

8 South Square,
London WC1R 5ET

Basement Impact Assessment
Audit

For
London Borough of Camden

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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 (BIA) submitted as part of the Planning Submission documentation for 8 South Square, London WC1R 5ET (planning reference 2019/6319/P). The basement is considered to fall within Category B as defined by the Terms of Reference.
- 1.2. The Audit reviewed the 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. The BIA has been carried out by individuals who possess suitable qualifications.
- 1.5. Site specific ground investigation is required to justify the parameters used in the conceptual site model, confirm an adequate bearing stratum and inform the assessment of stability and ground movement.
- 1.6. Further consideration of the presence of a tree near the development is required, particularly with respect to excavation and construction techniques required to enlarge the basement and raise the ceiling level.
- 1.7. It is accepted that the surrounding slopes to the development site are stable and that the development is not in an area subject to flooding.
- 1.8. Further consideration of the impact to the hydrogeology at the site will be required following completion of the site specific ground investigation.
- 1.9. Outline structural calculations and details of the retaining wall design should be provided. Further clarification regarding the construction sequence and levels is also required.
- 1.10. The Ground Movement Assessment and Damage Category Assessment should be revised in accordance with the comments in this report.
- 1.11. The BIA recommends monitoring of the neighbouring structures during all stages of construction, and that trigger levels and associated actions be developed as part of a monitoring specification for the works.
- 1.12. A number of queries have been raised and are summarised in Appendix 2. It cannot currently 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 29 May 2020 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 8 South Square, London WC1R 5ET.
- 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 *"Excavation within existing vaults to form underground plant room [in] adjacent front lightwell to south-west of Bencher's Entrance"*
- 2.6. The Audit Instruction also confirmed that there are no listed buildings that could be affected by the development at 8 South Square.
- 2.7. CampbellReith accessed LBC's Planning Portal on 2 June 2020 and gained access to the following relevant documents for audit purposes:
- Desk Study & Basement Impact Assessment Report (BIA) by Geotechnical and Environmental Associates Limited (GEA), ref. J20048, dated 13 March 2020.

- Design and Access Statement by ghk Architects, ref. HK2252/3.1, dated December 2019.
- Planning Application Drawings by ghk Architects consisting of a Location Plan, Existing Plans and Proposed Plans.
- Tree Protection Plan by ghk Architects, ref. HK2252-01.048, dated December 2019.
- Proposed Vaults services Layout drawing by Ralph T. King & Associates, ref. 1426-MSK10-2, dated December 2019.

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?	No	Construction sequence, work programme, details of temporary works or outline structural calculations should be provided.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	No	As above.
Are suitable plan/maps included?	No	Former post office tunnels, now belonging to BT, identified. No plans provided.
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?	No	Question 6 regarding trees should be a 'yes' response due to the existing tree, which is to be retained.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Is a conceptual model presented?	No	Further justification for the values used is required.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	No	Consideration of adjacent tree is required.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	Yes	No investigation undertaken on site. Data from an investigation 50m to the southeast was used.
Is monitoring data presented?	Yes	Three groundwater monitoring visits undertaken during the investigation 50m to the southeast. Data is from August and September 2015.
Is the ground investigation informed by a desk study?	No	Site specific investigation not carried out.
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	
Is a geotechnical interpretation presented?	Yes	Section 6.3 of BIA
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 7.1.2 of BIA.
Are reports on other investigations required by screening and scoping presented?	N/A	Stability screening did not identify potential impact on tree, however, arboricultural report provided.
Are the 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	

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	Consideration of adjacent tree is required.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Impact assessment requires further consideration
Has the need for monitoring during construction been considered?	Yes	
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?	No	Assumptions are inappropriate for the ground conditions assumed.
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	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	However, the Ground Movement Assessment requires further consideration.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

