

80 Greencroft Gardens
London, NW6 3JQ

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12466-48
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March 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 80 Greencroft Gardens, London NW6 3JQ (planning reference 2016/2822/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 proposed development involves the refurbishment and remodelling of the existing internal spaces, conversion of existing loft into accommodation space, extension of the building at basement and ground floor levels including the provision of rear terraces and a lower garden at the back and lightwell at the front.
- 1.5. The BIA has been prepared by H Fraser Consulting and Ground and Project Consultants Ltd. The authors' qualifications are not in accordance with the requirements of CPG4.
- 1.6. A Supplementary Structural Engineering statement to the BIA has been prepared by Quorum Project Management. The details and qualification of the author of the report is not included within the submission.
- 1.7. Desk study information has been presented, but not in accordance with aspects recommended in the LBC guidance. No hydrological information or Screening is presented, and utility and transport companies have not been approached with regards to underground infrastructure.
- 1.8. The site investigation undertaken identified the London Clay as the bearing formation for the proposed foundations, underlying Made Ground and a thin layer of Head Deposits. Interpretative geotechnical information is presented but does not include stiffness parameters for heave assessment.
- 1.9. The site investigation did not encounter groundwater. However, the BIA indicates that shallow groundwater has been encountered on an adjacent site. Ongoing monitoring of borehole installations should be undertaken to inform design and construction planning. The BIA states that the scheme should be designed to take account of seasonally high groundwater levels and mitigate against hydrogeological impacts to neighbours, although no details are provided.

- 1.10. The BIA recommends that neighbouring properties should be surveyed to establish whether there are basements or cellars present, including surveys of their condition. These should be undertaken, as recommended.
- 1.11. Surface water flow Screening and Scoping exercises have not been carried out and are required.
- 1.12. The BIA notes that the site is at very low risk of flooding from rivers and the sea and is not prone to groundwater flooding. There has been no assessment of surface water flooding, sewer surcharging or reservoir flooding risk. The site is within the Goldhurst Local Flood Risk Zone and as such a Flood Risk Assessment should be undertaken.
- 1.13. The proposed development will result in an increase in impermeable site area. Outline drainage plans should be provided, including any proposal for attenuation SUDS, with sufficient assessment to demonstrate discharge flows will be in accordance with LBC's and Thames Water's requirements.
- 1.14. Proposed temporary works are presented, including an underpinning sequence. However, proposed propping arrangements should be provided. Permanent structural works drawings should also be presented.
- 1.15. The retaining wall design calculations adopt groundwater level at 1.2m above the basement slab level. However, as stated in the BIA, the design of the retaining wall should consider seasonal fluctuations in groundwater level and the elevated levels recorded at the adjacent property.
- 1.16. The structural design calculations presented do not demonstrate consideration of heave pressure and movements.
- 1.17. The BIA states that an assessment of ground movements and related building damage assessment should be carried out. This should be presented in accordance with LBC guidelines. A structural monitoring scheme with trigger levels and contingency plans linked to the movements predicted should be provided.
- 1.18. An outline works programme has been included. A detailed works programme is to be provided by the appointed Contractor.
- 1.19. 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 25 January 2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 80 Greencroft Gardens, London NW6 3JQ (planning reference 2016/2822/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: "Extensions to the property at basement, ground and roof levels including the provision of rear terraces to facilitate sub-division from 4x into 7x self-contained residential units (C3)."
- 2.6. CampbellReith accessed LBC's Planning Portal on 6th February 2017 and gained access to the following relevant documents for audit purposes:
- Basement Impact Assessment dated 30 June 2016 (ref 30128R2) by H Fraser Consulting which included the following appendices:

