30 November 2015

Our ref J14349/MC/3

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Dear Gideon

Re: AUDIT OF REVISED BASEMENT IMPACT ASSESSMENT FOR 13/15 JOHN'S MEWS WC1N 2PA (2014/3330/P)

Further to your instruction, we have now completed our review of the further revised Basement Impact Assessment (BIA) relating to basement construction at the above site. This letter forms our report on the review and should be read in conjunction with our previous letters J14349/MC/1 of December 2014 and J14349/MC/2 of May 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 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 (2015).*

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 John's Mews roughly mid-way between Northington Street and Roger Street. The proposed development comprises the residential conversion of two adjoining and currently connected former mews houses that have most recently been in commercial / light industrial use. The existing structures comprise two-storey buildings that front onto John's Mews with a ground floor extension to the rear that covers the entire site area. The proposed conversion includes the excavation of a single-storey basement beneath the footprint of the current buildings along with the addition of accommodation within a new mansard roof. The walls of the basement are proposed to be formed by two-stage mass concrete underpinning which will be temporarily supported upon piled foundations that will, in the long term, also support the structural loads of the new buildings.

1.3 Documentation

Previously two BIA submissions have been prepared by Chelmer Consultancy Services (CCS).

The first was referenced BIA/4507 Rev 1 Basement Impact Assessment at 13/15 John's Mews, London WC1N 2PA for JM13 Limited, and dated September 2014. It included a ground investigation undertaken by Chelmer Site Investigations (CSI), referenced 4507 between May 2014 and August 2014 and structural calculations by Trevor Scott 1420 and dated May 2014.

The BIA was reviewed by GEA and found to not meet the requirements of CPG4, predominantly because the scheme proposed the underpins and basement slab to bear upon made ground or soils of low strength.

The BIA was revised with an updated methodology using piled foundations beneath the basement slab. The revised CCS BIA was referenced BIA/4507 Rev 2 Basement Impact Assessment at 13/15 John's Mews, London WC1N 2PA for Wansworth (sic) Sand and Stone Limited (WSS), and dated March 2015. It included the same ground investigation, structural calculations by Trevor Scott 1420 dated May 2014 and a structural statement dated September 2014.

The revised BIA was reviewed by GEA and again found to not meet the requirements of CPG4 because the scheme still proposed the underpins to bear upon made ground or soils of low strength despite the basement slab being supported on piles.

Following a site meeting attended by WSS, GEA, FT Architects and the new consulting engineer Barrett Mahony, additional ground investigation was undertaken and the construction methodology was reconsidered. The findings of the additional investigation were presented by Chelmer Site Investigations (CSI) in an Addendum Factual Report referenced FACT/4507D Rev 1 and dated 4th August 2015.

The findings of the phase of investigation together with drawings by FT Architects and Barrett Mahony were used in a third revision of the BIA referenced BIA/4507 Rev 3 dated September 2015. The client is still noted as JM13 Limited although this has no bearing on the review of this BIA.

2.0 AUDIT OF THE REVISED BASEMENT IMPACT ASSESSMENT

2.1 Introduction

Those matters that were previously deemed acceptable have not been repeated herein and the notes below may be referenced against the shortcomings raised in our previous letters. A small point of note is that in Section 1.1 the BIA is noted to follow the requirements of CPG4 but the date is referenced as "September 2015". For correctness this should read July 2015 but it is noted that this year's edition has been used.

2.2 Development Proposals

The scope of the overall development proposal is essentially unchanged from the previous submissions in that it is proposed to renovate the current two-storey building to form a three-storey building with the third storey being a mansard roof along with a single-storey basement. The existing walls will be retained and supported using a system of piles and cantilevered ground beams as shown on Barrett Mahony drawing No L14771 702 Rev T2. The existing walls will be thus supported during underpinning and excavation and the underpinning will be temporarily propped by a steel frame until the basement floor slabs and lining walls have been cast to form the basement box.

This methodology is not considered to be straightforward but it is considered that it is sufficiently developed as to meet with the requirements of CPG4 and the previous concerns in respect of the underpins transferring the existing wall loadings deeper into the made ground or even into the softer underlying materials have now been addressed.

