

32 Glenilla Road
London, NW3 4AN

Basement Impact Assessment
Audit

For
London Borough of Camden

Project Number: 12466-46

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February 2017

Campbell Reith Hill LLP
Friars Bridge Court
41-45 Blackfriars Road
London
SE1 8NZ

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	H Pham, MSc CEng MStructE
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 32 Glenilla Road, London NW3 4AN (planning reference 2016/6712/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, Card Geotechnics Ltd, with structural inputs from Price & Myers. The authors of the main BIA possess suitable qualifications that comply with the requirements of CPG4.
- 1.5. It has been confirmed that the development site does not involve a listed building, or is in close proximity to a listed building.
- 1.6. The proposal includes the demolition of an existing single-storey building and a garage at No. 32 Glenilla Road and the construction of two semi-detached houses, each three storeys in height with a single basement. There are discrepancies between the architectural information and the BIA. Further clarification should be provided to confirm that the BIA and the structural proposal have been based on the latest architectural information.
- 1.7. An intrusive ground investigation was undertaken in August 2015. The investigation confirms that the site is underlain by up to 3.2m Made Ground over the London Clay Formation. Groundwater was encountered within the Made Ground and the upper parts of the London Clay Formation during the site investigation and subsequent monitoring visit. It is likely that the groundwater is perched water and is not representative of a groundwater table. However, further monitoring should be undertaken to inform temporary and permanent works design.
- 1.8. The geotechnical design parameters adopted for the Made Ground are not considered reasonably conservative, considering the heterogeneous nature of Made Ground and the description of 'very soft to firm'.
- 1.9. The conceptual site model and hydrogeological assessment assume there are no nearby basements. However, the BIA states that the adjacent 34 Glenilla Road has a lower ground floor. These details should be clarified and assessments updated, if required.

- 1.10. The architectural drawings show that the proposed basement level will be 3m below the existing ground level. As the proposed thickness of the basement slab is 400mm, the formation level will be 3.4m and is within the London Clay Formation.
- 1.11. The BIA states that the new basement will be formed by contiguous piled walls and a reinforced concrete basement slab. The submitted structural drawings show that the basement slab acts as a raft foundation to support the loading of the building above. The formation of the raft foundation is below the foundations of the adjacent structures. Outline design calculations for the retaining walls, basement raft slab, and adequacy of the bearing stratum under superstructure loads and uplift forces from heave pressure should be presented. Temporary works sequencing has been presented indicating the retaining walls will be unpropped in the temporary case.
- 1.12. A ground movement analysis (GMA) has been carried out to assess effects on the surrounding properties. The BIA states that the damage category to neighbouring buildings is within Burland Category 0. However, the GMA states that it is reliant upon propping in the temporary case. The GMA and damage impact assessment should be updated, to be based on the actual unpropped construction sequence proposed and appropriate geotechnical parameters for Made Ground (as 1.8). The full Wallap and GMA calculations should be presented. The assessment should include the impact on Glenilla Road's pavement / highway.
- 1.13. A brief movement monitoring strategy has been proposed. A more detailed monitoring strategy linked to the predicted ground movements should be presented, including trigger values and contingency planning recommendations.
- 1.14. There are discrepancies in the Surface Flow and Flooding Screening between the BIA report by Card Geotechnics Ltd and the Flood Risk and Surface Water report by Price & Myers. However, it is accepted that off-site discharge flows will be limited to 5l/s per property by implementing an attenuation system. This should be agreed with Thames Water and LBC.
- 1.15. It is accepted that the new development and associated basement is at low risk of flooding.
- 1.16. Queries and requests for further information are discussed in Section 4 and summarised in Appendix 2.
- 1.17. Until the missing information is provided, it is not possible to conclude that the criteria contained in CPG4 and DP27 have been met.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 20 January 2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 32 Glenilla Road, London NW3 4AN, Camden Reference 2016/6712/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 "Erection of 2 x 3-bedroom 3-storey plus basement dwellinghouses (Use Class C3) with hard and soft landscaping following demolition of existing single storey church (Use Class D1)". The Audit Instruction also confirmed the property is not adjacent to Grade II listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 01 February 2016 and gained access to the following relevant documents for audit purposes:

- Planning Statement dated December 2015 by Tibbalds.
- Design & Access Statement dated 30 November 2016 by Adam Khan Architects.
- Geotechnical Interpretative Report and Basement Impact Assessment Revision 02 Dated November 2016 by Card Geotechnics Ltd.
- Arboricultural Report Dated 24 October 2016 by Crown Consultants.
- Architectural drawings by Adam Khan Architects include the following:
 - Existing location plan and site plan.
 - Existing roof plan and building elevations.
 - Proposed location plan and site plan.
 - Proposed floor plans, sections and building elevations.

