CampbellReith
consulting engineers

5B Prince Arthur Road
London, NW3 6AX

Basement Impact Assessment Audit

For

London Borough of Camden

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Campbell Reith Hill LLP
15 Bermondsey Square
London
SE1 3UN

T:+44 (0)20 7340 1700
F:+44 (0)20 7340 1777
E:london@campbellreith.com
W:www.campbellreith.com

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Author	C Botsialas, BSc MSc MBA CEng MIMMM CGeol FGS RoGEP Specialist
Project Partner	E M Brown, BSc MSc CGeol FGS
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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 5B Prince Arthur Road, London, NW3 6AX (planning reference 2020/2402/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 Basement Impact Assessment (BIA) has been carried out by companies and individuals with suitable qualifications.

1.5. The proposed development will involve the demolition of the existing building and construction of a new detached three-storey dwelling with a single below ground basement.

1.6. Screening and scoping sections for land stability, hydrology and hydrogeology of the site are included in the BIA report, in accordance with Camden Planning Guidance (CPG) Basements.

1.7. A site-specific ground investigation was undertaken.

1.8. A Hydrogeological Impact Assessment Report and a Ground Movement Assessment (GMA) Report have been undertaken. A number of queries have been raised for these reports as further discussed in Section 4 of this audit. Both reports should be reviewed in light of the comments raised and revised as necessary.

1.9. The proposed ground movement trigger levels shall be informed by the GMA results and be amended in order to be consistent in the various sections of the BIA.

1.10. Preliminary structural retaining wall calculations, a construction methodology and construction sequence drawings are presented.

1.11. Outline calculations for the proposed sheet piled wall are not presented and are requested.

1.12. References in the BIA report that no trees will be felled should be revised in accordance with the arboricultural report.

1.13. There will be a slight decrease of the hardstanding areas due to the proposed development. It is accepted that the proposed development will not affect the hydrology of the site.

1.14. Based on the comments above, a number of queries have been raised as summarised in Appendix 2. In this context, it cannot currently be confirmed that the proposal adheres to the requirements of CPG Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 9/6/2020 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 5B Prince Arthur Road, London, NW3 6AX (planning reference 2020/2402/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 (CPG): 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 "*Demolition of existing dwelling house and erection of replacement dwelling house with basement (Use Class C3)*".

The Audit Instruction also confirmed that the proposal does not involve, or is a neighbour to, listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 11/6/2020 and gained access to the following relevant documents for audit purposes:

- "Basement Impact Assessment", 29 May 2020, Rev.1, report ref.no. 9634_SL_GB_BIA, Taylor Whalley Spyra consulting civil and structural engineers;
- "Design and Access Statement", May 2020, Rev.00, Charlton Brown Architecture & Interiors;
- "Planning Statement", May 2020, Iceni Projects Ltd;
- "Tree survey and arboricultural method statement", May 2020, Tretec;
- Planning application drawings dated 3/7/2019, 2/2/2020 & 2/4/2020, project reference no.1908, Charlton Brown Architecture & Interiors;
- Planning consultation responses.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Refer to Section 1.3 of the BIA report.
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	
Are suitable plan/maps included?	Yes	Refer to the BIA report.
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	Refer to Section 1.17 of the BIA. Some amendments are in the screening section required as per Section 4 of this audit.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Refer to Section 1.17 of the BIA report.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Refer to Section 1.17 of the BIA report.
Is a conceptual model presented?	Yes	Refer to Section 3 of Appendix J of the BIA report.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Refer to Section 2 of the BIA report.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Refer to Section 3 of the BIA report.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Refer to Sections 4 and 5 of the BIA report.
Is factual ground investigation data provided?	Yes	Refer to Appendix J of the BIA report.
Is monitoring data presented?	Yes	As above.
Is the ground investigation informed by a desk study?	Yes	Historical OS maps, BGS maps, Environment Agency maps and information and GSD maps are presented in the BIA appendices.
Has a site walkover been undertaken?	Yes	Refer to Section 1.7 of the BIA.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	The presence of adjacent lower ground floors or basements is confirmed in the BIA. Existing plans of adjacent properties are appended in the BIA.
Is a geotechnical interpretation presented?	Yes	Refer to Appendix J of the BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Refer to Appendix J of the BIA. Stiffness parameters are presented in the GMA in Appendix H.
Are reports on other investigations required by screening and scoping presented?	Yes	A Ground Movement Assessment and a Hydrogeological Impact Assessment are presented in Appendix H of the BIA. An arboricultural survey is presented in Appendix M of the BIA.
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	A Ground Movement Assessment (GMA) is provided but shall be revised in accordance with the comments of this audit in Section 4.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	However, any mitigation required should be revisited based on the comments of this audit in Section 4.
Has the need for monitoring during construction been considered?	Yes	However, different ground movement trigger levels are presented in various sections of the BIA and this should be revised.
Have the residual (after mitigation) impacts been clearly identified?	No	The BIA should be revisited as per the comments of this audit.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	The GMA should be revisited as per the comments of this audit.
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?	No	The GMA should be revisited as per the comments of this audit.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Refer to Section 2.13 of the BIA report and Section 6.1 of the GMA (Appendix H of the BIA). However, the GMA should be revisited as per the comments of this audit.
Are non-technical summaries provided?	Yes	Refer to the executive summary section to the front of the BIA report.

