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23 Netherhall Gardens, London, NW3 5RL

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12466-70
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May 2017

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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 23 Netherhall Gardens, London, NW3 5RL (planning reference 2016/2648/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 carried out by Geotechnical & Environmental Associates. The authors' qualifications are in accordance with LBC guidance.

1.5. The existing property comprises a four-storey detached house with a lower ground floor level and associated areas of soft landscaping and hardstanding. It is proposed to extend the existing lower ground floor level into the rear garden with a partial single-level basement beneath the rear of the building. It is proposed to form the retaining walls by underpinning of the existing foundations using a traditional 'hit-and-miss' approach.

1.6. Outline structural calculations for the basement retaining wall, outline temporary works sequencing and propping and preliminary geotechnical parameters have been presented, which are accepted.

1.7. An outline construction programme should be provided.

1.8. Groundwater was monitored at depths of 0.85m to 1.45m in the rear garden, although this was confirmed to be perched groundwater in the Made Ground. Control of groundwater by sump pumping or similar is proposed during construction.

1.9. The BIA acknowledges that the proposed development will increase the proportion of hard surfaced/paved areas at the rear of the site. Assessment of drainage considering the utilisation of attenuation SUDS should be presented, in accordance with LBC guidance.

1.10. An indicative assessment of the likely heave forces is presented in the BIA, in conjunction with a quantitative Ground Movement Assessment (GMA to assess the effects that the construction of the proposed basement will have on the neighbouring buildings. The assessment predicts that the proposed construction will result in damage impacts of Negligible (Category 0) to Very

Slight (Category 1) to neighbouring structures. The front bay windows of 23 Netherhall Gardens are predicted to suffer Slight damage (Category 2).

1.11. A monitoring strategy for structures within the zone of influence is discussed. This should be reviewed to include trigger levels linked to the GMA, with appropriate contingency measures and other recommendations, as required.

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

1.13. Queries and requests for clarification are discussed in Section 4 and summarised in Appendix 2. Until the additional information is presented, the BIA does not meet the criteria of CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 22 March 2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 23 Netherhall Gardens (2016/2648/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;

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 *"Lower ground floor rear extension and semi-submerged basement level."*

2.6. The Audit Instruction also confirmed that the basement proposal does not involve a listed building nor does the site neighbour any listed buildings.

2.7. CampbellReith accessed LBC's Planning Portal on 21 April 2017 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA) dated May 2016 by Geotechnical & Environmental Associates.
- Construction Method Statement (CMS) dated May 2016 by Price & Myers.
- Design and Access Statement dated May 2016 by Hayhurst and Co.
- Planning Application Drawings by Hayhurst and Co. consisting of:

  Existing Plans, Elevations and Sections (May 2016).

  Proposed Plans, Elevations and Sections (May 2016).

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?	No	Outline construction programme to 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?	Yes	BIA.
Are suitable plan/maps included?	Yes	Throughout BIA and referenced maps in Section 9.1.
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 and summary in Section 9.1.1.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 3.1.1 and summary in Section 9.1.1.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 3.1.3 and summary in Section 9.1.1.
Is a conceptual model presented?	Yes	BIA Section 7.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.1.

Item	Yes/No/NA	Comment
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 Section 4.2, 4.3 and 5.
Is monitoring data presented?	Yes	BIA Section 5.3, with further groundwater monitoring proposed in Section 8.1.1.
Is the ground investigation informed by a desk study?	Yes	BIA Section 1.3.
Has a site walkover been undertaken?	Yes	BIA Section 2.1.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	BIA Section 9. The absence of basements was confirmed based on records held on the Camden Planning Portal.
Is a geotechnical interpretation presented?	Yes	BIA Part 2.
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA Section 8.1.2, although no stiffness parameters are included.
Are reports on other investigations required by screening and scoping presented?	Yes	Ground Investigation presented in BIA Section 5.
Are the baseline conditions described, based on the GSD?	Yes	BIA.
Do the base line conditions consider adjacent or nearby basements?	Yes	BIA.
Is an Impact Assessment provided?	Yes	BIA Appendix 2 and 3.