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?	Yes	
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	No	There is a discrepancy between the BIA and the architectural information regarding the proposed building. Further clarification should be provided.
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	However, impact to pavement / highway should still be considered if within development's zone of influence.
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?	No	See BIA Section 3.2 and Appendix D Section 3. There are discrepancies in the Surface Flow and Flooding Screening between the BIA report by Card Geotechnics Ltd and the Flood Risk & Surface Water report by Price & Myers.
Is a conceptual model presented?	Yes	See BIA Section 3
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	See BIA Section 3.5 and 4. However, impact to pavement / highway should still be considered if within development's zone of influence.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	No potential issues identified at Screening.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Discussed in drainage and flood risk assessment and mitigation proposed.
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	See BIA appendix G. Further groundwater monitoring required.
Is the ground investigation informed by a desk study?	Yes	Not specifically referenced, but desk study information presented.
Has a site walkover been undertaken?	Yes	Not specifically referenced, but site and surroundings described.
Is the presence/absence of adjacent or nearby basements confirmed?	No	Contradictory information provided re 34 Glenilla Road.
Is a geotechnical interpretation presented?	Yes	Parameters for Made Ground not considered reasonably conservative.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Insufficient detail.
Are reports on other investigations required by screening and scoping presented?	Yes	Drainage and flood risk.
Are baseline conditions described, based on the GSD?	Yes	The BIA does not specifically reference the GSD
Do the base line conditions consider adjacent or nearby basements?	No	Inconsistent assessments and reference to lower ground floor at 34 Glenilla Road.
Is an Impact Assessment provided?	Yes	See BIA Section 4

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	However, should be revised to adopt reasonably conservative parameters and actual unpropped temporary works proposed.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	See BIA Section 10 to 13.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Flood risk and drainage adequate. Land stability to be updated.
Has the need for monitoring during construction been considered?	Yes	This will require updating to be linked with predicted ground movements.
Have the residual (after mitigation) impacts been clearly identified?	No	This will require updating to be linked with revised predicted ground movements.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	The GMA should include an assessment of the retaining walls of the plant rooms, which are close to Glenilla Road's pavement. The GMA should be revised to adopt reasonably conservative parameters and actual unpropped temporary works proposed.
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	Outline calculations should be presented. 34 Glenilla Road basement presence to be clarified.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, GMA and damage impact assessment to be revised.
Are non-technical summaries provided?	No	

4.0 DISCUSSION

- 4.1. The BIA has been prepared by a firm of engineering consultants, Card Geotechnics Ltd, with structural inputs from Price & Myers. The authors of the main BIA possess suitable qualifications that comply with the requirements of CPG4.
- 4.2. The architectural information shows that proposal includes the demolition of an existing single-storey building and a garage at No. 32 Glenilla Road and the construction of two semi-detached houses, each three storeys in height with a single basement. It is noted that the BIA Section 1 states that the houses are detached and have two storeys instead of three storeys as shown on the architectural drawings. Further clarification should be provided to confirm that the BIA and the structural proposal have been based on the latest architectural information.
- 4.3. The conceptual site model and hydrogeological assessment assume there are no nearby basements. However, the BIA states that the adjacent 34 Glenilla Road has a lower ground floor. These details should be clarified and assessments updated, if required.
- 4.4. An intrusive ground investigation was undertaken by Card Geotechnics Ltd in August 2015. The investigation confirms that the site is underlain by up to 3.2m Made Ground over the London Clay Formation up to the depth of investigation of 15.5m below ground level. Monitoring indicates that groundwater varied between 2.89mbgl and 4.15mbgl, which is within the Made Ground and the upper parts of the London Clay Formation during the site investigation and subsequent monitoring visit. It is likely that the groundwater is perched water and is not representative of a groundwater table. However, further monitoring should be undertaken to inform temporary and permanent works design.
- 4.5. The geotechnical design parameters adopted for the Made Ground are not considered reasonably conservative, considering the heterogeneous nature of Made Ground and the description of 'very soft to firm'.
- 4.6. The architectural drawings show that the proposed basement level will be 3m below the existing ground level. As the proposed thickness of the basement slab is 400mm, the formation level will be 3.4m and is within the London Clay Formation.
- 4.7. The BIA states that the new basement will be formed by contiguous piled walls and a reinforced concrete basement slab. The submitted structural drawings show that the basement slab acts as a raft foundation to support the loading of the building above. The formation of the raft foundation is below the foundations of the adjacent structures. The BIA Section 9.1.3 states that the basement slab could be either ground bearing or suspended. It is to be confirmed which slab option will be carried forward. Outline design calculations for the retaining walls, basement raft slab, and adequacy of the bearing stratum under superstructure loads and uplift

forces from heave pressure should be presented. These should be based on cautious estimates of engineering values and assumptions.