2.3 Basement Impact Assessment

Revision 3 of the BIA, when read in conjunction with the architect's drawings and details provided by Barrett Mahony presents a relatively thorough assessment of the impact of the proposed construction. The following concerns, which had previously been identified, are now considered to have been addressed with fuller explanations set out below.

Further consideration of the cumulative groundwater impact and the final foundation arrangements is required. It is accepted that these will most likely be finalised when the project reaches the detailed design stage.

It is considered that the proposed development poses more risks than most due to the thickness of the made ground and its inherent variability. These risks and their potential impacts are considered to have been met to a degree but further investigation and revision of the BIA is needed before the requirements of CPG4 can be considered to have been met.

2.3.1 Groundwater

GEA and Chelmer had previously recommended that further groundwater monitoring should be undertaken. The installation of a second standpipe and its monitoring now reflects in excess of a year of measurements but the measurements have only been taken in the drier seasons. It is

therefore considered that the groundwater monitoring should be continued during the wetter months to either confirm that the proposals remain relevant in the wetter periods or obtain information for those periods.

The shallowest groundwater level is roughly 3.2 m below the existing ground floor level and within either the made ground or within the Lynch Hill Gravel which extends to some 5.7 m below existing ground level. The excavation is proposed to be roughly 4.2 m below the existing ground level and therefore the lower 'lift' of the underpinning will be roughly 1.0 m below the groundwater level but the upper 'lift of underpinning should remain dry. In any case, however, groundwater will be able to flow through the roughly 1.5 m thickness of sand and gravel that remain beneath the proposed basement floor level. Chelmer has advised that the basement walls should be designed for a groundwater level as high as 1.0 m below existing ground level and have set out measures to mitigate the effect of groundwater ingress during construction. If the measures recommended by Chelmer in Section Nos 10.2 and 10.3 in the BIA are adopted then it is considered that the effects of groundwater flow will have been appropriately mitigated.

Section 10.2.10 considers the cumulative impact of this basement and one that is proposed to connect No 27 John Street to No 21 John's Mews close by. The BIA states that planning permission has been granted for the other basement which, by its size and nature, will have a greater effect than the one under consideration. We do not necessarily agree with that supposition but in any case the planning permission that was granted was for an amended scheme that does not include a basement. This may readily be seen on the LBC planning web-site where the longitudinal section D on Drawing No 2301 rev G shows the full length connecting basement but the consented section on Drawing 2301 rev H shows no basement.

Furthermore, GEA was originally instructed by LBC to consider the cumulative effect of both basements as part of the review of each of the BIA submissions. The BIA for the other basement was found to be deficient and no further information has been forthcoming so for the purpose of this review it is considered that the basement for No 13/15 John's Mews will stand alone and as outlined above will not have a detrimental impact on the flow of groundwater.

2.3.2 Ground Stability

Additional ground investigation has been undertaken since the previous BIA submissions and the previously identified concerns have now been addressed. The additional investigations have included extension of the previous trial pits to explore the extent of the existing foundations, obstructions and buried floors, an additional cable percussion borehole with in-situ testing and installation of the additional standpipe as noted above.

A new construction sequence has now been derived and is laid out on the Barrett Mahony drawings. The revised methodology proposes to support the party walls around the perimeter of the site using a system of transfer beams and using piled foundations for both temporary and permanent works. This scheme is considered to provide long term stability for the adjacent properties.

From the additional borehole information, Borehole No 3, it appears that the underpins around the boundary with No 17 John's Mews and to the front and rear in that area should be formed within the upper layers of the dense Lynch Hill Gravel. As such the underpins would be formed within a highly competent stratum and the preliminary calculations that predicted damage to adjacent properties to be within Burland 'Category 1 – very slight', albeit only just above the threshold for 'Category 0 – negligible', are thought to be appropriate. In the location of Borehole 1B in No 13 John's Mews, the Lynch Hill Gravel appears to be absent and the underpins would be formed within the made ground. Whilst the underpinning takes place in these locations, the existing walls would be supported by transfer beams bearing onto the piles in the temporary condition and onto the basement floor slab bearing on the piles in the permanent condition.

Section 10.4 of the BIA sets out the potential impacts of the construction on ground stability and the stability of surrounding buildings. Chelmer provides a number of mitigation measures to

deal with potential instability if encountered. If followed, the recommendations are considered sufficient to control movements and in a number of places, reference is made to the importance of best practice during design and construction. In particular, full face support to all faces is indicated as mandatory in Section 10.4.4 and permeation grouting is suggested as a further mitigation measure for unstable ground.

