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63 Goldhurst Terrace, London, NW6 3HB

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12466-11

Revision: F1

December 2016

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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 submitted as part of the Planning Submission documentation for 63 Goldhurst Terrace, London, NW6 3HB (planning reference 2016/4083/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 BIA was originally carried out by AND Designs Limited with supporting documents by H Fraser Consulting Ltd, Stephen Buss Environmental Consultants Ltd, Ground and Project Consultants Ltd and Dig for Victory Limited. The authors' qualifications are in accordance with requirements. In the revised submissions additional supporting documents are provided by Kaya Consulting Ltd and MMP Design Ltd.

1.5. In the original submission the AND Designs Limited BIA was considered the lead document. The BIA did not appear to have completed all the screening questions. The BIA omitted question 13 and 14 of the land stability screening and questions 1 to 5 of the hydrology screening. In the revised submission the additional screening questions have been addressed.

1.6. The BIA has confirmed that the proposed basement will be founded within London Clay. The BIA reported some seepage being noted during the investigation, but no groundwater monitoring has been undertaken. As it is now understood that the development has been constructed without groundwater issues being reported, further monitoring is no longer required.

1.7. The site is located within the Goldhurst Local Flood Risk Zone, as delineated by LBC. Flood risk assessments have been undertaken and conclude there is no risk to the development assuming suitable mitigation measures are implemented. These are proposed in the revised submission.

1.8. A geotechnical interpretive report is included in Appendix E which presents some geotechnical parameters but not all in accordance with Arup's GSD Appendix G3. Assessment shear strengths are based on hand shear vane test results and the report states that insufficient insitu testing has been undertaken. Normally, further investigation would be required to confirm design parameters prior to construction. However, as it is now understood that the development has been constructed, further investigation is no longer required. An inspection by

Building Control should be undertaken to confirm the stability of the structure and to investigate any signs of movement / structural damage.

1.9. Insufficient structural design information was originally provided. Retaining wall design calculations have now been provided for the permanent and temporary works, but they do not adopt parameters recommended in the geotechnical interpretative report (GIR). Ground movement and damage impact assessments have been made but are substantially incomplete. However, as it is now understood that the development has been constructed, further assessment would not serve the intended purpose of planning mitigation to prevent structural damage. An inspection by Building Control should be undertaken to confirm the stability of the structure and to investigate any signs of movement / structural damage.

1.10. It was requested that the site location is shown on the maps / figures to support answers given in the screening questions. These have been provided in the supporting documents.

1.11. All screening questions with a 'Yes' answer should be carried forward to scoping and if necessary, mitigation proposed. This has not been undertaken for all questions. However, as it is now understood that the development has been constructed, further assessment is no longer required, assuming an inspection visit by Building Control to validate that the structure is stable and that appropriate drainage and flood risk protection measures have been implemented.

1.12. In the revised submissions, mitigation measures are discussed in regards to flooding.

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

1.14. Queries and issues requiring additional information are listed in Appendix 2. The criteria within CPG4 and DP27 have not been met in full. However, as the development has been constructed further assessment is not warranted unless an inspection by Building Control reveals issues with structural stability, drainage or flood risk protection measures that require remediation.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 28 September 2016 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 63 Goldhurst Terrace, London, NW6 3HB, planning reference 2016/4083/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 *"Excavation of basement with front and rear lightwells."*

The Audit Instruction also confirmed 63 Goldhurst Terrace did not involve, nor was a neighbour to, listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 26 October 2016 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (ref 15-139) dated 24 June 2015 issued by AND Designs Limited.
- Basement Impact Assessment: Groundwater (ref 30161R1D1) dated 15 September 2016 issued by H Fraser Consulting Ltd.
- Addendum Report on Ground Movements dated September 2016 issued by Ground and Project Consultants Ltd.
- Screening and Scoping Basement Impact Assessment (ref 2015-007-004-002) issued by Stephen Buss Environmental Consultants Ltd.
- Planning Application Drawings issued by Dig for Victory comprising:
  - Location Plan
  - Existing Plans and Sections (Dwg E-01)
  - Proposed Plans (Dwg P-01)
  - Proposed Structural Details (Dwg 4491-01 to 03)
- Method Statement dated 07 September 2016 issued by Dig for Victory Limited.
- Planning Comments and Responses.

