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26 Denning Road
London, NW3 1SU

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12336-17
Revision: D1

March 2016

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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 26 Denning Road (planning reference 2015/3593/P). On the basis of the BIA, the basement was considered to fall within Category A as defined by the Terms of Reference, however, a review of the proposals identified potential impacts on surrounding structures and infrastructure.

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 author and reviewer of the BIA are Chartered Civil Engineers. CPG4 requires the input of a Chartered Geologist with respect to the appraisal of groundwater flow.

1.5. The property to be developed comprises a four storey terraced building that includes a lower ground floor level approximately 500mm below existing front pavement level. A basement is proposed to be constructed for the full length of the property together with an existing rear light well deepened locally to allow natural light into the basement.

1.6. A single borehole to 6.0 metres depth identified that the site was very close to the boundary between the Claygate Member and the underlying London Clay Formation. The investigation did not incorporate any trial pits to verify BIA assumptions for the presence of voids below the lower ground floor level or depth of existing foundations.

1.7. Inadequate Screening responses have been provided to questions regarding the presence of groundwater aquifers and springlines and it is requested that an enhanced ground investigation is carried out which is reviewed by a qualified geologist on the basis of increased monitoring of groundwater.

1.8. Structural calculations are requested for the basement retaining walls, basement floor slab and superstructure loadings supported by replacement beams below lower ground floor to justify the intended basement construction philosophy and its effect on adjoining party walls.

1.9. Drawings supplied in support of the BIA are unclear regarding construction methodology and additional information is requested to verify the extent of underpinning to front and rear walls and the rear walls relationship with the deepened rear light well and its lowered retaining wall foundations.

1.10. A Ground Movement Assessment is requested which identifies the risk of damage to adjoining properties.

1.11. Details are requested showing how the existing rear light well is drained and how this will be maintained if the light well is deepened.

1.12. Details are requested showing rear garden levels and how these loadings will be catered for by the deepened existing retaining walls.

1.13. It is accepted that there are no hydrological concerns with respect to the development proposals.

1.14. The BIA should be improved by the inclusion of map extracts from CPG4 source documents, showing the site location, to support statements made in the screen process.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 28 January 2016 to carry out a Category A Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 26 Denning Road, London NW3 1SU, Camden Reference 2015/3593/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 *"Creation of basement to be used as a Cinema room and a rear lightwell"*

The Audit Instruction also confirmed the proposal does not involve a listed building nor is it neighbour to a listed building.

2.6. CampbellReith accessed LBC's Planning Portal on 23 February 2016 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (BIA) by CET Structures Ltd dated January 2016
- Existing and Proposed Plans and Sections comprising:

  Block Plan (1:500) and Site Plan (1:1250)

  Drawing No. A3/3060/201 rev D

  Drawing No. A3/3060/202 -

  Drawing No. A3/3060/2010 -

  Drawing No. A3/3060/2011 -

  By Noak Bridge Consultants Ltd
- Reports dated February 2016 by First Steps Ltd and Eldred Geotechnics Ltd commissioned by Nos. 24 and 28 Denning Road.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	See Audit paragraph 4.1.
Is data required by Cl.233 of the GSD presented?	No	A works programme has not been provided.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	No	BIA report and appendices unclear.
Are suitable plan/maps included?	Yes	Noak Bridge Consultant drawings.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	No	Extracts from Camden GHHS, EA and Strategic Flood Risk Assessment identifying site location should be provided.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Section 3.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Section 3.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Section 3.
Is a conceptual model presented?	No	

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	N/A	BIA states Scoping not required as no concerns were raised in the screening.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	N/A	BIA states Scoping not required as no concerns were raised in the screening.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	N/A	BIA states Scoping not required as no concerns were raised in the screening.
Is factual ground investigation data provided?	Yes	One window sampler borehole.
Is monitoring data presented?	Yes	Initial installation and one subsequent water monitoring visit.
Is the ground investigation informed by a desk study?	Yes	See BIA Section 2.
Has a site walkover been undertaken?	No	
Is the presence/absence of adjacent or nearby basements confirmed?	No	
Is a geotechnical interpretation presented?	Yes	Included with Screening responses.
Does the geotechnical interpretation include information on retaining wall design?	No	
Are reports on other investigations required by screening and scoping presented?	No	
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	No	

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	No	
Are estimates of ground movement and structural impact presented?	No	
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	
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	See BIA Appendix C.
Have the residual (after mitigation) impacts been clearly identified?	No	None identified.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Not demonstrated.
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	
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	No	
Are non-technical summaries provided?	No	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been produced by CET Structures Ltd, the author and reviewer both being Chartered Civil Engineers. The preparation of a BIA also requires the involvement of a Chartered Geologist (C.Geol) with respect to the appraisal of groundwater flow.

