27 April 2016

Our ref J15113/MC/2

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Dear Alex

Re: AUDIT OF REVISED BASEMENT IMPACT ASSESSMENT FOR 168 HAVERSTOCK HILL, LONDON NW3 2AT (2014/6736/P)

Further to your instruction, we have now completed our audit of the revised Basement Impact Assessment (BIA) relating to the proposed basement construction at the above site and this letter forms our report on the review.

A BIA was undertaken previously by Knapp Hicks Limited, referenced 32399/R/001/RJM Basement Impact Assessment (BIA) & Site Investigation Report for 168 Haverstock Hill, London NW3 2AT, dated October 2014. It was reviewed by GEA in May 2015 and was found not to meet the requirements of London Borough of Camden (LBC).

1.0 INTRODUCTION

1.1 Brief

Geotechnical and Environmental Associates Limited (GEA) has been instructed by London Borough of Camden (LBC) to undertake an independent audit of a BIA for the above site and an assessment of the completeness of the submission in satisfying the requirements of Camden Planning Guidance 4 (dated July 2015).

Specifically LBC has requested that GEA provide an opinion on whether:

1. *The submission contains a Basement Impact Assessment, which has been prepared in accordance with the processes and procedures set out in Camden Planning Guidance 4 (2013).*

2. *The methodologies have been appropriate to the scale of the proposals and the nature of the site.*

3. *The conclusions have been arrived at based on all necessary and reasonable evidence and considerations, in a reliable, transparent manner, by suitably qualified professionals, with sufficient attention paid to risk assessment and use of conservative engineering values/estimates.*

4. *The conclusions are sufficiently robust and accurate and are accompanied by sufficiently detailed amelioration/mitigation measures to ensure that the grant of planning permission would accord with DP27, in respect of*

   a. maintaining the structural stability of the building and any neighbouring properties
   b. avoiding adversely affecting drainage and run-off or causing other damage to the water environment and
   c. avoiding cumulative impacts on structural stability or the water environment in the local area.

In addition, LBC specify the following requirements of the assessor because of criticisms and concerns raised by neighbours in respect of this proposal and another close by:

5. *Raise any reasonable concerns about the technical content or considerations of the submission which should be addressed by the applicant by way of further submission, prior to planning permission being granted. In this case it would need to be apparent that the submission so deficient in some respect that the three conclusions (points 4a-c above) cannot be guaranteed without further information at this stage. Please clearly denote the precise information (if any) that would be required to satisfy 4a-c.*

6. *Raise any relevant and reasonable considerations in respect of the structural integrity or condition of the neighbouring properties which may be unknown or unaccounted for by the submission or which would benefit from particular construction measures or methodologies in respect of the development following a grant of permission for the development. Please clearly denote what such conditions should entail.*

1.2 Proposed Development

The site comprises No 168 Haverstock Hill which, in May 2015, is understood to have comprised a four-storey semi-detached building with a lower ground floor formed as a semi-basement and lightwells to the front (southwest) and side (southeast). The lower ground floor level is understood to have been extended to the rear of the building in 2004/5 along with a lowered garden terrace and a single storey extension.

The proposed redevelopment is understood to comprise the construction of a single-storey basement beneath the lower ground floor level which will extend over the entire footprint of the existing building, extension and garden terrace. In addition a swimming pool is proposed for the central section of the rear part of the basement and will extend by a further part-storey.

1.3 Documentation

The revised BIA has been prepared by Soiltechnics Limited and is referenced as having been updated in December 2015. This supersedes the previous BIA but no additional site investigation or groundwater monitoring has been undertaken since the previous BIA.

2.0 AUDIT OF THE BASEMENT IMPACT ASSESSMENT

2.1 Qualifications and Procedure

This audit has been undertaken by Martin Cooper, a Chartered Civil Engineer (CEng) and Member of the Institution of Civil Engineers (MICE) with over 25 years of experience in the geotechnical industry in conjunction with Steve Branch, a Chartered Geologist (CGeol) specialising in engineering geology and geotechnical engineering for over 28 years with specific extensive knowledge and experience of the ground and groundwater conditions in the London Borough of Camden.

The review has been carried out by reviewing the BIA in the light of the following documents:

- Camden geological, hydrogeological and hydrological study; Guidance for subterranean development, Issue 01, November 2010 ('The Arup report')
- Camden Planning Guidance, basements and lightwells, CPG4, 2015.
- Camden Development Policy DP27: Basements and lightwells

2.2 Overview

The requirements of a BIA are set out in CPG4 and fully detailed in Section 6 of the Arup Report. A BIA requires five Stages, as follows:

- Stage 1 – Screening
- Stage 2 – Scoping
- Stage 3 – Site Investigation and study
- Stage 4 – Impact assessment
- Stage 5 – Review and decision making (undertaken by LBC).