- 4.1. The Basement Impact Assessment (BIA) has been carried out by Geotechnical & Environmental Associates Limited (GEA) and the individuals concerned in its production have suitable qualifications.
- 4.2. The LBC Instruction to proceed with the audit identified that the basement proposal does not involve a listed building and will have no effect on the setting of any listed buildings.
- 4.3. The proposed development is to convert 4 existing individual vault rooms into a single plant room facility for a new heating system. One of the vaults is connected to No. 8 South Square and the other three are accessed via an external path at lower ground floor level, which also acts as a lightwell for the lower ground floor level of No. 8.
- 4.4. The development will lower the floor level, and also raise the ceiling level from that of the existing vaults. The ground above the vaults comprises a paved pedestrian area in the northeast corner of South Square. It is confirmed in the BIA that the buildings surrounding the vaults have lower ground floor levels extending to 2m below ground level.
- 4.5. Section 7.1.1 of the BIA indicates it is proposed to construct the basement using a combination of underpinning existing foundations and replacing the existing vault structure with reinforced concrete retaining walls. Drawings of the proposed basement indicate an internal headroom within the basement of 3.00m, a floor level of 16.47m OD and a ceiling level of 19.47m OD. Ground level above the basement is given as 19.71m OD. Structural drawings of the basement retaining wall construction are not provided, therefore the thickness of the floor slab of the proposed basement is unknown. The BIA assumes the maximum excavation is to a level of 16.5m OD (given as approximately 1.0m to 1.5m).
- 4.6. No site investigation has been undertaken at this site. Section 2.4 of the BIA discusses the geology of the site using data from the British Geological Survey (BGS) and an historic site investigation carried out by GEA approximately 50m to the southeast. The BIA states that the GEA investigation encountered Hackney Gravel to a depth of 7.70m (11.10m OD), however the borehole log presented in the Appendix show the base of this unit to be at a depth of 6.60m (13.25m OD). An historic BGS borehole log located approximately 150m west of the site is also referenced, where Hackney Gravel was encountered to a depth of 2.10m. London Clay was encountered below the Hackney Gravel in all instances.
- 4.7. In Section 6.1 of the BIA, the boundary between the Hackney Gravel and London Clay has been taken as 13.00m OD, which is lower than the level at which it was encountered in the GEA investigation 50m to the southeast. The ground model assumes no Made Ground is present below the existing vaults, although the BIA indicates the site was redeveloped in the 1950's

following bomb damage from WW2. Based on the granular nature of the anticipated soils, and the depth of excavation required, a site specific ground investigation should be carried out to justify the conceptual site model, confirm an adequate bearing stratum and support the soil parameters used in the ground movement assessment.

- 4.8. The site and surrounding area is generally flat, therefore it is accepted that the proposed development will have no significant impact on the slope stability of the area.
- 4.9. Further consideration of the presence of a tree near the development is required, particularly with respect to excavation and construction techniques required to enlarge the basement and raise the ceiling level.
- 4.10. The site is indicated to have a low risk of surface water flooding, and anecdotal information indicated that the area has never flooded. The proposed development will not increase the amount of impermeable surfacing at the site. As such it is accepted that the development will not affect the hydrology of the area.
- 4.11. The Hackney Gravel is designated a Secondary Aquifer. Groundwater level was monitored during the historic GEA investigation and Section 2.5 of the BIA indicates these water levels ranged from 14.64m OD to 15.27m OD. Groundwater level for the CSM is taken as 15.00m OD, which is an approximately average value. The table in Section 2.6.2 shows that the monitoring was undertaken from July to September 2015. Further evidence to support the groundwater level used should be provided.
- 4.12. The maximum excavation level is taken as 16.50m OD, which is the floor level given on the proposed development drawing and does not take into account the additional excavation required to construct the floor slab. The ground level is taken as 19.50m OD, which is also different to the levels on the drawings.
- 4.13. Section 8.2 of the BIA described the construction sequence for the basement as a combination of traditional mass concrete underpinning and reinforced concrete retaining walls. Section 8.2.2 indicates that, due to the limited size of the development, underpinning will be undertaken concurrent with bulk excavation. Further clarification of this statement is required, particularly with respect to the required temporary works to support the granular soils during excavation.
- 4.14. Section 9 of the BIA presents a Ground Movement Assessment (GMA) for the development. Vertical ground movements within the basement area have been modelled using PDisp software.
- 4.15. Section 9.2 states that “the magnitude of the settlement resulting from the proposed basement construction will be controlled to a large extent by the quality of workmanship of the underpins and by the existing building that is likely to provide additional rigidity”. In the case of this

development there is no building overlying the basement, therefore any contribution from such to the stability of the excavations should be reconsidered.