- Groundsure Report.
 - Site Investigation Report (GWPR1731) by Ground and Water.
 - Land Stability dated July 2016 by Ground and Project Consultants Ltd.
- Supplementary Structural Engineering Statement dated January 2017 by Quorum Project Management.
- Location plan, block plan, existing ground floor plan (A-03 dated 28-06-16), existing and proposed basement plan, existing section (revised) A.02.8 S-02, proposed section (S-01 dated 28-06-16) by Archian.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	
Is data required by Cl.233 of the GSD presented?	No	Hydrological information, utility information, neighbouring structure depths, historical mapping etc nor 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 indication of consideration to ground heave, no construction methodology for the section of the basement outside the footprint of the existing building, insufficient structural information, no hydrological assessment etc
Are suitable plans/maps included?	No	Historical land use not considered, GSD figures not referenced
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	No	
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA report – Appendix E, Section 3
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Lost rivers information to be presented
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Not presented
Is a conceptual model presented?	No	However, ground model described in text, should be consistent between all documents.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	However, more assessment recommended by BIA e.g. GMA etc
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	
Is factual ground investigation data provided?	Yes	BIA report – Appendix C
Is monitoring data presented?	No	It is recommended that ongoing monitoring of groundwater is carried out
Is the ground investigation informed by a desk study?	Unknown	Not demonstrated
Has a site walkover been undertaken?	Unknown	Not demonstrated
Is the presence/absence of adjacent or nearby basements confirmed?	No	Information has been provided based on data obtained from LBC planning portal for 78 and 82 Greencroft Gardens. No 78 is assumed to have a basement and no basement at No 82. It is recommended in Appendix D, Table 5.1 that neighbouring properties should be surveyed.
Is a geotechnical interpretation presented?	Yes	Stiffness parameters for heave assessment should be presented.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Retaining wall design parameters provided in Appendix E, Section 5. Retaining wall design provided but no temporary / permanent propping design / arrangement presented.

Item	Yes/No/NA	Comment
Are reports on other investigations required by screening and scoping presented?	No	Ground movement assessment and a related assessment of building damage is required. Stability assessment refers to nearby trees and potential for shrink / swell impacts – tree survey should be provided and assessed. No hydrology assessment.
Are baseline conditions described, based on the GSD?	No	
Do the base line conditions consider adjacent or nearby basements?	No	Confirmation required of adjacent or nearby basements and underground utilities / structures.
Is an Impact Assessment provided?	Yes	BIA report – Appendix D, Table 5.1 and Appendix E Section 7. Incomplete – no hydrology assessment. Hydrogeological assessment indicates potential impacts, not mitigated.
Are estimates of ground movement and structural impact presented?	No	Ground movement assessment and a related assessment of building damage is required as recommended in Appendix E, Section 7 of the BIA.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	Further assessment to be presented in regards to hydrology., stability (heave, movements)
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Mitigation is discussed. Further assessment to be presented in regards to stability, groundwater impacts, flood risk and drainage.
Has the need for monitoring during construction been considered?	Yes	Sections 3 and 4 of the supplementary structural engineering statement discuss movement monitoring during construction. Should be based on GMA and damage impact assessment.
Have the residual (after mitigation) impacts been clearly identified?	No	Further structural / movement / drainage / flood risk assessment required.

Item	Yes/No/NA	Comment
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Ground movement assessment is required. Confirmation of presence of adjacent basements and assets (tunnels / utilities etc) required.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	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	Further structural / movement / drainage assessment required. Further groundwater assessment and mitigation required.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, no assessment presented.
Are non-technical summaries provided?	Yes	BIA report – Appendix D, Page I and Appendix E Page 4.

4.0 DISCUSSION

- 4.1. The BIA has been prepared by H Fraser Consulting and Ground and Project Consultants Ltd. Structural information is provided by Quorum Project Management. The authors' qualifications have not been demonstrated to be in accordance with the requirements of CPG4.
- 4.2. The BIA indicates the proposed work involves the refurbishment and remodelling of the existing internal spaces, conversion of existing loft into accommodation space/loft extension, extension of the building at basement and ground floor, including the provision of rear terraces and a lower garden and lightwell at the front. The existing single storey basement/cellar is to be lowered and extended to cover the footprint of the building. Neither the site nor the surrounding structures are designated as listed buildings. The site lies within the East Hampstead area and within a Conservation area.
- 4.3. The proposed development should be clearly described and accompanied by dimensioned permanent and temporary works drawings. A Conceptual Site Model should be presented that indicates the baseline conditions and potential impacts.
- 4.4. The construction methodology includes underpinning to a maximum depth of 2.9m beneath the building existing foundations, and excavation of the new basement under the footprint of the building, and extension into the rear garden. Insufficient drawings and structural information for the proposed construction methodology and temporary works have been provided.
- 4.5. Retaining wall calculations have been included for "no building load", "building load over reinforced concrete wall" and "building load over (Load behind wall) reinforced concrete wall" conditions. A key/diagram showing where each condition has been considered should be included to identify where these conditions are applicable. The proposed structure of the extension into the rear garden, to form lower and upper gardens, with terraces to be formed is required. Temporary works information including sequencing and propping drawings are also required. An underpinning sequence drawing has been presented.
- 4.6. The site investigation undertaken identifies the London Clay as the bearing formation for the proposed foundations, underlying Made Ground and Head Deposits. Interpretative geotechnical is presented but should include stiffness parameters to allow heave / ground movement assessment to be undertaken.
- 4.7. The BIA states that the London Clay soils at the site are of very high plasticity and high volume change potential. It also adds that the basement structure should be designed to account for swelling pressures including taking account of the nature of the existing foundations at the property and its neighbours. The BIA also indicates the presence of trees within the garden

