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Dear Alex

Re: AUDIT OF BASEMENT IMPACT ASSESSMENT FOR 67 GOLDHURST TERRACE NW6 3HB (2013/6914/P)

Further to your instruction, we have now completed our audit of the Basement Impact Assessment (BIA) relating to 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 a BIA 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*
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 is located on the eastern side of Goldhurst Terrace roughly mid-way between its junctions with Fairhazel Gardens to the south and Greencroft Gardens to the north. The existing structure comprises a three-storey end of terrace building that fronts onto Goldhurst Terrace and shares a party wall with No 65. The existing building has a small cellar beneath the southern elevation and the site includes a front garden containing a mature Cypress tree as well as an open rear garden. The proposed development comprises the construction of a new rear extension at ground floor level along with a single-storey basement beneath the entire footprint of the existing building and extension. Conventional reinforced concrete underpinning is proposed for the support of the existing building and its party wall as well as forming the retaining walls for the excavation.

1.3 Documentation

A Basement Screening Report (BSR) was prepared in October 2013 by Michael Alexander Consulting Engineers (MACE: reference P2640/H/Issue 1.0). The BIA has subsequently been prepared by Chelmer Consultancy Services (CCS), referenced BIA/4243 Basement Impact Assessment at 67 Goldhurst Terrace, London, NW6 3HB for Etch Design Limited, and dated March 2014. It includes a ground investigation undertaken by Chelmer Site Investigations (CSI), referenced FACT/4243 and dated March 2014. A number of FT Architects drawings have also been referenced within the BIA and represent the plans and elevations of the existing buildings and proposed layouts. Other documents available on the Camden Plannning web-based portal have been inspected but are not relevant for the purpose of this review.

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 CPG4 flow chart

processes and making additional comment on the sufficiency or inadequacy of information provided where necessary.

2.2 Overview

The BIA is considered to have followed the procedures and protocols of CPG4 in that the major impacts have been considered and generally satisfactorily addressed. There are however a few items that require either rewording for correctness or that require some additional justification. These are discussed in more detail below and referenced by the section number in the BIA.

2.3 Author Qualification

The CCS BIA was written by Keith Gabriel, a Fellow of the Geological Society and a Chartered Geologist (CGeol) and Mike Summersgill who is a Chartered Civil Engineer (CEng) and a Member of the Institution of Civil Engineers (MICE). In addition Mr Summersgill is a Chartered Water and Environmental Manager (C.WEM).

Section 2.11 of CPG4 requires that the professionals undertaking a BIA have qualifications that are relevant to the matters being considered. The qualifications of the professionals listed above comply with the requirements of CPG4.

2.4 Setting of the site

The property and its topographical setting are discussed in Section 2.0 of the BIA and desk study research is provided in Section 4.0, whilst the hydrological and hydrogeological settings are drawn from the MACE screening report.

Evidence of what appears to have been significant previous structural movement is noted in Section 2.4 of the BIA and reference is made to the repairs which comprised rebuilding of one of the corners along with repointing and possible remedial underpinning.

2.5 Development Proposals

The development proposal is summarised in Section 3.0 and shown on the series of architect's drawings sourced from the LBC Planning Portal. The proposed finished floor level of the basement is given as being between 2.6 m and 2.8 m below the existing ground floor level and will require excavation to a depth of about 3.1 m to 3.3 m to allow construction of the basement floor slab, insulation and finishes.

2.6 Basement Impact Assessment

The BIA is ordered such that the screening stage is dealt with in Section 5.0, the scoping stage in Section 6.0, Ground Investigation in Section 7.0 and the Basement Impact Assessment in Section 8.0. A series of non-technical summaries is provided at the end of each section and in Section 9.0.

The screening stage questionnaires are included in full and develop the previous MACE screening responses. Where the answer is given as 'yes' then an explanation is provided along with forward reference to the scoping stage and then detailed assessment.

2.6.1 Ground Investigation

The findings of the ground investigation are set out in Section 7. The investigation comprised two boreholes advanced to a maximum depth of 10 m and two trial pits extended to a maximum depth of 1.2 m to reveal the foundations of the existing building. The investigation encountered made ground extending to a maximum depth of 0.95 m and London Clay extending to the maximum depth investigated of 10.0 m. Groundwater was not encountered in any of the exploratory locations during fieldwork. During subsequent monitoring, however, groundwater was measured at depths of 4.99 m and 5.88 m in Borehole No 1 in the rear garden and, whilst not encountered in the first visit, was recorded at a depth of 0.66 m in Borehole No 2 in the front drive.

The investigation is considered to be sufficient for the purpose of this BIA.

This BIA considers of each the three matters set out in CPG4 separately and each is discussed below.

2.6.2 Subterranean (Groundwater) Flow

Considerations in respect of subterranean groundwater flow are set out in the Table 5.2. The conclusions drawn seem generally appropriate for this development. Question No 1b is taken forward to scoping in Section 6.2 where the potential impact of the basement extending below the groundwater table is discussed and Question 4 relates to the increased proportion of hard to soft surfacing.

Section 8.2 and 8.3 discuss the impacts of the groundwater levels measured on the proposed basement both during construction and in the long term. The BIA indicates that groundwater ingress into excavations may occur and we concur with the conclusion that inflows may be controllable by sump pumping. The report also suggests that service runs and garden irrigation systems be inspected for leakage to address as many possible sources of water ingress as possible. The BIA suggests that the basement is to be fully waterproofed and designed for hydrostatic pressures both in retaining wall design and for buoyant uplift forces.

