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Basement Impact Assessment Audit

69 Charlotte Street, London W1T 4RW

For
London Borough of Camden

Project No.
14006-35

Date
February 2024

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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 Address (planning reference 2023/2138/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 BIA has been prepared by GEA engineering consultants using individuals who possess suitable qualifications.

1.5 Proposals comprise refurbishment of the existing building including lowering the existing basement by approximately 2.00m and does not increase the footprint of the basement. It is proposed to underpin the existing foundations by around 1.00m.

1.6 A screening and scoping assessment is presented, supported by desk study information.

1.7 It is accepted that there are no surrounding slopes to impact the development site and vice versa.

1.8 It is accepted that the development will not impact on the wider hydrogeology of the area and is not in an area subject to flooding. No increase in impermeable area is proposed.

1.9 A site-specific ground investigation has been undertaken.

1.10 The BIA has confirmed that the proposed basement will be founded within Made Ground supported by a piled raft bearing in more competent materials at depth. Perched ground water may be encountered during underpinning and basement excavation. Potential stability issues associated with the Made Ground are described in both the BIA and Construction Method Statement (CMS). The BIA notes that a piled retaining wall might be considered and recommends further investigation.

1.11 The CMS included with the revised submission, presents outline structural information, temporary propping details, groundwater mitigation measures and construction sequence.

1.12 The Ground Movement Assessment has been undertaken indicating any movement will be within acceptable limits (no worse than Category 1 of the Burland Scale) assuming the underpinning scheme is taken forward and the Made Ground remains stable.

1.13 It can be confirmed that the BIA complies with the requirements of CPG: Basements subject to a Basement Construction Plan to confirm the construction details and stability of the Made Ground.

2.0 INTRODUCTION

2.1 CampbellReith was instructed by London Borough of Camden (LBC) on 11th October 2023 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 69 Charlotte Street, London W1T 4RW (planning reference 2023/2138/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. January 2021.
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Camden Neighbourhood Plan - Fitzrovia East (designated area only).

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 "Erection of basement extension and alterations to shopfronts on Charlotte Street and Tottenham Street elevations."

2.6 The Audit Instruction confirmed 69 Charlotte Street is not involved, or was a neighbour to, listed buildings.

2.7 CampbellReith accessed LBC's Planning Portal on Date and gained access to the following relevant documents for audit purposes:

- 69 Charlotte Street – Site Investigation and Basement Impact Assessment Report (BIA) by Geotechnical and Environmental Associates (GEA), Ref J23022, Rev 0, dated 28th April 2023.
- Existing and Proposed Plans by Charlotte Property Ventures Ltd, Ref CST69.01, Rev 1, dated 12th August 2023

- 69 Charlotte Street – Design and Access Statement by Charlotte Property Ventures Ltd, dated 4th May 2023.

2.7.2 The full data input and output tables for the Ground Movement Assessment were received from GEA on 25th October 2023.

2.7.3 The following document was received by CampbellReith on 6th December 2023:

- Subterranean Construction Method Sequence by Aspire Consulting Engineers, Ref 9422, Rev 01, dated May 2023.

2.7.4 The revised submission includes information received by email correspondence with Geotechnical and Environmental Associates (GEA) on 14th December 2023.

2.7.5 The following document update was received by CampbellReith on 26th January 2024:

- Revised Section 5 of the Subterranean Construction Method Sequence by Aspire Consulting Engineers, Ref 9422.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	BIA section 1.3.2
Is data required by Cl.233 of the GSD presented?	Yes	The revised submission includes outline structural information including the construction sequence and temporary propping arrangements.
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	Although the Arup GSD map extracts absent
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 3.2
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA section 3.1
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA section 3.3
Is a conceptual model presented?	Yes	BIA section 7.0

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA section 4.1
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA section 4.1
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA section 4.1
Is factual ground investigation data provided?	Yes	BIA appendix a
Is monitoring data presented?	Yes	BIA section 5.4
Is the ground investigation informed by a desk study?	Yes	BIA section 2.0
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	BIA section 3.2 Q13
Is a geotechnical interpretation presented?	Yes	BIA section 8.0
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA section 8.1.1
Are reports on other investigations required by screening and scoping presented?	NA	
Are the baseline conditions described, based on the GSD?	Yes	

