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Engineering - materials, energy, structure

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The Studio 76 Parkhill Road

Basement Impact Assessment

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1. Introduction

It is proposed to construct a single storey basement beneath the existing single storey, residential dwelling on Parkhill Road. Ecos Maclean has been instructed to carry out a Basement Impact Assessment (BIA) to assess the potential impact on surrounding structures and hydrological features.

Camden Planning Guidance CPG4 Basements & Lightwells [1] requires that the impact of any new basement development in the borough be assessed according to the following 5 stages:

1. Screening
2. Scoping
3. Site investigation
4. Impact assessment
5. Review and decision making

This report is intended to address the screening, scoping and impact assessment processes set out in CPG4 and the Camden geological, hydrogeological, and hydrological study (CGHHS) [2]. The screening process identifies key issues relating to land stability, hydrogeology and hydrology to be considered as part of any proposed basement development.

This report also provides an assessment of geotechnical impacts on adjacent structures and the surrounding area based on available site investigation data. This includes design checks of proposed and existing retaining walls below existing structure, and a damage assessment to predict the impact on adjacent properties.

The proposed basement will extend approximately 3.0 metres below the existing property ground floor level. In preparing this BIA a thorough review of published and unpublished sources of information on Geology, Hydrogeology, Hydrology and Flood Risk has been undertaken.

2. Site Context

2.1 Site Location

The site is located at 76 Parkhill Road. The site location is shown in figure 1.



Figure 1: Site location plan & aerial photo

2.2 Site Layout

The studio is a small single storey detached dwelling in the rear garden of 76 Parkhill Road. The studio abuts the rear wall of the No 76 which is a four storey end of terrace now divided into flats. The south side of the studio is enclosed by a brick garden wall with the studio abutting the wall in part. There is a small enclosed paved courtyard garden to the east.

2.3 Proposed Development

Development plans and elevations, showing the site with existing and proposed condition, are included in Appendix A. The structural details of the underpinning and typical retaining wall details are provided in Appendix B.

2.4 Site History

Maps of the site dating from 1871 were obtained and are shown in figure 2. The site has been part of a residential setting since that date and Parkhill Road in its present day alignment. The general arrangement of the residential dwellings along Parkhill Road has not changed since that date.