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by 'tws consulting civil & structural engineers'. The BIA included a Ground Movement Assessment (GMA) and a Hydrogeological Impact Assessment in Appendix H, both prepared by the 'Geotechnical Consulting Group'. All reports have been prepared/reviewed by individuals with suitable qualifications.

4.2. The site is located within the Fitzjohns Netherhall Conservation Area and is currently occupied by a detached three-storey residential dwelling, with private rear garden, with no basement.

4.3. The proposed development will involve the demolition of the existing building and construction of a new detached three-storey dwelling with a single below ground basement. The proposed basement excavation will be about 4.30m deep. Stairs are proposed to the front and a lightwell to the rear of the dwelling. A propped/braced sheet piled wall will be used around the perimeter of the basement to facilitate its construction in the short term, with a reinforced concrete basement box and a raft basement slab designed for the long term.

4.4. The proposed construction methodology including the temporary works sequence is discussed in Section 2.17 and further presented in drawings in Appendix D of the BIA. It is requested that the wall for the front stairs is also included in the construction methodology and the outline sequence drawings.

4.5. Preliminary structural retaining wall calculations are presented in Appendix N of the BIA. Outline calculations for the proposed sheet piled wall are not presented and are requested.

4.6. Screening charts for the land stability, hydrology and hydrogeology of the site are included in Section 1.17 the BIA report. Scoping sections are covered in Sections 2 to 5 and the appendices of the BIA report. The BIA is supported by desk study information including OS maps, BGS, GSD and Environment Agency information and maps, and site walkovers.

4.7. According to the arboricultural report (page 7), the existing tree T5 to the front of the property, is proposed to be felled. There are contradictory references in the BIA report that no trees will be felled including the answer to question 6 of the land stability screening. It is accepted that the removal of tree T5 will not have any impact on the stability of the site due to the presence of granular ground conditions as discussed in the following section.

4.8. A site-specific ground investigation (GI) was undertaken with the results presented in Appendix J of the BIA. The GI comprised two boreholes to 4.50m and 11m depth and two hand-dug foundation inspection pits within the existing building footprint. The GI recorded Made Ground up to 1.10m depth over gravel and sand of Bagshot Formation to 6.40m depth over clayey and

sandy layers of Claygate Member proved to 11m depth. With the exception of a thin sandy clay layer encountered locally at 1.10m-2.20m in one borehole only, it is evident that the proposed basement will be excavated within the sandy and gravelly layers of the Bagshot Formation. A 'soft to firm' sandy clay layer of the Claygate Member was encountered below the proposed basement excavation at 6.40m-9.50m depth.

4.9. Groundwater was encountered during the GI at 9.50m depth. No further records of groundwater monitoring during the site work are reported and subsequent monitoring visits from July to September 2019, indicated groundwater at about 7.60m depth (deep borehole) and at 3.20m (shallow borehole). The former is possibly associated with the groundwater encountered at 9.50m depth; the latter is interpreted in the BIA as being possibly associated with rainwater, i.e. not being representative of groundwater level at the site.

4.10. The Hydrogeological Impact Assessment presented in Appendix H of the BIA, concludes that the deeper groundwater records (c.7.60m) represent 'perched water'. Whilst this may not be the case, it is accepted that the proposed basement excavation will likely be above any permanent ground water level. However, it is requested to be clarified whether the proposed sheet piles might influence the state of the aquifer encountered at 9.50m bgl. It is noted that the Hydrogeological Impact Assessment proposes (Section 5) that the sheet piles should be constructed in such a way as to allow free flow of groundwater beneath the basement. The Claygate Member is noted as being susceptible to internal erosion. A comment on any potential instability of the sheet piled wall is requested with regard to a potential loss of passive resistance or piping phenomena.

4.11. Geotechnical interpretation including parameters for retaining wall design and a ground movement assessment (GMA) are presented in Appendices J and H of the BIA report respectively.

4.12. The GMA used linear elastic analysis, proprietary software and CIRIA C760 methodology for 'stiff clay', which is intended for embedded retaining walls. However, based on the GI results, the ground conditions mainly comprise sand and gravel of Bagshot Formation underlain by a 'soft to firm' sandy clay layer of Claygate Member encountered well below the proposed basement excavation at 6.40m-9.50m depth. As such, the ground conditions assumed in the GMA are not in accordance with the GI results. The BIA states that the use of 'stiff clay' curves is appropriate for the encountered ground conditions. This should be justified or alternative analysis be presented.

4.13. The ground movements due to demolition of the existing building have been estimated in the GMA using PDisp software but the detailed input and output of the software has not been provided in the BIA report and is requested.

