BASEMENT IMPACT ASSESSMENT
69 KENTISH TOWN ROAD
LONDON
NW1 8NY

Revision A
11-08-2106

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1:0 INTRODUCTION

Rose & Associates have been commissioned to prepare a Basement Impact Assessment report to accompany a Planning application for the extension of an existing basement to 63 Kentish Town Road, London NW1 8NX. The semi– basement forms part of an extensive refurbishment to this existing property.

This Basement Impact Assessment is based on the criteria set down by Camden Council.

The property stands on the west side of Kentish Town Road (A440) just north of the junction of Hawley Road (A502)
The site is predominantly level with an altitude of approximately 27 meters above sea level.

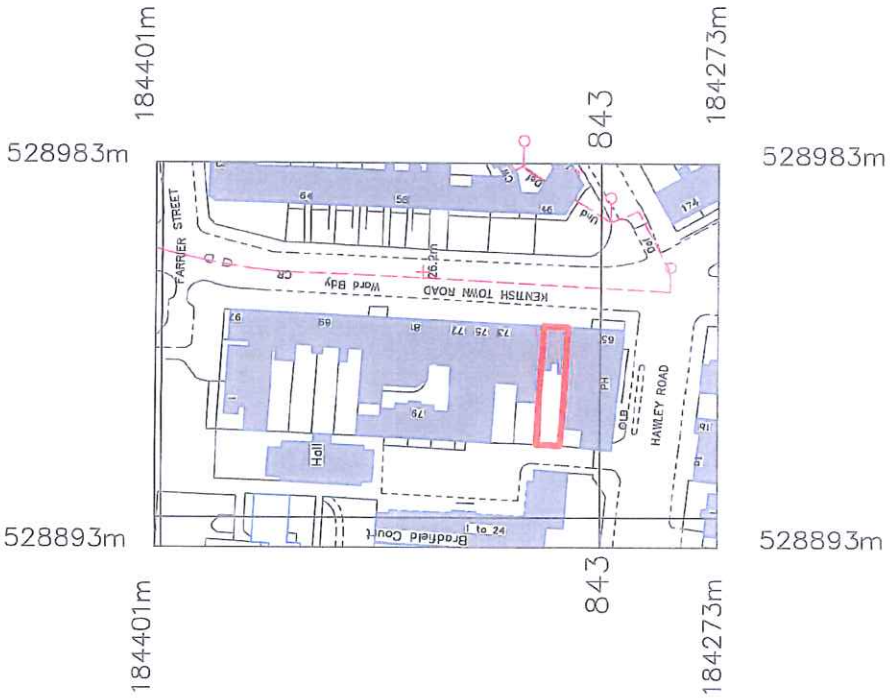
2:0 METHODOLOGY

Camden Council's guidance for Basements and Lightwells CPG4 requires a Basement Impact Assessment to be undertaken for new basements in the borough. This document sets out 5 stages which must be satisfied. These are:-

Stage 1: Screening
Stage 2:Scoping
Stage 3: Site investigation and study
Stage 4:Impact Assessment
Stage 5: Review and decision making

3:0 SITE DESCRIPTION AND PROPOSED REDEVELOPMENT

The site is located at 69 Kentish Town Road, London NW1 8NX on a general flat site as shown on the block plan shown below:-



The existing building forms part of a terrace with retail premises at ground floor level and domestic accommodation above. Although the building and those adjacent have rendered front elevations we believe the construction likely dates from the late Victorian period.

The building currently has a full height basement occupying the entire footprint of the building. We understand the properties forming this terrace on the west side of Kentish Town Road also contain similar basements.

The proposals are to refurbish all the existing commercial and residential elements of this four storey building and to extend across the full width of the site at the rear to include a similar basement creating a two and three storey extension.

These details are shown on the accompanying drawings prepared by Arthurell & Kirkland Architects

1169 -07-D	Proposed Section AA
1169 -08-C	Proposed Rear Elevation
1169 -12-C	Proposed Lower Ground Floor
1169 -13-C	Proposed Ground Floor
1169 -14-C	Proposed First Floor
1169 -15-C	Proposed Second Floor
1169 -16-C	Proposed Roof Plan
1169 -17-A	Proposed Section BB
1169 -18-A	Proposed Side Elevation

Currently the rear garden stands marginally higher than the public pavement at the front of the shops.

