CampbellReith
consulting engineers

# 43 Burghley Road, Kentish Town, London NW5 1UH

## Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12727-18
Revision: D1

March 2018

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## Document History and Status

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## Document Details

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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 a Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 43 Burghley Road, London, NW5 1UH (planning reference 2015/6385/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. Additional information was subsequently issued by email.

1.4. The BIA documents have been prepared by personnel with qualifications complying with the requirements of CPG4, although the input by one of the named parties should be confirmed. There are some discrepancies between the documents and clarification and/or confirmation of some statements and assumptions is required as described in Section 4.

1.5. The proposed development comprises a single storey basement beneath the footprint of the existing building with small light wells to the front and rear. The nature of, and loadings on, the existing and proposed foundations should be clarified. This should include confirmation of the basement slab and any allowance for heave.

1.6. The site is underlain by Made Ground and London Clay, and underpins will be formed in the London Clay. The significance of the shallow perched groundwater with respect to temporary works should be clarified and requirements for dewatering confirmed.

1.7. The BIA assesses the impact of the basement proposals on a slope to the rear of the property. Queries are raised with respect to some of the assumptions made.

1.8. A ground movement and building damage assessment is presented in the BIA. Damage up to Burland Category 3 is predicted. This exceeds permissible damage as given in the Local Plan and contradicts the Structural Feasibility Report. Likely ground movements and resultant building damage are to be confirmed. Predicted settlements should be confirmed once building loads are clarified.

1.9. Outline structural calculations are presented which are accepted, although they require to be developed as part of detailed design and should consider the ground model presented in the

BIA. If existing underpinning at the front of the property is to be utilised as a basement retaining wall, its adequacy should be confirmed.

1.10. The Structural Feasibility Report provides an outline monitoring strategy which should be developed as part of detailed design. A sequence of construction is presented which should be reviewed against BIA recommendations for accidental overdig.

1.11. An arboricultural assessment confirms the basement will encroach marginally into the root protection zone of a tree at the front of the property, but the effect is insignificant.

1.12. Measures to protect the highway are recommended in the BIA. It is accepted that no other significant impacts to land stability exist.

1.13. The hydrology and hydrogeology screening and scoping identify no significant impacts on the local and wider water environment. Mitigation measures in the form of drainage around the basement and an attenuation tank are presented.

1.14. Until the requested clarifications are provided it is not possible to conclude that the criteria contained in CPG4 and DP27 have been met.

1.15. Queries and requests for further information are summarised in Appendix 2.

## 2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 2 February 2018 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 43 Burghley Road, Kentish Town, London, NW5 1UH.

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.
- Local Plan Policy A5 Basements.

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 an *"Excavation of single storey basement with front and rear lightwells."*

The Audit Instruction confirmed that the basement proposals neither involved, nor were a neighbour to, listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 15 February 2018 and gained access to the following relevant documents for audit purposes:

- Application Form
- Architect's existing and proposed drawings - Martin Evans Architects
- Basement Impact Assessment and Ground Investigation Report, Ground & Water Ltd, Ref GWPR2032/BIA/November 2017, V3.02
- Ground Investigation and Basement Impact Assessment – Non-technical Summary, Ground & Water Ltd, Ref GWPR2032/TS/November 2017
- Structural Feasibility Report, Ian Harben Consulting Engineers, Ref 215130.101 Rev C, October 2017
- Arboricultural Impact Assessment Report, Landmark Trees, Ref MEA/43BGR/AIA/01, November 2017.

## 3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

| Item | Yes/No/NA | Comment |
|---|---|---|
| Are BIA Author(s) credentials satisfactory? | Yes | However, BIA&GIR not signed by one of the verifying parties. |
| Is data required by Cl.233 of the GSD presented? | No | Construction programme not presented. |
| Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology? | Yes | |
| Are suitable plan/maps included? | Yes | Contained in BIA&GIR. |
| Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail? | Yes | Contained in BIA&GIR. |
| Land Stability Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | Yes | Section 3 of BIA&GIR. |
| Hydrogeology Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | Yes | Section 3 of BIA&GIR. |
| Hydrology Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | Yes | Section 3 of BIA&GIR. |
| Is a conceptual model presented? | Yes | Section 3 of BIA&GIR. |
| Land Stability Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | Section 3 of BIA&GIR. |