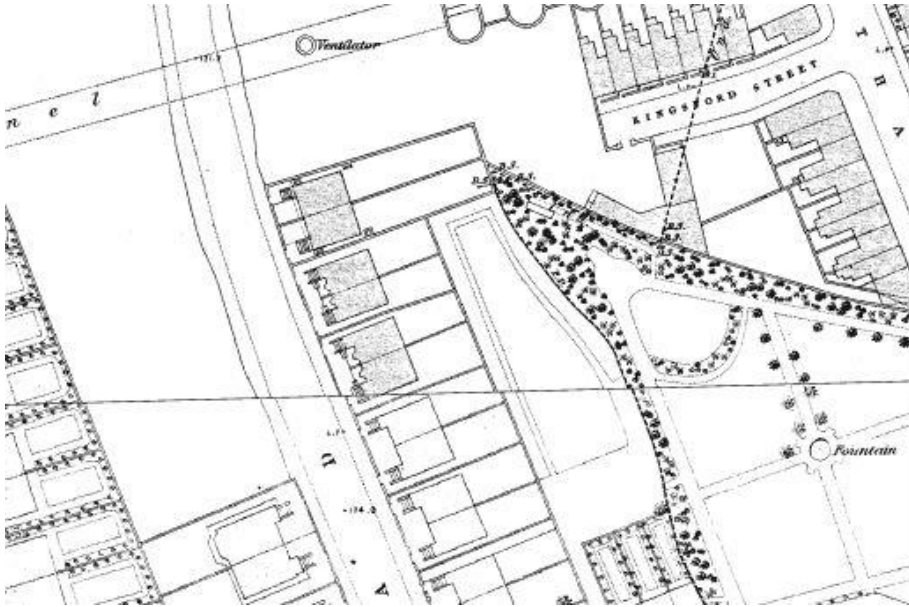


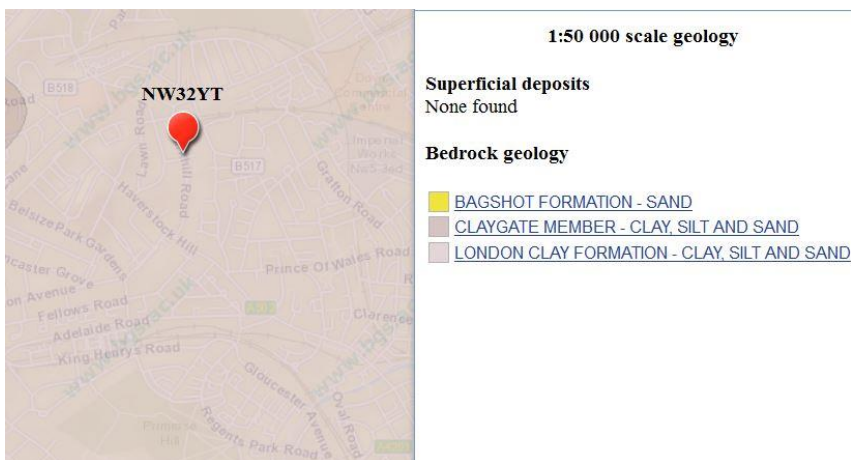
Figure 2: Parkhill Road residential setting 1870s

2.5 Topography

The site lies at an elevation of approximately 50mOD, sloping from West to East and covers an area of 100 sq. m. Parkhill Road at this point follows the contour and the rear gardens to the east in which the property is located are approximately 2 metres below road level.

2.6 Published Geology

The British Geological Survey (BGS) of the area indicates the site to be underlain by the London Clay Formation. The London Clay Formation is an over consolidated firm to very stiff, becoming hard with depth, fissured, brown to grey silty clay of low to very high plasticity.



2.7 Unpublished Geology

There are no boreholes records exist within 100m of the site boundary and so a borehole investigation was commissioned. The factual report is enclosed as an annex to this report and the results summarised in the table below.

Table 1: Results of Borehole investigation

Stratum	Depth (m)
MADE GROUND	0 to 0.9 metres
Orange brown silty sandy clay	0.9 to 1.7 metres
Light orange brown silty sandy clay	1.7 to 2.1 metres
Brown Mottled Clay	2.1 to 4.3 metres
END	4.3

Because the borehole had to be made using a hand auger the borehole investigation was not able to go beyond 4.3 metres.

The borehole investigation identified the presence of London Clay Formation around the site, the geological properties of which have been widely studied and are well known [2]. Further borehole investigations are therefore deemed unnecessary.

2.8 Hydrogeology

The Environment Agency (EA) has classified the site location as unproductive strata. The borehole record identified the presence of groundwater at 2 metres but this was considered moderate and not rising was recorded. The site is not within any groundwater source protection zones

2.9 Hydrology

The site is not located close to any rivers or drainage channels serving the borough of Camden.

2.10 Flood risk

With reference to the Environment Agency website Parkhill Road is not within a flood risk zone.

3. SCREENING

3.1 Subterranean (ground water) flow screening - Fig 1 [1]

	Question	Response	Justification	Reference
1a	Is the site located directly above an aquifer?	No	The site is located on unproductive strata as defined by the Environment Agency with low permeability that has negligible significance for water supply or river base flow.	Fig. 8 CGHH
1b	Will the proposed development extend beneath the water table surface?	No	The water table is below the impermeable clay which is below the level of the basement excavations	Table 1 Borehole Data
2	Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	No		Fig. 8, 11 and 12 CGHH [5] [6]
3	Is this site within the catchment of the pond chains on Hampstead Heath	No		Fig. 14 CGHH
4	Will the proposed development change the proportion of hard surfaced/paved areas?	No	The basement will occupy the footprint of the existing studio flat and the new lightwell will extend in the part of the full paved courtyard	Appendix A
5	As part of the site drainage, will more surface water than at present be discharged to the ground (e.g. via soak ways and/or SUDS)?	No		Appendix A
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.	No		Fig. 11 and 12 CGHH

Table 3: Subterranean Ground Water flow Screening

3.2 Slope stability screening - Fig 2 [1]

	Question	Response	Justification	Reference
1	Does the existing site include slopes, natural or manmade, greater than 7°? (approximately 1 in 8)	No	The slope of land around the site is less than 7°.	Site survey Fig. 16 CGHH [7]
2	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7°?	No	The slopes at the property boundary will be unaffected by the development.	Appendix A
3	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	No		
4	Is the site within a wider hillside setting in which the general slope is greater than 7°?	No		
5	Is the London Clay the shallowest strata at the site?	Yes		Fig. 2 CGHH
6	Question 6: Will any tree/s be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained?	No	There are no trees on the site	
7	Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	No	There is no evidence to suggest any history of shrink-swell subsidence	
8	Is the site within 100m of a watercourse or a potential spring line?	No		Fig. 8, 11 and 12 CGHH [5] [6]
9	Is the site within an area of previously worked ground?	No		[8]
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?	No	The site is situated on unproductive strata with negligible permeability that has a negligible significance for water supply or river base flow	Fig. 8 CGHH
11	Is the site within 50m of the Hampstead Heath ponds?	No		Fig. 2 CGHH

