CampbellReith
consulting engineers

18-22 Haverstock Hill, London NW3 2BL

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12727-85

Revision: F2

October 2018

Campbell Reith Hill LLP
Friars Bridge Court
41-45 Blackfriars Road
London
SE1 8NZ

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

Document History and Status

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D1	July 2018	Comment	GKemb12727-85-240718-18-22 Haverstock Hill-D1	GK	SOS	EMB
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Author	G Kite, BSc MSc DIC FGS
Project Partner	E M Brown, BSc MSc CGeol FGS
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Project Name	18-22 Haverstock Hill
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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 18-22 Haverstock Hill, London, NW3 2BL (planning reference 2018/2179/P). The basement is considered to fall within Category C 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 work involves the demolition of the existing four-storey building and the construction of a six-storey building with a single level basement extending to a maximum depth of 4.5m below ground level. Chalk Farm London Underground Station (20m southwest of the site) is a Grade II Listed Building.

1.5. The BIA has been prepared by Geotechnical & Environmental Associates Limited with supporting documents prepared by Engineeria. The qualifications of the authors of the reports prepared by GEA Ltd are in accordance with LBC guidance.

1.6. A desk study has been presented, broadly in accordance with LBC guidance.

1.7. The site investigation undertaken in March 2018 identifies Made Ground overlying the London Clay. The highest groundwater level recorded was 4.36m bgl in BH5 (southwest corner of the site adjacent to Haverstock Hill). The BIA recommends continued monitoring be undertaken. The proposed development will not impact the wider hydrogeological environment.

1.8. The construction methodology indicates the construction of reinforced concrete retaining walls to the perimeter of the proposed basement and the underpinning of the existing party wall with the Salvation Army Citadel. Structural calculations, retaining wall design, sequencing and propping information are provided for review.

1.9. A Ground Movement Assessment (GMA) is presented that the impacts on neighbouring buildings and the LUL Northern Line, which runs under Haverstock Hill. For the structures assessed, a maximum Damage Impact of Category 1 (Very Slight) in accordance with the Burland Scale is predicted. Queries from the D1 Audit have now been addressed and the assessment is accepted.

1.10. A monitoring strategy has been proposed. Monitoring of the proposed construction and neighbouring structures should be implemented.

1.11. The BIA acknowledges that London Underground Limited's (LUL) exclusion zones must be adhered to and that all works affecting LUL assets are to be undertaken in consultation with LUL. The applicant will need to enter into an asset protection agreement with LUL, as applicable.

1.12. Thames Water assets are identified in the vicinity of the site. The applicant will need to evaluate impacts to the assets and enter into an asset protection agreement with Thames Water, as applicable.

1.13. Flood resistance measures to protect the basement from local surface water flooding are discussed and should be implemented in the final design.

1.14. The development will not increase the impermeable site area. The Drainage and SuDS Strategy outlines the various options for SuDs. Final drainage design should meet the requirements of Thames Water and LBC. The proposed development will not impact the wider hydrological environment.

1.15. An outline construction programme has been presented.

1.16. Queries and matters requiring further information or clarification are discussed in Section 4 and summarised in Appendix 2. Considering the revised information received, the BIA meets the criteria of CPG Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 15 June 2018 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 18-22 Haverstock Hill, London NW3 2BL, Camden Reference 2018/2179/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 : Basements (2018).
- 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.

2.5. LBC's Planning Portal described the planning proposal as: "Demolition of existing buildings and ancillary structures (11 flats, A1 unit, A5 unit) and construction of a new building comprising ground plus basement and five upper floors for use as 29 no. dwellings (Class C3) and flexible Class A1/A2/A3/A4 together with cycle parking, landscaping, refuse and associated works."

LBC's Planning Portal confirmed that the site does not lie within a Conservation Area and is not a Listed Building. Chalk Farm London Underground station (20m southwest of the site) is a Grade II Listed Building.

2.6. CampbellReith accessed LBC's Planning Portal on 26 June 2018 and gained access to the following:

- Concept Design Report & Basement Impact Assessment dated 23 April 2018 (ref 0563-EEE-XX-RP-S-0001, Rev P2) by Engineeria including:
    - Desk Study and Ground Investigation report dated April 2018 (ref J18009) by Geotechnical & Environmental Associates.
- Proposed and existing drawings including elevations, sections and plans dated April 2018 by Piercy & Company.
- Design and Access Statement dated April 2018 (ref 13528) by Piercy & Company.
- Arboricultural Impact Assessment dated April 2018 (ref 551027jrMarch18D01_BS5837) by Greengage.

