequence as depicted in the LB Camden document produced by ARUP.

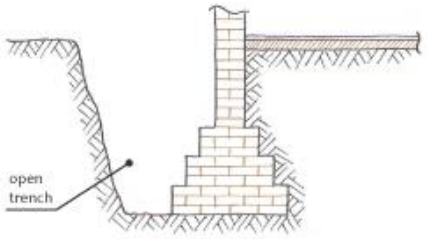
Sequential Underpinning

Typical underpinning sequence to be used for adjacent property

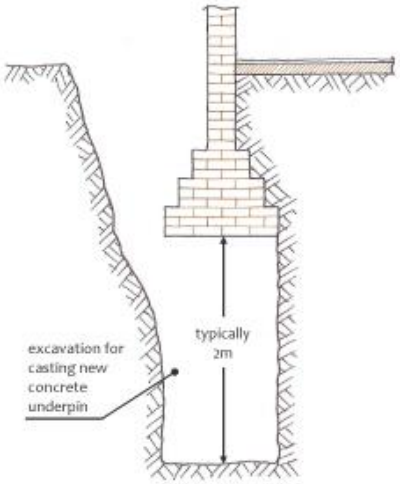
Stage 0: original foundation, typical of houses



Stage 1: exposure of original foundation by digging a short trench along a section of the wall to be underpinned



Stage 2: excavation of pit to form underpin: see Fig. 2.1b for details



Indicative, schematic sketches only. Actual dimensions are likely to vary. Not to scale.

Camden Geological, Hydrogeological and Hydrological Study
Typical underpinning construction sequence

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FIGURE **19**

6) Waterproofing Systems and Screed

For all basement areas, either the Architect or suitably competent specialist will prepare design details in conjunction with the contractor.

The waterproofing system will be installed in accordance with the Architects details in conjunction with the specialist contractorôs technical specifications and details, once the basement slab and walls are complete.

The floor finishes, which may include insulation and under floor heating, can then be laid in accordance with the Architects details. A cement and sand screed will be applied to the slabs surface.

The height of the basement and relative level of the water table determines that Types A (barrier), B (structurally integrated) or C(drained) protection against ingress of water will be satisfactory, as defined by BS 8102:2009. The basement will be constructed and detailed to achieve a Grade 3 Level of Performance, as defined by BS 8102:2009.

Table 2 **Grades of waterproofing protection**

Grade	Example of use of structure[A)]	Performance level
1	Car parking; plant rooms (excluding electrical equipment); workshops	Some seepage and damp areas tolerable, dependent on the intended use[B)] Local drainage might be necessary to deal with seepage
2	Plant rooms and workshops requiring a drier environment (than Grade 1); storage areas	No water penetration acceptable Damp areas tolerable; ventilation might be required
3	Ventilated residential and commercial areas, including offices, restaurants etc.; leisure centres	No water penetration acceptable Ventilation, dehumidification or air conditioning necessary, appropriate to the intended use

A) The previous edition of this standard referred to Grade 4 environments. However, this grade has not been retained as its only difference from Grade 3 is the performance level related to ventilation, dehumidification or air conditioning (see BS 5454 for recommendations for the storage and exhibition of archival documents). The structural form for Grade 4 could be the same or similar to Grade 3.

B) Seepage and damp areas for some forms of construction can be quantified by reference to industry standards, such as the ICE's *Specification for piling and embedded retaining walls* [1].

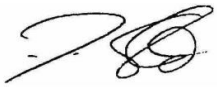
To achieve Grade 3 Performance, either a drained cavity installed in front of the concrete wall; or an applied waterproofing membrane applied and bonded to the internal faces of the underpins is likely to be used. Waterproof concrete may also be employed.

9.0 Conclusion

The proposed development of 26 Lower Merton Rise can be achieved using standard construction techniques and materials. The new construction will not be beneath the prevailing groundwater level. The basement can be constructed using relatively light techniques, in controlled and predetermined sequences and without the need for a large open excavation before construction can start, and consequent extensive temporary works. Where mechanical means are necessary to construct permanent works, these can be of a type that generates low vibrations to which the surrounding buildings have a form and construction that is robust and resistant to.

Provided that the proposed extension including the subterranean basement can be constructed without compromising the underground mainline railway tunnel, we can conclude that the construction of the proposed development generally, and the subterranean basement in particular, will not affect the integrity of the surrounding building stock, will not disturb underlying hydrogeology or overload the near-surface geology. There are no critical utilities beneath the site that cannot be relocated easily to accommodate the construction and, as there is no change in use proposed there will be no significant increase in foul discharge to the sewer despite the increase in level of accommodation.

The techniques proposed for the subterranean element of the building and the nature of the underlying geology minimises the risk of instability, ground slip and movement.

Report Prepared by	Qualifications	Signature	Position	Date
Daniel Staines	B.Eng C.Eng MIStrucE		Director	24 October 2013

10.0 Appendix A - Borehole Records

TERRESEARCH LIMITED

BOREHOLE NO. 5

2736
8434

Contract Name Adelaide Road
Report No. S. 476/12

Client W. R. J. Budgen & Partners
Site Address Adelaide Road, London N.W. 3.

Address 54, Queen Anne Street, London, W.1.