The increase in hard surface area is discussed and the impact of this is notionally mentioned in Section No 8.2 but in detail with the surface flow and flooding aspects in Section 8.5.

Although a limited number of groundwater monitoring visits has been undertaken, the BIA does takes a conservative 'worst credible' view in respect of the short and long term groundwater levels and therefore further monitoring, although of interest, may not inform the short or long term designs.

If the measures recommended in the BIA are adopted it is considered that the effects of subterranean groundwater flow will have been appropriately mitigated.

2.6.3 Ground Stability

Slope / ground stability considerations are set out in the Table 6.3 and the answers to the 14 questions in the flowchart are considered appropriate with six of the responses having been taken forward to the scoping stage as noted below.

Question No 2 refers to the effect of potentially unstable slopes being introduced into the development due to the final level differences. Section 8.4.2 indicates that the level differences will be incorporated into the structure of the basement retaining walls which seems to be a logical and reasonable solution.

Question No 5 suspects London Clay to be the shallowest stratum and the Site Investigation part of the BIA confirms this to be the case.

Question No 6 Refers to the removal of trees and the response is based on the plans at that time to remove the Cypress tree from the front garden with notes and recommendations made in respect of preventing heave damage effects on the site and its neighbouring properties. However it is understood that subsequent to this BIA having been issued, it has been decided that the Cypress tree is to remain in place. Certain of the measures proposed in Section No 8.4.13 and 8.4.14 may still be necessary and for the sake of completeness it is recommended that the BIA should be reworded to reflect the current proposal.

Question No 7 considers the impact of seasonal shrink and swell movement and attributes the previous structural damage to the existing building (discussed in Section Nos 2.3 and 2.4) to such activity. Again this section would be best revised to account for retaining the Cypress tree on site rather than removing it.

Question No 13 refers to the differential depth between foundations that will be introduced by the basement and the impact of the loss of support to the ground beneath the foundations of the adjacent buildings. Section No 8.4 of the BIA deals with these potential impacts and provides

statements of the methodology, recommendations in respect of construction and control of movements. The analysis of movements and 'Burland' damage category is based on 'bulk ground movements' of less than 5 mm and heave movements of 2 mm occurring beneath the walls of the adjacent terraces. No estimate is provided of the magnitude of heave of the basement formation and only a comment that the basement slab will need to be stiff enough to resist heave related forces.

There is no indication of how the heave movements beneath the underpins have been derived, nor a profile of the movement along the walls under consideration. It is thought likely that the PDisp software has been used for the analysis of heave movements and it would be useful for a plot of movement contours to be provided for the level of the foundations of the surrounding buildings as well as at basement formation level. Underpinning is a commonly used technique in the area and if reputable and appropriately experienced contractors are used then there should be a low risk to surrounding structures. However the statements made in the BIA are rather generic and should be updated to reflect a clear construction methodology with proposed foundation details and this information used to produce movement contour plots.

Whilst calculations are included within the assessment of the potential stability aspects of the proposed basement, they are limited to just two walls. Further details are required in respect of how ground movements vary around and within the site to demonstrate that the damage caused to other walls of adjacent buildings will be within acceptable limits.

Question No 14 relates to tunnels and although the Chelmer BIA carries this forward to scoping it is on the basis of requiring a services search to be undertaken. The previous MACE report suggests that there is no evidence of tunnels nearby and we agree with that conclusion.

Section 8.7 of the BIA recommends a strict regime of structural monitoring of the site and neighbouring buildings before during and after construction. This is considered to be essential but a comment should be made in respect of the measures that might be taken if movements become too large and exceed agreed targets. Simply increasing the frequency of monitoring as noted in Section 8.7.3 would not be sufficient to arrest movement.

2.6.4 Surface Flow and Flooding

The surface water flow and flooding aspects are set out in Table 6.4 and the answers to the six questions in the flowchart are considered appropriate, with three having been taken forward to the scoping stage. The proposed development includes two sustainable urban drainage systems (SUDS) which are, according to Section 8.5.2, sufficient to mitigate the increase in hard surfacing of 8 m^2. Despite Goldhurst Terrace having flooded in 1975 and 2002 we agree with the assertion in Section 8.5.4 in respect of the remote risk of surface water flooding. However despite this risk being remote, an upstand is proposed to protect the front lightwell.

The risk of pluvial flooding of the rear garden is considered and although once again the risk is given as very low, the rear lightwell is also proposed to be protected by an upstand.

On the basis of the above the conservative measures proposed are considered to be sufficient to address these impacts.

3.0 SUMMARY

Our review has found that the Basement Impact Assessment is a thorough assessment of the impact of its construction; the further information requested below is considered necessary to provide a more complete assessment rather than because of any gross technical errors or omissions.

- The BIA requires rewording to account for the Cypress tree remaining on site rather than being removed.

- Further detail is considered necessary in respect of ground movements in order to

justify the damage assessment.

- Further detail is required in respect of the construction methodology and also the mitigation measures that might be considered if movements exceed agreed limits.

It is considered that the proposed development is relatively straightforward and little revision to the BIA is needed before the requirements of CPG4 can be considered to have been met.

We trust that the foregoing comments are sufficient for your needs and we would be pleased to discuss the findings in more detail if required and to provide any additional assistance that may be necessary. We will be happy to discuss outstanding matters directly with Chelmer Consultancy Services if you think that would assist the Council with the process.

Yours sincerely
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