which could induce shrink / swell movements, and further assessment of this should be presented, including an arboriculture survey if required. The structural design calculations presented do not demonstrate consideration of heave movements and associated pressure due to the removal of the soils.

- 4.8. Desk study information is incomplete and should be presented in line with the GSD Appendix G1.
- 4.9. A Hydrology Screening and Scoping process has not been carried out, as required by CPG 4.
- 4.10. The BIA notes that the site is at very low risk of flooding from rivers and the sea and is not prone to groundwater flooding. There has been no assessment of surface water flooding, sewer surcharging or reservoir flooding risk. The site is within the Goldhurst Local Flood Risk Zone and as such a Flood Risk Assessment should be undertaken.
- 4.11. The site investigation has indicated no ground water was encountered within the boreholes during the investigation. However the BIA noted that at a local property, 20m west, groundwater monitoring recorded ground water at 1.08m and 0.95m bgl in the autumn of 2015.
- 4.12. The BIA recommends ongoing groundwater level monitoring should be undertaken to assess the range of ground water levels and provide a baseline against which to compare future groundwater levels. The stability assessment also recommends further groundwater monitoring prior to construction. The design of the retaining wall structure and the temporary works contingency planning and control measures should take account of seasonal fluctuations of groundwater. This further investigation will inform/confirm the requirement for temporary works, permanent waterproofing and retaining wall design.
- 4.13. The hydrogeological assessment indicates potential 'backing up' of groundwater which could impact neighbouring properties. This should be further assessed and mitigated against.
- 4.14. A conceptual site model should be presented that includes the ground and groundwater conditions and indicates the relative elevations of the proposed structure, the existing structure and those structures' foundations / basements / utilities within the zone of influence. Pertinent construction information should be included.
- 4.15. The proposed scheme will cover a proportion of the site which is currently permeable (the rear garden). The BIA (Appendix D, Table 5.1) recommends consideration to the requirements of SUDS in the design of the drainage systems. However, no details of the proposals are provided. Outline drainage plans and attenuation strategy should be provided in accordance with CPG4 section 3.51.
- 4.16. Sections 3 and 4 of the supplementary structural engineering statement discuss movement monitoring during construction on neighbouring buildings and below ground infrastructure. It

states that damage impacts are likely to be Category 1 to 2 (Very Slight to Slight). However, a Ground Movement Assessment (GMA) has not been presented and is required, including a related damage impact assessment as "strongly" recommended in Appendix E, Section 7 of the BIA. The GMA and damage impact assessment should be in accordance with CPG4 section 3.27.

- 4.17. The BIA states that neighbours properties should be surveyed to establish whether there are basements or cellars including their conditions. The BIA indicates the information currently included in the BIA is based on information from LBC's planning portal. A survey of the neighbouring buildings should be undertaken as recommended within the BIA. This should be used to inform damage impact and hydrogeological assessments.
- 4.18. Section 7 of Appendix E states heave movements will occur due to the removal of soils, as part of the construction process. Estimated heave movements due to excavation and settlement due to the new loads should be provided and incorporated in the substructure design, and adopted within the GMA and damage impact assessments.
- 4.19. Any revisions to the BIA should be presented in a single, coherent document, including the provision of non-technical summaries.
- 4.20. Queries and matters requiring further information or clarification are summarised in Appendix 2.

