18 – 20 LANCASTER GROVE, LONDON

BASEMENT IMPACT ASSESSMENT AND CONSTRUCTION METHOD STATEMENT

For:

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Rev A – 14th June 2013

Project no: ***293 001***

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Revision History

Rev	Date	Purpose/Status	Comments
A	14/06/13	Revised Issue	New Borehole and Ground Water information added.

Prepared and Approved by:

_____

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Director

1.0 Introduction

1.1 This report has been prepared to set out the proposed design philosophy and construction method statement for the proposed basement construction at 18-20 Lancaster Grove. 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.

1.2 The report is based on the information produced by Robert Adam Architects and Engineering information by Upton McGougan limited and is intended to provide the basis for planning and may be subject to further design discussion and development with the successful Contractor.

1.3 This report is for the exclusive use of the Client and should not be used in whole or in part by any third parties without the express permission of **kfr consulting limited** in writing.

1.4 This report should not be relied upon exclusively by the Client for decision-making purposes and may require reading with other material or reports.

1.5 This report must be read in conjunction with KFR Consulting Structural Drawings, Upton McGougan Limited Structural Drawings and Robert Adam Architectural Drawings of November 2008.

1.6 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.

1.7 This report has been compiled by Kevin Rayner BEng (Hons) Civil Engineering, CEng MIStructE, on behalf of KFR Consulting, who is a Chartered Engineer of 28 years. The Site Investigation document and recommendations were prepared by Allan Cattell BSc PhD CGeol FGS.

1.8 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 KFR Consulting.

2.0 Existing Site

No. 18-20 Lancaster Grove is a single building located on a residential street in the Belsize Park area of North London, Grid Reference TQ 271 845. The site has approximately 20m of frontage on the south side of Lancaster Grove and extends southwards from the road by approximately 50m. The existing building is located towards the north of the property with a paved drive to the front with a mainly laid to lawn garden to the rear. The site is surrounded by residential properties.

The site is generally level with some shrubs and bushes within the site ands some larger trees to the southern boundary. There are no surface water features in the vicinity of the property.

2.1 Flood Condition

The site is not within an area at risk from flooding as defined by the flood maps of the Environment Agency. No drift deposits were present in the Site Investigation Borehole logs and the solid geology stratum is London Clay with no particular ground water issues (e.g. no aquifer/underground rivers nearby). It is therefore deemed that this assessment does not require input from a chartered professional hydro-geologist.

3.0 Proposals

It is proposed to develop the site by demolishing the existing building and constructing a new two storey building above ground with a basement below the whole footprint of the building. The main basement is approximately 3.6m below ground level with an extended basement to 6.3m to accommodate a swimming pool.

3.1 Basement

The proposal is to construct a single basement level below the full footprint of the house, with additional depth to facilitate a swimming pool. The two levels will accommodate changing facilities, a gymnasium, a cinema room as well as the wine cellar at the lowest level.

4.0 Ground Conditions

A detailed Geotechnical site investigation has been carried out by Structural Soils Limited and the interpretative report is included in this document.

4.1 Site Assessment

As part of the development process, the site under consideration has undergone a detailed assessment in order to highlight the potential risks associated with the project for both development and cost purposes. The preliminary assessment has covered, but is not to be limited to the following items:

- Assessment of Geological survey information. – Structural Soils Report included in the document.
- Assessment of existing site information made available by the Client.
- Site Desk Study including geology, hydrology, potential contamination and site history completed by GEA.
- Implications of any existing buildings on the site. (Adjacent property)
- Implications of Arboricultural issues.
- Assessment of Archaeological impact.
- Assessment and recommendations for further investigations and surveys.
- Site accessibility and potential constraints and limitations.

4.2 Site Geology

The investigation works completed by Structural Soils Limited encountered the expected ground conditions indicated in the British Geological Survey Map of North London (sheet 256, scale 1:50,000) indicating the site to underlain by the London Clay Formation, which is part of the Thames Group, and consists predominantly of clay with some silts and sands.

Beneath a moderate thickness of made ground, London Clay was encountered and was proved to the maximum depth investigated of 15.0 m. The made ground extended to depths of 0.4m to 1.8m, where proved, and generally comprised brown sandy clay or clayey sand with rare gravel and fragments of brick, concrete and charcoal.

4.3 Site Contamination

The chemical analyses found elevated levels of arsenic, lead, benzopyrene and zinc in the made ground encountered in TP1. Refer to the detailed Site Investigation Report.

In consideration of the site geology and groundwater regime, and the continued use for residential purposes, the soil conditions are considered to be a low risk to new construction.

