2 December 2014

Our ref J14339/MC/2

Geotechnical & Environmental Associates

Unit 1, Church Farm
Gotham Road, Kingston on Soar
Notts NG11 0DE

tel 01509 674888
fax 01509 674950
email mail@gea-ltd.co.uk
web www.gea-ltd.co.uk

Jennifer Walsh
Principal Planner
Regeneration and Planning
London Borough of Camden
Town Hall
Argyle Street
London WC1H 8ND

Dear Jennifer

Re: AUDIT OF BASEMENT IMPACT ASSESSMENT AND STRUCTURAL ASSESSMENT FOR THE CASTLE PUBLIC HOUSE 147 KENTISH TOWN ROAD NW1 8PB (2014/5900/P)

Further to your our previous letter dated 18 November we have spoken with Michael Davenport of RWA and have reviewed the two revised reports and information provided in a covering e-mail from Helen Cuthbert of Planning Potential Limited and forwarded by LBC. This letter forms our report on the review.

1.0 Documentation

The BIA has been revised by Site Analytical Services Limited (SAS), referenced 14/22463 Basement Impact Assessment at 147 Kentish Town Road, London NW1 8PB for Ringleys Limited, and dated November 2014.

In addition to the BIA, Richard Watkins and Associates Limited have revised their document entitled Structural Appraisal of Planning Scheme at 147 Kentish Town Road, London referenced 3396 revision A and dated November 2014. This document considers the structural aspects of the proposed development including façade retention and the basement construction.

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 additional information provided in the revised BIA is considered sufficient to address the inadequacies identified in the previous submission. These are discussed in more detail below and referenced by the section number in the BIA with quotes from our previous review set out in italic.

2.3 Author Qualification

The SAS BIA was written by Andrew Smith, a Fellow of the Geological Society and, since the first BIA, a CWEM and Member of the Chartered Institute of Water and Environmental Management (MCIWEM) in conjunction with Michael Davenport of RWA who is a Chartered Engineer (CEng) and a Member of the Institution of Civil Engineers (MICE). In addition Conor O'Doyle, a chartered structural engineer (CEng) and Member of the Institution of Structural Engineers (MIStructE) has contributed to the assessment.

Section 2.11 of CPG4 requires that the professionals undertaking a BIA have qualifications that are relevant to the matters being considered. In this respect there is still no evidence that the assessments have been carried out in conjunction with an engineering geologist who should also be a chartered geologist or that the Chartered Engineers have a specialism in ground engineering.

In addition, the surface water and flooding part of the assessment should be undertaken by either a Chartered Civil Engineer or a Chartered Water and Environment manager (CWEM) as required in Section 2.45 of CPG4. This evidence has now been provided.

The professional standing of the engineers is not in question; however the BIA has not been written by professionals with the all of the qualifications strictly required to comply with CPG4. On this basis, compliance has not been achieved. However in the covering e-mail from SAS, the qualifications for Andrew Smith are cited as previously having been acceptable to LBC for a different site. In accordance with our brief to assess whether the requirements of CPG4 have been met, our view is that they have not been in this regard. However, the Council may wish to exercise its own discretion.

2.4 Ground Stability

Heave of the soils within the proposed basement is considered in Section No 5.3 and the effects of the basement excavation on adjacent properties and the road are considered in Section Nos 5.6 and 5.7. In these regards the assessment is considered to be inadequate. The excavation to increase the size of the existing basement will significantly increase the differential depth of foundations to adjacent properties. No conceptual site model of the ground conditions has been provided; such a model taken along a section of the site would have been useful in demonstrating how the adjacent properties and ground conditions fit in with the proposed development. This information has been provided on Drawing Nos T04 and T05 as part of the revised Structural Appraisal document by RWA.

Reference to the RWA Appraisal document provides additional information in respect of the structural aspects of the basement construction but this report is not referenced in the BIA. However from the standpoint of ensuring that sufficient consideration has been given to the adjacent properties and roads, the RWA report provides too many generalised comments that, despite being correct, do not demonstrate that the design and construction approach has been sufficiently developed. The absence of a construction methodology and any sort of outline design mean that the requirements of Paragraph 2.30 of CPG4 have not been met. Information to address these concerns has been provided within the commentary and Drawing Nos T04 and T05 within the revised Structural Appraisal document by RWA.