12	Is the site within 5m of a highway or pedestrian right of way?	No	The front of the building is set back from the highway	
13	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes	The new foundations for the basement will be approximately 2 metres below the level of the adjacent properties	
14	Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	No		

Table 4: Slope Stability Screening

3.3 Surface flow and flooding screening - Fig 3 [1]

	Question	Response	Justification	Reference
1	Is the site within the catchment of the pond chains on Hampstead Heath?	No		Fig. 14 CGHH
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	Site drainage will be channelled along the existing routes.	Appendix A
3	Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	No	The basement will be contained below the existing building and courtyard	Appendix A
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		Appendix A
5	Question 5: Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No		Appendix A
6	Question 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 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	.	Fig. 14 CGHH

Table 5: Surface Flow and Flooding Screening

4. SCOPING

4.1 Introduction

This section of the report covers the scoping process of the BIA, which is used to identify potential impacts of the proposed scheme on the groundwater, slope stability and surface water flow identified as risks in the screening stage. The scoping stage also informs the scope of any necessary site investigations and is used to establish a Conceptual Site Model (CSM).

4.2 Groundwater

The borehole investigations of the London Clay Formation around Parkhill Road found water at a depth of 2 metres, which is assumed to be a result of local surface water drainage which would be associated with the sandy, gravelly orange brown clay found at this level. No ground water was encountered at the lower level and it is therefore assumed that there will be a small amount of ground water present at the new depth of the proposed basement development.

4.3 Slope Stability

The shallowest strata at the site is London Clay which is known to be a consolidated clay formation and is therefore subject to some changes in volume when excavating. The potential impact of excavating is the possibility of volume changes causing movement and cracking of existing structures. However, the site is not into the over-consolidated London Clay, merely the 'weathered' brown London Clay which has no significant potential for volume change that might affect the adjoining structures or this new structure.

4.4 Surface Water Flow and Flooding

It was found in the screening stage that is no risk of flooding or history of flooding in Parkhill Road.

4.5 Consultation with local residents

A letter will be sent to local residents in order to inform them of the proposed development at Parkhill Road. A dialog will be opened with neighbours to agree on a suitable construction management plan that will ensure minimal impact on local residents and to address any comments or concerns.

4.4 Conceptual Site model

A conceptual site model before and after the proposed development has been formed based on a thorough investigation of the site and the surrounding area, in accordance with the

recommendations of the Camden geological, hydrogeological, and hydrological study it is summarised in sections 4.5.1 and 4.5.2 below.

The site is located in the London Borough of Camden on Parkhill Road. Below the main ground is the London Clay Formation assumed to be at least approximately 25 M thick, designated by the Environment Agency as unproductive strata in terms of ground water flow. The water table lies at least 25m below the current level of the site.

Hard surfacing is the predominant surface covering in the local area apart from the narrow gardens to the north of the property. The majority of rainfall incident on the surrounding area will run-off into local guttering and drainage system surrounding the site, with a proportion evaporating, a small proportion retained in the soil and root layer, and a very small proportion being absorbed by the London Clay.

The property and the neighbouring properties are constructed on shallow stepped or corbelled foundations

4.5.1 Existing

1. Made Ground to 1 metre depth
2. The London Clay Formation below Made Ground to at least 25 m depth.
3. Rainwater is channelled as surface run-off into the main drainage system, with a small proportion being evaporated.
4. Vertical load from rear wall of 76 Parkhill restrained by earth pressure

4.5.2 Proposed

1. Excavation of approx. 3m of London Clay from below existing property.
2. New basement occupies the footprint of the existing property.
3. Rainwater is channelled as surface run-off into the main drainage system, with a small proportion being evaporated.
4. Underpinning to resist the load of the rear wall of 76 Parkhill.

5. Site Investigations

5.1 Geotechnical Information

It is not considered necessary to carry out further borehole investigation; the borehole investigation gives sufficient information for the retaining wall and underpinning to be designed.

6. Subterranean (Groundwater) Flow

The site is located above London Clay which presents an almost complete barrier to groundwater. The development will have a negligible impact on the groundwater flow as the site is identified as being unproductive strata. Royal Geological Survey boreholes in the local area indicate that the water table is at least 25m below the level of Parkhill Road.