4.4 Ground Water

No groundwater was encountered in any of the exploratory holes during the investigation works.

Due to the presence of London Clay, which limits the presence of ground water, and the distances to the nearest open water course the risk of contamination of ground water or surface watercourses is considered to be 'low'. Natural or perched water levels for the site are not known at this time but all Basement Construction will be designed accordingly based on the results of the Investigation.

4.5 Existing Trees

Due to the presence of large trees in and around the boundary of the property, a detailed Arboricultural report for the site was commissioned by the Architect. The report considers the potential impact of the development and condition of the trees with recommendations to manage risk. The basement design, construction methods and site management will take account of the presence of these trees accordingly.

5.0 Foundation and Basement Design

The investigation has indicated that formation level for the basement will be within the stiff London Clay. With reference to the Structural Soils report, significant groundwater inflows are not anticipated during basement excavation, although some groundwater inflows may be encountered from perched water from within the made ground. It is considered likely that the rate of any inflows will be relatively slow and localised and should be adequately dealt with through sump pumping, although it will be necessary to carry out trial excavations to confirm this view.

The design of basement support in the temporary and permanent conditions will take account of the need to maintain the stability of surrounding structures and to protect against perched groundwater inflows.

5.1 Site Constraints

The site is located on Lancaster Grove and is a detached two storey property. The proposed basement profile is in close proximity to both Lancaster Grove and the neighbouring boundaries. Due to this restricted clearance and potential lack of working space the construction form will need to take due consideration of the sensitivity of each of these adjacencies as well as the potential undermining of the existing adjacent property foundations in order to form the new Basement Construction.

5.2 Basement

For the basement areas a contiguous bored pile wall will be adopted with an open cut bottom up construction technique. This method is likely to be the most economic and rapid option to construct the retaining walls externally given the site constraints and soil conditions. The wall consists of discrete piles typically installed at centres 150mm greater than their diameter, leaving gaps where soil is exposed during excavation. This type of wall can be installed in restricted working space and designed to carry long term vertical loads. A reinforced concrete capping beam will be required

along with a reinforced concrete lining wall to secure exposed soil, and resist long term groundwater pressures. Slabs will be reinforced concrete typically.

5.3 Basement Heave (A)

The proposed construction of the 3.6/6.3m deep 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. However, the design of the Basement is for construction of a contiguous piled wall, within which the excavation will be carried out. In these circumstances the heave would be restricted to the volume of soil within the contiguous piled wall; therefore the soil outside of the wall would not be unloaded. This would confirm that any heave movement would be negligible.

A detailed heave analysis will be undertaken prior to construction to confirm. Consideration will also be given to the effects of differential movement as the basement depth varies across the site.

6.0 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.

6.1 Subterranean (Groundwater) Flow

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

No. The Environment Agency's Groundwater Vulnerability map of West London (sheet 39, scale 1:100,000) shows the site to lie on a non-aquifer.

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

No. Groundwater was not encountered in any of the exploratory holes during the investigation works.

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

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

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.

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

No. The amount of hard standing areas will not 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.

6.2 Slope Stability

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

No. The site is generally flat and not in excess of 1:8.

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 or shallower 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 – 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 and work will be outside of tree protection zones on the property boundaries.

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?

Yes. The borehole records show made ground to 1.8m below ground level – carry forward to scoping stage.

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?

No. The site is not within an aquifer. 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. To the North (Front) of the site is Lancaster Grove

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

Yes. The proposed basement is over the whole footprint of the building so will increase differing depths of foundations - carry forward to scoping stage.

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

No. The site is outside all such exclusion zones and not within 250m of known tunnels.

6.3 Surface Flow and Flooding

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

No. The site is well removed from these ponds and 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 unaffected.

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

No. The amount and proportion of hard standing areas will not 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.

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 – as per the Camden Geological, Hydro geological and Hydrological Study and is outside of the plotted areas for previous flooding. See Appendix.

7.0 Scoping Stage

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. The investigation of the potential impacts is carried out through a suitable site investigation and this has been carried out by Structural Soils Limited in September 2008. It is considered that the scope of the investigation complies with the guidance issued by the Council and is therefore a suitable basis on which to assess the potential impacts.

7.1 Subterranean (Groundwater) Flow

No issues were highlighted requiring carry forward to the scoping stage.

7.2 Slope Stability

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

9: The presence of made ground to the depth of 1.8m does not constitute a cause for concern as the basement will generally extend to a minimum of 1.8m below the maximum made ground formation level noted in the Site Investigation.

