CampbellReith
consulting engineers

49 Belsize Lane, London, NW3 5AU

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12985-83

Revision: F1

April 2020

Campbell Reith Hill LLP
15 Bermondsey Square
London
SE1 3UN

T:+44 (0)20 7340 1700
E:london@campbellreith.com
W:www.campbellreith.com

Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	November 2019	Comment	KBemb12985-83-281119-49 Belsize Lane-D1.docx	KB	EMB	EMB
F1	April 2020	Final	KBemb12985-83-170420-49 Belsize Lane-F1.docx	KB	EMB	EMB

Document Details

Last saved	17/04/2020 16:49
Path	KBemb12985-83-170420-49 Belsize Lane-F1.docx
Author	K Barker, MSci FGS
Project Partner	E M Brown
Project Number	12985-83
Project Name	49 Belsize Lane
Planning Reference	2019/4411/P

Contents

Appendix

1.0 NON-TECHNICAL SUMMARY

1.1. CampbellReith was instructed by London Borough of Camden, (LBC) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 49 Belsize Lane, London NW3 5AU (planning reference 2019/4411/P). The basement is considered to fall within Category B as defined by the Terms of Reference.

1.2. The Audit reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development in accordance with LBC's policies and technical procedures.

1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and reviewed it against an agreed audit check list.

1.4. The proposed development comprises the deepening of an existing basement by approximately 0.5m and the construction of an extension to the basement, approximately 2.5m deep, into the rear garden by 4.5m.

1.5. The Basement Impact Assessment (BIA) has been carried out by CET, by individuals with suitable qualifications.

1.6. Site investigation data indicates the ground conditions comprise Made Ground to 1.1m depth, with London Clay below. The revised BIA includes interpretative geotechnical information, including retaining wall parameters.

1.7. It is accepted that the proposed development will not impact upon slope stability.

1.8. The BIA confirmed that the site is located above an 'Unproductive' aquifer, the London Clay Formation, therefore no further consideration of the hydrogeology of the site is required.

1.9. Based on the revised submission it is confirmed that the proposed development will have no adverse effect on the hydrology of the area.

1.10. The impact of removing trees on the basement and surrounding properties is presented in the revised BIA submission.

1.11. The ground movement assessment indicates the proposed basement will result in damage to neighbouring properties and services not exceeding Damage Category 1 (Very Slight).

1.12. Based on the revised BIA and Planning Construction Method Statement submissions it can be confirmed that the proposal adheres to the requirements of the CPG Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 24 October 2019 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 49 Belsize Lane, London NW3 5AU, Camden Reference 2019/4411/P.

2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development.

2.3. A BIA is required for all planning applications with basements in Camden in general accordance with policies and technical procedures contained within:

- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Camden Planning Guidance (CPG): Basements.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- The Local Plan (2017): Policy A5 (Basements).

2.4. The BIA should demonstrate 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; and,
c) avoid cumulative impacts upon structural stability or the water environment in the local area;

and evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.

LBC's Planning Portal described the planning proposal as: *"Excavation to extend existing basement into rear garden, erection of raised and sunken terraces in rear garden, and alterations to rear and front facades."*

LBC's Planning Portal confirmed that the property is not a Listed building and the site does not neighbour any listed buildings

2.5. CampbellReith accessed LBC's Planning Portal on 07 November 2019 and gained access to the following relevant documents for audit purposes:

- Site location plan, dated 28/08/2019
- Basement Impact Assessment (BIA) dated July 2019 (ref 527194, version V0) by CET Infrastructure
- Existing Drawings PL-011 and PL-101, and proposed drawings PL-01 rev B and PL-02 rev B, all dated 10.01.2019, by Ensoul Ltd.
- Design and Access Statement dated August 2019 by Ensoul Ltd.
- Planning Construction Method Statement (PCMS), ref 2019-051, dated 28 August 2019 by Elite Designers Ltd.
- Landmark Trees, Arboricultural Impact Assessment Report, ref. ESL/49BLS/AIA/01, dated 15 August 2019

2.6. CampbellReith were provided with the following relevant documents for audit purposes between November 2019 and April 2020:

- Planning Construction Method Statement (PCMS), ref 2019-051 rev 1, dated 28 February 2020 by Elite Designers Ltd.
- Basement Impact Assessment Version 2, rev 2, dated April 2020 by CET Infrastructure.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	
Is data required by Cl.233 of the GSD presented?	Yes	A basic construction methodology and mitigation measures are presented.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	
Are suitable plans/maps included?	Yes	
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA, Section 4.1.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA, Section 4.2.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA, Section 4.3.
Is a conceptual model presented?	Yes	Described textually in Section 3.6

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA report, Section 5.1.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA report, Section 5.2.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA report, Section 5.3.
Is factual ground investigation data provided?	Yes	Described in Section 6 of BIA.
Is monitoring data presented?	Yes	Only one monitoring visit carried out and presented in the BIA.
Is the ground investigation informed by a desk study?	Yes	BIA report, Section 3
Has a site walkover been undertaken?	Yes	During the ground investigation.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	
Is a geotechnical interpretation presented?	Yes	Revised BIA submission includes the necessary parameters.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Revised BIA submission includes the necessary parameters.
Are reports on other investigations required by screening and scoping presented?	Yes	Arboricultural Impact Assessment provided.
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	Included in Section 5 of the BIA.

