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Our ref J15085/SB/2

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
SG12 7QE

tel 01727 824666
email mail@gea-ltd.co.uk
web www.gea-ltd.co.uk

Alex McDougall
Senior Planning Officer
Regeneration and Planning
Culture and Environment
London Borough of Camden
2nd Floor
5 Pancras Square
London N1C 4AG

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.

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*

Geotechnical and Environmental Associates Limited
Registered office: 3 Brook Business Centre, Uxbridge UB8 2FX
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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 have been 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).

2.0 AUDIT OF THE 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	A Hydrologist or a Civil Engineer specialising in flood risk management and surface water drainage, with either: • 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	A Hydrogeologist with the "CGeol" (Chartered Geologist) qualification from the Geological Society of London.
Land stability	A Civil Engineer with the "CEng" (Chartered Engineer) qualification from the Engineering Council and specialising in ground engineering; A Member of the Institution of Civil Engineers ("MICE") and a Geotechnical Specialist as defined by the Site Investigation Steering Group; or A Chartered Member of the Institute of Structural Engineers with some proof of expertise in engineering geology. 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.

The CGL report has been 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

The first stage of the BIA methodology is screening, where matters of concern are investigated and the requirement for a full BIA is established. The CGL report includes three tables that answer the questions in the flowcharts included as Figures 1 to 3 in CPG4, covering the three issues referred to above.

The Subterranean (groundwater) Screening Assessment notes that the site is located directly above an aquifer (Lynch Hill Gravel) and that the proposed basement may extend below the groundwater table.

The Land Stability Assessment also notes that the site is within an aquifer and additionally that the site is within 5 m of a highway, although the basement excavation will fall outside this distance.

The Surface Flow and Flooding Assessment has not identified any concerns.

It is concluded that the CGL report includes an appropriate screening assessment.

2.4 Scoping

Stage 2 of the BIA methodology requires that the potential impacts of each of the matters of concern from Stage 1 should be identified. The CGL report is only a Screening Study and therefore does not include a scoping assessment. However, it provides some commentary that considers potential impacts and these are summarised below.

Groundwater flow:
The CGL report notes that the proposed basement could cause a "minor increase" in the groundwater level to the north of the property below Tavistock Place but concludes that any associated risk is negligible given the distance to the closest properties and the presence of free-draining gravel, although the presence of gravel is only assumed, as discussed further below.

Land stability:
As the new basement matches the foundation depths of neighbouring properties the CGL report notes that no underpinning will be required, although the garden walls will need to be underpinned to accommodate the basement extension into the rear garden. The foundation depths of adjacent properties have not however been determined, as discussed further below. The relative basement depths are however reported differently in the CMS, as also discussed below.

Surface flow and flooding:
The report notes that that although the inclusion of a lowered basement between two properties that already include similar lower level basements could cause groundwater to be "backed up" the limited groundwater flow, based on historical borehole records, means that groundwater flow will not be significantly affected.

Stage 2 of the BIA is therefore present in the form of a discussion of the potential impacts.

2.5 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 CGL report includes a brief desk study, noting that the site has comprised residential properties since the late 19th Century, but it would appear that historical maps have not been studied. Reference is made to geology maps and BGS borehole records to provide an interpretation of likely soil conditions and groundwater level below the site, but the closest borehole is 70 m from the site. It is not known whether any attempt was made to source records associated with the reported lowering of adjacent basements.

Whilst it is reported that the adjacent sites have lowered basements no reference is made to the source of this information and trial pits have not been excavated on the site to check adjacent foundation levels.

Groundwater levels below the site are not known and have been inferred from available BGS records.

It is concluded that Stage 3 of the assessment is not included other than by inference from records of boreholes that are some distance from the site.

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. There is no Stage 4 included within the BIA and it is assumed that the conclusion that the basement will have no effects has been used to conclude that an assessment is not required.

It is concluded that the documentation provided is insufficient to meet the requirements of CPG4.

