CampbellReith
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Flat 1, 28 Canfield Gardens
London, NW6 3LA

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12466-76

Revision: D1

June 2017

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Appendices

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 Flat 1, 28 Canfield Gardens, London NW6 3LA (planning reference 2017/0859/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 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 authors' qualifications are in accordance with the requirements of CPG4.

1.5. It is proposed to deepen the existing basements below the three storey mid-terrace property by 0.89m adjacent to No.26 and by 1.80m adjacent to No.30. Front and rear lightwells are proposed to match the deeper section adjacent to No.30 via 3.39m excavations and the construction of reinforced concrete retaining walls. The increased depths of basement will be formed by traditional underpinning techniques. The depth of adjacent basements should be established rather than assumed.

1.6. A ground investigation has established a variable depth of Made Ground, below which lies London Clay in which the basement will be founded. Perched groundwater may be encountered in the Made Ground.

1.7. Acceptable structural engineering information has been provided to support the construction of the basement and lightwells except that an indicative temporary works scheme is requested for the lightwell retaining walls. A Ground Movement Analysis has been undertaken which predicts a damage Category of 1 (Very Slight) for both Nos. 26 and 30 Canfield Gardens and this is accepted. Mitigation in the form of a suitable action monitoring plan is acknowledged, and this should be developed during detailed design stage.

1.8. The BIA has failed to recognise that the property lies within the Goldhurst Local Flood Risk Zone and that a Flood Risk Assessment is required, which should also assess the site's proximity to the "lost" River Westbourne.

1.9. The increase in the area of hardstanding and paving, due to the new lightwells, should be identified and specific details of attenuation provided to deal with the increase in surface water flow. Preventative measures to stop basement flooding via the lightwells should be provided.

1.10. A search of existing man-made services should be undertaken to ensure viability of lightwell construction.

1.11. It is accepted that the surrounding slopes to the development are stable and that there are no known ponds or wells in close proximity and that the site is outside the Hampstead pond chain catchment area.

1.12. Queries and matters requiring further information or clarification are discussed in Section 4 and summarised in Appendix 2. Until the additional information requested has been provided, the criteria of CPG4 have not been met.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 19 May 2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Flat 1, 28 Canfield Gardens, London NW6 3LA (planning reference 2017/0859/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: "*Enlargement of existing basement level, including front and rear lightwells*". The property lies within the Swiss Cottage Conservation Area.

2.6. CampbellReith accessed LBC's Planning Portal on 23 May 2017 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment by Site Analytical Services Ltd and Appendices dated December 2016:
- Engineering Impact Assessment & Construction Method Statement/Sequence of work by Martin Redston Associates dated 16 January 2017.
- Design & Access Statement by Treatment (Architecture) Ltd undated.
- Report on a Phase 1 Risk Assessment by Site Analytical Services Ltd date December 2016.
- Architectural Existing & Proposed Floor Plans and Sections by Treatment Architecture Ltd dated June 2016, nos. 01-14.
- Martin Redston Associates drawings nos. 01A & 02.
- Comments and objections to the proposed development from local residents and residents' associations.

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?	No	Utility information and neighbouring foundation depths not 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	No Flood Risk Assessment, no trial pits.
Are suitable plans/maps included?	Yes	BIA Section 3.
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 Table 1.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Table 1.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Table 1.
Is a conceptual model presented?	No	Ground model presented in BIA Section 6.3. CSM should indicate the existing and proposed development foundation levels in the context of ground / groundwater conditions and neighbouring structures, highlighting potential risks and impacts.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.1.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.1.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	BIA Section 4.1. Screening Question 3, response ignored. Screening Questions 6, response inadequate.
Is factual ground investigation data provided?	Yes	BIA Appendix A.
Is monitoring data presented?	Yes	
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	Assumptions made regarding presence of adjoining basements but not confirmed.
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	Retaining wall design parameters provided in BIA Section 6.7. Retaining wall design provided but no temporary / permanent propping design / arrangement presented.
Are reports on other investigations required by screening and scoping presented?	Yes	Ground movement assessment provided but no Flood Risk Assessment.
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	Confirmation required of adjacent or nearby basements and underground utilities / structures.