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	BIA includes a ground movement assessment that presents predicted vertical movement but does not assess the impacts.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	The revised BIA submission provides the necessary additional considerations.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	General statements regarding good construction practices and the need for monitoring are included.
Has the need for monitoring during construction been considered?	Yes	Generic statement regarding mitigation measures and monitoring strategies.
Have the residual (after mitigation) impacts been clearly identified?	Yes	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Revised BIA submission describes attenuation methods
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Revised BIA submission confirms Category 1 or less.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The revised BIA has been prepared by CET Infrastructure with supporting documents provided by Elite Designers Ltd. The BIA authors' qualifications are in accordance with CPG guidelines. Clarification has been provided in the revised submission that the issuing company is CET Infrastructure.

4.2. The proposed development will comprise the deepening of an existing single-storey basement by approximately 0.5m and the construction of a full height basement extension approximately 2.5m deep, into the rear garden area by 4.5m. The new basement area is indicated as being 31m^2. The property shares a party wall with neighbouring properties 47a and 51.

4.3. No information has been gathered to confirm the presence or absence of basements in the adjoining properties 47a or 51. The BIA has been carried out on the assumption that no basements are present. It is accepted that, for this application, the assumption is conservative.

4.4. The site investigation and BIA have been informed by a desk study broadly in accordance with the GSD Appendix G1.

4.5. The BIA considers the proposed development in the context of the slope across the site, which is identified as being less than 7 degrees. It is accepted that the proposed development will not impact upon slope stability.

4.6. A site investigation (SI) was undertaken comprising one window sample borehole to 8m depth and one trial pit to a target depth of 1.8m depth. Information regarding the location of these investigations in relation to the proposed development was provided in the revised BIA. The window sample log revealed Made Ground soils to 1.1m depth with London Clay Formation below this, extending to at least 6.5m depth.

4.7. A basic conceptual site model is presented textually in the BIA and in the revised BIA submission. The latter includes an updated model that takes the comments of the BIA audit into account.

4.8. Whilst soil strength parameters were derived from pocket penetrometers and hand vane data, a full summary of soil parameters informed by the site investigation was not provided in the BIA. Suitable interpretative geotechnical parameters have been provided in Section 7.3 of the revised BIA submission.

4.9. The site is identified as being underlain by an Unproductive aquifer (the London Clay Formation). During the site investigation a groundwater strike was recorded at a depth of 6.5m in the window sample borehole. A standpipe was installed with a response zone from 1m to 4m below ground level (bgl), which encompasses both the natural London Clay and the Made Ground deposits that were encountered from ground level to 1.1m depth. One subsequent water

monitoring visit was carried out one week after the borehole was constructed and recorded a standing water level of 0.99m bgl.

4.10. The BIA report states that groundwater flow in the London Clay is expected to be slow due to it having a low permeability. The data recorded from the site investigation indicates a 3m head of water accumulated over the space of 1 week. The source of the encountered groundwater is identified as perched water from within the Made Ground. The BIA subsequently adopts the level of 0.99m bgl as the groundwater table. It is accepted that this is a conservative assumption. The CMS identifies the potential need for dewatering to keep excavations dry through the construction phase.

4.11. The proposed scheme is identified in Section 2.6 of the BIA as increasing the proportion of hardstanding in the rear garden, occupying about 30% of the garden space and resulting in a loss of 31m^2 of surface area. This is identified in the screening and scoping stages and the revised BIA presents mitigation measures in Table 5.2 comprising an attenuation tank to accommodate this surface water drainage.

4.12. The London Clay has been identified as having a high volume change potential and to be prone to shrink/swell behaviour. Two trees are due to be removed from the garden to allow basement construction to proceed. The BIA correctly identifies the need for ground heave to be considered as a result of these trees being removed and mitigation measures are summarised in Section 9.4 of the revised BIA submission.

4.13. The PCMS provides a construction method (Section 9) detailing a possible excavation, propping and construction sequence for the works. However, in Section 1 of the PCMS it is stated that the contents of the report should only be used as a guide, therefore the suggested construction sequence and temporary works are subject to change.

4.14. Preliminary calculations for a basement underpinning and retaining wall scheme are provided in Appendix B of the revised PCMS. The general arrangement of the underpin design has been revised to omit the use of a heel. The revised BIA and PCMS also confirm the thickness of the underpins to be 300mm.

4.15. In the BIA a Ground Movement Assessment is provided. It has been carried out using PDisp software and assesses the vertical ground movements resulting from the construction process. The basement construction is described as a reinforced concrete box with no internal columns or pads. The revised BIA submission and drawings within the PCMS now consistently show that a suspended ground floor slab will be used in the basement construction to address uplift.

