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12-14 Greville Street
London, EC1N 8SB

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12466-22
Revision: F1

February 2018

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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 12-14 Greville Street, London EC1N 8SB (planning reference 2016/1091/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. The BIA has been prepared by a firm of engineering consultants, Geotechnical & Environmental Associates (GEA). The Structural Method Statement has been prepared Price & Myers. The authors of both documents possess suitable qualifications that comply with the requirements of CPG4.

1.5. It has been confirmed that the development site does not involve listed buildings. However, there are Grade II listed buildings within the likely zone of influence of the development.

1.6. The proposal includes the demolition of two existing five storey buildings at No. 12-14 Greville Street and the construction of a new five storey building with a single basement. The proposed building will provide jewellery workshops, retail, and offices. The existing façade of No. 12-13 is proposed to be retained and repaired.

1.7. The initial BIA was based on a Desktop Study and a limited ground investigation undertaken by GEA. Further GI was undertaken in 2017 and the site is underlain by Hackney Gravel over the London Clay Formation. The investigation has confirmed the surface of the London Clay to lie below the formation level for the basement.

1.8. The revised BIA confirms that the proposed basement will not be constructed below groundwater table and will not therefore cause significant hydrogeological impacts.

1.9. The BIA states that the new building will be supported by a reinforced concrete raft foundation. The formation of the raft foundation is likely to be below the foundations of adjacent buildings. The party walls with the adjacent buildings will be underpinned with mass concrete footings. Outline design calculations for the retaining walls, basement raft slab, and adequacy of the bearing stratum under superstructure loads and uplift forces from hydrostatic pressure have been be presented. Final clarification of outstanding queries was presented in February 2018.

Temporary works sequencing and propping arrangements are described in the Construction method Statement, including reference to how the stability of the excavations will be maintained in the granular deposits.

1.10. A ground movement and damage assessment of the existing structures has been provided. Ground movement associated with the proposals could potentially cause harm to the surrounding structures, which include Grade II structures. The assessment predicts negligible damage to adjacent structures and this is accepted, provided that the ground conditions are proven to be as assumed and there is good control of workmanship.

1.11. A brief movement monitoring strategy has been proposed. This will require to be developed as part of detailed design.

1.12. It is accepted that the new development and associated basement is at low risk of flooding.

1.13. The proposed development is over a Crossrail tunnel, which is approximately 25m below the site. A specific GMA should be submitted to Crossrail for approval.

1.14. Queries and requests for further information which were raised during the audit process are discussed in Section 4 and summarised in Appendix 2. It is confirmed that, with the supplementary information presented in Appendix 3, the BIA identifies the potential impacts of the basement proposals to stability and the water environment and describes suitable mitigation.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 25 July 2015 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 12-14 Greville Street, London EC1N, Camden Reference 2016/1091/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 (CPG) 4: Basements and Lightwells.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.

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 Audit Instruction described the planning proposal as "Demolition of existing buildings at 12 – 14 Greville Street with retention of the façade of no.12 – 13, works to enlarge existing basement(s), construction of a replacement building of five above ground storeys for office, workshop and retail use. Alterations to retained façade and fenestration". The Audit Instruction also confirmed the property was adjacent to Grade II listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 03 August 2016 and gained access to the following relevant documents for audit purposes:

- Planning Statement and Heritage and Townscape Assessment dated February 2016 by Montagu Evans.
- Design & Access Statement dated February 2016 by Frost Architects.
- Desk Study and Basement Impact Assessment Report dated February 2016 by Geotechnical & Environmental Associates (GEA).
- Architectural drawings, revision P0 dated between January and February 2016, by Frost Architects include the following:
    - o Block plan
    - o Location Plan
    - o Existing floor plans, sections, and elevations.
    - o Demolition plans
    - o Proposed floor plans, sections, and elevations.
- Draft Construction Management Plan undated by Steve Devlin.
- Construction Method Statement dated February 2016 by Price & Myers.
- Structural drawings by Price & Myers include the following:
    - o Proposed structure drawings, various revisions dated between October and November 2015.
    - o Assumed sequence of construction drawing dated 07th December 2015
    - o Possible underpinning requirements drawing dated 02nd February 2016

2.7. Subsequent to issue of the initial audit report a further round of information was provided in May and July 2017. This comprises:

- Basement Impact Assessment Report by GEA, dated May 2017.
- Outline assessment of basement raft slab and retaining walls by Price and Myers, dated July 2017.
- Sketch - SK102 ver B by Price and Myers, dated February 2016.