2.7 Construction methodology

The CGL report notes that the basement will be formed through excavation of retained soil between existing adjacent walls that have already been extended to the proposed basement formation level, which is 0.7 m below existing lower ground floor level. Only in the rear garden will underpinning be required, where it is understood that the basement retaining walls will be formed through underpinning of the existing garden walls on three sides of the basement.

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 assumed ground conditions, including the assumed groundwater level. However, there is no recommendation for ground investigation or confirmation of the assumed groundwater conditions and what measures may be required if different conditions are encountered. On this basis details of the methodology are considered inadequate.

It is hence considered that the methodology is in general appropriate to the scale of the proposed development and the nature of the site, on the basis that the ground conditions are as assumed, but that there is insufficient information on the site-specific conditions to establish whether the proposals are suitable.

2.8 Requirements of DP27

Camden Development Policy DP27 refers to "larger schemes, where the basement development extends beyond the footprint of the original building or is deeper than one full storey below ground level (approximately 3 metres in depth)". It is clear that the proposed development will extend beyond the footprint of the existing building and therefore falls within the definition of a "larger scheme".

The requirement of DP27 for "larger schemes" is that evidence must be provided against each of the considerations (a) to (h) of Policy DP27. Points (a) to (c) are specifically relevant to the assessment of the BIA; the developer is required to demonstrate by methodologies appropriate to the site that schemes:

a) maintain the structural stability of the building and neighbouring properties;

b) avoid adversely affecting drainage and run-off or causing other damage to the water environment;

c) avoid cumulative impacts upon structural stability or the water environment in the local area;

Whilst the CGL screening report provides a reasoned approach to the proposed development and methodology, the absence of site-specific information on soil and groundwater conditions means that the methodology relies on the site conditions being as assumed on the basis of data that is not particularly local to the site, with the closest borehole record being 70 m from the site.

There is no ground movement assessment and hence no assessment of potential damage to 4 Tavistock Place or the neighbouring structures. It is therefore considered that the developer has not positively demonstrated that structural stability will be maintained.

There is no proper hydrogeological assessment for the site; instead an assumption is made that the shallow aquifer is of a similar thickness to records of sites over 50 m distant from the site and water levels recorded at those sites. In particular it is notable that the historical borehole data is not related to Ordnance Datum (OD) levels.

DP27 also notes, in Paragraph 27.9, that proposals for basements that take up an entire rear garden are unlikely to be acceptable. It is not clear from the drawings appended to the CGL report to what extent the basement will reach the boundaries of the garden, although this is implied by the proposed method of forming the retaining walls outside the existing footprint through underpinning of the garden walls.

It is considered that the requirements of DP27 are not met.

3.0 ASSESSMENT AND RECOMMENDATIONS

As previously noted, it is considered that the submitted documentation fails to comply with CPG4 and DP27, although it is acknowledged that the basement is to be lowered by a relatively limited depth below the existing building, that underpinning of adjacent buildings will not be required and that, on the basis of the assumed ground conditions, the effect of the development should not be significant.

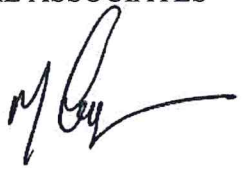
The efficacy of the proposed methodology relies on the ground conditions being as assumed. Whilst this is reasonable on the basis of the available evidence, relatively little additional work would have been required to allow the requirements to have been properly met bearing in mind the small scale and particular nature of the development.

It is considered that a site investigation and proper desk study, including a study of historical maps, should be carried out to allow the BIA to be completed. The investigation need only extend to a relatively shallow depth, but will need to establish the thickness of any made ground, the depth to the London Clay, the level of the groundwater in the gravel and the depth of surrounding foundations. This will also allow the construction methodology to be properly developed, a hydrogeological assessment to be made and some estimate to be made of potential ground movements.

It is considered that the application is currently not compliant with 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



Steve Branch
BSc MSc CGeol FGS FRGS

Martin Cooper
BEng CEng MICE FGS