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111 Canfield Gardens, London NW6 3DY

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 13398-28
Revision: D1

June 2020

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Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	June 2020	For comment	KBemb-13398-28-190620 111 Canfield Gardens D1.doc	KB	EMB	EMB

Document Details

Last saved	19/06/2020 15:06
Path	KBemb-13398-28-190620 111 Canfield Gardens D1.doc
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Project Number	13398-28
Project Name	111 Canfield Gardens, London NW6 3DY
Planning Reference	2019/4089/P

Contents

Appendix

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 111 Canfield Gardens, London NW6 3DY (planning reference 2019/4089/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 Site Investigation Services Ltd and the individuals concerned in its production have suitable qualifications. A Ground Movement Assessment (GMA) is included in Appendix B of the BIA and has been completed by Fairhurst. The qualifications of the authors of the GMA have not been provided.

1.5. The site investigation identifies the site to be underlain by Made Ground to a maximum depth of 1.80m, below which lies London Clay Formation.

1.6. It is accepted that there are no slope stability concerns regarding the proposed development, however, further clarification is required regarding the differential depth between the new basement and neighbouring foundations

1.7. The BIA should be updated to present a consistent assessment of the flood risk and a FRA should be carried out if necessary.

1.8. The construction methodology presented in the GMA should be revised to reflect the proposed development. The maximum excavation depth should be confirmed, taking into account all excavations required for temporary works during construction.

1.9. Clarification of the stages used in the GMA is required and the loading and geometry input data for the PDisp and XDisp assessments should be provided to support the conclusions.

1.10. The GMA should consider the impact to the adjacent highway and utilities. Utility data should be provided.

1.11. The BIA recommends the inclusion of a monitoring strategy, which should be agreed as part of the party wall agreement.

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 19 May 2020 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 111 Canfield Gardens, London NW6 3DY.

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 of the front garden are for the provision of x1underground car parking spaces, by means of a car lift system in the driveway together with the installation of hardstanding landscape with a permeable bonded aggregate surface."*

The Audit Instruction confirmed the property is not a listed building.

2.6. CampbellReith accessed LBC's Planning Portal on 21 May 2020 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA) by Site Analytical Services Ltd, ref 19/31225-2, dated January 2020.
- Ground Movement Assessment (GMA) by Fairhurst, ref 136072/R0, dated 17 January 2020. This report is presented in Appendix B of the BIA.
- Report on a Phase I Risk Assessment by Site Analytical Services Ltd, ref 19/31225, rev 0, dated January 2020.
- Structural Drawings, Calculations and Temporary Works Sequence by Martin Redston Associates, ref 19-558, dated January 2020.
- Planning Application Drawings by Willingdale Associates, consisting of Location Plan, Existing Plans and Proposed Plans
- Design and Access Statement by Willingdale Associates, dated August 2019.
- Planning consultation comments

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Presented in Table A of the BIA
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?	No	Utility data should be 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 13 should be reassessed for neighbouring properties, not the host property.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Question 3 from the CGHHS Screening Flow Chart is missing. However, the same question forms part of the Hydrology screening and is answered satisfactorily. Question 4 in Table 1 of the BIA should be 'yes' due to the inclusion of permeable surfacing in the development, and suggests further assessment regarding SUDS is required.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Is a conceptual model presented?	Yes	

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	No	Screening requires additional consideration.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	No	Screening requires additional consideration.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	Two rounds of groundwater monitoring have been undertaken.
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?	No	
Is a geotechnical interpretation presented?	Yes	Presented in the Fairhurst report
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 6.8 of BIA and Section 4.3 of the Fairhurst report.
Are reports on other investigations required by screening and scoping presented?	No	A flood risk assessment is recommended by the BIA.
Are the baseline conditions described, based on the GSD	Yes	
Do the base line conditions consider adjacent or nearby basements?	No	It is assumed the neighbouring properties do not have basements, which is accepted as being a conservative assumption for this proposal.

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	Further assessment of hydrology and hydrogeology is required.
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	
Have the residual (after mitigation) impacts been clearly identified?	Yes	However further assessment of flood risk and mitigation may be required.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	Not demonstrated.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Not demonstrated.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	However GMA may require revision.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by Site Investigation Services Ltd and the individuals concerned in its production have suitable qualifications. A Ground Movement Assessment (GMA) is included in Appendix B of the BIA and has been completed by Fairhurst. The qualifications of the authors of the GMA have not been provided.