In addition to the above, it would be prudent to ensure that the pile design is such that settlement of the pile head does not exceed 5 mm so that the deflection of the supported walls remains in line with the assumptions made in the ground movement analysis in Section 10.4.8 of the BIA.

This section of the BIA is considered to be a thorough assessment of the potential stability aspects of the proposed basement. The BIA makes it plain that the construction is not straightforward but the recommended sequence, strict regime of monitoring and mitigation measures demonstrate that the potential impacts of the basement have received due consideration.

The additional investigation and the conclusions drawn are considered to be sufficient to satisfy the requirements of CPG4 (2015).

3.0 SUMMARY

Our review has found that the revised Basement Impact Assessment, when read in conjunction with the architect's drawings and Barrett Mahony drawings, is a thorough assessment of the impact of its construction.

Provided that the recommendations within the BIA are followed in full then it is considered that the methodology proposed provides sufficient confidence in the protection provided to the surrounding structures. It is acknowledged that satisfying the council's requirements for this project relies on a particularly high standard of workmanship and monitoring and appropriate timing of any mitigation measures that are indicated by the monitoring to be necessary. The council may therefore wish to apply conditions relating to the level of expertise and supervision involved in the construction of this basement.

4.0 NOTICE OF OBJECTION NOVEMBER 2015

In addition to the review of the revised BIA, GEA have been asked by LBC to specifically provide comment on a Notice of Objection letter dated 18th November 2015 by Mr Morgan and Ms Coombs, the occupants of No 24 John Street which backs onto the site. We have only been able to comment on matters pertaining to the BIA or that are within our area of expertise and have therefore made no comment in respect of other points raised. For clarity, the relevant extracts of the notice of objection are set out below in italics and our comments are set out point by point.

Insufficient Investigation of Ground Conditions

1. *This application, in now revised form, has been before the Council since May 2014. During that time a number of professionals have indicated that further steps need to be taken to establish the true amount of water present on site and the degree of seasonal variance.* This has been discussed in Section 2.3.1 above but good practice would suggest that monitoring should continue until just prior to the commencement of excavation.

It is noticeable that the developer has deliberately chosen only to undertake site specific investigations during the driest time of the year and has failed to undertake any follow up investigations over the wetter months. Even the summer investigations have indicated that, once opened up, water entering boreholes has continued to rise during the period of examination, reaching as high as 3.18 metres below ground level (Revised BIA, paragraph 9.9) or 2.7 metres below ground level (Revised BIA, paragraph 10.2.8). The 3.18 m is a site specific measurement and most appropriate for the site whereas the 2.7 m measurement is publicly available data for an unnamed site nearby and therefore not reliable.

Damage to Adjacent Properties

2. *The houses on John Street are listed and John's Mews lies in a conservation area. The proposed development of 13-15 John's Mews, if granted permission, involves continuous dewatering of the site throughout the construction process, which itself involves substantial undermining and underpinning works to the listed rear walls of the houses on John Street (for which listed building consent is required, but which has not been sought) even before one begins to consider the impact of the works on the wider environment of the adjacent listed buildings.* With all due respect to the objectors and their concerns, their letter contains a number of inaccuracies to the point of exaggeration and a number of points where engineering principles have been misunderstood.

The objectors' letter continues and states

As Camden's own material states:

"Underground construction will always – inherently and unavoidably – cause some movement in the surrounding ground……. implications of damage induced by ground movements, including the potential for legal proceedings arising from damage to third-party property and structures, are significant." (Paragraph 164, section 3.3.3 of the ARUP Hydro-Geological Report, Guidance for Subterranean Development)

That Report then goes on to explain the inevitability of differential movement between properties when one property has a new basement constructed where dewatering and piling are necessary, and that there will be subsequent settlement of the other surrounding properties.

At paragraph 177 the same Report states:

"Extending downwards beneath an existing building, especially old, masonry-built properties that were not designed to contemporary engineering standards and modern Building Regulations, is a challenging and potentially hazardous undertaking. Although collapses are rare, they do sometimes occur."

Both 13-15 John's Mews and the adjoining listed John Street properties are old, masonry-built properties.

