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Our ref J15085/SB/3

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Dear Alex

**Re: AUDIT OF BASEMENT IMPACT ASSESSMENT FOR 4 TAVISTOCK PLACE,
WC1H 9RA (2015/0837/P)**

Further to your instruction, we have now completed our audit of the Basement Impact Assessment (BIA) relating to the proposed basement construction at the above site and this letter forms our report on the review. Further to your instruction, we have now completed our review of the revised Basement Impact Assessment (BIA) relating to basement construction at the above site and this letter forms our report on the review. It should be read in conjunction with our letter J15085/SB/2 dated 29 April 2015.

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 documentation for the above site and an assessment of the completeness of the submission in satisfying the requirements of Camden Planning Guidance 4.

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*

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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.

1.2 Existing building

No 4 Tavistock Place comprises a six-storey terraced property with a lower ground floor adjoining similar buildings fronting onto Tavistock Place and bounded to the south by Bloomsbury Ambulance Station. It is understood that No 2 Tavistock Place to the west has already completed a basement extension similar to that proposed and that No 6 to the east has a lower ground floor at the same level as the proposed basement floor level of No 4.

1.3 Proposed development

The proposed development comprises lowering the lower ground floor by about 0.70 m to a level of 20.82 m OD and extending this new basement level into the rear garden. The garden walls are proposed to be underpinned to lower the garden level to the new basement level.

1.4 Documentation

We were previously provided with a Screening and Scoping Study (Revision 1, Ref CG/18292, dated February 2015, prepared by Card Geotechnics Limited (CGL) and a Structural Engineer's Construction Method Statement (CMS) by Form Structural Design (ref 142264 rev P1, dated 6 February 2015).

Additional work has now been carried out and we have been provided with a letter by CGL titled *4 Tavistock Place, Basement Impact Assessment: Stage 4* (ref CG/18292a, dated 20 May 2015) and a revised Structural Engineer's Construction Method Statement (CMS) by Form Structural Design (ref 142264 rev P3, dated 20 May 2015). The CMS includes a Factual Report of Ground Investigation by Aviron (ref 15-192.01, dated May 2015).

2.0 AUDIT OF THE REVISED BASEMENT IMPACT ASSESSMENT

2.1 Qualifications and Procedure

This audit has been undertaken by 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, in conjunction with 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.

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, 2013.
- Camden Development Policy DP27: Basements and lightwells

2.2 Requirements

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, covering three main issues:
 - Groundwater flow
 - Land stability
 - Surface flow and flooding
- Stage 2 – Scoping
- Stage 3 – Site Investigation and study
- Stage 4 – Impact assessment
- Stage 5 – Review and decision making (undertaken by LBC).

The qualifications required for assessments are detailed in the table below, reproduced from CPG4:

Surface flow and flooding	<p>A Hydrologist or a Civil Engineer specialising in flood risk management and surface water drainage, with either:</p> <ul style="list-style-type: none"> • The “CEng” (Chartered Engineer) qualification from the Engineering Council; or a Member of the Institution of Civil Engineers (“MICE); or • The “C.WEM” (Chartered Water and Environmental Manager) qualification from the Chartered Institution of Water and Environmental Management.
Subterranean (groundwater) flow	<p>A Hydrogeologist with the “CGeol” (Chartered Geologist) qualification from the Geological Society of London.</p>
Land stability	<p>A Civil Engineer with the “CEng” (Chartered Engineer) qualification from the Engineering Council and specialising in ground engineering;</p> <p>A Member of the Institution of Civil Engineers (“MICE”) and a Geotechnical Specialist as defined by the Site Investigation Steering Group; or</p> <p>A Chartered Member of the Institute of Structural Engineers with some proof of expertise in engineering geology.</p> <p>With demonstrable evidence that the assessments have been made by them in conjunction with an Engineering Geologist with the “CGeol” (Chartered Geologist) qualification from the Geological Society of London.</p>

The previously reviewed CGL report and the letter of 20 May were both authored by Richard Ball, a Chartered Engineer and Member of the Institution of Civil Engineers and approved by Ian Marychurch, a Chartered Engineer and Member of the Institution of Civil Engineers and a Chartered Geologist. These authors are assumed to satisfy the requirements for the groundwater flow and land stability assessments, but it not clear that the authorship requirements for the surface flow and assessment have been met. The CMS has been prepared by Andy Ilsley, a Chartered Engineer and Member of the Institution of Structural Engineers.