The refurbishment and redevelopment of the property will be undertaken using traditional construction techniques. The full depth basement immediately beyond the rear wall to the terrace abuts similar extensions to the two immediately adjoining properties.

Subject to trial pitting, traditional underpinning of the neighbours' foundations may be appropriate to maintain their stability when forming the new basement.

Note in the neighbouring plot (71) is an existing tree close to the rear garden boundary wall. The proposed rear extension will still be approximately 9 meters from this tree. The proposed construction therefore lies outside of this tree protection zone.

It is envisaged the foundations will compromise a reinforced concrete raft forming the basement floor slab which in turn will support reinforced concrete retaining walls. The walls will be cast in short sections akin to traditional underpinning, using the neighbouring soil as the back shutter. This technique will minimise lateral movement in the adjoining soils to within Burland's category of damage 2.

4:0 GEOLOGY AND FLOOD RISK

Reference to the British Geological Society data confirms that the building lies over an area of London clay to depths of about 52m which in turn overlying clay/ sand which in turn overlies chalk found at about 75m below ground level.

Reference to Borehole TQ285E5 which lies to the Southwest of the site grid, reference 5288850, 184138, also confirms clay to depth.

London clay is classified by the Environment Agency as non-productive strata (formerly defined as a non-aquifer)

The London clay formation is an over consolidated clay, usually firm to stiff, becoming very stiff at depth. The clay can vary between low to very high plasticity and may contain silt or fine grained sand.

Reference to Camden Council's Geological, Hydrogeological and Hydrological study (referred hereinafter in this report as CHHS) 'Watercourses' map, Figure II shows that the river Fleet runs down Kentish Town Road basically parallel to the shop frontage with a further tributary running along Hawley Road whereupon the two rivers meet. The river Fleet emanates from headwaters on Hampstead Heath separated by Parliament Hill fields before flowing south into the river Thames

Local enquiries have not revealed any flooding in the shop's basement although it is recognised that local flooding of Kentish Town Road is recorded in Camden's Planning Evidence CPG4 "streets at risk of surface water flooding," recorded in 1975 . It is worthy of note that there was no recorded flooding in 2002.

Further south, near the Mount Pleasant sorting office, Bazalgette's middle level sewer intercepts the river Fleet and carries it away to Beckton sewerage works. What remains of the former river flows to the Thames in a brick sewer.

5:0 SCREENING

To summarise, Camden Council's policy for basement and light wells CPG4 has been established to ensure that the new basement excavations do not:-

I Cause harm to the built and natural environment and local amenity.

II Result in flooding or

III Lead to ground instability

Further reference has also been made to London Borough of Camden's Geological, Hydrogeological and Hydrological study "Evidence for subterranean development" and in particular Chapter 6.

CPG4 guidance also requires any proposed development must assess the impact of the proposed works on:-

- Surface flow and flooding
- Subterranean (groundwater) flow
- Slope stability

CHHS provides 3 flow charts which are replicated below with respective answers and a narrative as to the response and proposals to mitigate any risks identified.

5:1 TABLE 1 – SURFACE WATER AND FLOOD SCREENING FLOW CHART:

No.	Question	Y/N
1	Is the site within the catchment of the pond chains on Hampstead Heath?	N
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?	N
3	Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?	Y
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?	N
5	Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	N
6	Is the site in an area known to be at risk from surface water flooding, such as South Hampstead, West Hampstead, Gospel Oak and Kings 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.	Y

Narrative

Q1, by reference to Figure 14, site lies south of Hampstead Heath.

Q2, part of the rear garden will become hard landscaped which will require formal drainage.. The new storm water drainage is to be designed to satisfy SUDS criteria and will use an attenuation tank to ensure the run off from the property does not exceed existing. The flat roof to the rear extension is designed as a green roof which will also act as a natural attenuation tank. See drawing 1169-16-B

Q3, again to ensure there is no increase in the storm water discharge from the site a green roof and attenuation tank with an hydro brake will be used.