Camden Development Policy DP27, at paragraph 27.1 states that LB Camden:

"will only permit [basement and other underground development that] does not cause harm to the built and natural environment and local amenity and does not result in flooding or ground instability". LB Camden "will require developers to demonstrate by methodologies appropriate to the site that schemes:
• maintain the structural stability of the building and neighbouring properties;
• avoid adversely affecting drainage and run-off or causing other damage to the water environment;
• avoid cumulative impacts upon structural stability or the water environment in the local area;"

However one reads the developer's supporting engineering documentation from Chelmer Consultancy Services (and it all states how exceedingly difficult and extreme the project is in the context of the prevailing unstable, waterlogged soil conditions, and is therefore hedged around with "ifs' and 'buts" and the absolute necessity of utmost best practice to minimize damage) it is inevitable, and apparently accepted by the developer's engineers, that there will be differential movement, there will be damage to adjacent structures and the prevailing condition of the water table will be affected. The purpose of this review has been to ensure, on behalf of LB of Camden, that compliance with DP27 has been demonstrated.

Indeed paragraph 10.7.1 of the Revised Basement Impact Assessment specifically identifies the fact that there will be "structural crack damage in the walls to be underpinned" (these must include the listed party walls) as these "will have weakened the building's structural integrity". This sentence has been misunderstood by the objectors. What is actually being said is that the walls to be underpinned are already cracked and have weakened. It is stated that that these cracks should be repaired (with stitching recommended) and hence strengthened prior to the underpinning taking place. This seems to be a wise approach.

The inevitability of damage is emphasized in paragraph 2 of the Report of TSC Consulting Limited which identifies the potential for heave, both immediate and residual, and the fact that even if best practice is observed during construction the damage to adjacent (listed Georgian) properties is anticipated to result in horizontal and vertical movements of 5 mm. TSC Consulting are understood to no longer be involved with the project and their designs have been superseded by the involvement of Barrett Mahony. The ground movements quoted by TCS are reasonable for the previous scheme and for which we raised concerns but are no longer appropriate for the piled scheme.

The proposed development involves the excavation to extend to a depth of around 5 metres below the existing internal ground-bearing floor slab of the Mews houses (BIA, paragraph 3.4), which is well below the depth of even the ambient water level at the driest time of the year (which is the only period during which the developer has been prepared to risk taking measurements). That existing floor slab is itself around 1 metre below the ground level of adjoining properties to the rear on John Street. This is incorrect – the drawings and text indicate an excavation of 4.2 m below the existing ground level. The excavations will extend below the groundwater level but only by being undertaken in two stages and then in excavations of 1.0 maximum width with local sump pumping or grouting. This is common practice and should be within the scope of a competent and experienced contractor.

The developer further needs to excavate and pile below the proposed basement to an undefined depth.

The Mews houses sit in an area defined as "Minor Aquifer High" groundwater vulnerability (Revised BIA para.6.3). Similarly the Georgian properties on John Street adjacent to the proposed development sit on the same ground with "Minor Aquifer High" groundwater vulnerability. The susceptibility to groundwater flooding in the area is already classified by the BGS as "Potential at Surface". The adjacent listed Georgian properties have original basements that extend to a depth of approximately 3 to 4 metres below ground level. As Georgian properties, they were constructed on foundations of unknown depth and they do not benefit from modern tanking and damp-proofing. Any change in the historic levels of ambient groundwater will therefore have a disproportionate effect on them. The phrase 'Minor Aquifer High groundwater vulnerability' relates to the potential for soluble contamination to cause harm and is not relevant to this issue.

The proposed basements for the Mews houses would not only extend below the depth of the existing water table but would also involve significantly deeper piling into deep Made Ground to an as yet undetermined depth (Revised BIA, para 8.4) where multiple obstructions have been encountered in the developer's trial pits. Although not explicitly stated (because the developer has consistently avoided providing any detailed construction plans, even though this was identified as a critical failing in paragraph 3 of the report prepared for Camden by Geotechnical and Advisory Services), one imagines that the piling and the removal of any obstructions encountered during that process can only be achieved through mechanical processes that result in significant subterranean vibration and percussive shock. We assume that "Geotechnical and Advisory Services" should in fact read "Geotechnical and Environmental Associates" ie ourselves. The extent of the obstructions noted in the previous BIAs and reports have been determined by the additional investigation. It is thought that local trial pitting by manual methods at each pile location in advance of the piling should mitigate the effects.