4.2. The property to be developed comprises a four storey terraced building that includes a lower ground floor located 3 or 4 steps below existing ground (front pavement) level. A light well at the rear of the property leads from the lower ground floor up to the rear garden but the height differential is not identified.

4.3. It is proposed to create a basement for the full length of the house below the lower ground floor with the rear light well locally deepened to windowsill level to allow natural light into the new basement. The basement walls are shown inset from the party walls to No.24 and No.28 presumably in order to overcome the requirement to underpin the adjacent properties.

4.4. The Noak Bridge drawing no. A3/3060/202 indicated that voids are present below the existing lower ground floor and the BIA states in response to Screening Question 13 that existing foundations (to the Party Walls) are founded at 1.95 metres below lower ground floor level, which is then reproduced on Noak Bridge drawing no. A3/3060/201.

4.5. The soils investigation consisted of a single window sampler borehole to a depth of 6.0 metres but did not incorporate any trial pits to verify the assumptions stated previously regarding void and foundation depths.

4.6. The BIA correctly states that the site is located very close to the boundary between the deposits of the Claygate Member and the underlying London Clay Formation. The Arup Guide for Subterranean Development (GSD) Section 2.2.4 makes it clear that this boundary is a spring line making the positive BIA screening responses to Questions 2 and 6 incorrect.

4.7. The BIA Screening response to Question 1a is also incorrect as the Claygate Member is designated a "Secondary B" aquifer by the Environment Agency as does the Arup GSD.

4.8. It is extremely possible that the presence of a water table in these deposits, and borehole water levels, can vary considerably across a site casting doubt on the negative response to BIA Screening Question 1b. Best practice is to drill at least three boreholes on a site, preferably in a triangular pattern, to characterise the water table, reiterated in the Arup GSD Section 7.2.2. More than one monitoring visit is also preferable.

4.9. The five no. Noak Bridge drawings supplied in support of the BIA show insufficient detail to explain how the rear garden light well retaining walls will be deepened. Calculations are requested to justify the 200mm thick walls and floor slab of the proposed basement

construction which may reduce further the 2.55 metres internal dimension of the basement if the walls need to be thickened and assuming the existing foundation depth of 1.95 metres below (lower) ground floor is confirmed.

4.10. Structural calculations are requested to identify the load acting on the central pier between kitchen and dining area, the structural beam at underside of lower ground floor to support this pier and the effect of the beam's reactions on the existing party walls. Similar calculations are requested for the structural beam supporting a significant superstructure wall load between the kitchen and family room as indicated on drawing no. A3/3060/2011.

4.11. The "proposed cross section" on this drawing also appears to suggest that the existing front and rear walls will be underpinned down to the new basement level but no details are provided and no layout of proposed "hit and miss" bays is identified.

4.12. The structural assessment report undertaken by Eldred Geotechnics for the occupiers of the adjoining properties identifies a potential level of damage that might occur based upon the methodologies contained within the BIA. It is requested that if a further reiteration of the BIA is produced, it provides a Ground Movement Assessment which adequately identifies the risk of damage to adjoining properties using the Burland Scale. Any assessment should also consider potential heave due to the excavation of the basement and be based on a revised construction methodology which considers the findings of this audit.

4.13. Whilst it is accepted that the current proposals will not significantly alter the area of hard landscaping, details should be provided of the current drainage to the rear light well and how this will be maintained if the light well is deepened.

4.14. It is accepted that there are no slope stability concerns regarding the proposed development but further details of the rear garden levels should be provided in order to assess loadings on deepened existing retaining walls.