That section refers to an engineering interpretation requiring "calculations of predicted ground movements and structural impact" to be provided. It is acknowledged that the existing basement will be largely retained as is and that if undertaken with care and attention by a reputable contactor ground movements arising from the underpinning of such party walls are likely to remain very small and cause damage that is within the limits

acceptable to LBC. However the excavation of a basement such as this will also cause heave of the underlying London Clay and the BIA does not demonstrate a clear understanding of the heave mechanism or how it might be dealt with. The assessment of the effects of such heave should form part of the BIA. Some further information has been provided in this respect. The foundations of existing adjacent buildings are noted to be 2.4 m deep in the RWA Structural Appraisal although this has not been updated in Table 1 of the BIA. The underpinning of adjacent buildings will not need to extend to significant depth below the existing foundations to form the new 2.8 m deep basement and we agree with the conclusions that there is likely to be little movement arising from the underpinning. In the new basement however, there will be heave of the underlying London Clay due to the removal of roughly 60 kN/m^2 of overburden. This degree of unloading will comprise an initial 'elastic' rebound component as SAS note but also a long term component as pore water pressures regain equilibrium and which might comprise up to 40 % of the total movement. The RWA Structural Assessment Drawing T04 shows that the new structure will bear upon relatively wide strip foundations bearing on the London Clay and it might be that the new loading imposed will offset the unloading. That being the case then the heave would be restricted to smaller areas between the strips. The RWA Drawing T04 and commentary shows that the basement is to be formed of a suspended floor slab cast over a proprietary material that will crush under heave pressures. Whilst this seems an entirely acceptable solution, CPG4 requires that an assessment of ground movements by calculation should be undertaken although it does not specify whether a full numerical analysis needs to be provided or merely some manual calculations that provide an order of magnitude of the likely movements.

2.5 Site Investigation

The site investigation information that is included within the BIA in Section No 3.0 is extremely limited; in effect comprising a single borehole log from a continuous flight auger borehole and monitoring of the borehole standpipe on a single subsequent occasion.

A number of shortcomings in the site investigation have been identified and these are as follows.

- *No evidence of soil strength testing has been included and despite being shown on the site plan there is no information in respect of Borehole Nos 1 and 2 or Trial Pit Nos 1 and 2.*
- *The groundwater level was measured at 8.91 m but was only monitored on a single occasion after installation.*
- *The Arup study provides a framework for the methodology for assessing the impact of basements within the borough. Section 7.2.2 of the guidance recommends a minimum of three boreholes or trial pits to determine groundwater flow direction.*
- *It is unclear why the findings of the previous investigation have not been included. For this site, the trial pits would provide information essential to determine the effect of the basement on the adjacent properties whilst the other boreholes could provide quantitative soil strength data that could be used in the calculation of heave movements and in the design of new foundations as well as providing groundwater level data.*

This information has now been provided within Appendix A of the BIA. Logs for Borehole Nos 1 and 2 and Trial Pit Nos 1 to 4 have now been provided and the information is considered acceptable for the purposes of this assessment.

3.0 REVIEW OF THE STRUCTURAL APPRAISAL

3.1 Demolition and Façade Retention

The proposals for this part of the construction appear to be generally satisfactory in principle but there are matters that are considered to warrant further consideration. A temporary steel structure is proposed to support the facades to Kentish Town Road and Castle Road. The steelwork is to be supported upon spread foundations bearing upon the London Clay. No detail has been provided as to the likely range of design bearing

pressures to be adopted or the thickness of the foundation but it is thought that with some quantitative site investigation data this design should be relatively straightforward. This information has now been provided.

3.2 Basement Construction

Excavation of the basement has been discussed in Section 2.6.2 above and the same concerns remain in respect of the generalised nature of the proposals. Whilst the proposals seem reasonable and appear to follow good practice, further information is required to demonstrate that appropriate design has been undertaken. The further information provided is considered sufficient to address these comments.

3.3 Lightwell Construction

The construction proposals for the lightwell are very much outline and are considered to require further refinement. It is noted that interlocking trench sheeting is proposed to support the road but there appears to be very little room to install the sheets. The timing of the scaffold removal should be clarified - early removal would allow access for the sheet installation but that would expose the façade during the construction. However, the principal of trench support using flying shores is accepted practice and the section sketches seem reasonable. However a plan showing the position of the support to the trench sheets together with the façade retention steelwork is thought likely to show a very congested site area. No comment has been made in this respect of this comment but on the basis that ground movement and structural monitoring are undertaken as RWA set out, then it is considered acceptable that this part of the construction is finalised during detailed design.

4.0 SUMMARY

Our review has found that the revised Basement Impact Assessment and Structural Appraisal documents have addressed some of the concerns previously raised, but there remain some items that require further consideration.

Essentially, a ground movement assessment is still required although it does not have to be a full numerical analysis, merely sufficient to justify the proposed mitigation measures of a crushable heave protection layer. This might simply take the form of an addendum e-mail but it should also provide evidence of the input of a Chartered Geologist in accordance with CPG4 and the Arup document unless the council wishes to exercise its own discretion in this respect.

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.

Yours sincerely
GEOTECHNICAL & ENVIRONMENTAL ASSOCIATES

Martin Cooper
BEng CEng MICE FGS

Steve Branch
BSc MSc CGeol FGS FRGS MIEnvSc