2.7. CampbellReith were provided with the following relevant documents for audit purposes via email on 29 November and 2 December 2016:

- Supplementary Hydrology / Flood Risk Assessment (ref KC1184/SS) dated 24 November 2016 issued by Kaya Consulting Ltd.
- Land Stability Screening dated November 2016 issued by Ground and Project Ltd.
- Geotechnical Interpretative Report dated July 2016 issued by Ground and Project Ltd.
- Structural Design Calculations (Revision A) dated February 2016 issued by MMP Design Ltd.

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	
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	See Audit paragraph 4.4.
Are suitable plan/maps included?	Yes	See BIA Report text and Appendix A.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	See Audit paragraph 4.8.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Provided in revised submission.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Section 2 and separate report by H Fraser Consulting.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Provided in revised submission.
Is a conceptual model presented?	Yes	Provided in revised submission.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	No	See Audit paragraph 4.5.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	No	See Audit paragraph 4.14.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	See Audit paragraph 4.5.
Is factual ground investigation data provided?	Yes	See BIA Appendix E.
Is monitoring data presented?	No	See Audit paragraph 4.6.
Is the ground investigation informed by a desk study?	Yes	See BIA Section 5 and Appendix E.
Has a site walkover been undertaken?	No	Not referenced.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	See BIA Section 10.
Is a geotechnical interpretation presented?	Yes	Updated in revised submission. Parameters not adopted in design.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Provided in revised submission, Structural Design. Not consistent with GIR.
Are reports on other investigations required by screening and scoping presented?	No	Arboriculture report referenced.
Are the baseline conditions described, based on the GSD?	No	See Audit Section 4.
Do the base line conditions consider adjacent or nearby basements?	Yes	See BIA Section 10.
Is an Impact Assessment provided?	Yes	See BIA Section 10.
Are estimates of ground movement and structural impact presented?	Yes	Assessment undertaken is estimated, not calculated.

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	See Audit paragraph 4.13.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	In regards flood risk, provided in revised submission.
Has the need for monitoring during construction been considered?	Yes	See BIA Section 10. However, insufficient detail.
Have the residual (after mitigation) impacts been clearly identified?	No	See Audit paragraph 4.16.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	See Audit Section 4. Building Control inspection recommended.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Not clearly demonstrated but accepted that run-off should not be higher than previous site arrangements. No provision for attenuation.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	See Audit Section 4. Building Control inspection recommended.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, no basis for assessment.
Are non-technical summaries provided?	No	Non-technical summaries have not been included.

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) was carried out by AND Designs Limited with supporting documents by H Fraser Consulting Ltd, Stephen Buss Environmental Consultants Ltd, Ground and Project Consultants Ltd and Dig for Victory Limited. The authors' qualifications are in accordance with requirements. In the revised submissions additional supporting documents are provided by Kaya Consulting Ltd and MMP Design Ltd.

4.2. The LBC instruction to proceed with the audit confirmed that the basement proposal did not involve a listed building and is not adjacent to a listed building.

4.3. In the original submission the AND Designs Limited BIA was considered the lead document. However, presentation of the original documents did not clearly answer the requirements of CPG4 and there were contradictory statements between them.

4.4. The original BIA confirmed the proposal to comprise construction of a single storey basement beneath the entire footprint of the ground floor of the property including lightwells to the front and rear of the property. The BIA confirmed that both neighbours have completed the construction of similar basements. It is now known that the 'proposed' basement has been constructed.

4.5. It was noted that only partial screening had been completed within the original BIA, which has been rectified in the revised submissions. Land Stability screening questions 1 to 5 and Hydrology screening questions were omitted, or not clearly presented. Scoping discussion in the revised submission are incomplete and do not address all the potential impacts. However, as the basement has been constructed, impacts should now be assessed by a Building Control inspection to check for structural damage, adverse ground movements and implementation of suitable drainage and flood risk mitigation measures.