2.7. CampbellReith were presented with additional information in July and August 2018, including via email and in discussion with the Applicant's Engineers:

- Desk Study and Ground Investigation Report Issue 3 dated 14 August 2018 (ref J18009) by Geotechnical & Environmental Associates.
- Email correspondence with GEA with supplementary calculations.
- Outline construction programme.

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	Updated in revised submissions.
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	GEA BIA report, Section 3.1.2. The Northern Line Tunnel is located adjacent to the southwest of the site, beneath Haverstock Hill, with the tunnel crown level at 9.50m bgl.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	GEA BIA report, Section 3.1.1.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	GEA BIA report, Section 3.1.3.
Is a conceptual model presented?	Yes	Adequately described in text and drawings
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	GEA BIA report, Section 4.1.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	No issues identified in Screening process.

Item	Yes/No/NA	Comment
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	No issues identified in Screening process.
Is factual ground investigation data provided?	Yes	GEA BIA report, Section 4.
Is monitoring data presented?	Yes	Groundwater monitoring presented in BIA report, section 5.3.
Is the ground investigation informed by a desk study?	Yes	GEA BIA report, Section 2.
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	GEA BIA report, Section 9.1.1. The proposed construction will need to respect LUL's exclusion zone.
Is a geotechnical interpretation presented?	Yes	GEA BIA report, Sections 8 and 9.
Does the geotechnical interpretation include information on retaining wall design?	Yes	GEA BIA report, Section 8.1.1.
Are reports on other investigations required by screening and scoping presented?	Yes	GMA; Drainage and SuDS Strategy report provided as Part 6 of the Engineeria report; Arboricultural Impact Assessment provided; Ongoing consultations with LUL.
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	GEA BIA report, Section 12.
Are estimates of ground movement and structural impact presented?	Yes	
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	

Item	Yes/No/NA	Comment
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	A temporary works sequence indicating propping is presented in Appendix D of the Engineeria report. A proposed scope of monitoring is provided in Appendix C of the Engineeria report including trigger levels and contingency actions. Updated in revised submissions. Flood resistance measures and drainage discussed in Section 6 of the Engineeria report.
Has the need for monitoring during construction been considered?	Yes	Engineeria report, Appendix C. GEA BIA report, Section 9.3.2, Section 10.7.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Updated in revised submissions.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Updated in revised submissions.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Updated in revised submissions.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	To be confirmed pending review of GMA.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The BIA has been prepared by Geotechnical & Environmental Associates Limited with supporting documents prepared by Engineeria. The qualifications of the authors of the reports prepared by GEA Ltd are in accordance with CPG guidelines.

4.2. The BIA indicates that the proposed work involves the demolition of the existing four-storey residential and retail building (ground floor recessed below existing external level by approximately 1.3m in the northern part of the site) and the construction of a six-storey building with a single level basement beneath the rear of the building extending to a maximum depth of 4.5m below ground level. Chalk Farm London Underground Station (20m southwest of the site) is a Grade II Listed Building.

4.3. A desk study has been presented, broadly in accordance with the GSD Appendix G1.

4.4. A site investigation undertaken in March 2018 identifies Made Ground overlying the London Clay. Interpretative geotechnical information in accordance with the GSD Appendix G3 is presented. Groundwater was monitored on three occasions during March and April 2018. The highest groundwater level recorded was 4.36m below ground level (bgl) in BH5 (southwest corner of the site adjacent to Haverstock Hill). The Engineeria report incorrectly states that no groundwater was encountered to 25m bgl.

4.5. The BIA recommends continued groundwater monitoring be undertaken and that for the design of the retaining walls, groundwater level should be assumed to be 2/3 of the retained height, unless the risk of groundwater and surface water collecting behind the retaining walls can be suitably mitigated through drainage. The Engineeria report recommends that the basement be waterproofed with a secondary cavity drainage system.

4.6. The proposed development will not impact the wider hydrogeological environment.

4.7. The proposed basement will be in close proximity to the southbound tunnel of the Northern Line (London Underground) which runs beneath Haverstock Hill carriageway. The tunnel crown is approximately 9.50 m below the site.