4.14. In the GMA (Section 5.2.2), it is stated that the installation of the sheet piles is expected to cause upward ground movements up to about 5mm. This figure is requested to be justified. Estimates for the anticipated horizontal movement due to the sheet piles installation should also be provided. The statement in the GMA (Section 5.2.) that any ground movement due to the installation of the sheet piles 'would be expected to be localised immediately behind the wall' shall be justified and the length of the proposed sheet piles confirmed.

4.15. In the GMA (Section 5.2.3) ground movements due to excavation are estimated using XDisp software assuming 'stiff clay' (there is a reference in Figure 10 of the GMA) is present on site. The ground conditions assumed shall be reviewed, as discussed above, and the detailed input and output of XDisp software be provided.

4.16. Contour plans are requested to be included in the GMA, for the anticipated total horizontal and vertical movements due to both wall installation and excavation. Figures 11 and 12 of the GMA present contour plans due to excavation in front of the wall only.

4.17. A sketch/plan showing the various structural wall elements considered in the building damage assessment in Section 6 of the GMA for the neighbouring properties at No. 5 and No. 7-9 is requested. The building damage assessment shall then be confirmed once the comments of this audit have been considered.

4.18. The potential impact to surrounding structures and infrastructure presented in Section 6.1.3 of the GMA, appears to consider only the ground movements due to excavation in front of the wall; it should also include anticipated ground movements due to wall installation. A utility search has not been available and is requested to be included in the GMA to clearly locate (or exclude the presence) of any sensitive utilities that might be impacted near the proposed basement.

4.19. The proposed in the GMA (Section 6.2) ground movement trigger levels are not consistent with the trigger levels proposed in the Appendix G of the BIA report. In any case, the trigger levels shall be informed by the GMA results and be consistent in the various sections and appendices of the BIA report.

4.20. An allowable bearing pressure of 150kN/m^2 is proposed for a basement slab at 3m depth, in the GI report attached in Appendix J of the BIA. This bearing pressure value is adopted by the outline structural calculations presented in Appendix N but for a deeper basement slab founded at 4.30m depth. According to the GI data (BH1), a 'soft to firm' sandy clay (with a low recorded SPT N raw value of 6) is noted at 6.40m-9.50m depth, within the bulb of pressure of the proposed raft slab, which may give rise to undue settlement and ground instability. It is requested that the allowable bearing pressure value is rechecked and revised as required for the proposed foundation depth at c.4.30m bgl.

4.21. Based on the information presented in Section 5 of the BIA, there will be a slight decrease of the hardstanding areas due to the proposed development. It is accepted that the proposed development will not affect the hydrology of the site.

4.22. Based on the comments above, a number of queries have been raised as summarised in Appendix 2. In this context, it cannot currently be confirmed that the proposal adheres to the requirements of CPG Basements.

5.0 CONCLUSIONS

5.1. The Basement Impact Assessment (BIA) has been carried out by companies and individuals with suitable qualifications.

5.2. The proposed development will involve the demolition of the existing building and construction of a new detached three-storey dwelling with a single below ground basement.

5.3. It is requested that the wall for the front stairs is also included in the construction methodology and the outline sequence drawings.

5.4. Outline calculations for the proposed sheet piled wall are not presented and are requested.

5.5. Contradictory references in the BIA report and the arboricultural report about felled trees should be revised.

5.6. Groundwater at 9.50m depth was encountered. It should be clarified whether the proposed sheet piles might influence the state of this aquifer. Potential instability problems of the proposed sheet piled wall related to groundwater should be further discussed in the BIA.

5.7. The ground conditions assumed in the GMA are not in accordance with the GI results and justification is required for the assumptions made, or an alternative assessment presented.

5.8. The ground movement trigger levels shall be informed by the GMA results and be consistent in the various sections of the BIA report.

5.9. The proposed allowable bearing pressure value should be revised for the proposed foundation depth.

5.10. It is accepted that the proposed development will not affect the hydrology of the site.

5.11. Based on the comments above, a number of queries have been raised as summarised in Appendix 2. In this context, it cannot currently be confirmed that the proposal adheres to the requirements of CPG Basements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Thompson & Corrigan	Flat 5, 9 Prince Arthur Road	Unknown	Risk of subsidence and damage to neighbouring structures at 7/9. Groundwater risk.	Queries have been raised in Section 4 of this audit.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Stability	The proposed wall for the front stairs shall be included in the construction methodology and the outline sequence drawings.	Open	
2	Stability	Outline calculations for the proposed sheet piled wall are not presented and are requested.	Open	
3	Stability	Contradictory references in the BIA report and the arboricultural report about felled trees should be revised.	Open	
4	Stability	The GMA shall be reviewed in accordance with the comments in Sections 4.12 to 4.19 of this audit.	Open	
5	Stability	The allowable bearing pressure value shall be checked and revised if necessary for the proposed foundation depth.	Open	
6	Hydrogeology / Stability	The Hydrogeological Impact Assessment shall be reviewed as per the comments in Section 4.10 of this audit.	Open	

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