The BIA is authored by Nigel Thornton, a Chartered Civil Engineer (C.Eng) and Member of the Institution of Civil Engineers (MICE) and his CV which is appended to the report indicates the appropriate level of expertise and experience in ground engineering and experience in preparing flood risk assessment and drainage designs. In addition evidence has been provided of the consultation and review of the BIA by John Evans of Chord Environmental Limited who is a Chartered Geologist (C.Geol) and has provided specialist advice in respect of groundwater. It is therefore concluded that the report meets the requirements of CPG4 (2015) in respect of the authors' qualifications.

The first stage of the BIA methodology is screening, where matters of concern are investigated and the requirement for a full BIA is established. Three main issues are required to be considered: surface flow and flooding, slope stability, and subterranean flow. Each of these issues is covered by a separate screening flowchart (included as Figures 1 to 3 in CPG4) to assist the screening process, whereby a series of questions are posed regarding the site and the proposed development.

The BIA presents the methodology in an illogical sequence in that the flood risk is presented before the site investigation which is before the scoping which is in turn set out before the screening flowcharts.

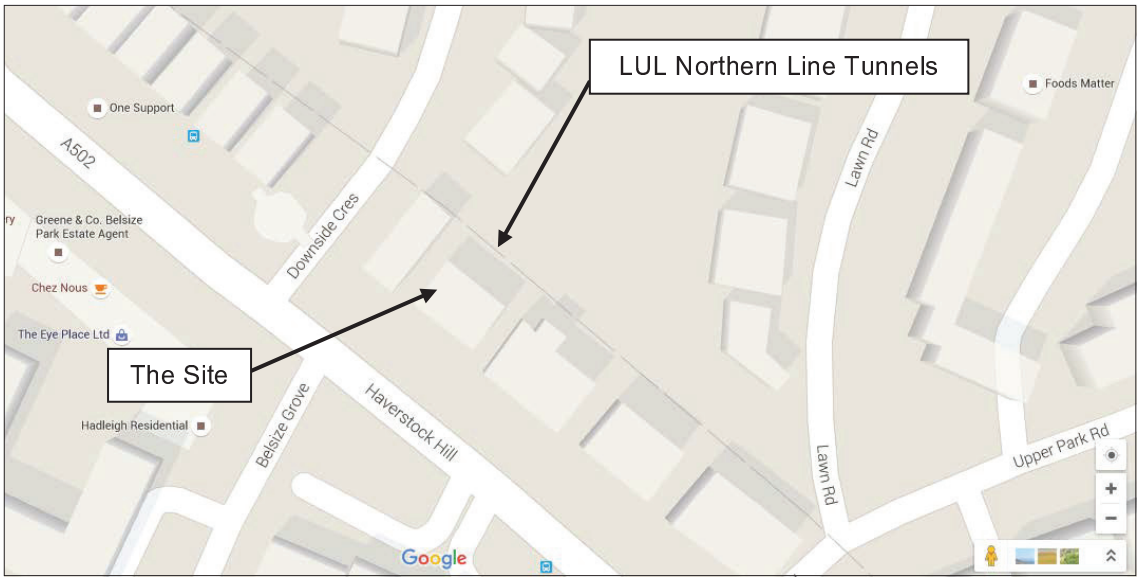
2.3 Stage 1 - Screening

The Screening sections of the Soiltechnics report (Section Nos 9 to 11) provide answers to the questions included in all three of the CPG4 Screening Assessment flowcharts.

Within Section No 9, the subterranean (groundwater) flow screening flowchart, all questions are answered 'No'. It is considered that these answers and their respective justification comments are generally appropriate although Question No 1b asks whether the proposed basement will extend beneath the water table surface. The site investigation information has been used to inform this answer as groundwater was encountered within the two boreholes advanced and was measured in a single subsequent monitoring visit. However, the groundwater is recorded on the borehole logs as having been a steady slow inflow but no details on its level or the results of the subsequent monitoring have been provided. Further, given the length of time between the previous submission and this one, it is considered remiss that further groundwater monitoring has not been undertaken.