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	BIA Part 4
Are estimates of ground movement and structural impact presented?	Yes	BIA Part 3
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	
Has the need for monitoring during construction been considered?	Yes	BIA section 11.2
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	Subject to a Basement Construction Plan
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	BIA section 3.4 Q4
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	

Item	Yes/No/NA	Comment
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Subject to a Basement Construction Plan
Are non-technical summaries provided?	Yes	BIA section 13.3

4.0 DISCUSSION

4.1 The Basement Impact Assessment (BIA) has been carried out by engineering consultants Geotechnical & Environmental Associates (GEA) and the individuals concerned in its production have suitable qualifications.

4.2 The LBC Instruction to proceed with the audit states the basement proposal neither involves listed building nor is adjacent to listed buildings. The Design & Access Statement identified that 69 Charlotte Street is located within the local Conservation Area boundary of the London Borough of Camde, Charlotte Street Conservation Area, and contains a mix of four to five storey Georgian and Victorian properties.

4.3 The site is within the Fitzrovia East Camden Neighbourhood Plan area.

4.4 69 Charlotte Street is a terraced property with four above ground storeys and a basement level beneath the building footprint and vaults extending approximately 5.00m out from the front of the building. Proposals comprise refurbishment of the existing building including lowering the existing basement by approximately 2.00m to 22.70m AOD formation level. This will involve the removal of some structural walls at basement level without increasing the footprint of the basement.

4.5 The BIA has been informed by a desk study, GEA's ground investigation database, and a site-specific ground investigation.

4.6 The BIA has identified that the existing basement is underlain by Made Ground to a depth of 4.70m below basement level. The Made Ground generally comprises an initial horizon of grey brown very gravelly clayey Sand, over dark brown locally very gravelly silty sandy Clay. Below 2.00m depth, the Made Ground contains organic materials locally. The natural strata below is the Lynch Hill Gravel of 1.80m thickness, below which lies the London Clay Formation to the maximum depth of investigation of 9.50m below the basement level.

4.7 A single groundwater monitoring measurement identifies perched water within the Made Ground at 1.81m below basement level. The Subterranean (Groundwater) and Land Stability Screening Assessment indicates the site is underlain by the Lynch Hill Gravel Member a Secondary 'A' Aquifer.

4.8 The BIA states the existing foundations will need to be underpinned prior to basement construction. A piled raft is proposed to support the loads from a new lift core and will be tied into the underpins forming the internal basement walls. The BIA has identified that the proposed basement slab will be constructed within Made Ground and will be supported on piles that will extend into competent material.

4.9 Stability screening identifies the neighbouring properties 27 Tottenham Street and 67 Charlotte Street have existing basements. Based on the trial pit findings along the party walls, 27 Tottenham Street and 67 Charlotte Street are founded 1.02m below existing basement floor level at 69 Charlotte Street. The proposed basement will increase the foundation depth relative to the neighbouring properties by around 1m.

4.10 Land Stability Screening indicates the site and proposed basement are within 5.00m of the highways and associated buried services of Tottenham Street to the north and Charlotte Street to the east.

4.11 There is no evidence of seasonal shrink-swell subsidence in the local area. It is considered that some residual heave may occur within the London Clay following the excavation and unloading of the overlying soil.

4.12 Land stability screening acknowledges the substantial thicknesses of Made Ground that have been recorded. It has not been brought forward to scoping however it is included in the ground model and is considered in the basement design.

4.13 The Surface Flow and Flooding Screening Assessment confirms the site is already covered by hardstanding therefore there will be no change in the proportion of hard surfaced paved areas. Deepening the basement will be contained within the existing footprint therefore there will be no impact on existing surface water flow or surface drainage.

4.14 The BIA outlines the following construction sequence:

1. construction of underpins to the existing perimeter walls in a hit and miss sequence (max 1.00m to 1.20m length sections);
2. installation of piles for raft (8.00m assumed pile length);
3. propping installation and excavation to basement level;
4. basement slab installation;
5. temporary propping removal once concrete has sufficiently cured.