12: As the basement is close to the public highway a design loading surcharge pressure of 10kN/m^2 will be incorporated into the retaining wall design. 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 accordingly with all temporary works agreed prior to construction in accordance with Building Control requirements and approval.

13: The proposed construction method of contiguous piling to form the basement structure will take account of the neighbouring property foundations and any potential issues with undermining or altering of current ground stabilisation and equilibrium.

7.3 Surface Flow and Flooding

No issues were highlighted requiring carry forward to the scoping stage.

8.0 Impact Assessment (A)

The screening identified a number of potential impacts noted above and they are commented upon accordingly in the scoping section. The desk study and ground investigation information has been used below to review the potential impacts to assess the likelihood of them occurring and the scope for reasonable engineering mitigation. The following are key items that require clarification:

8.1 The excavations will normally result in approximate unloading of the soil, which can 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. However, the design of the Basement is for construction of a contiguous piled wall, within which the excavation will be carried out. Settlements within this area will be limited to 15 to 25mm as noted in the Site Investigation report. In these circumstances the heave would be restricted to the volume of soil within the contiguous piled wall; therefore the soil outside of the wall would not be unloaded. This would confirm that any heave movement would be negligible with regard to the impact on adjacent structures and buildings.

8.2 The category of damage in the CIRIA C580 Damage Category Chart would therefore be Burland Category 0, negligible. Some minor ground movement could occur via the deflection of the contiguous piled wall but would be minimised by the proposed propping as outlined in section 9.2.5 of this document.

8.3 The original investigation encountered no groundwater during excavation of the trial pits and drilling of the boreholes. No standpipes were installed. The London Clay was of high and very high plasticity and would be impermeable. No sand horizons or clay layers were noted in the borehole investigations. We therefore consider that there will be no significant lateral ground water flow in the London Clay and therefore, the basement will have no impact on the current ground water flow.

A further borehole was carried out on 5th June 2013 with a view to clarifying the current conditions relating to ground water levels and the potential impact on the development. A copy of the resulting report and borehole log are included in Appendix B. The additional borehole has confirmed the findings of the original investigation in terms of soils encountered and no ground water was present during the drilling to 5m depth. Subsequent monitoring has indicated a level of -3.8m after one day and -3.82m one week after drilling.

The water encountered within the standpipe is likely to be attributable to the presence of perched groundwater within the made ground, seepages from sandy partings or fissures in the London Clay. Inflows from within the made ground are unlikely to be significant, whilst seepages from silt and sand partings is unlikely to result in prolonged inflows and the permeability of the London Clay as a whole is very low, normally less than 1×10^{-8} m/s, as such inflows should be controllable by nominal sump pumping.

8.4 Conclusions

The site is located in the London Borough of Camden and the report has been compiled in accordance with the requirements of CPG4 and the relevant guidance documents.

A Basement Impact Assessment has been carried out following the information and guidance published by the London Borough of Camden. Information from a Site Investigation has been used to assess potential impacts identified by the screening process.

It is concluded that the proposed development is unlikely to result in any specific issues relating to land or slope stability, the hydrogeology and hydrology of the site. Suitable construction methods

will ensure slope stability at the site and there should not be any negative impact on the groundwater.

9.0 Construction Method Statement

This method statement has been prepared to provide information on the likely methods for Basement Construction for the Basement, 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.

9.1 Prior to Commencement of Work

9.1.1 The method of construction is to be agreed by all parties, with specific reference to the potential for vibrations and noise from the selected piling process. The size and type of piling to be agreed and full details of the methodology to be provided by the piling contractor prior to commencing works.

9.1.2 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.

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

9.1.4 All services surveys, diversion agreements and temporary supply requirements will be agreed and approvals will be in place prior to commencement of works.

9.1.5 Existing building condition surveys will be carried out prior to commencing any piling works, inclusive of neighbouring property.

9.2 Sequence of Work

9.2.1 The key stages forming the body of the Construction Method Statement are as follows:

- Establish site access, hoarding and spoil conveyor installation.
- Investigatory works as required for full detailed design.
- Contiguous Bored Pile Retaining Walls
- Excavation and construction of external basement levels and capping slabs
- Internal waterproofing membranes, screeds and finishes

The final sequence of working 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.

9.2.2 Establish Access, Hoarding and Spoil Conveyor

The hoarding will be located around the property to enclose all works front and rear. The conveyor for spoil removal will be located subject to any restrictions imposed by the governing local authority.

All set up works to facilitate access will take account of the Arboricultural Report and Method Statement for the project. All works adjacent to Trees will be executed in accordance with the requirements of that report.