4.16. The revised BIA presents vertical and horizontal displacements that have been calculated using the methods described in CIRIA C760. The vertical displacements calculated using C760 have

been combined with the results of the PDisp analysis. The horizontal displacements are broadly in line with those anticipated for underpinning.

4.17. In the revised BIA submission an updated Damage Category Assessment is provided. It has been carried out using the method proposed by Burland and CIRIA C760 which is intended for embedded retaining walls, however, it is accepted that this approach can predict ground movements within the range typically anticipated for the proposed 'hit and miss' retaining wall techniques when carried out with good control of workmanship.

4.18. The Damage Category Assessment presented in the revised BIA indicates damage to neighbouring properties will be a maximum of Category 1 (Very Slight) in accordance with the Burland Scale.

4.19. The BIA recommends that an 'observational approach' be adopted to 'keep any damage within Category 1' and identifies that a monitoring strategy with appropriate trigger levels is required. The BIA recommends that the vertical deflection must not exceed 4.5mm but further assessment of appropriate trigger levels is not provided. The revised PCMS suggests trigger values for ground movement monitoring that are in line with the anticipated ground movement identified in the revised BIA.

4.20. A utility search is not provided however the revised BIA includes a suitably conservative assessment of the impact of the development on buried services as part of the ground movement assessment.

5.0 CONCLUSIONS

5.1. The qualifications of the authors are in accordance with LBC requirements.

5.2. Clarification is required regarding whether the issuing company is CET Infrastructure or CET Structures, and whether the BIA can be relied on.

5.3. Desk Study information within the BIA is broadly in line with aspects recommended in the GSD Appendix G1.

5.4. A site investigation has confirmed the underlying ground conditions comprise Made Ground over London Clay. The scope of the investigation is considered insufficient to adequately characterise the site.

5.5. The revised BIA provides interpretative geotechnical information and retaining wall parameters for the drained and undrained conditions.

5.6. The surface water drainage (hydrology) and the potential for surface water flooding required further assessment. The revised BIA submission includes suitable attenuation measures to ensure the development will not adversely affect the hydrology of the area.

5.7. The impact of removing trees on the basement and surrounding properties has been undertaken and mitigation measures are presented.

5.8. A generic construction methodology, structural scheme and proposed temporary works are presented, including sequencing and propping arrangements.

5.9. The BIA considers the proposed development in the context of the slope across the site. The proposed development will not impact upon slope stability.

5.10. In the revised BIA submission a ground movement assessment (GMA) has been undertaken broadly in line with the methodology described in CIRIA C760. From the results of the GMA a damage category assessment indicates damage to neighbouring properties will be a maximum of Category 1 (very slight).

5.11. The proposed ground movement monitoring strategy provided in the revised PCMS has been revised to include appropriate trigger values that reflect the outcome of the ground movement assessment.

5.12. The revised BIA now includes consideration of adjacent utilities in the ground movement assessment.

5.13. Based on the revised BIA and PCMS submissions, it can be confirmed that the proposal adheres to the requirements of the CPG Basements.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	General	Confirm whether the issuing company is CET Infrastructure or CET Structures, and whether the interpretation in the BIA can be relied on.	Closed	31/03/2020
2	Hydrology	Further assessment of surface water drainage is required in light of the shallow groundwater and low permeability London Clay encountered in the site investigation.	Closed	31/03/2020
3	Stability	Interpretative geotechnical information should be provided including all retaining wall parameters in both the drained and undrained condition. Technical references should be provided to justify any derived parameters.	Closed	31/03/2020
4	Stability	Further assessment of the impact of removing trees on the basement and surrounding properties is required	Closed	31/03/2020
5	Stability	Structural drawings provided in the Planning Construction Method Statement present conflicting information regarding the basement construction and should be clarified.	Closed	31/03/2020
6	Stability	Further assessment of the ground movement and mitigation methods to reduce the maximum anticipated category of damage from 2 to 1 is required.	Closed	31/03/2020
7	Stability	A utility search should be carried out and any affected services should be included in the ground movement assessment.	Closed	31/03/2020
8	Stability	The GMA should be updated to consider the potential impacts and mitigation measures for all potentially affected surrounding structures and infrastructure.	Closed	15/04/2020
9	Stability	Trigger levels for ground movement monitoring should be revised to reflect the outcome of the ground movement assessment.	Closed	15/04/2020

Appendix 3: Supplementary Supporting Documents

None

London

15 Bermondsey Square
London
SE1 3UN

T: +44 (0)20 7340 1700
E: london@campbellreith.com

Birmingham

Chantry House
High Street, Coleshill
Birmingham B46 3BP

T: +44 (0)1675 467 484
E: birmingham@campbellreith.com

Surrey

Raven House
29 Linkfield Lane, Redhill
Surrey RH1 1SS

T: +44 (0)1737 784 500
E: surrey@campbellreith.com

Manchester

No. 1 Marsden Street
Manchester
M2 1HW

T: +44 (0)161 819 3060
E: manchester@campbellreith.com

Bristol

Wessex House
Pixash Lane, Keynsham
Bristol BS31 1TP

T: +44 (0)117 916 1066
E: bristol@campbellreith.com