5.0 CONCLUSIONS

- 5.1. The authors' qualifications are in accordance with the requirements of CPG4.
- 5.2. The proposed development should be clearly described and accompanied by dimensioned permanent and temporary works drawings. A Conceptual Site Model should be presented.
- 5.3. The site investigation undertaken identified the London Clay as the bearing formation for the proposed foundations, underlying Made Ground and Head Deposits.
- 5.4. The BIA recommends ongoing groundwater level monitoring should be undertaken to inform temporary and permanent works assessments and designs.
- 5.5. Insufficient desk study information is provided and should be presented.
- 5.6. Hydrological Screening and Scoping should be presented.
- 5.7. The site is within the Goldhurst Local Flood Risk Zone and as such a Flood Risk Assessment should be undertaken.
- 5.8. A drainage strategy, which includes consideration of attenuation SUDS, should be presented, in accordance with CPG4 section 3.51.
- 5.9. Potential hydrogeological impacts should be further assessed and mitigated against.
- 5.10. Stiffness parameters should be included with the interpretative geotechnical information.
- 5.11. In accordance with the BIA recommendations, neighbouring properties should be surveyed to establish whether there are basements or cellars, including their conditions and levels.
- 5.12. Structural information including outline permanent and temporary works design, methodology and sequencing, and retaining wall calculations that consider seasonal fluctuations in groundwater level should be presented.
- 5.13. A GMA and damage impact assessment should be presented in accordance with CPG 4 section 3.27, which should include consideration of heave. A structural monitoring scheme with trigger levels and contingency plans linked to the movements predicted should be provided.
- 5.14. Movements related to shrink / swell and the presence of nearby trees should be further considered.

- 5.15. 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
Trunkfield	77 Canfield Gardens	03/10/16	Structural impact and disruptions to groundwater flow/ flood risk	The applicant will need to demonstrate through Ground Movement Assessment and related assessment of building damage that the impact on neighbouring properties is appropriately addressed. Further assessments required.
Gunson (c/o AFA Planning Consultants)	78 Canfield Gardens	13/10/16	Lack of interpretation of BIA on subsequent impact on 78 Canfield Gardens and adjoining properties, Full structural report, Flood risk	The applicant will need to demonstrate through Ground Movement Assessment and related assessment of building damage that the impact on neighbouring properties is appropriately addressed. Further assessments required.
Kernick	79 Canfield Gardens	01/10/16	River Westbourne under the properties, disruptions to groundwater flow/ flood risk	Further assessments required.
Symonds	(Combined Residents Association of South Hampstead)	27/09/16	Risk of flooding due to rising ground water*	Further assessments required.

*Residents at No 81, 83 and 87 Canfield Gardens have filed objections concerning increased risk of flooding.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA Format	Author's qualifications to be demonstrated in accordance with CPG4	Open	
2	Desk Study	To be provided in accordance with GSD Appendix G1	Open	
3	BIA Format	Scheme to be coherently described and presented in structural drawings (temporary and permanent) with conceptual site model.	Open	
4	Hydrology / Surface Water Flow	Screening / Scoping to be provided.	Open	
5	Hydrology / Flood Risk	Site within flood risk zone. Assessment required with appropriate mitigation proposed.	Open	
6	Hydrology / Drainage	Drainage assessment in accordance with CPG4 3.51 to be provided	Open	
7	Hydrogeology	Groundwater monitoring to be undertaken and further assessment / mitigation proposed, as required.	Open	
8	Stability	Identify adjacent buildings' foundations depths and basements within the zone of influence of the site. BIA recommends survey.	Open	
9	Stability	Geotechnical parameters to include stiffness parameters / heave assessment. Outline slab design is required taking due account of London Clay heave pressure and building loads.	Open	

10	Stability	Construction methodology / temporary works sequencing and propping, structural calculations required. Groundwater control to be considered, as required.	Open	
11	Stability	GMA and damage impact assessment required in accordance with CPG4 3.27. Trigger values and contingency plans to be presented.	Open	
12	Stability	Movements related to shrink / swell and the presence of nearby trees should be further considered, as recommended in the BIA.	Open	
13	Stability	Retaining wall design calculations to be updated for seasonal fluctuation of groundwater levels, as required.	Open	

Appendix 3: Supplementary Supporting Documents

None

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