2.8. Further information (listed below and presented in Appendix 3) was issued by the applicant's team in January and February 2018 in response to revision D2 of the BIA audit. This updated audit report considers that revised information.

- Basement Impact Assessment Report by GEA, Issue 4, dated December 2017.
- Construction Method Statement by Price and Myers, revision 5, dated February 2018 and accompanying email dated 13 February 2018.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	See BIA Section 1.1.2.
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 BIA and Construction Method Statement.
Are suitable plan/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	BIA Section 3.1.2. However, potential impacts identified that require further assessment.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Section 3.1.1.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Section 3.13.

Item	Yes/No/NA	Comment
Is a conceptual model presented?	Yes	See BIA Section 2.6.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	See BIA Section 4. As the party walls with adjacent properties will be underpinned with mass concrete and vertical loadings are likely to increase, a ground movement assessment should be carried out to assess the effects on the adjacent structures.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	See BIA Section 4.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	No potential issues identified at Screening.
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	Described in BIA Issue 4, dated December 2017.
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	BIA Section 2.3.
Is a geotechnical interpretation presented?	Yes	In BIA July and December 2017.
Does the geotechnical interpretation include information on retaining wall design?	Yes	

Item	Yes/No/NA	Comment
Are reports on other investigations required by screening and scoping presented?	Yes	Ground investigation, ground movement assessment, damage impact assessment.
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	See BIA Section 4.1. Supplementary ground investigation has confirmed impact on groundwater.
Are estimates of ground movement and structural impact presented?	Yes	
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?	No	
Has the need for monitoring during construction been considered?	Yes	This requires updating to be linked with predicted ground movements and building damage assessment.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Refer to Section 4.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Original queries closed out by revised/updated BIA and CMS.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Previous queries addressed by BIA Issue 4.

Item	Yes/No/NA	Comment
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Original queries closed out by revised CMS.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The BIA has been prepared by a firm of engineering consultants, Geotechnical & Environmental Associates (GEA). The Structural Method Statement has been prepared Price & Myers. The authors of both documents possess suitable qualifications that comply with the requirements of CPG4.

4.2. The proposal includes the demolition of two existing five storey buildings at No. 12-14 Greville Street and the construction of a new five storey building with a basement for office, workshop, and retail use. The proposal also includes the retention of the existing façade of No. 12-13. It is understood that the adjacent buildings have a basement. Their exact levels have not been established with the exception of Audrey House to the south where the basement is deeper than is proposed for the subject site. A number of foundation inspection pits have been excavated to assist the design of the proposed underpins to the party walls.

4.3. The BIA has been based on a Desktop Study and ground investigation (GI) undertaken by GEA. A limited GI was supplemented by further exploratory holes following the issue of the second audit report. It is accepted that this has confirmed ground conditions and groundwater conditions sufficient for impact assessment. The exploratory holes revealed that the basement would be constructed in the Hackney Gravel with the London Clay present approximately 1m below the proposed excavation level. Groundwater observations suggested the groundwater is approximately 0.70 to 0.80m below dig level.

4.4. The Hackney Gravel is classified as a Secondary 'A' Aquifer, which is capable of supporting water supply. However, the further GI has shown that the basement will not have a effect on local groundwater movements.

4.5. The BIA states that the new building will be supported by a reinforced concrete raft foundation. The formation of the raft foundation will be likely to be below the foundations of adjacent buildings. The party walls with the adjacent buildings will be underpinned with mass concrete footings. The proposed raft and underpins will be close to and possibly below the groundwater table and this should be addressed in the construction sequence. Revised calculations for the retaining walls, basement raft foundations, and adequacy of the bearing stratum under superstructure loads have been provided (Revision 4). The retaining wall design does not assume the groundwater level recommended in the BIA and the submitted calculations are incomplete. Both the BIA and the structural engineering calculations note the need to set back the raft from Audrey House so as not to stress the basement walls of that building.

