

CHRIS BROWN STRUCTURAL ENGINEERING LTD

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PROJECT: 11150

37 & 39 RUDELL CRESCENT, LONDON, NW3 1RR

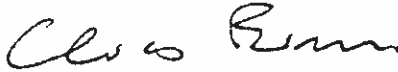
TITLE: BASEMENT IMPACT ASSESSMENT – SLOPE STABILITY

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DOCUMENT REVIEW SUMMARY

Revision	Date	Filename	Description
Rev P1	21/09/11		Initial Issue
NAME: Dr Christopher Brown MEng, PhD, CEng, MStructE			SIGNED: 

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SITE DESCRIPTION

- 1.1 The site comprises of two adjoining terrace houses on the north side of Rudall Crescent, NW3 1RR. The houses are considered to have been built circa 1960's and form a part of a terrace of six houses of a similar appearance.
- 1.2 A review of historical maps indicates the first record of Rudall Crescent in 1896 although the site of the houses is vacant. No record of any property is shown until record maps post 1968.
- 1.3 The construction of No.s 37 & 39 is similar and comprises of a split level between the front and rear of house. The change in level is estimated to be 900mm.
- 1.4 The proposed alterations including lowering the ground level at the front of the house to match that at the rear. Additionally, it is proposed to construct a single storey basement under each house. This will be located within the footprint of the houses with the exception of a small lightwell to be located at the front.
- 1.5 Chris Brown Structural Engineering Ltd have been appointed by the owner of these properties to carry out an appraisal of the structural and slope stability aspects of the Basement Impact Assessment (BIA) in accordance with Camden Planning Guidance Document CPG4, "Basements & Lightwells"

STAGE 1 – SCREENING

QUESTIONS ARISING FROM CPG4 FIGURE 2, SLOPE STABILITY SCREENING FLOWCHART:

- Q1** Does the existing site include slopes, natural or man-made, greater than 7 degrees (approximately 1 in 8)?
- No. With reference to Figure 16 of the Camden Geological, Hydrogeological and Hydrological study prepared Arup, dated Nov 2010 the site slope does not exceed 7 degrees. Additionally, if the site is assumed to slope gradually from the front to the rear of the house, instead of a 900mm change in level, then the equivalent slope would be 5.7 degrees.
- Q2** Will the proposed re-profiling of the landscaping at site change slopes at the property boundary to more than 7 degrees (approximately 1 in 8)?
- No. The basement is to be located under the existing buildings and the lightwell to be positioned in an existing area at the front of the house which is approximately flat. No other landscaping around the property is proposed.
- Q3** Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees (approximately 1 in 8)?
- No.
- Q4** Is the site within a wider hillside setting in which the general slope is greater than 7 degrees (approximately 1 in 8)?
- No. With reference to Figure 16 of the Camden Geological, Hydrogeological and Hydrological study.
- Q5** Is the London Clay the shallowest strata on the site?
- No. With reference to Figure 4 of the Camden Geological, Hydrogeological and Hydrological study and online maps available from British Geological Society the site is located on the Claygate Member.

Q6 *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. The existing ground to the front in vicinity of the proposed lightwell is currently paved.

Q7 *Is there a history of seasonal shrinkage-swell subsidence in the local area, and/or evidence of such effects on the site?*

No. A mature London Plane tree was observed in the adjoining garden at the rear of No. 39 but an inspection of No.s 37 & 39 both internally and externally did not indicate any signs of cracks within finishes of any kind, or evidence of any repairs. Additionally, neither property had not been decorated for a considerable period time so would suggest that the buildings are not susceptible to periodic ground movements.

Q8 *Is the site within 100m of a watercourse or a potential spring line?*

No. Figure 11 of the Camden Geological, Hydrogeological and Hydrological study indicates that the nearest water course is 500m away and the site is >100m from the geological boundary between the Bagshot Sands with the Claygate Member and also the Claygate Member with the London Clay.

Q9 *Is the site within an area of previously worked ground?*

No. Historical maps do not show any areas on or near the site labelled as "worked ground", "old pits", "formerly dug" or "brickyard". However it is expected that the ground immediately below the surface is will have been reinstated after construction works were completed. Additionally, interpreting Figure 17 of Camden Geological, Hydrogeological and Hydrological study does not show the region to in an area of slope instability. This appears to be located close to the boundary between the Claygate member and London Clay.