Q4, the green roof and an attenuation tank will be used to control rainwater run off so there will be no change to instantaneous or long term surface water run off

Q6 Reference to CHHS Fig 15 and CPG4 indicates Kentish Town Road flooded in 1975 but significantly not in 2002. We believe this was likely due to an inundation of the road gullies leading to the road surface becoming flooded. We are not aware of any flooding to the basement of 69 Kentish Town Road, or their immediate neighbours.

5:2 TABLE 2 – SUBTERRANEAN (GROUNDWATER) FLOW SCREENING FLOWCHART

No.	Question	Y/N
1a	Is the site located directly above an aquifier?	N
1b	Will the proposed basement extend beneath the water table surface?	N
2	Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	Y
3	Is the site within the catchment of the pond chains on Hampstead Heath?	N
4	Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	Y
5	As part of the site drainage, will more surface water (e.g. rainfall and run off) than at present be discharged into the ground (not just the pond chains on Hampstead) or Spring line?	N
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?	N

Narrative

1a. The site is situated on London Clay which is classified by The Environment Agency as Unproductive Strata (formerly Non Aquifer). Reference to CHHS figure 8 also confirms this.

1b. The depth of the water table is unknown at the moment, but on the basis that the new basement is no deeper than existing, and the existing basement is not underwater, we believe the water table will be lower than the new basement.

2: Lies close to the river fleet, although it is understood the river is culverted in and around the Kentish Town Road area.

3: Site lies south of Hampstead Heath.

4: Some of the open ground associated with the rear garden will be built upon. Effect of increase in surface water run-off to be managed by green roof and drainage to satisfy SUDS criteria utilising an alternative tank and hydro brake.

5:3 TABLE 3 SLOPE STABILITY SCREENING FLOWCHART

No	Question	Y/N
1	Does the existing site include slopes; natural or man-made, greater than 7 degrees (approximately 1 in 8)?	N
2	Will the proposed re –profiling of landscaping at site change slopes at the property boundary to more than 7 degrees?	Y
3	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees?	N
4	Is the site within hillside setting in which the general slope is greater than 7 degrees?	N
5	Is the London clay the shallowest strata at the site	Y
6	Will any trees be felled as part of the proposed development and/or any works proposed within any tree protection zones where trees are to be retained?	N
7	Is there a history of seasonal shrink –swell subsidence in the local area, and/or evidence of such effects at site?	Unknown
8	Is the site within 100m of a watercourse or a potential spring line?	Y
9	Is the site within an area of previously worked ground?	N
10	Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?	N
11	Is the site within 50 meters of Hampstead Heath Ponds?	N
12	Is the site within 5m of a highway or pedestrian right of way?	N
13	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	N
14	Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	N

Narrative

Q1 -4 See the site plans, sections and photographs appended to this report. The site is generally flat.

Q2. Slope stability to be maintained using traditional underpinning which shall be temporarily propped until such time as conventional retaining walls are constructed to cater for both lateral earth pressures and vertical loads from the proposed new extension.

Q5. Although formal site investigation works have not been undertaken at this early stage, we believe the ground compromises top soil, possibly with an element of fill, overlying London clay to depth, all as confirmed on British Geological maps and boreholes.

Q6. Trees at rear of site are to remain and are outside tree protection zones.

Q7 Unknown, although as the building and those that surround it have basements the risk of subsidence is negligible.

Q8. Reference to CHHS Fig.II indicates the old River Fleet likely runs down Kentish Town Road. However we believe it is contained in a brick culvert.

Q9. Reference to British Geological maps do not indicate previously worked ground.

Q10. Inspection of CHHS Fig.8 shows the site lies outside of the Aquifer Designation Zone and London Clay is recognised as an unproductive strata.

Q12 Although the property fronts directly onto Kentish Town Road, the proposed extension lies at the rear of the terraced property and is therefore greater than 5m away from the highway or pedestrian right of way.

Q13. Adjacent properties already have basements.

Q14. No tunnels have been located passing beneath or close to the site. British Rail assets lie south of the site carried on brick viaducts. The Northern Line Edgware branch runs to the west of the site whereas the Barnet branch line runs to the east of the site.

6:0 SCOPING

6:1 RESULTS OF SCREENING PROCESS.

This initial screening assessment has been undertaken in accordance with the three flow charts detailed in Appendix E of the Basements and Lightwells Policy CPG4.