4.6. Ground movement associated with the proposals could potentially cause harm to the surrounding structures, which include Grade II structures. Although it is accepted that the proposals will not significantly increase the differential depth in foundations, a ground

movement assessment has been carried out to assess the effects on the adjacent properties, highway and underlying infrastructure assets. However, the assessment is considered reasonable and it is accepted that, provided workmanship is of a high standard, it should be possible to limit damage to adjacent properties to Category 0. It is noted that the raft is to be designed to accommodate heave.

4.7. A construction method statement, which includes proposed temporary works, sequence of construction, and a brief movement monitoring strategy, has been provided. A brief movement monitoring strategy has been proposed. The initial audit requested that temporary works sequencing and propping and a more detailed monitoring strategy linked to the predicted ground movements should be presented, including trigger values and contingency planning recommendations. The GI has shown that the underpinning will be constructed in gravelly sand and the use of sacrificial shuttering to ensure the stability of the underpin excavation is described in the CMS. The monitoring regime has been updated to consider both vertical and horizontal movement.

4.8. The proposed development is over a Crossrail tunnel, which is approximately 25m below the site. It is understood that consultations are ongoing between the engineer and Crossrail.

4.9. Data from the Camden Flood Risk Management Strategy, the Strategic Floor Risk Assessment, and Environment Agency show that the site has a very low flooding risk from surface water, sewers, reservoirs, groundwater, and fluvial/tidal watercourses.

5.0 CONCLUSIONS

5.1. The BIA has been prepared by a firm of engineering consultants, Geotechnical & Environmental Associates (GEA). The Structural Method Statement has been prepared Price & Myers. The authors of both documents possess suitable qualifications that comply with the requirements of CPG4.

5.2. The BIA was initially based on a Desktop Study undertaken by GEA. Subsequent intrusive ground investigations have determined the ground and groundwater conditions sufficiently for this impact assessment.

5.3. It is accepted that the new development and associated basement is at low risk of flooding.

5.4. The BIA has stated that the excavation for the proposed basement will be up to around 1.0m below the existing basement slab level. The GI has shown that some Hackney Gravel will remain beneath the raft slab and that it will lie above the groundwater. The potential hydrogeological impacts have been closed out.

5.5. Queries have been raised with respect to the outline design calculations for the retaining walls, basement raft slab, and adequacy of the bearing stratum under superstructure loads and uplift forces from hydrostatic pressure should be presented. It was requested that temporary works sequencing and propping arrangements were also be presented, with particular regard to maintaining excavation stability in the Hackney Gravel. These queries are addressed in the revised BIA and CMS.

5.6. A ground movement and damage assessment has been provided. It is accepted that, if the ground and groundwater conditions are as assumed, and workmanship is controlled, it should be possible to limit damage to Category 0. Suitable outline monitoring proposals are presented in the revised CMS.

5.7. The proposed development is over a Crossrail tunnel, which is approximately 25m below the site. Approval of the GMA from Crossrail will be required.

5.8. Queries and requests for further information which were raised during the audit process are discussed in Section 4 and summarised in Appendix 2. It is confirmed that, with the supplementary information presented in Appendix 3, the BIA complies with the requirements of CPG4.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Halperin	24 Hatton Garden, EC1N 8BQ	27/06/2016	Effects of basement excavation on the stability of the adjoining properties.	See 4.5-4.6

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA Content	Ground investigation to be undertaken and BIA is to be updated.	Open. Ground and groundwater profile not defined.	12/02/2018
2	Hydrogeology	Effects on groundwater flow – impact assessment and mitigation measures.	Open. Groundwater regime has not been identified and queries exist over proposed mitigation.	12/02/2018
3	Stability	Outline calculations for basement raft slab, retaining walls, and adequacy of the bearing stratum; temporary works sequencing and propping arrangements.	Open. Calculations presented by queries exist. Temporary works and propping information not provided.	15/02/2018
4	Stability	Ground movement assessment and damage assessment are to be submitted. Monitoring proposals to be updated, based on these assessments.	Open. GMA presented and accepted. Monitoring proposals still to be updated.	15/02/2018

Appendix 3: Supplementary Supporting Documents

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