4.6. The BIA confirmed the basement is to be founded within London Clay although a layer of Made Ground is present to 0.9m below ground level. The Dig for Victory ground investigation report states that groundwater was not encountered during the investigation, however, a slight seepage was noted at 2.6m below ground level. No subsequent monitoring data is presented. Normally this is required to inform construction temporary works design and mitigations. However, since the basement is already constructed further groundwater monitoring is not required unless advised by Building Control in response to their inspection.

4.7. A Geotechnical Interpretive Report (GIR) has been included within BIA Appendix E which discusses the results of the investigation comprising a single 15m borehole to the rear of the property. It is noted that undrained shear strength has been determined from the results of hand shear vane tests which have not been corrected for plasticity or discussed in terms of

appropriate design strengths. The BIA Section 8 states that additional site investigation should be completed to obtain detailed design parameters and that shear strengths should be confirmed during construction with a hand shear vane. In the revised submissions, additional geotechnical interpretation is presented which provides parameters that have not been adopted for design purposes. Given that the basement is constructed, further investigation or interpretation will not be beneficial. However, a sensitivity analysis of the structural design adopting the more conservative values of the revised GIR would be best practise, and should certainly be carried out if Building Control identify structural / movement concerns following inspection.

4.8. It is noted that the GIR included in BIA Appendix E provides a table of parameters for London Clay only and does not include stiffness parameters as required for settlement and retaining wall calculations. The conceptual model should include parameters for all strata likely to be encountered during the works as per guidance in Arup GSD Appendix G3.

4.9. It is stated in one of the consultation responses that construction of the proposed basement has already started. Basement construction is now confirmed to have been substantially completed. An inspection by Building Control is recommended to assess stability and ensure that drainage and flood risk mitigation measures have been implemented.

4.10. The BIA includes relevant figure extracts from the Arup GSD with the report text at each relevant section and as figures in Appendix A. In the revised submissions, the site boundary is indicated on the maps to support the screening responses.

4.11. The BIA discusses the impact of the proposals and identifies the need for survey and monitoring at the start of the works along with stating that the works will need to be undertaken under the Party Walls Act. It is assumed that the works have taken place without structural monitoring or control processes implemented by a Party Wall Surveyor.

4.12. In the original submission, insufficient structural design information was provided. In the revised submission, retaining wall design calculations are noted not to adopt the parameters presented in the GIR.

4.13. In the original BIA, Section 10 stated that the damage category to adjacent structures will be slight, 2-5mm cracking. In the revised submissions, it is stated that the damage category is "anticipated to be" Negligible, with hairline cracks of <0.1mm. In both submissions there are no calculations to justify these statements. Normally a conservative assessment of movement and damage impact would be required. However, given that the basement is substantially constructed it is recommended that Building Control inspect the development for signs of movement and structural damage.

4.14. In the original BIA, Question 4 of the hydrogeology screening identified a 'yes' answer to there being a change on the proportion of hard surfaced/paved area, but this was not carried through to scoping. In the revised submission this has been changed to a 'no' answer and appropriately justified.

4.15. The site is located within the Goldhurst Local Flood Risk Zone, as delineated by LBC. Flood risk assessments have been undertaken and conclude there is no risk to the development assuming suitable mitigation measures are proposed. In the revised submission, suitable mitigation measures are proposed. A Building Control inspection should verify they have been implemented.

4.16. Outline mitigation measures are discussed at the relevant points within the BIA scoping and impact assessment. However, the BIA does not discuss the effects of any mitigation proposed or any residual risks after mitigation has been implemented.

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

5.0 CONCLUSIONS

5.1. The authors' qualifications are in accordance with requirements.

5.2. In the original submission the AND Designs Limited BIA was considered the lead document. The BIA did not appear to have completed all the screening questions. The BIA omitted question 13 and 14 of the land stability screening and questions 1 to 5 of the hydrology screening. In the revised submission the additional screening questions have been addressed.