4.8. The construction methodology indicates the construction of reinforced concrete retaining walls to the perimeter of the proposed basement and the underpinning of the existing party wall with the Salvation Army Citadel. The foundations will comprise a reinforced concrete raft. Structural calculations and retaining wall design are provided in Appendix B of the Engineeria report. Sequencing and propping information are also provided for review.

4.9. A Ground Movement Assessment (GMA) is presented that considers the movements relating to the proposed basement construction and the effect on nearby sensitive structures (Salvation Army

Citadel, Haverstock School, Chalk Farm LUL station, depot adjacent to LUL station and LUL Northern Line which runs under Haverstock Hill). For the structures assessed, a maximum Damage Impact of Category 1 (Very Slight) (in accordance with the Burland Scale) is predicted. Upon review of additional calculations submitted, and discussions with the Applicant's Engineers, the GMA is accepted.

4.10. Structural movement monitoring is proposed. It's noted that red trigger values for vertical movement are 10mm, based on the survey techniques to be used having an accuracy of +/- 3mm. Structural monitoring should be implemented during the works to ensure damage to neighbouring structures is maintained within the predicted limits.

4.11. The BIA acknowledges that London Underground Limited's (LUL) exclusion zones must be adhered to and that all works affecting LUL assets are to be undertaken in consultation with LUL. The GMA indicates that the proposed development will result in total displacement of approximately 2mm to the LUL Northern Line Tunnels, which should be confirmed following review of the GMA. It is recommended that the guidance document G0023 (Infrastructure Protection – Special Conditions for Outside Parties Working On or Near the Railway) forms a basis for any proposals. The applicant will need to enter into an asset protection agreement with LUL, as applicable.

4.12. Thames Water assets are identified in the vicinity of the site. The applicant will need to evaluate impacts to the assets and enter into an asset protection agreement with Thames Water, as applicable.

4.13. The current Environment Agency and Camden SFRA data indicates that the site is at "very low" risk of flooding (less than 0.1%) and is not located within a Local Flood Risk Zone. However, Haverstock Hill carriageway is classified as being at "medium" to "high" risk of surface water flooding. Haverstock Hill did not flood in 1975 or 2002. Flood resistance measures to protect the basement from local surface water flooding are discussed and should be implemented in the final design.

4.14. The site is within Critical Drainage Area (Group 3-003). The development will not increase the impermeable site area. The Drainage and SuDS Strategy outlines the various options for SuDs on the proposed site including rainwater harvesting, infiltration techniques and attenuation techniques. Final drainage design should meet the requirements of Thames Water and LBC.

4.15. An outline construction programme has been presented.

5.0 CONCLUSIONS

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

5.2. A desk study has been presented, broadly in accordance with LBC guidance.

5.3. The site investigation identifies Made Ground overlying the London Clay. The BIA recommends continued monitoring be undertaken. The proposed development will not impact the wider hydrogeological environment.

5.4. A construction methodology including outline structural calculations, retaining wall design and temporary works are provided for review.

5.5. A Ground Movement Assessment (GMA) is presented that considers the impacts on neighbouring buildings and LUL Northern Line Tunnels. A maximum Damage Impact of Category 1 (Very Slight) in accordance with the Burland Scale is predicted. After review and discussion of additional calculations, the GMA is accepted.

5.6. The monitoring strategy and trigger values proposed should be implemented to ensure damage to adjacent buildings is maintained to within Category 1.

5.7. The applicant will need to enter into an asset protection agreement with LUL, as applicable.

5.8. Thames Water assets are identified in the vicinity of the site. The applicant will need to evaluate impacts to the assets and enter into an asset protection agreement with Thames Water, as applicable

5.9. Flood resistance measures to protect the basement from local surface water flooding are discussed in the BIA and should be implemented in the final design.