Q10 *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?*

It is thought not though some minor dewatering may, nonetheless, be required for short periods from time to time during construction as a result of water trapped in the top soils and around the existing foundations.

Q11 *Is the site within 50m of the Hampstead Heath ponds?*

No.

Q12 *Is the site within 5m of a highway or pedestrian right of way?*

Yes. The proposed lightwell is approximately 3m from the highway and 1.5m from the pavement.

Q13 *Will the proposed basement significantly increase the differential depth of foundations relative to the neighbouring properties?*

Yes. It is expected that the existing foundations will comprise of mass concrete strip foundations located at a depth of upto 1m below the surface. It is not expect that the foundations will extend to any greater depth for a building of this age.

Q14 *Is the site over (or within the exclusion zone of) any tunnels, eg railway lines.*

No. Figure 18 of the Camden Geological, Hydrogeological and Hydrological study indicates the nearest tunnel to be the Northern Line of London Underground Ltd. This is broadly aligned with Hampstead High St which is approximately 150m away.

STAGE 2 - SCOPING

WITH REFERENCE TO CHAPTER 5 OF THE CAMDEN GEOLOGICAL, HYDROGEOLOGICAL AND HYDROLOGICAL STUDY

GENERAL

The existing slope at the site is less than 8 degrees so is considered to be within the limiting maximum stable angle for a natural slope for the Claygate Member. Additionally, the site is remote from the area of slope instability as shown in Figure 16 of the Camden Geological, Hydrogeological and Hydrological study.

The subterranean structures will be designed to withstand applied water and earth pressures in addition to surcharge loads applied at ground level. This will ensure that the ground will remain stable in the permanent condition.

However, consideration will need to be given to the stability of the surrounding ground during construction. This includes the effect on neighbouring properties each side and the highway to the front.

STRUCTURAL DAMAGE BEYOND THE SITE BOUNDARY

Before the works: The proposed basement construction will require a Party Wall Agreement with owners of the neighbouring properties. Part of this agreement will include a condition survey of the existing buildings.

- DURING THE WORKS:

The screening stage highlighted the proximity of the lightwell to the site boundary with the pavement and highway. A suggested method statement has been prepared which will be issued to the contractor. Please refer to Appendix A.

It is proposed to adopt a series of reinforced concrete underpins to form the walls to the proposed basement which will be located under the party walls and front facade. These walls act as a deepened foundation to the walls above also as a retaining wall. A construction sequence will be prepared showing a hit/miss pattern of installation. The length of each will be in the region of 1.0 to 1.5m long.

- AFTER THE WORKS, CHANGE IN STIFFNESS OF FOUNDATIONS:

The proposed foundation depth will be deeper than the neighbouring properties and is likely to be founded on stiffer ground. However, the proposed works are not considered to affect the foundation loads so problems associated with differential settlement will be avoided.

- AFTER THE WORKS, CHANGE IN DEPTH OF FOUNDATIONS:

This issue primarily relates to settlement associated with moisture change in London Clay. The geology of this ground is the Claygate Member and it appears the buildings have not previously been affected by moisture changes. Additionally, deeper foundations will also mitigate the effect of soil shrinkage.

STAGE 3 – SITE INVESTIGATION & STUDY

The screening process indicated that the gradient of the ground is such that slope instability is unlikely to occur and ground composition is likely to be a mixture of clay, silt and sand as associated with the Claygate Member. No additional weight is to be added to the building so the foundation bearing pressures will remain unchanged.

It is therefore not considered necessary to carry out an intrusive site investigation to determine the ground composition and determine the parameters for geotechnical design. Instead, the basement will be designed following the guidance of BS8102.

Environment Agency flood maps show the site is not within an area at risk of flooding. Additionally, Rudell Crescent is not listed in CPG4 as area previously flooded and therefore at risk.