It is concluded that the proposed development will have no detrimental effects on the subterranean water flow and risk mitigation measures are not required.

7. Slope (Land Stability) Assessment

7.1 Adjacent Structures

The adjacent properties in road are assumed to be founded on shallow stepped foundations onto weathered London Clay. The introduction of a new basement has the potential to have a structural impact on the neighbouring properties.

7.2 Retaining Walls – Global Stability

7.4.1 General

The design ensures the walls are stable in sliding, overturning and ground bearing in both the permanent and temporary condition. It should be noted, calculations were completed using a partial safety factor method following the combinations outlined in design approach 1 in accordance with EC7, as below:

- Factor of Safety for angle of shearing resistance ($\tan \phi'$) = 1.25
- Factor of Safety for effective cohesion (c') = 1.25
- Factor of Safety for undrained shear strength (c_u) = 1.4

Geological parameters were assumed in accordance with Section 4.1. It should be noted that, in all calculations, the loading and material properties have been multiplied by the appropriate factor of

safety and as such a factor of safety greater than 1.0 represents a safe design. In the permanent condition the walls will be propped at the top and bottom by the ground floor slab and basement slab respectively, providing support against overturning and sliding. The underpinning below the foundations of the rear wall 76 Parkhill will prevent any movement in the wall above.

7.3 Damage Category Assessment

The construction scheme as currently envisaged to will ensure that there is negligible risk of cracking or other potential damage that may be caused to neighbouring structures and infrastructure.

8. Surface Flow and Flooding

Parkhill Road is outside the EA flood risk zone. The basement will be protected from water ingress by internal tanking and a drained cavity which are to be specified by the architect. All the surface run-off from the garden can be transmitted to the existing drainage by gravity. In addition the basement contains a shower, sink and toilet which will require its own foul drainage. Therefore a volume of foul water must be pumped out of the basement into the existing drainage system. A separate pump sets is required which will be housed in a service trench excavated below the level of the basement raft. All drainage from the property will be fitted with non-return valves to stop the back flow of water in the event of surcharge pressure on the drainage system

9. Conclusions

The findings of this Basement Impact Assessment are informed by site investigation for the site and structural drawings and calculations. On the basis of this information it is considered that the proposed development will not have a detrimental effect on groundwater or surface flooding in the vicinity of the site. The construction of the basement will not generate ground movements or impacts on the adjacent properties.

10. References

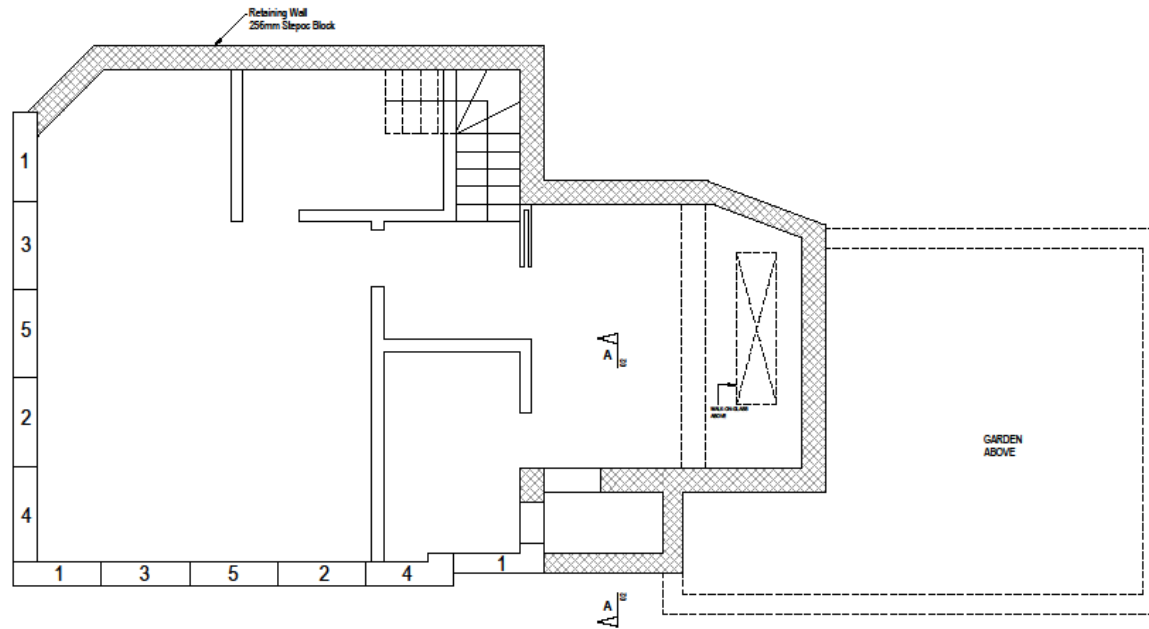
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11. The Author