The purpose of this initial assessment was to identify factors which require further investigation to complete the Basement Impact Assessment. To aid simple identification we have set out below a summary of additional considerations and the potential impact these may have. This is basically where answers to the flow charts have primarily been answered as "Yes". Risks can be mitigated so a narrative of further investigative works or design proposals to mitigate the risks are set out below.

6:2 TABLE 1. SURFACE WATER AND FLOOD SCREENING

Q3. Detailed drainage design to be undertaken to SUDS requirements to ensure no increase in rain water run-off from the site.

Q6. Coupled with the green roof, provided the development incorporates drainage to SUDS criteria which may include an attenuation tank and hydrobreak there is no increase in storm water discharge from site, hence there is negligible risk of flooding to the proposed development.

It is anticipated SUDS design will be a planning condition which will become part of the design to satisfy Building Regulations.

No further investigations at this stage required.

6:3 TABLE 2 SUBTERRANEAN (GROUNDWATER) FLOW SCREENING FLOW CHART.

Q2. Site lies immediately adjacent to the old river Fleet. It is understood the Fleet runs in a brick culvert at this location.

Since reference to CHHS chart 15 shows the site lies outside of the Flood Map, it is considered no further assessment is required.

Q4. Some of the open ground associated with the existing rear garden will become hard landscaped. As we stated above provided the storm water run-off from the new development's green roof is managed via SUDS criteria and an attenuation tank and hydro break installed, if shown to be required, then there is no risk to the property and those that surround it, as well as the public space beyond.

No further investigations at this stage required.

6:4 TABLE 3. SLOPE STABILITY SCREENING FLOW CHARTS

Q8. As we stated above the old river Fleet likely runs in a brick culvert beneath Kentish Town Road. As the development lies at the rear of the terraced property we do not believe the river poses any risk to the development.

No further investigations at this stage required.

7:0 STAGE 3 INVESTIGATIONS AND STUDY

Based on information provided by the British Geological Society, site plans and borehole log, information provided by Camden's Geological, hydrogeological and hydrological study undertaken by Ove Arup & Partners Ltd (Fig.4 & 5) and our local knowledge, the ground compromises London clay to depth. This provides a relatively stable material for excavation works.

We don't think there will be a perched water table issue as the new basement is set broadly level or slightly higher than the existing basement.

The new extension is to be 'sandwiched' in between existing structures so trial pitting adjacent to the structures will be required so that appropriate foundations can be developed as part of normal Building Regulations design stage.

So that bulk excavations at the rear of the site for the new basement can take place, underpinning may be required. This will effectively lower the foundations to these adjacent buildings to maintain stability, both in the short term constructions stage and long term during occupation.

As the works are confined to the rear of the building there is no risk to the public footpath or highway.

It is a known fact that any excavation in clay will promote an elastic recovery in the remaining clay below. This action is commonly referred to as heave.

Any heave has the potential to damage the existing building as well as those that surround the proposed excavation works.

To mitigate the risk of damage it is commonly accepted that movement must be restricted to "slight" as defined in ciria publications C580. Slight is defined as movements causing cracks less that 5mm in width and is based on work undertaken by Burland et.al. A copy of crack classifications is shown at the rear of this report.

If the ground were to heave uniformly across the whole site as well as the adjoining plots, then in theory the buildings would all rise in unison and there would be no damage. Unfortunately the removal of clay on this site will cause a pudding effect diminishing in extent in the neighbouring plots. This causes angular distortions. It is these angular distortions which lead to crack damage.

A detailed assessment of two phases of construction have been considered:-

Phase 1.

Settlement of the Party walls if they are underpinned.

Settlement predicted to be 0.22mm. See page 06 of heave assessment calculations.

Phase 2.
Elastic heave recovery of the clay to depth following bulk excavations and a modest appraisal of the dead load generated by the two/three storey rear extension.

Total heave recovery predicted to be 3.6mm (See page 08) which would lead to angular distortions with predicted heave recovery at the Party wall of 2.7mm (See page 10)

8:0 STAGE 4

BASEMENT IMPACT ASSESSMENT

We have undertaken a detailed analysis of the risks associated with the proposed basement development at the above mentioned site, We believe this desk top appraisal, using the screening and scoping procedures laid down in CPG4 have identified the direct and indirect implications of the proposed development on the environment and properties in the immediate vicinity of the proposed works.