4.2. The site does not contain and is not located near any listed buildings. The site is located within the South Hampstead Conservation Area.

4.3. The proposed development comprises deepening an existing light well and extending the excavation to the north to allow installation of a car lift system. Part of the existing basement will be converted from a bedroom to a garage. The maximum excavation depth for the basement extension is given as 3.30m and the existing light well will be deepened by 1.40m.

4.4. The site investigation identifies the site to be underlain by Made Ground to a maximum depth of 1.80m, below which lies London Clay Formation extending to at least 15m depth.

4.5. The presence of basements in neighbouring properties has not been discussed in the BIA, however the GMA assumes no basements are present. Based on the site conditions and proposed development, this is considered to be a conservative assumption.

4.6. With respect to the land stability screening exercise, it is accepted that there are no slope stability concerns regarding the proposed development, however, further clarification is required regarding the differential depth between the new basement and neighbouring foundations.

4.7. The shallowest geology underlying the site is identified as London Clay, which is designated an unproductive aquifer. The hydrogeology screening assessment should be revised to acknowledge the proposal for permeable surfacing.

4.8. The hydrology screening assessment identifies the site to be in close proximity to a tributary to one of London's 'Lost Rivers', the River Westbourne. Flow of this tributary is identified as being from north to south and following consideration of historic Ordnance Survey maps the BIA concludes the route of the tributary is not likely to have crossed the site. The site investigation did not encounter ground water and subsequent groundwater monitoring rounds encountered limited water that was considered to be a result of water ingress from the surface. The BIA conclusion is accepted.

4.9. The BIA presents an inconsistent approach to assessing the flood risk for the site. Section 3.5.2.2 of the BIA identifies the site as being within the Goldhurst Local Flood Risk Zone and the hydrology screening exercise notes that Canfield Gardens flooded historically. The scoping

exercise states that a Flood Risk Assessment (FRA) should be carried out. However, the subsequent Section 7.2 suggests the development will not increase the flood risk, in part due to the decrease in impermeable surfacing following development, and undertaking a FRA is not included in Section 7.3 'Advice of Further Work and Monitoring'. The BIA should be updated to present a consistent assessment of the flood risk and a FRA should be undertaken if necessary.

4.10. Section 4.3 of the GMA presents the ground model used for the analysis and soil parameters are presented in Table 5. A Poisson's Ratio of 0.4 has been adopted for the London Clay in the long term drained condition. We note the reference cited to support the use of this value dates from 1999. However, a Poisson's Ratio of 0.2 in the assessment of cohesive soil in the drained condition is more appropriate.

4.11. Section 4.4 of the GMA describes the structural loading used in the ground movement assessment. Reference is made to loads that are spread over 1.0m or 0.6m wide 'columns'. Further clarification is required regarding the use of the term 'column'.

4.12. The GMA includes an assessment of the development using PDisp software to estimate vertical ground movements within the development during and after construction. Section 4.4 of the GMA discusses the load cases used to inform the PDisp analysis. Section 4.5 references three stages used in the PDisp assessment but only discusses two of them in the subsequent text. Output data from three stages of assessment are presented in Appendices C (Stage 1, Undrained Unloading), D (Stage 2, Undrained reloading) and E (Stage 3, Drained reloading). Clarification of the stages assessed is required and the input data for the PDisp assessments should be provided to confirm the geometry and loading used, and to support the conclusions.

4.13. The discussion of the Stage 1 excavations suggests locally deeper excavation may be required for temporary works. The ground movement assessment should be carried out for the maximum excavation depth, taking into account all requirements for temporary works.

4.14. Section 4.6 of the GMA states that 'a ground floor slab is also proposed' and discusses the use of a ground floor slab as a prop in the permanent case. The proposed basement will contain a car lift that will need to raise and lower from ground to basement level, therefore no propping at ground floor level will be present in the permanent case. The statements in Section 4.6 regarding the suitability a 'low stiffness approach' should be revised in consideration of the proposed development. In Section 4.4, Stage 3 'Reloading' also refers to the construction of a new ground floor slab. The construction sequence should be amended to reflect the proposed development and presented consistently throughout. LBC require a moderately conservative approach to be adopted for the ground movement assessment.