Nick Maclean an engineer with over 40 years of experience has approved the basement impact assessment. He has above average experience of basements, commencing with being the Assistant Resident Engineer on the Barbican Arts Centre Site in 1973, ie 40 years, specifically tasked there with investigating and overseeing remedial works to the myriad defects in retaining walls and 1.5m thick cross site, jacked prop walls, which defects delayed the project for so long. This basement was up to 30m below street level, below the piled foundations of the adjacent 140m high Tower Blocks and the adjacent Metropolitan & Circle line tunnels.

Additionally, he has in the last 28 years in Private Consultancy been involved in numerous basements in Camden and other Inner London Boroughs, with two under construction presently and three in the design phase. Additionally he is active acting as checking engineer for Party Wall Matters on two basements where his intervention to refine the design is resulting in less excavation and steel.

Appendix 1 – Engineering design



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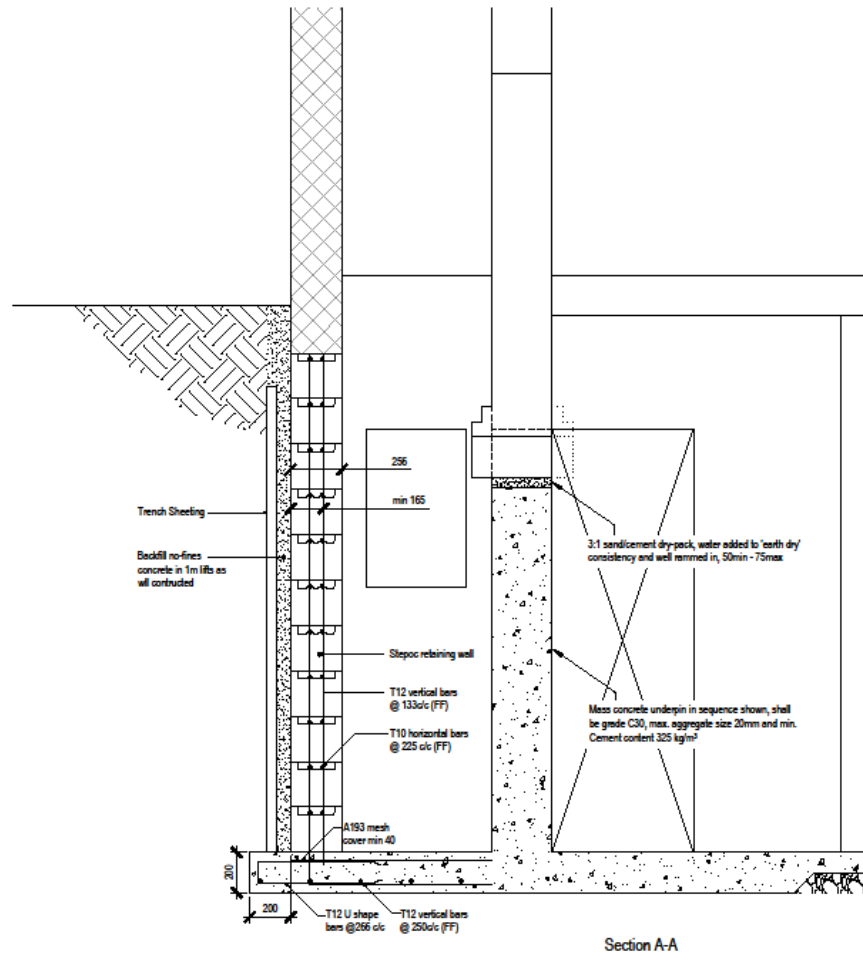
Client
 Robert Gamette

Project
 The Studio, 76 Park Hill Road
 London NW3

Title
 Foundation Plan

Revision	Date	Made by	Approved by

Date	Drawn by	Checked	
16.12.2013	JG		
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Client
Robert Garnette

Project
**The Studio, 76 Park Hill Road
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Title
Section A-A

Revision	Date	Made by	Approved

Date	Drawn by	Checked	
16.12.2013	JG		
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