A plywood hoarding 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.

Protection to public will be provided where the conveyor extends over any external footpath. Particular care will be taken regarding works near to the trees, particularly below the canopies, and all works will be carried out in accordance with the Arboricultural Report and Method Statement.

The Contractor will construct a plywood bulkhead onto the pavement. The hoarding is to have a plywood roof covering, night-lights and safety notices as required.

The conveyor will be installed adequately supported and secured to the hoarding using a temporary scaffold structure.

Temporary electrical and water supplies from the Clients permanent connections will be set up as required.

9.2.3 Investigation Works

A Geotechnical Desk Study and Ground investigation was carried out by Structural Soils Limited in September 2008 (Report Ref 722146).

The excavation to approximately 6.3m deep for basement construction will result in a formation level in the stiff London Clay. The detailed design will be based on the findings of the soil investigation report. 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 will 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.

9.2.4 Installation of Bored Piled Retaining Walls

The contiguous piling installation will be carried out by a specialist piling contractor. All Geotechnical information will be provided along with the current design philosophy and performance specification for the specialist contractor design of the piling.

A suitable piling mat will be installed to provide a platform for the piling rig operations. The final details of the piling mat are subject to agreement with the specialist piling contractor.

In accordance with the specialist contractor design and the proposed Contiguous Piling Process drawing, the Piles will be installed to the design depth and locations prior to commencing excavations.

9.2.5 Excavation and Construction of Basements

Once all of the piles are in position, excavation down to the first prop level can be carried out. The steel prop is then installed between the piles. This continues with each prop location until excavation to the proposed formation level is reached.

At formation level the reinforcement for the slab is placed in accordance with the design requirements ready for inspection by the engineer and building control officer prior to concreting. Once the basement slab is complete, the lowest level prop can be removed to commence upward construction.

The reinforcement for the piled wall liner will be placed and offered for inspection prior to concreting. Once complete, the formwork can be installed for the next basement level to be cast in the same manner. This process continues up with horizontal props removed as the process progresses until completion of the capping beam and cover slabs. Once

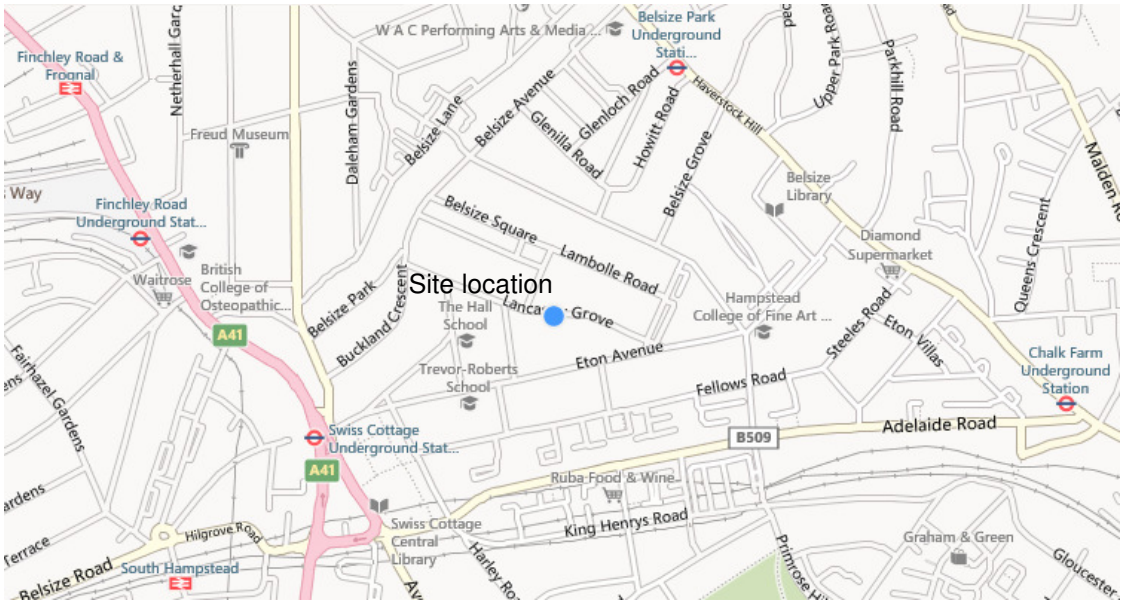
the capping slab is complete the superstructure works above can be commenced in accordance with the design requirements and detail specification.