5.10. The development will not increase the impermeable site area. A Drainage and SuDS Strategy is presented. Final drainage design should meet the requirements of Thames Water and LBC. The proposed development will not impact the wider hydrological environment

5.11. An outline construction programme has been presented.

5.12. Queries and matters requiring further information or clarification are summarised in Appendix 2. Considering the additional information presented, the BIA meets the criteria of CPG Basements.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

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consulting engineers

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	Stability	GMA should be reviewed and updated as stated in Section 4.	Closed	August 2018
2	Stability	Once the GMA review is completed the monitoring strategy and trigger values proposed should be checked to ensure they limit damage to adjacent buildings to within Category 1.	Closed	August 2018
3	Stability	Impacts to Thames Water Assets to be assessed and agreed with Thames Water.	Note only	N/A
4	Stability	Ongoing discussions with LUL should continue to ensure works proceed in accordance with LUL requirements regarding the Northern Line exclusion zone / asset protection	Note only	N/A
5	BIA	Outline construction programme to be provided	Closed	August 2018

Appendix 3: Supplementary Supporting Documents

Email correspondence with GEA

12727-85: 18-22 Haverstock Hill - basement auditJack Deaney to: GrahamKite@campbellreith.com 09/08/2018 18:06
Cc: "Steve Branch", "Pramod Gurung", "Ben Whitehead"
From: "Jack Deaney" <Jack@gea-ltd.co.uk>
To: "GrahamKite@campbellreith.com" <GrahamKite@campbellreith.com>
Cc: "Steve Branch" <Steve@gea-ltd.co.uk>, "Pramod Gurung" <pramod.gurung@engineeria.com>, "Ben Whitehead" <ben@engineeria.com>
History:This message has been replied to.

1 Attachment

Xdisp1 Total movements (Structure B @ 31.5 m OD).txt

Hi Graham,

We have ran the model again with the foundation level at 31.5 m OD as per the rest of the building and damage categories are still acceptable. I've attached the tabular out which shows 6.76 mm perpendicular horizontal movement and the corresponding damage category of 0 Negligible.

Kind regards,

Jack

From: GrahamKite@campbellreith.com [mailto:GrahamKite@campbellreith.com]
Sent: 07 August 2018 15:11
To: Jack Deaney <Jack@gea-ltd.co.uk>
Cc: Ben Whitehead <ben@engineeria.com>; camdenaudit@campbellreith.com; Fowler, David <David.Fowler@camden.gov.uk>; Pramod Gurung <pramod.gurung@engineeria.com>; Steve Branch <Steve@gea-ltd.co.uk>
Subject: RE: 12727-85: 18-22 Haverstock Hill - basement audit

Hi Jack

I tried calling earlier to discuss. We don't share your view on the potential for movement. The wall that is being assessed (B) is being underpinned, and the processing of underpinning itself and then excavating adjacent to the underpin will cause movements. We're unsure why you think its appropriate to take lateral movements at the toe of the wall.

Regards

Graham Kite

CampbellReith
consulting engineers
Friars Bridge Court,
41-45 Blackfriars Road,
London
SE1 8NZ

Tel +44 (0)20 7340 1700
www.campbellreith.com

From: "Jack Deaney" <Jack@gea-ltd.co.uk>
To: "GrahamKite@campbellreith.com" <GrahamKite@campbellreith.com>
Cc: "Ben Whitehead" <ben@engineeria.com>, "Pramod Gurung" <pramod.gurung@engineeria.com>, "Steve Branch" <Steve@gea-ltd.co.uk>, "Fowler, David" <David.Fowler@camden.gov.uk>, "camdenaudit@campbellreith.com" <camdenaudit@campbellreith.com>
Date: 31/07/2018 15:37
Subject: RE: 12727-85: 18-22 Haverstock Hill - basement audit

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Hi Graham,

Movements at the top of the wall are between 5 mm and 10 mm as you suggest (and presented on the contour plots in the appendix), however, as I'm sure you are aware, these movements decrease to zero at the base of the wall. As mentioned in our report, because 'Structure B' (i.e. the partywall) is to be underpinned, it has been modelled at proposed formation level (i.e. toward the base of the basement excavation), and this is reflected in the low predicted movements along that structure. The remaining walls of the Salvation Army building (Structures A, C and D) have been modelled at existing foundation level (0.5 m depth) as these walls are not to be underpinned. Subsequently higher movements that are more in line with the ground surface movements are predicted, as one would expect.

London

Friars Bridge Court
41- 45 Blackfriars Road
London, SE1 8NZ

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

UAE

Office 705, Warsan Building
Hessa Street (East)
PO Box 28064, Dubai, UAE

T: +971 4 453 4735
E: uae@campbellreith.com