STAGE 4 – BASEMENT IMPACT ASSESSMENT

- 4.1 The existing building is assumed to be constructed on shallow strip foundations formed using mass concrete. All walls in the region of the proposed basement will be underpinned which will maintain the foundation to building above and also form a retaining structure to resist earth and water pressure in addition to surcharge loads. Subject to a Party Wall Agreement, reinforcement will be included with the proposed basement walls in order to provide sufficient strength to act as a retaining structure. All underpinning will be carried out in short lengths in a carefully controlled sequence to ensure that the adjoining structures remain stable and entirely safe at all times.
- 4.2 A lightwell is proposed to be formed at the front of the each property. This will also be formed using a reinforced concrete wall cast in-situ. Temporary propping will be adopted in order to maintain stability to the excavation and maintained until the permanent structure has been completed, cured and backfilled.
- 4.3 The proposed sequence of works and temporary propping measures is anticipated to mitigate any damage to neighbouring properties and settlement of the highway. It is expected that the resulting movement will fall the category of negligible or very slight as defined by Burland *et al* in CIRIA Report C580.
- 4.4 It is therefore considered that any movement monitoring of adjacent buildings will not be necessary.

APPENDIX A – LIGHTWELL CONSTRUCTION**SUGGESTED METHOD STATEMENT**

PROJECT: 37/39 RUDALL CRESCENT, NW3 1RR	JOB NO: 11150
WORK LOCATION: FRONT OF HOUSE	DATE: 21/09/11
WORK ACTIVITY: EXCAVATION FOR LIGHTWELL CONSTRUCTION	PREPARED BY: CJB
OBJECTIVE: To form open excavation to allow the construction of a lightwell to existing basement at the front of the house.	
TIMESCALE: Work to start as soon as approval granted. Duration TBC by contractor.	
GROUND CONDITIONS: <ol style="list-style-type: none"> 1. Geology maps indicate Claygate Member, although surface deposits of made ground expected. 2. Anticipate that front wall foundations were constructed in open excavation and subsequently backfilled to form formation for hardstanding at front. 3. Made ground expected to a depth of approximately 1.0m. Ground expected to be unstable. 4. Depth of proposed excavation to approx 3.0m. 	
RISKS IDENTIFIED: <ol style="list-style-type: none"> 1. Collapse of sides to an open excavation. 2. Risk of falls into open excavation. 3. Undermining existing foundations. 	
SUGGESTED WORK SEQUENCE: <ol style="list-style-type: none"> 1. Break out hard standing and had dig initial depth to identify and incoming services. 2. Stop works if any incoming services are found and refer to relevant utility company for diversion. 3. Provide temporary support to any existing drains identified using a steel beam above which is supported at ground level on each side of the excavation. Note: Additional drainage to be designed to suit requirements of proposed basement and included a sump and pumps to connect to existing drain. 4. Install fencing around excavation and display signs warning of open excavation. 5. Hand dig entire excavation to a depth of 1m ensuring that spoil is removed from sides of excavation. Works to be supervised at depths greater than 1m. No lone working permitted. 6. Install close boarding running horizontally and soldiers running vertically. 7. Install props across the length and breadth of excavation at the top and bottom of soldiers. 8. Continue hand digging by another 0.75m. If ground appears to be loose then install another level of close boarding, soldiers and props. If ground appears to be firm clay then install further levels of propping at depth intervals of 1m. 	

SUGGESTED WORK SEQUENCE CONT.

9. Soldiers at base of excavation to be embedded into ground by at least 300mm to avoid the use of props at base of excavation.
10. Pour nominal 50mm blinding layer at base of excavation.
11. Install lintel in existing front wall to form opening to proposed lightwell using Acro props to provide temporary support to front wall.
12. Create opening in front wall under lintel. Use saw cuts at sides of opening to avoid damaging the surrounding brick to be retained.
13. Fix reinforcement to the base slab and wall starters, install formwork, waterproofing seals and pour base slab.
14. Install waterproof seals to walls and pour kickers.
15. Fix wall reinforcement, install wall formwork for first lift and pour concrete.
16. Remove bottom level of temporary support and reinstate behind wall with well compacted granular fill.
17. Repeat stage 16 for the second and subsequent lifts until the wall reaches the top of the excavation.
18. Install stairs and permanent railing around top of lightwell.
19. Remove temporary fencing.

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