9.2.6 Waterproofing Systems and Screed

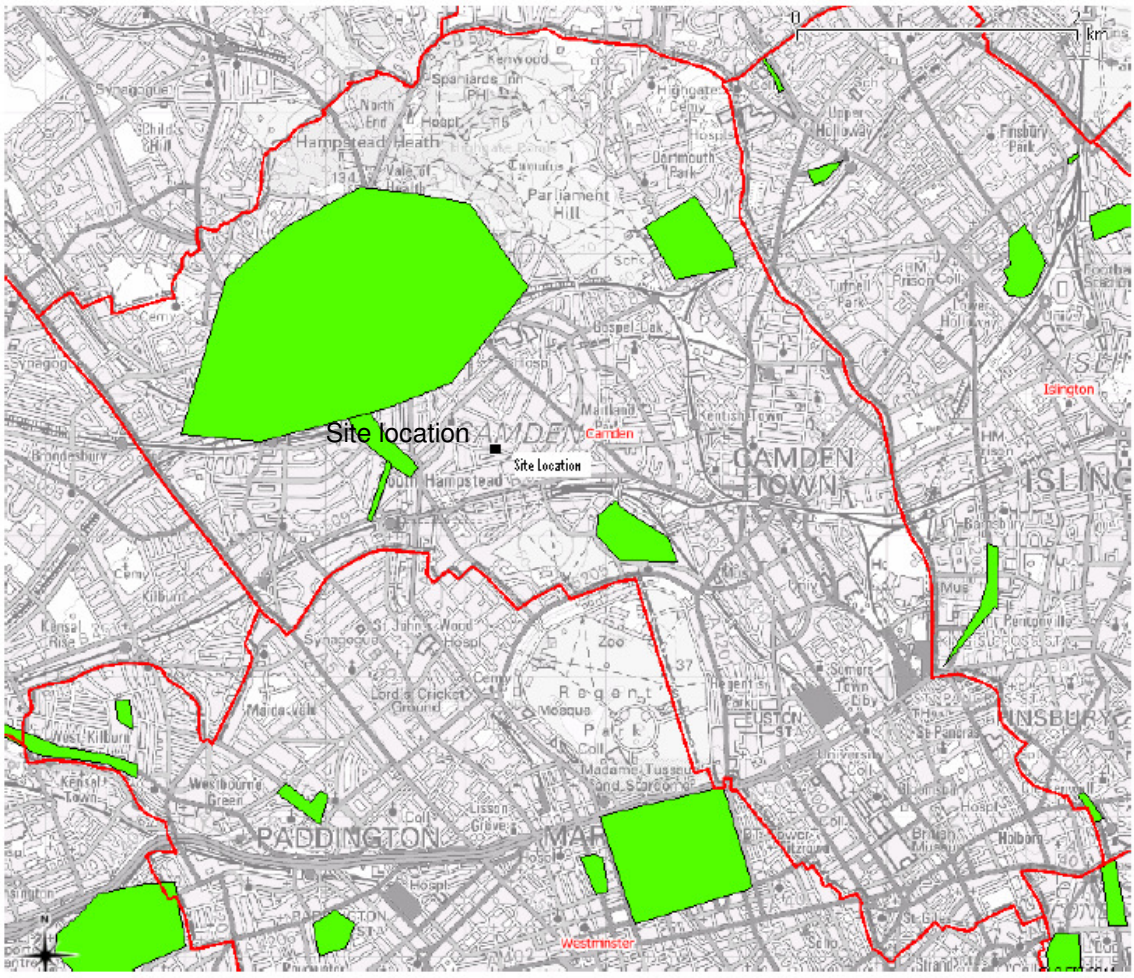
For all basement areas, the Architect will prepare design details in conjunction with a specialist contractor. The waterproofing system will be installed in accordance with the Architects details in conjunction with the specialist contractor technical specifications once the basement slab is complete.

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 on the slab surface.

APPENDIX A Site Location Plan, Study Area and Location of Past Floods



Site Location Plan



Study Area and Location of Past Floods (Camden Flood Risk Assessment 05/12/11)

APPENDIX B (A) **Site Investigation Report and Addendum letters.**

(Appendices available on request)

APPENDIX C Structural Drawings

Upton McGougan Limited Drawings

022.1798/01 P4	Sub Basement and Foundation Details
022.1798/02 P3	Ground Floor Layout
022.1798/06 P3	Building Sections 1
022.1798/07 P2	Building Sections 2
022.1798/100 P2	External Drainage Layout
022.1798/105 P1	Site Layout and Sections

KFR Consulting Engineering Drawings

293 001 120 P1	Construction process for Contiguous Piled Wall