4.15. The GMA uses XDisp software to estimate the damage category for adjacent structures that may result from the construction. The assessment should be revised based on the outcome of the above considerations.

4.16. The GMA should consider the impact to the adjacent highway and utilities. Utility data should be provided.

4.17. Section 7.3 of the BIA recommends the inclusion of a monitoring strategy before commencement, during construction and for a period after completion of the works. Trigger levels and corresponding actions should be agreed as part of the party wall agreement.

5.0 CONCLUSIONS

5.1. The Basement Impact Assessment (BIA) has been carried out by Site Investigation Services Ltd and the individuals concerned in its production have suitable qualifications. A Ground Movement Assessment (GMA) is included in Appendix B of the BIA and has been completed by Fairhurst. The qualifications of the authors of the GMA have not been provided.

5.2. The site investigation identifies the site to be underlain by Made Ground to a maximum depth of 1.80m, below which lies London Clay Formation.

5.3. It is accepted that there are no slope stability concerns regarding the proposed development. However, further clarification is require regarding the differential depth between the new basement and neighbouring foundations.

5.4. The BIA should be updated to present a consistent assessment of the flood risk and an FRA should be undertaken if necessary. Further assessment of the impact to the hydrogeology of the area is also required.

5.5. The construction methodology presented in the GMA should be revised to reflect the proposed development, particularly with respect to the absence of ground level propping in the permanent case. The maximum excavation depth should be confirmed, taking into account all excavations required for temporary works during construction.

5.6. Clarification of the stages used in the GMA is required and the loading and geometry input data for the PDisp assessments should be provided to support the conclusions.

5.7. The GMA should consider the impact to the adjacent highway and utilities. Utility data should be provided.

5.8. The BIA recommends the inclusion of a monitoring strategy before commencement, during construction and for a period after completion of the works. Trigger levels and corresponding actions should be agreed as part of the party wall agreement.

5.9. 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

Residents' Consultation Comments

At the time of this audit a total of 53 responses had been submitted to the council regarding this development. Of the issues raised, those that are relevant to this audit have been separated into a number of distinct categories, which are discussed as follows:

Surname	Address	Date	Issue raised	Response
Numerous	N/A	January and February 2020	Loss of garden area at the front of the property.	The front garden of the property already comprises hardstanding, therefore there will be no loss of soft landscaping.
			Subsidence and/or damage to neighbouring structures, particularly the adjoining property at No. 109.	Further information has been requested to support the ground movement assessment.
			Groundwater levels being affected.	The geology in the area comprises London Clay, which is impermeable and designated an 'unproductive strata'. These soils do not sustain significant volumes of water. In addition, no groundwater was encountered during the site investigation. Limited water was recorded during subsequent groundwater monitoring visits, which is likely to represent impersistent volumes of water in the Made Ground, but not a true groundwater level. As such, the proposed development is not considered likely to adversely impact groundwater levels.
			Flooding to neighbouring property.	Further clarifications have been requested to support the hydrological assessment of the site.
			Lost rivers of London	Based on the historical maps and site investigation data, it is accepted that it is unlikely that a subterranean river crosses the site.

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Qualifications	It should be confirmed that the authors of the Fairhurst Ground Movement Assessment hold appropriate qualifications.	Open	
2	Hydrology	A consistent approach to addressing the flood risk is required and a flood risk assessment should be provided if necessary.	Open	
3	Hydrogeology	The hydrogeology screening assessment should be revised to acknowledge the use of permeable surfacing.	Open	
4	Stability	The construction methodology presented in the GMA should be revised to reflect the proposed development. The maximum excavation depth should be confirmed and clarification of the use of the term 'column' to describe the structural loading should be provided.	Open	
5	Stability	Clarification of the PDisp loading stages is required.	Open	
6	Stability	Input geometry and load data for the PDisp assessments are required.	Open	
7	Stability	Ground movement assessment should consider the impact to the adjacent highways and utilities. Utility plans should be provided.	Open	

Appendix 3: Supplementary Supporting Documents

None

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