- 4.8. Temporary works sequencing by Price & Myers is presented. This is inconsistent with the descriptions in the BIA. The BIA should be revised to reflect the temporary and permanent works proposed. The sequencing drawings indicate the retaining walls are proposed to be unpropped in the temporary case.
- 4.9. It is noted that a ground movement analysis has been carried out to assess effects on the surrounding properties. The BIA states that the damage category to neighbouring is within Burland Category 0. However, the GMA states that it is reliant upon propping of the retaining walls in the temporary case. The GMA and damage impact assessment should be updated, to be based on the actual unpropped construction sequence proposed and appropriate geotechnical parameters for Made Ground (as 4.5).
- 4.10. The damage impact assessment does not include an assessment of Glenilla Road's pavement / highway, which is within the zone of influence of the development. This assessment should be provided.
- 4.11. The full inputs / outputs of the analysis software used for the GMA, including the supporting load predictions from WALLAP, should be provided for review.
- 4.12. A brief movement monitoring strategy has been proposed. A more detailed monitoring strategy linked to the predicted ground movements should be presented, including trigger values and contingency planning recommendations, including the control of groundwater / perched water.
- 4.13. It is noted that there are discrepancies in the Surface Flow and Flooding Screening between the BIA report by Card Geotechnics Ltd and the Flood Risk and Surface Water report by Price & Myers. However, it is accepted that off-site discharge flows will be limited to 5l/s per property by implementing an attenuation system. This should be agreed with Thames Water and LBC.
- 4.14. It is accepted that the site is at low risk of surface water flooding, due to the raised nature of the site in relation to the adjacent road level. Threshold elevations should be confirmed as being suitably raised within the final design. Standard flood risk mitigation measures against sewer surcharging should be implemented.

5.0 CONCLUSIONS

- 5.1. The authors of the main BIA possess suitable qualifications that comply with the requirements of CPG4.
- 5.2. The proposal includes the construction of two semi-detached houses, each with a single basement level. Further clarification should be provided to confirm that the BIA and the structural proposal have been based on the latest architectural information.
- 5.3. The BIA should confirm the presence of nearby basements, such as at 34 Glenilla Road. These details should be clarified and assessments updated, if required.
- 5.4. A site investigation confirms that the site is underlain by Made Ground over the London Clay Formation. Groundwater was encountered. Further monitoring should be undertaken to inform temporary and permanent works design.
- 5.5. The geotechnical design parameters adopted for the Made Ground are not considered reasonably conservative and should be revised.
- 5.6. The basement formation level will be within the London Clay, formed by contiguous piled walls and a reinforced concrete basement slab. Outline design calculations for the retaining walls, basement raft slab, and adequacy of the bearing stratum under superstructure loads and uplift forces from heave pressure should be presented.
- 5.7. A ground movement analysis has been carried out. The GMA and damage impact assessment should be updated, to be based on the actual unpropped construction sequence proposed and appropriate geotechnical parameters for Made Ground.
- 5.8. A more detailed monitoring strategy linked to the predicted ground movements should be presented, including trigger values and contingency planning recommendations.
- 5.9. It is accepted that off-site discharge flows will be limited to 5l/s per property by implementing an attenuation system. This should be agreed with Thames Water and LBC.
- 5.10. It is accepted that the new development is at low risk of flooding, based on raised levels in relation to the adjacent road, which should be confirmed at detailed design stage.
- 5.11. Queries and requests for further information are summarised in Appendix 2. Until the missing information is provided, it is not possible to conclude that the criteria contained in CPG4 and DP27 have been met.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Arculas	Flat 2, 20 Belsize Park Gardens, NW3 4LH	20/01/2017	Effects of basement excavation on the stability of the adjoining properties.	See 4.3, 4.5 – 4.12
Williams	32 Belsize Park Gardens	20/12/2016	Effects of basement excavation on the stability of the adjoining properties.	See 4.3, 4.5 – 4.12

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA Content	Inconsistencies in the proposed scheme presented, to be clarified.	Open – as 4.2.	
2	Stability / Hydrogeology	Inconsistencies within BIA regarding the presence of nearby basements.	Open – as 4.3.	
3	Hydrogeology	Groundwater levels	Open – as 4.4 – Further monitoring should be undertaken to inform temporary and permanent works design.	N/A – ongoing
4	Stability	Made Ground parameters	Open – as 4.5	
5	Stability	Outline calculations for basement raft slab, retaining walls, and adequacy of the bearing stratum.	Open – as 4.7	
6	Stability	GMA / damage impact assessment to be revised, calculations to be presented, BIA text to be updated.	Open – as 4.5, 4.8 to 4.11	
7	Stability	A more detailed monitoring strategy should be provided.	Open – as 4.12	

Appendix 3: Supplementary Supporting Documents

None

London

Friars Bridge Court
41- 45 Blackfriars Road
London, SE1 8NZ

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

UAE

Office 705, Warsan Building
Hessa Street (East)
PO Box 28064, Dubai, UAE

T: +971 4 453 4735
E: uae@campbellreith.com

Campbell Reith Hill LLP. Registered in England & Wales. Limited Liability Partnership No OC300082
A list of Members is available at our Registered Office at: Friars Bridge Court, 41- 45 Blackfriars Road, London SE1 8NZ
VAT No 974 8892 43