CampbellReith
consulting engineers

17 Lyndhurst Gardens
London
NW3 5NU

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 13398-60
Revision: D1

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Campbell Reith Hill LLP
15 Bermondsey Square
London
SE1 3UN

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

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Author	N Simonini, BSc MSc FGS
Project Partner	E M Brown, BSc MSc CGeol FGS
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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 17 Lyndhurst Gardens, NW3 5NU (planning reference 2019/6151/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 (BIA) 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. Details of the site layout and proposed development are given in paragraphs 4.2 and 4.3.

1.5. The qualifications of the individuals involved in the BIA are in accordance with LBC guidance.

1.6. Screening and scoping assessments are presented, supported by desk study information.

1.7. The BIA states that there are slopes in excess of 7° on site. The BIA states that they are unlikely to pose a risk for the development, however, a site plan showing the location of these slopes should be presented in the BIA to clarify matters.

1.8. The site investigation indicates the proposed basement will be founded in the Claygate Member, which is considered to be a suitable bearing stratum.

1.9. The BIA confirmed that there will be no adverse impact on the hydrogeological environment.

1.10. There will be a slight increase in hardstanding areas on site, which may alter the rate of surface water discharged into the local sewer. An outline drainage proposal showing adequate mitigation measures is presented in the BIA. Consultation with Thames Water is recommended. The site is confirmed to have a very low risk of flooding from all the sources.

1.11. Geotechnical parameters to inform settlement, retaining wall calculations and foundation design have been presented in the BIA and are considered reasonable.

1.12. A Ground Movement Assessment (GMA) has been undertaken to demonstrate that ground movements and consequential damage to neighbouring properties will be within LBC's policy requirements. The GMA should be revised in accordance with paragraph 4.15-4.16 of this audit.

1.13. The BIA presented an outline monitoring strategy to ensure movements are limited to those predicted.

1.14. An outline check to ensure that foundations are not affected by future shrinking and swelling of the clay due to tree removal and/or continued growth should be presented in the BIA.

1.15. Queries and requests for information are summarised in Appendix 2. Until the additional information and further assessments requested are presented, the BIA does not meet the requirements of Camden Planning Guidance: Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 22 October 2020 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 17 Lyndhurst Gardens, London NW3 5NU, Camden Reference 2019/6151/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:

- Camden Local Plan 2017 - Policy A5 Basements.
- Camden Planning Guidance: Basements. March 2018.
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.

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;

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 Audit Instruction described the planning proposal as "*Change of use from Class D1 use (non-residential institution) to Class C3 Use (residential) as 1 x 5 bedroom unit, 1 x 5 bedroom unit and 1 x 4 bedroom unit, internal alterations, external alterations including a new glass link element and lowering of basement, hard and soft landscaping including a summer house with internal cycling parking, a bin store, a cycle store and other associated works*".

2.6. The Audit Instruction confirmed applicant's property and neighbouring properties are listed.

2.7. CampbellReith accessed LBC's Planning Portal on 5th November 2020 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (including Desk Study & Ground Investigation Report) (ref.: J20088), dated September 2020, by GEA Ltd;
- Existing and proposed plans, elevations and sections by Bowker Sadler Architecture, dated May 2020;

- Structural Engineering BIA Report (ref.: 28224, Rev. 1) by Price & Myers LLP, dated January 2020 (first revision);
- Arboricultural Impact Assessment Report (ref.:JDL/17/LDG/AIA/01c) by Landmark Trees, dated September 2020.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Document Control and 1.3.2 section of the BIA.
Is data required by Cl.233 of the GSD presented?	Yes	
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	See Section 2 of the BIA.
Are suitable plan/maps included?	Yes	The assessment is supported by suitable drawings of existing and proposed development and by suitable maps to describe proposal and environmental setting.
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	Section 3 of the BIA.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3 of the BIA.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3 of the BIA.
Is a conceptual model presented?	Yes	Sections 5 and 7 of the BIA.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4 of the BIA.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4 of the BIA.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4 of the BIA.
Is factual ground investigation data provided?	Yes	BIA appendix.
Is monitoring data presented?	Yes	Section 5.3 of the BIA.
Is the ground investigation informed by a desk study?	Yes	Section 2 of the BIA.
Has a site walkover been undertaken?	Yes	At the time of the site investigation.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Neighbouring properties are not considered to be within the zone of influence of the basement. Foundation inspection pits revealed foundation depth of the existing buildings on site.
Is a geotechnical interpretation presented?	Yes	Sections 8 and 10 of the BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	As above.
Are reports on other investigations required by screening and scoping presented?	Yes	Ground investigation reports. Arboricultural report.
Are the baseline conditions described, based on the GSD?	Yes	