- 4.16. Outline structural calculations for the basement have not been provided and no indication of the retaining wall structure has been provided, including the floor slab thickness. These details should be provided and incorporated into the GMA. Based on the site model assessed, the magnitude of the vertical ground movements arising from the development appear reasonable based on the anticipated granular soil. However, the assessment should be updated using appropriate excavation levels and site specific ground investigation information.
- 4.17. The results of the PDisp analysis have been imported into XDisp software to allow a damage category assessment for neighbouring structures to be carried out in accordance with CIRIA C760. Whilst the CIRIA C760 approach is intended for embedded retaining walls, it is often used as a reference to estimate ground movements arising from basements that use underpinning construction. This approach is acceptable so long as moderately conservative assumptions are used and that the resulting predicted ground movements are realistic for the development.
- 4.18. The XDisp assessment adopts the installation curves for a planar diaphragm wall. The ground movement curves for excavation assume a high support stiffness wall embedded in stiff clay. The BIA indicates that formation level for the basement is likely to be within the Hackney Gravel, therefore adopting a ground movement curve for a stiff clay is not considered appropriate. An alternative means of predicting ground movement should be adopted or the assessment carried out with reference to ground movement for excavations in granular soil.
- 4.19. The GMA does not include consideration of ground movements resulting from construction of the underpins and the compaction of the drypack. Industry guidance and experience indicates the vertical and horizontal components of this movement are likely to be a minimum of 5mm. The GMA should be updated to consider these movements.
- 4.20. Section 10.3 of the BIA recommends monitoring of the neighbouring structures during all stages of construction, and that trigger levels and associated actions be developed as part of a monitoring specification for the works.

5.0 CONCLUSIONS

- 5.1. The BIA has been carried out by individuals who possess suitable qualifications.
- 5.2. The BIA indicates that the proposed basement will be founded within the Hackney Gravel. The basement extension and lowering will be carried out using a combination of mass concrete underpinning and the construction of reinforced concrete retaining walls.
- 5.3. Site specific ground investigation is required to justify the parameters used in the conceptual site model, confirm an adequate bearing stratum and inform the assessment of stability and ground movement.
- 5.4. Further consideration of the presence of a tree near the development is required, particularly with respect to excavation and construction techniques required to enlarge the basement and raise the ceiling level.
- 5.5. It is accepted that the surrounding slopes to the development site are stable and that the development is not in an area subject to flooding.
- 5.6. Further consideration of the impact to the hydrogeology of the site is required following completion of the site specific ground investigation.
- 5.7. Outline structural calculations and details of the retaining wall design should be provided. Further clarification regarding the construction sequence and levels is also required.
- 5.8. The Ground Movement Assessment should be revised in accordance with the ground model and appropriate excavation depth. Consideration of the vertical and horizontal movements resulting from the underpin construction and compaction of the drypack should be included in the assessment.
- 5.9. The Damage Category Assessment should use appropriate assumptions relating to ground settlement for the strata revealed by site specific investigation.
- 5.10. The BIA recommends monitoring of the neighbouring structures during all stages of construction, and that trigger levels and associated actions be developed as part of a monitoring specification for the works.
- 5.11. A number of queries have been raised and are summarised in Appendix 2. It cannot currently 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	Ground model	Site specific ground investigation is required.	Open	
2	Stability	Further assessment of impact to the tree near the basement is required	Open	
3	Stability	Outline structural calculations and retaining wall design should be provided.	Open	
4	Stability	The ground movement assessment should be revised to also consider movements relating to the construction of the underpins.	Open	
5	Stability	The damage category assessment should be updated to reflect the actual ground conditions and an appropriate method of predicting ground movements.	Open	

Appendix 3: Supplementary Supporting Documents

None

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