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	BIA Section 7.1 but additional information requested.
Are estimates of ground movement and structural impact presented?	Yes	BIA, Appendix B.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	Further assessment to be presented in regards to Flood Risk and areas of hardstanding.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Mitigation is discussed in BIA Section 7.2. Further assessment to be presented.
Has the need for monitoring during construction been considered?	Yes	Discussed in principle in BIA Section 7.3 but further detail requested.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Discussed in principle in BIA. Section 7.3 but further detail requested.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Details of indicative temporary works requested.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	It is recommended that the design of the drainage system should consider the requirements of SUDS and groundwater drainage around the basement. However, no proposed drainage plans provided.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Flood Risk Assessment required.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	Burland Category 1 damage identified.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been prepared by Site Analytical Services Ltd (SAS) and the authors' qualifications are in accordance with the requirements of CPG4.

4.2. An Engineering Impact Assessment and Construction Method Statement/Sequence of Work (CSM) has been prepared by a firm of Consulting Engineers, Martin Redston Associated (MRA).

4.3. The existing building is a three storey mid-terrace property, probably built in the late 19th century, and now sub-divided into flats. It is proposed to extend an existing low-headroom basement beneath the full footprint of the building by deepening an area adjacent to No. 26 by 0.89m, deepening an area adjacent to No. 30 by 1.80m and creating two lightwells, at the front and rear of the property, by excavating 3.39m below ground level to match the deepened area adjacent to No. 30. It has been assumed that Nos. 26 and 30 have similar basements to No. 28. The depth of adjacent basements should be established to confirm assessments.

4.4. A ground investigation was carried out by SAS which consisted of two boreholes and identified Made Ground to depths of 0.60m bgl and 2.40m bgl underlain by London Clay to the full depth of the investigation. Groundwater was not encountered during the investigation but monitoring was carried out on two occasions with groundwater at 0.53m bgl and 5.78 bgl, the higher level being consistent with perched water within the Made Ground.

4.5. It is intended to deepen the two areas below the footprint of the existing building by traditional underpinning methods. An acceptable underpinning bay layout, construction details, and temporary propping arrangement have been provided within the MRA information. Care should be taken that fine materials are not washed through from the Made Ground during excavation.

4.6. The rear and front lightwells are to be formed by 1.0m wide sections of excavation with reinforced concrete retaining walls and base slab. Calculations having been provided for their design. An indicative temporary works plan should be provided, including sequencing and propping arrangements.

4.7. A Ground Movement Analysis (GMA) has been undertaken by Fairhurst Consulting Engineers, and has been included as Appendix B of the BIA. An assessment of ground movements within and surrounding the excavation has been undertaken using OASYS geotechnical modelling software programmes PDisp and Xdisp. Soil parameters used, based on the site specific ground investigation, and assumptions made in the assessment are generally conservative and are accepted. The analysis further assumed that basements are not present in adjoining properties, an assumption considered conservative. The assessment considered heave, horizontal movement and vertical settlement based on the proposed construction methodology.

4.8. A Damage Assessment based on the GMA and the recommendations of CIRIA C580 was performed for neighbouring properties Nos. 26 and 30. The assessments predicted a damage category of 1 (Very Slight) for both Nos. 26 and 30 Canfield Gardens. The use of best practice construction methods will be essential to ensure that the ground movements are kept in line with those predicted. It is accepted that the effect of construction on the highway will be negligible due to the distance between it and the proposed works. However, the presence of services within the zone of influence should be identified, and impacts assessed if applicable.

4.9. The GMA recommends that a ground movement sensitivity monitoring plan is set out at design stage, including trigger levels based on the GMA with appropriate actions as necessary and this is accepted.

4.10. The Screening and Scoping exercise has largely been correctly carried out except for the questions regarding drainage. Whilst the BIA correctly states that Canfield Gardens flooded in the 2002 flood event, it also flooded in the 1975 event. Although the BIA states that there is a 'Very Low' risk of surface water flooding according to Environment Agency flood modelling, the BIA fails to recognise that Canfield Gardens lies within the Goldhurst Local Flood Risk Zone and, as such, a Flood Risk Assessment should be undertaken in accordance with Clause 3.48 of CPG4.

4.11. The BIA Screening responses contradict each other (Surface Water Q.'s 2 and 3) with regard to increases in area of hardstanding and paving as the two lightwells will increase the impermeable area, which should be identified. One response indicated that any increase in surface water flow will be attenuated. Details of specific attenuated drainage provision are requested along with details of preventative measures to stop basement flooding via lightwells being overtopped by surface waters.

4.12. The BIA recognises that a search of existing utilities and man-made services should be undertaken and this is requested in order to ensure viability of lightwell construction.