4.15 The BIA outlines the basement construction method. The preferred option is to underpin the perimeter walls and to found within the Made Ground providing any groundwater ingress is controlled. The BIA assumes the depth of underpinning will not exceed 1.00m where the soils have been stressed by the existing foundations.

4.16 The basement floor slab will utilise a piled foundation solution to transfer loads to more competent materials at depth. This will support the loads from internal basement walls and new lift core. The BIA states the underpins must be structurally tied / have load transfer to the piled floor slab. The revised submission includes a construction method statement that provides outline structural information and drawings to illustrate how the building will be supported in both temporary and permanent conditions.

4.17 The BIA recommends that trial excavations are undertaken to provide an indication of the ground stability and the extent and impacts of groundwater ingress. It also suggests that piled retaining walls may be advantageous. These situations have not been considered further in the BIA.

4.18 The BIA states excavation is anticipated to be 2.00m depth and perched groundwater was encountered within the Made Ground at 1.81m depth. The BIA states any perched groundwater inflows are likely to be suitably dealt with using conventional construction practices such as sump pumping. The Construction Method Statement (CMS) by Aspire Engineering acknowledges this perched water measurement and the potential excavation stability issues. Conservative groundwater inflow and land stability mitigation measures include sump pumping, temporary propping and movement monitoring as recommended in the BIA and CMS.

4.19 The Ground Movement Assessment (GMA) was undertaken using X-Disp and P-Disp software to assess the ground movements within and surrounding the basement excavation. This includes heave / settlement (vertical movement) and lateral movement behind the retaining walls (horizontal). The GMA considers the 3 construction stages: underpinning short-term movements, short-term movements from pile raft, total (long term) movement of piled raft / complete construction.

4.20 The stress regime at the anticipated new formation level of 22.70m AOD is estimated in the BIA as resulting in an increase of stress between 5kN/m^2 to 128kN/m^2 for a 1.00m width underpin. Input and output data for the P-Disp assessment were provided by GEA directly to confirm the soil parameters, model geometry and loading used in the assessments.

4.21 There is no quantitative strength data from SPTs or the log descriptions for the Made Ground, however email correspondence from GEA justifies the rationale behind the conservative assumptions used to derive the Made Ground parameters. The parameters used in the updated GMA are acceptable. GEA's GMA update includes a revision to the short-term London Clay Formation parameters.

4.22 The ground movements predicted by the P-Disp assessment have been imported into X-Disp software to assess the horizontal and vertical ground movements around the development and their associated damage category for neighbouring structures. BIA section 10.2.1 indicates modified curves for 'excavations in front of low stiffness wall in stiff clay' have been used in the X-Disp analysis to achieve a 5mm to 11mm movement. The GMA model considers ground movement for a ground level of 22.70mOD with a rigid boundary of 0.00m OD. It is noted that the methods used are both derived from and applied to stiff clay soils, however, the excavations for this basement will be fully within the Made Ground. The revised submission provides justification on the methods used, assumptions made and the adoption of the 'lower range of horizontal movement' values, for Made Ground soils in which the underpinning will be constructed. Noting the limited depth of excavation, the GMA in this instance is considered suitably conservative on the basis that the Made ground remains stable.

4.23 The Ground Movement Assessment (GMA) was undertaken to consider the impact of the basement excavation on the neighbouring structures. Horizontal movement predictions range between 4mm to 5mm, and vertical movement predictions between 9mm and 10mm. The BIA concludes that damage can be limited to Burland Category 1 (Very Slight).

4.24 A movement monitoring strategy during underpin installation, basement construction and baseline monitoring is recommended prior to construction. The CMS included with the revised submission includes movement trigger limits that should be agreed as part of the party wall award negotiations.

5.0 CONCLUSIONS

5.1 The BIA has been carried out by individuals who possess suitable qualifications.

5.2 Proposals comprise refurbishment of the existing building including lowering the existing basement by approximately 2.00m and does not increase the footprint of the basement. The increased depth will be achieved by underpinning the existing foundations by around 1.00m

5.3 It is accepted that the surrounding slopes to the development site are stable.

5.4 It is accepted that the development will not impact on the wider hydrology of the area and is not in an area subject to flooding.