5.3. The BIA has confirmed that the proposed basement will be founded within London Clay. The BIA reported some seepage being noted during the investigation, but no monitoring has been undertaken. As it is now understood that the development has been constructed without groundwater issues being reported, further monitoring is no longer required.

5.4. The site is located within the Goldhurst Local Flood Risk Zone, as delineated by LBC. Flood risk assessments have been undertaken and conclude there is no risk to the development assuming suitable mitigation measures are implemented. These are proposed in the revised submission.

5.5. A geotechnical interpretive report presents some geotechnical parameters but not all in accordance with Arup's GSD Appendix G3. The report states that insufficient insitu testing has been undertaken. Normally, further investigation would be required to confirm design parameters prior to construction. However, as it is now understood that the development has been constructed, further investigation is no longer required. An inspection by Building Control should be undertaken to confirm the stability of the structure and to investigate any signs of movement / structural damage.

5.6. Insufficient structural design information was originally provided. Retaining wall design calculations have now been provided for the permanent and temporary works although they do not adopt the parameters contained within the GIR.

5.7. Ground movement and damage impact assessments have been made but are substantially incomplete. However, as it is now understood that the development has been constructed, an inspection by Building Control should be undertaken to confirm the stability of the structure and to investigate any signs of movement / structural damage.

5.8. It was requested that the site location is shown on the maps / figures to support answers given in the screening questions. These have been provided in the supporting documents.

5.9. All screening questions with a 'Yes' answer should be carried forward to scoping and if necessary, mitigation proposed. This has not been undertaken for all questions. However, as it is now understood that the development has been constructed, further assessment is no longer

required, assuming an inspection visit by Building Control to validate that the structure is stable and that appropriate drainage and flood risk protection measures have been implemented.

5.10. In the revised submissions, mitigation measures are discussed in regards to flooding.

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

5.12. Queries and issues requiring additional information are listed in Appendix 2. The criteria within CPG4 and DP27 have not been met in full. However, as the development has been constructed further assessment is not warranted unless an inspection by Building Control reveals issues with structural stability, drainage or flood risk protection measures that require remediation.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Wilans	Flat 3, 44 Goldhurst Terrace	29/09/2016	Believes that work has already started at the property	Confirmed - inspection by Building Control recommended.

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA	Incomplete screening	Open – The lead BIA to be resubmitted to include all screening questions, appropriate scoping, impact assessments and mitigation. The supporting documents should be referenced.	December 2016
2	Groundwater	Perched groundwater identified but not monitored	Open – further monitoring required to inform temporary/permanent works designs/mitigation.	N/A
3	Land stability	BIA identifies further site investigation required to confirm design / assessment parameters	Open – further insitu testing required prior to construction.	N/A
4	Land Stability	Geotechnical parameters and conceptual model incomplete.	Open – BIA to include conceptual model / geotechnical model as per requirements of Arup GSD Appendix G3.	December 2016 (GIR and Structural Calcs inconsistent)
5	Land Stability	Incomplete permanent and temporary works design information.	Open – BIA to present further design information which should include retaining wall design and site specific temporary works considerations.	December 2016 (GIR and Structural Calcs inconsistent)
6	Land Stability	No ground movement assessment (GMA)	Open - GMA to be undertaken to determine damage category and to be included within BIA	N/A – Building Control inspection
7	BIA	Site location not shown on figures	Open – It is advised that the site location be shown on all figures	December 2016
8	Land stability	Residual mitigation risks not presented	Open – BIA to discuss all relevant mitigation, the impact of the mitigation and any residual risks	N/A – Building Control inspection
9	Hydrology	Mitigating flood risk	Open – mitigation measures discussed in supporting documents should be presented and assessed in the BIA.	December 2016

Appendix 3: Supplementary Supporting Documents

Hydrology Screening / Flood Risk Assessment
Geotechnical Interpretative Report
Land Stability Screening
Structural Design Calculations

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