4.13. It is accepted that no known ponds or wells are in close proximity to the site and the site is outside the Hampstead Pond chain catchment area. However, the site location is very close (within 5m) of a tributary of the 'lost' River Westbourne and a further assessment of this proximity is requested within the Flood Risk Assessment. Although Alluvium has not been identified in the site investigation, relating to the 'lost' river, contingencies should be considered within the temporary works plan should this be encountered during construction.

4.14. The BIA has shown that the surrounding slopes to the development are stable

4.15. A conceptual site model (CSM) should be presented to indicate the existing and proposed development foundation levels in the context of the ground and groundwater conditions and neighbouring structures, highlighting potential risks and impacts.

5.0 CONCLUSIONS

5.1. The authors' qualifications are in accordance with the requirements of CPG4.

5.2. It is proposed to deepen the existing basements below the three storey mid-terrace property by traditional underpinning techniques. New lightwell are to be constructed at the front and rear.

5.3. The depth of adjacent basements should be established to confirm the assessments, which are based on assumptions.

5.4. A ground investigation has established a variable depth of Made Ground, below which lies London Clay in which the basements will be founded. Perched groundwater may be encountered in the Made Ground. Contingencies in the event of encountering Alluvium should be considered.

5.5. An indicative temporary works scheme is requested for the construction of the lightwell retaining walls.

5.6. A Ground Movement Analysis has been undertaken which predicts damage impacts of Category 1 (Very Slight). Mitigation in the form of a suitable action monitoring plan is acknowledged, and this should be developed during detailed design.

5.7. The property lies within the Goldhurst Local Flood Risk Zone. A Flood Risk Assessment is required, which should also assess the site's proximity to the "lost" River Westbourne.

5.8. The increase in impermeable site area should be identified and specific details of attenuation provided to deal with the increase in surface water flow.

5.9. Preventative measure to stop basement flooding via the lightwells should be provided.

5.10. A search of existing man-made services should be undertaken to ensure viability of lightwell construction.

5.11. It is accepted that the surrounding slopes to the development are stable and that there are no known ponds or wells in close proximity and that the site is outside the Hampstead pond chain catchment area.

5.11.1. Although Alluvium has not been identified in the site investigation, relating to the 'lost' river, contingencies should be considered within the temporary works plan should this be encountered during construction.

5.12. A conceptual site model should be presented, highlighting all potential risks and impacts.

5.13. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the additional information requested has been provided, the criteria of CPG4 have not been met.

Appendix 1: Resident's Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
O' Hegarty	48 Canfield Gardens (CRASH)	29/03/17	Risk of flooding to No. 30.	See 4.10 to 4.13.
Woolf	Flat 3, 30 Canfield Gardens	29/03/17	Potential damage.	See 4.6 to 4.13.
Wakefield	Flat 1, 30 Canfield Gardens	13/04/17	Subsidence problems, flooding problems.	See 4.6 to 4.13.
Vaziri-Tabar	Flat 2, 23 Compayne Gardens	14/04/17	Risk of flooding, subsidence problems.	See 4.6 to 4.13.
Newman	Flat 3, 22 Canfield Gardens	17/04/17	Risk of subsidence, underground streams.	See 4.10 to 4.13.
Fairhazel Co-operative	23 Compayne Gardens	13/04/17	Risk of flooding, lost river, past and future subsidence, ground movement.	See 4.6 to 4.13.
Coles	Flat 3B, 66 Fairhazel Gardens	12/04/17	Structural damage.	See 4.6 to 4.13.
Parham	57c Canfield Gardens	14/04/17	Flood risk, subsidence problems.	See 4.6 to 4.13.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	Hydrology	Site within flood risk zone.	Open - Assessment required with appropriate mitigation proposed.	
2	Hydrology	Impermeable site area, drainage and flood mitigation to be assessed.	Open - Increase in surface water flow to be assessed. Mitigation measures to be proposed including SUDS assessment. Lightwell anti-flood measures to be proposed.	
3	Stability	Services search to be undertaken.	Open – Impacts to be assessed, if applicable.	
4	Stability	Indicative temporary works scheme required for lightwell retaining walls.	Open – Sequencing and propping to be outlined. Contingencies for encountering softer Alluvium should be considered.	
5	Stability	Establish levels of adjoining basements.	Open – To confirm assessments.	
6	BIA	Conceptual Site Model	Open – CSM should indicate the existing and proposed development foundation levels in the context of ground / groundwater conditions and neighbouring structures, highlighting potential risks and impacts.	

Appendix 3: Supplementary Supporting Documents

None

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