5.5 A site-specific ground investigation has been undertaken.

5.6 It is likely that perched ground water will be encountered within the Made Ground during basement construction. Potential stability issues associated with the Made Ground are described in both the BIA and CMS.

5.7 The revised submission includes outline structural information including temporary propping details, groundwater mitigation measures and construction sequence.

5.8 The BIA has confirmed that the proposed basement will be founded within Made Ground supported on a raft piled into the more competent strata below. Underpinning of the existing foundations will be tied into the piled raft.

5.9 The construction method statement includes structural information for an underpinning scheme which shows how the building will be supported in both the temporary and permanent conditions.

5.10 A Ground Movement Assessment has been undertaken to assess the impact on the neighbouring properties and infrastructure. The results of the assessment indicate damage to the building will not exceed Burland Category 1 (Very Slight). The revised submission includes software input parameters updates and justification of the assumptions used for the Made Ground soils.

5.11 It can be confirmed that the BIA complies with the requirements of CPG: Basements. However, the BIA indicates the potential for instability in the Made Ground, particularly if groundwater is encountered. It recommends trial excavations and suggests that piled retaining walls may be appropriate. The BIA discusses two basement construction proposals, underpinning and piled perimeter retaining walls. A Basement Construction Plan is therefore recommended to confirm the suitability of the underpinning scheme, or to allow the impacts of an alternative scheme to be assessed.

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Appendix 1

Consultation Responses

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Appendix 2

Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Land stability	Outline structural information should be provided.	Closed - Paragraph 4.16	6th December 2023
2	Land stability	Short-term Poisson's ratio values require further consideration and clarification.	Closed - Paragraph 4.22	14th December 2023
3	Land stability	Confirmation is required that the methods used, assumptions made and the adoption of the 'lower range of horizontal movement' values, are all appropriate for Made Ground soils.	Closed - Paragraph 4.22 and 4.23	14th December 2023
4	Land stability	The Construction Method Statement should clearly describe the risks associated with groundwater inflow and excavation stability and describe suitable mitigation.	Closed - Basement Construction Plan recommended - Paragraphs 4.18 & 5.11	26th January 2024

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Appendix 3

Supplementary Supporting Documents

Construction Method Statement, Section 5 revision

GEA email correspondence

5.0 Ground Conditions, Environmental Assessment & Associated Risks

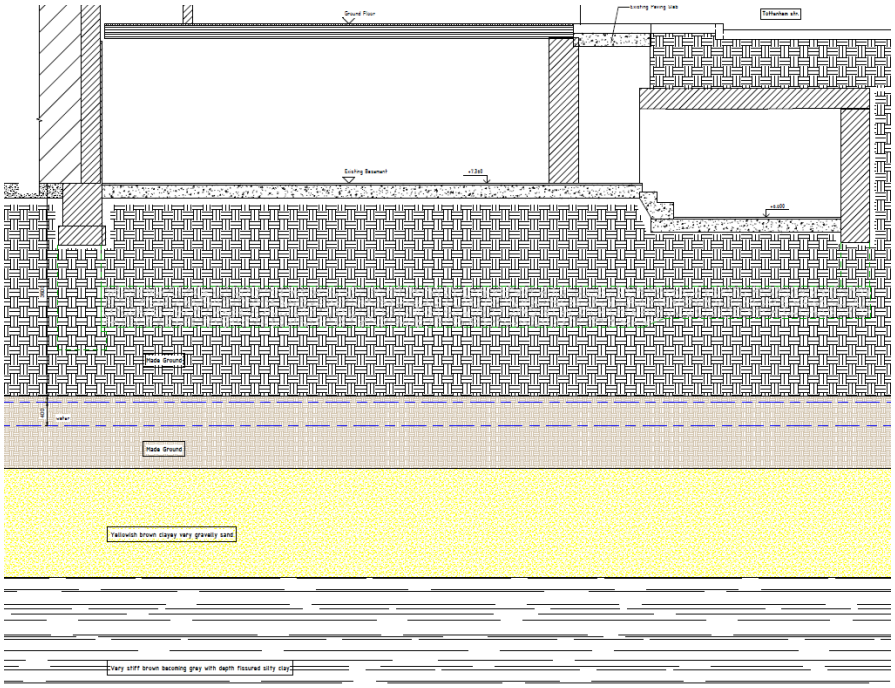
5.1 A site specific geotechnical and environmental investigation was carried out on site by GEA. A copy of the site-specific site investigation report and BIA is provided. Any reference to the ground conditions has been taken from the information contained within this report. In summary the findings are as follows:

- 0- 4.7m below ground: Made ground
- 4.7- 6.5m below ground: Medium dense to dense, moist, mid brown gravelly, silty coarse sand.
- 6.5m to 9.5m London Clay.

5.2 A single borehole with a couple of window sampler boreholes were constructed within the property. The ground conditions were found to be consistent with the neighbouring developments with a deep layer of made-up ground over the Lynch Hill Gravel which comprises of brown silty sandy gravel over London Clay.

Ground water was encountered at a level of 3.6m below existing basement and from monitoring of other developments within the vicinity was found to be at a similar depth of 4m below existing basement level. Additional ground water monitoring will also be confirmed in advance of commencing construction.

5.3 Based on the historical and Environmental data that GEA reviewed as part of their desktop study the likelihood of ground conditions affecting construction workers, site end users and local environment is indicated as being low.



5.4 As reported by GEA, a ground water strike was recorded at a level of 4m below existing basement level. The ground water subsequently came up to a level of 3.6m below basement level. However additional monitoring of the ground water confirmed the water rising to a level of 1.81m below basement level.

5.5 Therefore, as a result there is a risk of inflows of perched waters within the basement during the excavation of the underpins and bulk dig. The perched water will be locally controlled as defined later in this report, section 10, whereby we outline the mitigating measures to assist in controlling ground water.

5.6 The mitigation measures associated with ground water flows are to be installed during the excavation of the underpins, installation of the piles and also the bulk excavation of the basement.

5.7 In addition to this as a result of the existing building being supported on the made ground there is also a risk of the excavation becoming unstable during the excavation of the underpins and the piles. Therefore, as outlined within section 9 of this report All underpins are to be fully supported and propped with trench sheets and trench props during their sequenced excavation.

5.8 Any personnel entering the excavations must have a safe means of access and egress at all times. They must be able to operate within stable and fully supported excavations.

5.9 All piles are to be installed using segmental hollow stem CFA piling techniques and are required to be sleeved within the made ground and gravels to prevent ground instability and possible over flighting of the piles.

5.10 All other risks associated with carrying out the works and associated RAMS are to be provided by the contractor in advance of commencing the works.

RE: 69 Charlotte Street-2023/2138/P

Thu 14/12/2023 21:50

Please see initial response to the points raised below

Query No 2 (relating to paragraph 4.22) - The made ground parameters are currently based on conservative assumptions, and from data available from nearby sites, including the adjacent No.71 Charlotte Street to the north. Unfortunately the site currently has very restricted access and head height, thus we are unable to mobilise a rig capable of completing SPT's to site. The global poissons ratio and London Clay Poissons ration have been revised from 0.20 to 0.50 for the short term analyses as requested, and the analyses re-run.

Query No 3 (relating to paragraph 4.23) – The CIRIA curve for an excavation in front of a low stiffness wall in clay has been conservatively adopted instead of the high stiffness curve, as the low stiffness curve gives higher movements. Whilst I agree it is not ideal, there is no CIRIA curve for walls in made ground, and since the made ground was generally recorded as a gravelly clay, this or the high stiffness curve for a wall in clay still seem the most appropriate curves to be using.

5mm of horizontal movement has been adopted to reflect the limited depth of underpinning and excavation of just 2.0 m, whilst remaining within Campbel Reiths suggested 5-10 mm range.

Please don't hesitate to get in touch if you want to discuss further Best wishes

Alex

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