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	BIA Appendix 2 and 3.
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?	Yes	BIA Appendix 2 Section 6 and 7.
Has the need for monitoring during construction been considered?	Yes	BIA Appendix 2 Section 6.2.
Have the residual (after mitigation) impacts been clearly identified?	Yes	BIA Appendix 2.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	BIA Appendix 2 and 3. Temporary works scheme to be presented.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	Impermeable site area to be calculated. SUDS assessment in line with CPG4 3.51.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	BIA Appendix 2 Section 7.
Are non-technical summaries provided?	Yes	Executive summary presented in BIA and Section 9.1.

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by Geotechnical & Environmental Associates (GEA) and the individuals concerned in its production have suitable qualifications as per the requirements of CPG4.

4.2. The existing property comprises a four-storey detached house with a lower ground floor level and associated areas of soft landscaping and hardstanding. It is proposed to extend the existing lower ground floor level into the rear garden with a partial single-level basement beneath the rear of the building. The existing lower ground floor will be deepened by 0.7m while the new single-level basement will extend to a depth of 4.3 m below the existing lower ground floor level.

4.3. An intrusive investigation was undertaken by GEA comprising three window sampler boreholes drilled to depths of between 4.0m and 6.0m. On site ground conditions comprise a variable depth of Topsoil and Made Ground (0.8m to 1.9m thick) underlain by London Clay to at least 6.0m bgl. The proposed basement will therefore be founded in London Clay. A conceptual site model is presented in the BIA.

4.4. Groundwater was monitored at depths of 0.85m to 1.45m in the rear garden, although this was confirmed to be perched groundwater in the Made Ground. The proposed basement will be founded within the London Clay, which is classified as an Unproductive Strata. Control of perched groundwater by sump pumping or similar is proposed during construction.

4.5. The BIA acknowledges that the Westbourne, a lost river of London, is likely to have historically crossed through or close to the site. The ground investigation did not identify any superficial deposits likely to be associated with the historic river.

4.6. The BIA acknowledges that the proposed development will increase the proportion of hard surfaced/paved areas at the rear of the site and may impact the quality of surface water received by adjacent properties. It is accepted that the London Clay is classified as an unproductive stratum and is not capable of significantly attenuating surface water drainage. As required by CPG4 Section 3.51, other forms of attenuation drainage should be assessed and presented.

4.7. The BIA acknowledges that the area is prone to the effects of seasonal shrink-swell subsidence, due to the presence of London Clay and mature trees. No trees will be removed or added as a result of the development, and the basement will be installed below the depth likely to be affected by tree roots. Desiccation was not encountered during the investigation, and is likely limited to within close proximity to the trees. It is proposed to inspect the foundation excavations to ensure that there is not significant unexpectedly deep root growth. The BIA also

proposes that consideration should be given in the foundation design to protect against the effects of continued tree growth.

4.8. It is proposed to form the retaining walls by underpinning of the existing foundations using a traditional 'hit-and-miss' approach. This is an acceptable approach using established techniques. Proposed temporary works sequence and drawings are presented in the Construction Method Statement compiled by Price & Myers.

4.9. Outline structural calculations for the basement retaining wall, outline temporary works sequencing and propping and preliminary geotechnical parameters have been presented, which are accepted.

4.10. An indicative assessment of the likely heave forces is presented in the BIA using Oasys Pdisp software. The potential long term effect of this heave is considered for the basement slab design, and should be confirmed during the detailed design stage.

4.11. A quantitative Ground Movement Assessment (GMA) was undertaken using Oasys Xdisp software based on the requirements within CIRIA C580 to assess the effects that the construction of the proposed basement will have on the neighbouring buildings. Input parameters and assumptions used in the design are accepted.

4.12. The GMA predicts that the proposed installation of the retaining walls and excavation of the proposed basement will generally result in damage impacts to neighbouring structures of Negligible (Category 0) to Very Slight (Category 1). There is a single wall corresponding to the front bay windows of 23 Netherhall Gardens that is predicted to suffer Slight (Category 2) damage. It is proposed that repair of this damage can form part of the development.

4.13. A programme of monitoring the adjoining structures is proposed, includeng condition surveys. The monitoring strategy should be reviewed and updated to include trigger levels linked to the GMA and appropriate contingency measures.