Item	Yes/No/NA	Comment
Do the baseline conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	Part 4 of the BIA.
Are estimates of ground movement and structural impact presented?	Yes	Part 3 of the BIA.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	No	Further clarification is required on land stability.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Groundwater ingress mitigation measures and ground movement mitigation measures presented.
Has the need for monitoring during construction been considered?	Yes	Section 11.2 of the BIA.
Have the residual (after mitigation) impacts been clearly identified?	Yes	The BIA concludes that residual impacts will be negligible.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	The GMA confirmed damage to existing properties will be within Category 1 of the Burland Scale. However the GMA should be revised.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Outline drainage proposal presented.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	As above.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Sections 11 and 12 of the BIA. However the GMA should be revised.
Are non-technical summaries provided?	Yes	Section 13.3 of the BIA.

4.0 DISCUSSION

4.1. The BIA and the Structural Engineering Report were undertaken by GEA Ltd and Price & Myers Consulting Engineers. The reported qualifications of the authors are in line with those requested by LBC guidance.

4.2. The site is currently occupied by a Grade II listed large detached three storey building comprising a Victorian style building to the east with a ground floor level at 87.80m AOD and a 1980s era two-storey extension to the west which has an upper floor level at 88.12m AOD. The buildings are connected via a two storey glazed link. Both the buildings' ground floor is at a higher level than the surrounding gardens. A lower ground floor level is present below the western part of the Victorian building, the glazed link and the entire footprint of the 1980s extension at an elevation of c. 85.70m AOD.

4.3. The site slope towards south with an inclination generally less than 7°. Although not shown on the Arup maps, the BIA states that there are localised slopes at the rear of the site at an angle of 32°. However, it is understood these slopes are not located in the vicinity of the proposed basement works and will therefore remain unaffected by the development. A plan showing the location of these slopes is not presented in the BIA and is required for further clarification.

4.4. The proposed development comprises the demolition of the existing glazed link and the construction of a new link structure which will have a basement with a finished floor level at 84.42m AOD. An excavation of c. 1.30m below the existing lower ground floor is therefore proposed.

4.5. The LBC Instruction to proceed with the audit identified that the applicant's property is listed and that the basement proposal neighbours listed buildings. However, the neighbouring properties are at a minimum distance of 11m from the site and are not considered to be affected by the development.

4.6. Screening and scoping assessments are presented and informed by desktop study information. Most of the relevant figures/maps from the Arup GSD and other guidance documents are referenced within the BIA to support responses to the screening questions.

4.7. A site investigation has been undertaken in May 2020 to inform the basement design and to provide information on the existing foundations. A total of 3 cable percussive boreholes and 5 trial pits were undertaken. The ground investigation indicates Made Ground typically to a depth of 0.50 - 1.00m bgl. The Claygate Member underlies the Made Ground and is proven to the bottom of the boreholes to a depth of c 8.00m bgl. Where no lower ground floor is present, the existing structures have been generally found to bear on concrete strip footings at a depth of c. 1.15m bgl.

4.8. Groundwater was encountered during drilling at a depth of c. 0.80m bgl in two of the foundation inspection pits and between 3.60 and 6.00m bgl within the boreholes. The BIA states that this is likely associated with groundwater perched at the top of the natural clay and with the presence of sandy layers/lenses within the Claygate Member. Similarly the BIA states that groundwater intercepted during monitoring is attributable to the presence of granular material within the Claygate Member.

4.9. The Claygate Member is classified as a Secondary 'A' Aquifer due to the presence of sandy layers which can carry groundwater. The BIA shows that those layers have been encountered only in some areas and typically below the proposed formation level. As such, it is accepted that there will be no adverse impact on the hydrogeological environment. However, localised presence of groundwater bearing layers within the basement excavation area cannot be discounted and the BIA states that should inflows be encountered, water will be pumped out from the excavation.

4.10. It is accepted that the site is at very low risk from flooding from rivers, seas and reservoirs and at very low risk from surface water flooding.

4.11. The BIA states that the proposal will cause an increase of c. 5% of hardstanding areas and that this will have little effect as the ground is of low permeability. An outline drainage/SuDS proposal is presented in the BIA, confirming that the drainage network and volume of waters discharged will remain approximately the same. It is noted the final drainage design should be approved by Thames Water.