4.15. It is accepted that the site is not in a Flood Risk Zone based upon Camden Flood Risk Management Strategy maps and is not identified as a street that flooded in either 1975 or 2002.

4.16. If a further reiteration of the BIA is produced it should include scoping, investigation and impact assessment stages to provide confidence that the basement will not impact on the local environment. It would be beneficial if the requirements of CPG4 were followed accurately by the inclusion of map extracts from the LBC GSD, Environment Agency and the LBC Flood Risk Management Strategy identifying the site location on each map. These extracts would help to support statements made in the BIA screening process.

5.0 CONCLUSIONS

5.1. The author and reviewer of the BIA are Chartered Civil Engineers. CPG4 requires the input of a Chartered Geologist with respect to the appraisal of groundwater flow.

5.2. The property to be developed comprises a four storey terraced building that includes a lower ground floor level approximately 500mm below existing front pavement level. A basement is proposed to be constructed for the full length of the property together with an existing rear light well deepened locally to allow natural light into the basement.

5.3. A single borehole to 6.0 metres depth identified that the site was very close to the boundary between the Claygate Member and the underlying London Clay Formation. The investigation did not incorporate any trial pits to verify BIA assumptions for the presence of voids below the lower ground floor level or depth of existing foundations.

5.4. Inadequate Screening responses have been provided to questions regarding the presence of groundwater aquifers and springlines and it is requested that an enhanced ground investigation is carried out which is reviewed by a qualified geologist on the basis of increased monitoring of groundwater.

5.5. Structural calculations are requested for basement retaining walls, basement floor slabs and superstructure loadings supported by replacement beams below lower ground floor to justify the intended basement construction philosophy and its effect on adjoining party walls.

5.6. Drawings supplied in support of the BIA are unclear regarding construction methodology and additional information is requested to verify the extent of underpinning to front and rear walls and the rear wall's relationship with the deepened rear light well and its lowered retaining wall foundations.

5.7. A Ground Movement Assessment is requested which identifies the risk of damage to adjoining properties.

5.8. Details are requested showing how the existing rear light well is drained and how this will be maintained if the light well is deepened.

5.9. Details are requested showing rear garden levels and how these loadings will be catered for on the deepened existing retaining walls.

5.10. It is accepted that there are no hydrological concerns with respect to the development proposals.

5.11. The BIA should be improved by the inclusions of map extracts from CPG4 source documents showing the site location, to support statements made in the screening process.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Renshaw	22 Denning Road	23/8/15	Additional ground movement.	See Audit paragraphs 4.9 to 4.12
Heath & Hampstead Society		29/1/16	Stability and possible damage to adjoining houses.	See Audit paragraphs 4.9 to 4.12
First Steps Ltd (de Freitas)	On behalf of owner occupiers of 28 Denning Road and 24 Denning Road	15/2/16	Inadequate assessments of borehole data, subterranean ground water flow, slope stability and surface flow and flooding.	See Audit paragraphs 4.5 to 4.8 and 4.13 to 4.15.
Eldred Geotechnics Ltd (Eldred)	On behalf of owner occupiers of 28 Denning Road and 24 Denning Road	18/2/16	Inadequate assessment of ground movement and structural damage.	See Audit paragraphs 4.9 to 4.12.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Hydrogeology	Enhanced ground investigation to verify presence of aquifer and springlines.	Open – To be submitted, see 4.6 to 4.8.	
2	Stability	Trial pit investigation to verify voids and foundation depths.	Open – To be submitted, see 4.4 to 4.5.	
3	Stability	Structural calculations to justify basement construction philosophy.	Open – To be submitted, see 4.9 to 4.10.	
4	Stability	Additional drawings to verify extent of underpinning and existing foundations.	Open – To be submitted, see 4.11.	
5	Stability	Ground Movement Assessment and damage categorisation.	Open – To be submitted, see 4.12.	
6	Hydrology	Details of existing rear light well drainage and new proposals.	Open – To be submitted, see 4.13.	
7	Stability	Drawings and calculations to justify deepened garden retaining walls.	Open – To be submitted, see 4.14	
8	BIA – Screening	Map extracts from CPG4 source documents showing site location.	Open - To be submitted, see 4.16	

Appendix 3: Supplementary Supporting Documents

None

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