4.14. No known tunnels or railway lines are located within the vicinity of the site.

4.15. It is accepted that there are no slope stability concerns regarding the proposed development.

5.0 CONCLUSIONS

5.1. The BIA was undertaken by Geotechnical & Environmental Associates. The authors' qualifications are in accordance with CPG4 requirements.

5.2. The existing property comprises a four-storey detached house with a lower ground floor level and associated areas of soft landscaping and hardstanding. It is proposed to extend the existing lower ground floor level into the rear garden with a partial single-level basement beneath the rear of the building. It is proposed to form the retaining walls by underpinning of the existing foundations using a traditional 'hit-and-miss' approach.

5.3. An outline construction programme should be provided.

5.4. Groundwater was monitored at depths of 0.85m to 1.45m in the rear garden, although this was confirmed to be perched groundwater in the Made Ground. Control of groundwater by sump pumping or similar is proposed during construction.

5.5. The BIA acknowledges that the proposed development will increase the proportion of hard surfaced/paved areas at the rear of the site. Consideration of attenuation SUDS are to be presented as per CPG4 3.51.

5.6. Outline structural calculations for the basement retaining wall, outline temporary works sequencing and propping and preliminary geotechnical parameters have been presented, which are accepted.

5.7. The results of the GMA assessment has predicted the proposed construction will result in damage impacts of Negligible (Category 0) to Very Slight (Category 1) to neighbouring structures.

5.8. The monitoring strategy for structures within the zone of influence should be updated, with trigger levels linked to the GMA and appropriate contingency measures.

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

5.10. Queries and requests for further information are summarised in Appendix 2. Until the additional information is presented, the BIA does not meet the criteria of CPG4.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Brett, D	25 Netherhall Gardens, London, NW3 5RL	08.06.16	This application fails to provide any reasonable guarantees as to the risk of subsidence to our property next door. Nor does it appear to address adequately the integrity of the root base of the substantial tree that is growing in Number 23, any damage to which could have serious implications for us at Number 25.	See response in Section 4.7.
The Heath & Hampstead Society	P.O.Box 38214, London, NW3 1XD	12.06.16	The Basement Impact Assessment, although comprehensive, does not explicitly assess the extent of potential damage to adjacent properties, by reference to the Burland Scale of damage.	See response in Section 4.11 and 4.12.
Formstone, C	21 Netherhall Gardens, London, NW3 5RL	16.06.16	I must object to the plan to excavate a basement which will always carry a risk to neighbouring properties. Given the proximity of our house with number 23 this risk is unacceptable however small.	See response in Section 4.11 and 4.12.
Shaw, A	25 Netherhall Gardens, London, NW3 5RL	25.06.16	The neighbouring buildings are subject to subsidence due to the severe sloping of the hill and it can only endanger the neighbouring buildings.	See response in Section 4.7, 4.11 and 4.12.
Clark, D	21a Netherhall Gardens, London, NW3 5RL	28.06.16	There is unstable ground in the vicinity and excavating could be dangerous. The excavations will be in too close proximity to the foundations of 21.	See response in Section 4.7. See response in Section 4.11 and 4.12.

Amery, M	Flat 1, 27 Netherhall Gardens, London, NW3 5RL	06.07.16	Slope stability and subsidence concerns. Size of proposed development and increase in impermeable area at the site.	See response in Section 4.7, 4.11 and 4.12. See response in Section 4.6.
Salomon, S	Flat 1st Floor, 25 Netherhall Gardens, London, NW3 5RL		The works could cause subsidence to our property in 25 Netherhall Gardens. It does not provide reasonable guarantees that the work proposed would not cause damage to our building in the form of movement. It does not guarantee either that a tree in 23 Netherhall Gardens will not cause damage to our building in 25 Netherhall Gardens.	See response in Section 4.7, 4.11 and 4.12. See response in Section 4.7.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA format	Outline works programme to be provided.	Open	
2	Surface Water Flow	Assessment of attenuation SUDS to be presented as per CPG4 3.51.	Open	
3	Stability	Movement Monitoring Strategy to be reviewed with trigger levels / contingency measures linked to the predictions of the GMA.	Open	

Appendix 3: Supplementary Supporting Documents

None

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