4.12. The basement of the proposed new link structure will be typically constructed using traditional underpinning techniques employing a 'hit and miss' construction sequence with pins excavated in sequence in bays typically 1.0m wide. Although both the south and north reinforced concrete retaining wall will be constructed in open cut they will be installed using a similar underpinning technique. Temporary works information is provided, including sequencing, propping and structural calculations.

4.13. Geotechnical parameters to inform settlement, retaining wall calculations and foundation design have been presented in the BIA and are considered reasonable. The proposed parameter values have been adopted by the structural engineer in the outline retaining wall design presented in the BIA.

4.14. A Ground Movement Assessment (GMA) has been undertaken to demonstrate that ground movements and consequential damage to the applicant's listed properties (original Victoria building and 1980s extension) will be within LBC's policy requirements. Analysis of horizontal and vertical ground movements has been undertaken utilising proprietary software (PDisp and XDisp). The GMA shows that anticipated damage potentially occurring at the analysed walls will be within Category 1 of the Burland Scale.

4.15. From the BIA report and XDisp output, it is understood that ground movements due to underpinning has been included in the analysis by using the curves reported in CIRIA C760 for the installation of embedded retaining walls and this is accepted. An estimation of heave occurring due to the basement excavation has been also included in the GMA. However, when importing displacement data into XDisp, heave movements may counteract settlement occurring at neighbouring properties, resulting in an under-estimation of the resulting ground movements in the short term. Further justification should be provided for this approach or heave movements excluded from the analysis.

4.16. Most of the walls of the eastern building analysed in the GMA have been assumed to be founded at a depth of c. 1.00mbgl. However, one of the walls (wall no. 20 of the model) has been assumed to have existing foundation to a depth of c. 2.00m bgl. This is not supported by any evidence in the BIA and as such the wall should be assumed at a same depth as the other walls analysed.

4.17. It is confirmed in the BIA that a ground movements monitoring regime will be implemented throughout construction of the basement, in accordance with current guidance. It is accepted that the detailed monitoring strategy will be developed at a later stage and will include contingency measures and trigger levels.

4.18. The Screening section of the BIA indicates the area to be prone to seasonal shrink-swell which can result in foundation movements. An Arboricultural Impact Assessment has been undertaken. The BIA specifies that 8 trees are going to be removed. Although evidence of desiccation was not found during the ground investigation, an outline check against NHBC guidelines to ensure that foundations are not affected by future shrinking and swelling of the clay due to tree removal and/or continued growth should be presented in the BIA.

5.0 CONCLUSIONS

5.1. The qualifications of the individuals involved in the BIA are in accordance with LBC guidance.

5.2. Screening and scoping assessments are presented, supported by desk study information.

5.3. A site plan showing the location of slopes with a gradient in excess of 7° should be presented in the BIA.

5.4. The site investigation indicates the proposed basement will be founded in the Claygate Member.

5.5. The BIA confirmed that there will be no adverse impact on the hydrogeological environment.

5.6. There will be a slight increase (less than 5%) in hardstanding areas on site which may require the use of SuDS to not increase water discharge rates into the public sewer. An outline drainage proposal is presented in the BIA and is accepted. Final proposal to be approved by Thames Water. The site is confirmed to have a very low risk of flooding from all potential sources.

5.7. Geotechnical parameters to inform settlement, retaining wall calculations and foundation design have been presented in the BIA and are considered reasonable.

5.8. A Ground Movement Assessment (GMA) has been undertaken to demonstrate that ground movements and consequential damage to neighbouring properties will be within LBC's policy requirements. The GMA should be revised in accordance with paragraphs 4.15-4.16.

5.9. The BIA presented an outline monitoring strategy to ensure movements are limited to those predicted.

5.10. An outline check against NHBC guidelines to ensure that foundations are not affected by future shrinking and swelling of the clay due to tree removal and/or continued growth should be presented in the BIA.

5.11. Queries and requests for information are summarised in Appendix 2. Until the additional information and further assessments requested are presented, the BIA does not meet the requirements of Camden Planning Guidance: Basements.

Appendix 1: Residents' Consultation Comments

None relevant to this audit

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA format	A site plan showing the location of slopes with a gradient in excess of 7° should be presented in the BIA.	Open – See Section 4.3.	
2	Land stability	The GMA should be revised according to paragraphs 4.15-4.16.	Open – See Sections 4.15 – 4.16.	
3	Land stability	The BIA should present an outline check against NHBC guidance to ensure existing foundations will not be affected by shrink/swell of the clay due to proposed trees removal.	Open – See Section 4.19.	

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