Leaving aside the heave caused by dewatering, the ground movement caused by excavation, and the noise pollution of the works generally, the effect of such vibrations and shocks on neighboring listed Georgian properties has nowhere been addressed by the developer. Dewatering does not cause heave.

Indeed the report of Geotechnical and Advisory Services (sic) states explicitly that the developer's proposed methodology "does not provide sufficient confidence in the protection provided to the surrounding structures." This line has been taken from a review of earlier BIAs and is superseded by this review.

Consistent with LB Camden's stated positions in DP27 and DP25 to protect the structural stability of neighboring properties and listed buildings and only to permit development that

preserves the character of a conservation area, it is apparent that this application still fails to satisfy the appropriate tests.

It is our position that the prevailing geotechnical features of this site are such that DP25 and DP27 can never be satisfied: the location of the site is, and always will be, unsuitable for a basement excavation. GEA, on behalf of LBC, are satisfied that the methodologies set out in the BIA are appropriate for this site and for the ground conditions encountered.

Inaccurate Statements in the Revised Basement Impact Assessment

3. *The Revised Basement Impact Assessment relies repeatedly and positively on the grant of planning permission for a basement between 27 John Street and 21 John's Mews as supporting the construction of a basement for 13-15 John's Mews (see paragraphs 10.2.10, 10.4.16 10.6.11 of that report).*

   Regrettably, for whatever reason, the authors of the Revised Basement Impact Assessment are mistaken in their statement that planning permission has been granted for such a basement.

   The relevant Decision Notice for 27 John Street is dated 14th May 2015 (well before the Revised Basement Impact Assessment) and is found at Application Ref: 2013/5685/P. That Decision Notice identifies the plans for which permission was given, including elevations on plans 2300 rev H and 2301 rev H, neither of which includes any basement.

   In the circumstances, the accuracy, and indeed the conclusions, of the Revised Basement Impact Assessment are called into question. At the very least a proper, accurate report should be required to form the basis of an application such as this.

   The objectors are correct in stating that the proposed basement for No 27 John Street and 21 John's Mews gain consent but rather a smaller scheme without a basement. The references above all relate to the assessment of the cumulative effects of two basement schemes in close proximity. The BIA has taken due cognisance of both basements but with the other no longer proceeding the cumulative effects will effectively be for the impacts only from this one. We assume that this would be a preferable position for the objectors' property.

Contaminated ground

4. *The Addendum Factual Report produced by Chelmer again makes reference to a pungent smell (paragraphs 9.6 and 10.2.7). This apparently alludes to the concerns expressed in their original Geo-environmental Interpretive Report of September 2014 at paragraphs 6.27 and 6.38 to 6.64 about ground contamination. In the executive summary at paragraph 1.0 of that original report it is stated that the soil analysis evidences contaminants and that the sample is classified as "hazardous material" and accordingly the risk is "high".*

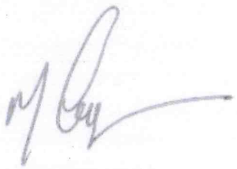
   The Addendum Factual Report now includes a soil analysis certificate produced by QTS Environmental. That document is highly technical and, without any narrative explanation, we, as lay people, are unable to analyse it. We are therefore concerned that it should at least be considered by an appropriately qualified expert on behalf of Camden because, at present, there seems to be no explanation or method statement for dealing with the contamination originally identified.

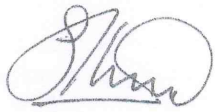
   However, even after all this time, the apparent contamination identified initially has not been definitively identified or addressed, despite the fact that this was specifically identified as a moderate risk to ground workers and neighbours (which necessarily includes the Council's own adjacent primary school) as long ago as September 2014. The QTS report considers the design of the presence of sulphates and the like which enable the correct buried concrete mix to be designed. However, the objectors should be reassured that when works are undertaken in accordance with the LBC guidance and best practice as defined by CIRIA and the HSE, then any risk to personnel on site or that might be affected by the works would be reduced to negligible levels.

We hope that the above comments will perhaps allay the fears of Mr Morgan and Ms Coombs but we would be pleased to discuss the matter with them and yourselves if you think that would be a useful exercise.

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





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