It is clear the development will increase the area of hard landscaping so there will be an increase in storm water run-off. As Kentish Town Road has a history of road flooding (1975) it therefore imperative that the increase in storm water is managed.

This can simply be done by designing the storm water to current Suds criteria initially using the green roof as a natural attenuation tank, ensuring that the storm water discharge from the site is not increased.

Clay is not a suitable medium to contemplate installing a soakaway so the drainage should be designed using the green roof attenuation tank and hydro break. Our recommendations are therefore to collect all of the storm water from the site into an attenuation tank and agree a revised discharge rate into the common sewer in Kentish Town Road. By negotiation this discharge rate could be less than the current runoff rate. A detailed design for building regulations approval and an application to discharge will resolve these issues.

Reference to various sources confirms the underlying geology is London clay to depth. Clay provides a relatively stable ground in which excavation works can proceed following good construction practices.

The stability of the adjacent buildings which currently hem in the proposed site can simply be underpinned if trial pit investigative works show the new basement is to be taken lower than the adjacent building's foundations. Providing these works are undertaken by competent contractors the proposed basement works do not pose undue risks to the neighbouring properties.

We have already discussed the known phenomenon of ground heave when excavating basements in a clay subsoil and have demonstrated by formal calculations that any ensuing ground movement would not cause cracking greater than 5mm, and hence category of damage 2. Criteria is satisfied.

In reality any heave movement will be very small given the relatively shallow excavations envisaged. The maximum predicted settlement of the Party walls is in the order of 2.7mm well below the maximum recommendations laid down by Burland and which sit within category "Slight"

Since the works are to be excavated at the rear of the site there is no risk to the public footpath, highway statutory services or Camden Councils assets in Kentish Town Road.

Taking all the matters discussed above we believe the risks associated with the proposed development to be no more significant than normal redevelopments and hence do not require any further investigations to satisfy Camden Councils Basement Impact Assessment criteria.

Signed .....
David Rose BSc (Hons) C.Eng. MICE; MIStructE.

Date..11th August 2016

TABLE 1. CLASSIFICATION OF CRACKS.

Where cracks are noted within the body of this report they relate to the standard classification given in the Building Research Establishment digest No: 251 entitled: 'Assessment of Damage in low-rise buildings.' Table 1 has been reproduced by permission of the controller of H.M. Stationery Office.

TABLE 1 CLASSIFICATION OF VISIBLE DAMAGE TO WALLS WITH PARTICULAR REFERENCE TO EASE OF REPAIR OF PLASTER AND BRICKWORK OR MASONRY.

CATEGORY OF DAMAGE	DESCRIPTION OF TYPICAL DAMAGE	APPROXIMATE CRACK WIDTH
0	Hairline cracks of less than about 0.1mm are classed as negligible.	up to 0.1 (1)
1	Fine (also noted as very slight) cracks which can easily be treated during normal decorations. Perhaps isolated light fracturing in building. Cracks rarely visible in external brickwork.	up to 1 (1)
2	Cracks easily filled. Redecoration probably required. Recurrent cracks can be masked by suitable linings. Cracks not necessarily visible externally. Some external repointing may be required to ensure weather tightness. Doors and windows may stick slightly.	up to 5 (1)
3	The cracks require some opening up and can be patched by a mason. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weather tightness often impaired.	5 to 15 (1) (or a number of cracks, each up to 3)
4	Extensive repair work involving breaking out and replacing sections of walls, especially over doors and windows. Windows and door frames distorted, floor sloping noticeably, walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15 to 25 (1) but also depends on the number of cracks.
5	This requires a major repair job involving partial or complete rebuilding. Beams lose bearing, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.	usually greater than 25(1) but depends on number of cracks.

Notes: 1. Crack width is one factor in assessing category of damage and should not be used on it's own as direct measure of it.
2. Local deviation of slope, from the horizontal or vertical, of more than 1/100 will normally be clearly visible. Overall deviations in excess of 1/150 are undesirable.

BRE Digests are available from:
Publications Sales Office, Building Research Establishment,
Watford, Herts WD2 7JR