Section No 10 considers the slope stability screening flowchart and answers 'Yes' only to Question Nos 5, 13 and 14. The comments that justify the 'No' answers to the remaining questions are considered to be reasonable. Question No 5 refers to London Clay being the shallowest stratum on site. Of particular note is Question 10 where the groundwater considerations are developed but the comments are general in that they relate to London Clay only and there is no reference to the borehole monitoring data. It is noted that the previous BIA recommended additional investigation but it appears that no further work has been undertaken

to inform this BIA. Question No 13 refers to significant increases in the differential depth relative to adjacent properties. We concur with the response to this question but there is insufficient detail to assess the impact at this stage. Question No 14 refers to the proximity of tunnels to the development. The previous BIA made reference to the Northern Line tunnels which appear lie at depth in beneath the rear of the site as shown on the extract from Google maps below.



The Soiltechnics BIA, however, indicates that there are no tunnels within 50 m of the site. It is considered that this is an incorrect statement and now that the scheme has a bored pile wall probably directly over the tunnels then contact with London Underground Limited should take place and their requirements should be confirmed and incorporated into the BIA. The Belsize Park Deep Level Air-Raid Shelter is also noted to be present in the vicinity of the site although it is understood that the shelter lies to the northwest of the Northern Line tunnels and at a depth that is unlikely to be significantly affected by the proposed basement.

All of the questions in Section 11, the Surface flow and flooding flowchart, have been answered 'No'. It is considered that these responses and the justification comments are appropriate.

The conclusions of the screening stage are generally considered to be appropriate but additional information is needed before being considered satisfactory.

2.4 Stage 2 - Scoping

The Scoping stage has been condensed into a small table that forms Section No 8 of the BIA but the points noted above mean that it cannot be considered adequate.

2.5 Stage 3 – Site Investigation and Study

The ground investigation has been extracted from the previous Knapp Hicks BIA and, as we stated in the previous review is barely sufficient to design foundations with soil strength parameters having been derived only from pocket penetrometer testing. Further investigation was recommended by Knapp Hicks and we concurred that this should be undertaken in order to inform the design and confirm the suitability of the proposed construction method. However, no additional investigation has taken place and what has been provided is considered barely sufficient to design the underpins but wholly inadequate to design the bored pile wall to the rear of the property.

2.6 Stage 4 – Impact Assessment

No construction sequence has been put forward and no depth or sizing of the underpins has been given, merely the comment that they will bear within the London Clay. A very simplistic ground movement assessment has been provided but there are no drawings to show how underpin or pile depths have been obtained. It is considered that the ground movement assessment should follow the approach set out in CIRIA C580 in respect of piled wall installation as well as excavation to basement level. The new lightwell to the front of the

property as noted to be constructed using a 'structural retaining wall'. We are of the opinion that all retaining walls are structural and what is meant by this should be clarified and its proposed construction methodology should be confirmed. In addition to the movements arising from the wall installation and excavation calculation are required to determine the extent of the heave of the London Clay due to reduction in overburden pressure during excavation of the basement and especially the swimming pool. It may be that the new loadings will off-set that unloading but if that is to be the case then the magnitude of the reloading needs to be justified.
In any case the effect of heave on the adjacent buildings needs to be confirmed in addition to the installation and excavation movements. The calculations provided are useful but are limited in their extent and do not appear to have satisfactorily considered all aspects of the basement construction.

On the basis of the above the report falls short of satisfying the requirements of CPG4 and further work is required.

2.7 Further Information Required

The BIA document reviewed provides a barely adequate description of the topographical and environmental setting of the site. It includes a thorough screening assessment but with a small number of errors. The following items, whilst not forming an exhaustive list, are considered to be essential in forming a properly reasoned and justifiable basement impact assessment.

- A clear and logical progression through the later stages of the BIA, including data from additional site investigation, with further monitoring of groundwater levels, to inform the assessment stage of the BIA.

- Evidence of communication with LUL and confirmation of their approval of the scheme or else confirmation of their requirements before commencing work. This may include a ground movement assessment and damage assessment in respect of the running tunnels.

- Formulation of a detailed construction methodology and sequence including proposals for the new front lightwell.

- Additional assessment of ground movements resulting from the basement construction, including an assessment of heave, damage category and proposals for monitoring and mitigation as necessary.

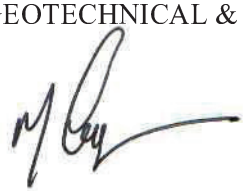
- An assessment of effects on groundwater and any required mitigation measures.

3.0 SUMMARY

Our review has found that the BIA report is not sufficient, does not provide a sufficient assessment of the impacts of the proposed basement and needs to be rewritten in the light of a detailed construction methodology informed by the recommended additional site investigation.

We trust that the foregoing comments are sufficient for your needs. Plainly, further work is required but we would be pleased to discuss our comments in more detail if required and to provide any additional assistance that may be necessary.

Yours sincerely
GEOTECHNICAL & ENVIRONMENTAL ASSOCIATES



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