2.3 Screening and Scoping

Our previous review concluded that Stage 1 (Screening) of the BIA methodology had been completed and that Stage 2 (Scoping) was present in the form of a discussion of the potential impacts.

2.4 Site investigation and study

Stage 3 of the BIA process requires site investigation and study. The ‘Arup report’ provides guidelines on the scope of the site investigation, with the recommendation that it follows a phased approach of desk study, intrusive investigation, monitoring, reporting and interpretation.

The initial CGL report included a brief desk study, noting that the site has comprised residential properties since the late 19th Century, but historical maps had apparently not been studied.

The revised CGL letter report includes reference to historical maps which indicate that in 1890 the site was occupied by a terraced assumed residential property, which had been converted to hotel use by 1950 and that the existing building was constructed in the 1970s.

A ground investigation was undertaken by Aviron Limited on 8 May 2015 and comprised a single window sampler borehole within the front lightwell to a depth of 6 m. Below the existing reinforced concrete slab made ground was found to extend to a depth of 0.95 m, over Lynch Gravel to 2.50 m and the London Clay was proved to a depth of 6.05 m. Groundwater was encountered at a depth of 1.75 m within the gravel,

The scope of the ground investigation was clearly limited by the available access but it is considered that in association with corroborative information from geological records Stage 3 of the assessment is satisfactorily included.

2.6 Impact assessment

Stage 4 of the BIA process requires an impact assessment, which is intended to evaluate the implications of the proposed basement, addressing the issues raised by the scoping stage and how these have been considered in light of the site investigation stage. Stage 4 is now included within the CGL letter of 20 May.

CGL note that the new basement formation level of 20.45 m SD is about 150 mm above recorded groundwater level in the gravel and does not therefore extend below the water level, but this takes no account of the potential for seasonal rises in groundwater level. However, this notwithstanding, it is reasonable to conclude that the basement will not significantly affect groundwater flow.

With regard to land stability, CGL note that underpinning will only be required along garden boundary walls at the rear of the site. Predictions are made of the magnitude of soil heave as a result of the basement excavation unloading and whilst these are not supported by any calculation, they appear reasonable on the basis of similar projects. They go on to conclude that movements of adjacent structures will not be significant, a view with which we concur.

2.7 Construction methodology

The CMS refers to underpinning as a “hit and miss” basis, and the proposed methodology and rationale for the method are reasonable on the basis of the ground conditions, including the assumed groundwater level, that have now been confirmed by the ground investigation. However, there is no reference to possible groundwater ingress and how this will be controlled if it is found above formation level. The CGL letter notes that “the contractor should provide an appropriate working methodology to control groundwater ingress where necessary during construction works.”

It is assumed that, as the groundwater level has been monitored subsequent to completion of the borehole, a monitoring standpipe has been installed in the borehole, which will provide the means for ongoing groundwater level monitoring. It may therefore be appropriate for a commitment for, say, monthly groundwater monitoring to be required by way of a planning condition, with the results of the monitoring incorporated into a revised contractor method statement that takes account of the groundwater level.

3.0 ASSESSMENT AND RECOMMENDATIONS

The previously assumed ground conditions have now been confirmed by a limited ground investigation which is considered to be reasonable on the basis of the relatively small scale of the proposed development.

Monitoring of the groundwater level should be continued, so that the level of the groundwater table can be taken into account in the construction methodology.

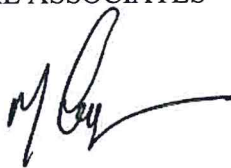
On the basis of the above it is considered that the information now provided meets the requirements of CPG4 and DP27.

We trust that the foregoing comments are sufficient for your needs. 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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