Standing Water Level
Diameter 8"

Water Struck None
Method of Boring Shell/Auger

Ground Level
Start 27.10.62 Finish 29.10.62

Remarks:

Description of Strata	Thickness	Depth	Disturbed Samples	'U' Cores and 'N' P. Test
Made Ground	0'6"	0'6"	J3001 0'6"	
Brown clay	5'6"	6'0"	J3002 3'0" J3003 6'0"	
Brown mottled clay	14'0"	20'0"	J3004 8'0" J3006 13'0" J3007 17'0"	U3005 10'0"
Brown clay	16'0"	36'0"	J3009 23'0" J3010 27'0" J3012 33'0" J3013 37'0"	U3008 20'0" U3011 30'0"
Blue clay	44'0"	80'0"	J3015 43'0" J3016 47'0" J3018 53'0" J3019 57'0" J3021 63'0" J3022 67'0" J3024 73'0" J3025 77'0"	U3014 40'0" U3017 50'0" U3020 60'0" U3023 70'0" U3026 78'6"
TOTALS	80'0"	80'0"		

NOTES: 1. Descriptions are given in accordance with the B.S. Civil Engineering Code of Practice C.P.2001 "Site Investigations".
2. J indicates Jar Samples.
B ,, Bulk Samples.
W ,, Water Samples.
U ,, Undisturbed Core Samples. These are nominal 4 in. diam. and 18 in. long. Depths shown are top of sample.
N ,, Number of blows per ft. penetration with Standard Penetration Tests.

Borehole Log for Adelaide Road Location

Norwest Holst Soil Engineering Ltd.

Borehole No. 5

BOREHOLE LOG

Contract No. F8715
Location. Elsworthy Road
Client. Norwest Holst Project Services Ltd
Method of Boring. Cable Percussion
Diameter of Borehole. 150mm

Sheet 1 of 2
Chainage.
Ground Level. m.A.O.D.
Date. 18/1/90

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOPSOIL		0.10					18/1
MADE GROUND: Brick rubble with angular gravel.		0.60			1.00 (45)		
MADE GROUND: Soft light brown CLAY with some yellow sand and brick fragments.		3.20			2.00 (40) 3.00 (40) (NR)		
MADE GROUND: Fine brick angular rubble.		3.30		150mm to 4.00	3.50 (45)		
Firm brown mottled grey fissured CLAY. ...with some orange brown mottling		4.50			4.50 (45)		
Firm brown fissured silty CLAY with some orange brown staining.		8.70			6.00 (50) 7.50 (55)		
Firm to stiff brown grey laminated fissured CLAY.					9.00 (55)		

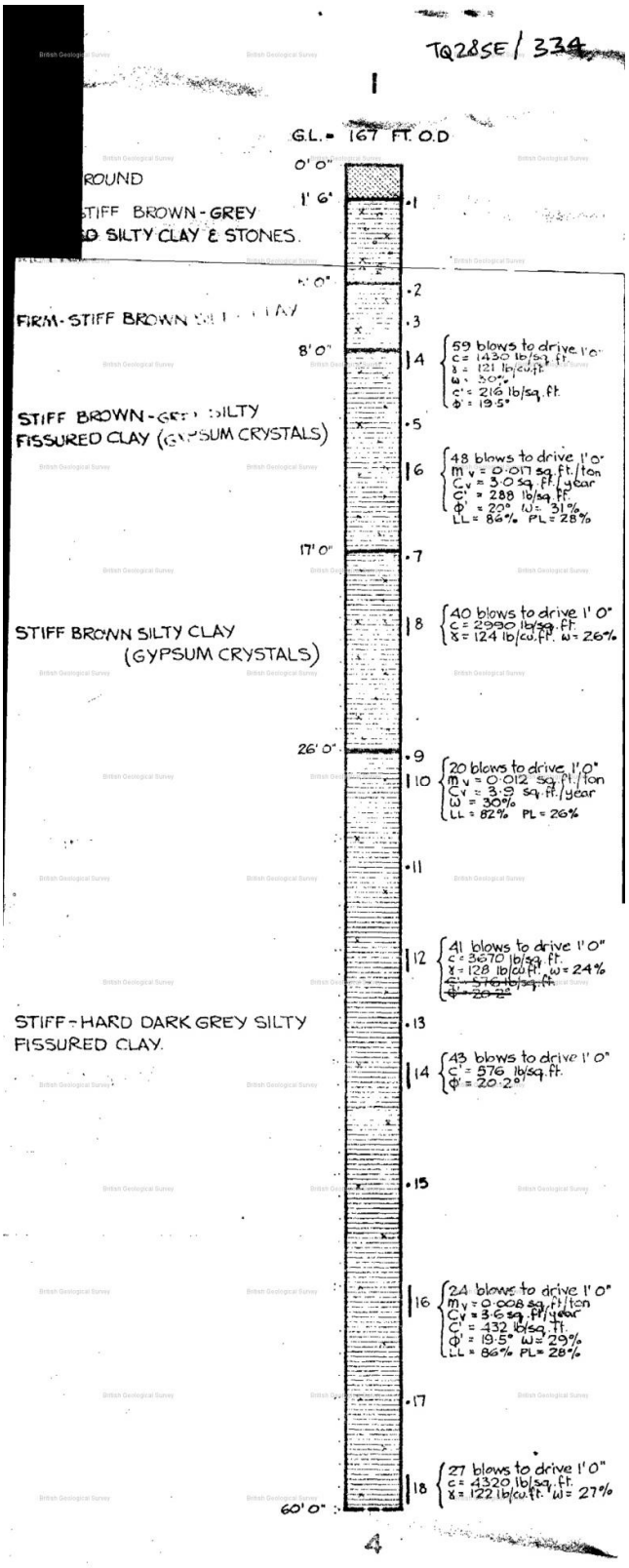
Type of Sample

Is S.P.T. ■ Undisturbed
Ic C.P.T. x Vane
0 Jar △ Water
● Bulk ▮ Piezometer

Remarks (Observations of Ground Water etc.) () U100 blows
NR No Recovery
Water struck at 3.40m, level rose after 20 mins to 3.30m.

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Borehole Log for Elsworthy Road Location



Borehole Log for Civic Centre Location