| Item | Yes/No/NA | Comment |
|---|---|---|
| Hydrogeology Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | Section 3 of BIA&GIR. |
| Hydrology Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | Section 3 of BIA&GIR. |
| Is factual ground investigation data provided? | Yes | Ground Investigation Report. |
| Is monitoring data presented? | Yes | Single groundwater monitoring result. |
| Is the ground investigation informed by a desk study? | Yes | Desk study information presented in BIA&GIR. |
| Has a site walkover been undertaken? | Yes | |
| Is the presence/absence of adjacent or nearby basements confirmed? | No | It is reported that there are no basements to the adjoining properties, but no evidence has been supplied. |
| Is a geotechnical interpretation presented? | Yes | Ground Investigation Report |
| Does the geotechnical interpretation include information on retaining wall design? | Yes | |
| Are reports on other investigations required by screening and scoping presented? | Yes | Arboricultural Impact Assessment presented. Scoping exercise confirms Flood Risk Assessment not required. |
| Are baseline conditions described, based on the GSD? | Yes | Ground Investigation Report. |
| Do the base line conditions consider adjacent or nearby basements? | Yes | Basements assumed to be absent. This is a conservative assumption for this scenario. |
| Is an Impact Assessment provided? | Yes | |

| Item | Yes/No/NA | Comment |
|---|---|---|
| Are estimates of ground movement and structural impact presented? | Yes | Clarification required. |
| Is the Impact Assessment appropriate to the matters identified by screening and scoping? | Yes | Although queries are raised in Section 4 of the audit report. |
| Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme? | No | Further information requested – refer to Section 4. |
| Has the need for monitoring during construction been considered? | Yes | Details can be further developed as part of detailed design. |
| Have the residual (after mitigation) impacts been clearly identified? | No | Further information requested – refer to Section 4. |
| Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained? | No | Further information requested – refer to Section 4. |
| 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 | Further information requested – refer to Section 4. |
| Does report state that damage to surrounding buildings will be no worse than Burland Category 1? | No | |
| Are non-technical summaries provided? | Yes | |

## 4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) was carried out by Ground and Water Limited and is presented in a combined report with the Ground Investigation Report. A separate non-technical summary is presented. The individuals concerned in its production have qualifications that comply with the requirements of CPG4, although the report has not been signed by one of the verifying parties. Supporting information, comprising architects' drawings, a Structural Feasibility Report (SFR) by Ian Harben Consulting Engineers and an Arboricultural Impact Assessment by Landmark Trees, is also presented. Reference should be made in the BIA to the Local Plan.

4.2. 43 Burghley Road is a three storey terraced house with a front and rear garden located towards the middle of Burghley Road between No. 41 and 45. The site is reported to slope down from the rear to the front. Ground levels are reported in the BIA&GIR.

4.3. It is proposed to construct a single level basement beneath the existing property with lightwells to the front and rear using underpinning techniques. The depth of the basement excavation is approximately 3m, although due to the level change, this reduces to approximately 1.70m at the front. The access to the front of the property remains unchanged. An outline construction sequence is presented in the SFR. The BIA&GIR notes that the existing foundations require to be broken out to 0.15m depth due to uncertain lateral loadings. It is assumed that this relates to the possible inadequacy of the underpins to act as retaining walls which is addressed in the construction sequence.

4.4. The Stage 1 screening has identified a number of areas that should be taken forward to scoping and sufficient investigations have been submitted.

4.5. The BIA&GIR identified a number of potential impacts to land stability comprising the presence of shrink-swell prone London Clay, a slope to the rear of the site, a lost river approximately 100m from the site, the proximity of the highway and the increased differential in foundation depths. The BIA&GIR notes that the London Clay and lost river do not present significant impacts. Impact assessments are presented for slopes and structural stability as discussed below and mitigation measures to protect the highway are described.

4.6. The BIA&GIR records the identification of roots to a maximum depth of 1.20m and states that the basement formation level must be inspected for evidence of live roots. It is stated that, if observed, the root affected soils should be removed and replaced with a granular engineered fill.

4.7. The BIA&GIR considers slope stability in the temporary and permanent cases resulting from the basement proposals. The approach is described in the text and graphical outputs are presented. A number of queries require confirmation as follows:

- It is suggested that an "undrained scenario" has been used to consider longterm stability. It should be confirmed whether this is appropriate.
- The stability assessment assumes that there will be a load of 105kN/$m^2$ in front of the wall in the permanent case. It should be confirmed that (i) this load exists in the lightwell and (ii) it has been determined correctly as there is a discrepancy between the loading arrangement described in the BIA&GIR and the SFR.
- It is stated that for the purposes of analysis, the groundwater was assumed to be at the surface. This does not appear to be supported by the graphical sections provided.

4.8. The BIA&GIR consider the existing and proposed foundation loading arrangements in order to estimate likely settlement. The current situation for the front wall requires clarification. There are discrepancies between the BIA&GIR and SFR with respect to the proposed foundation loading arrangement and the nature of the basement slab (suspended vs ground bearing) which also require clarification.

4.9. Outline structural calculations have been submitted following the issue of the D2 audit report. These consider retaining wall and slab design and provide the anticipated structural loads. The calculations also do not reflect the possibility of the retained soils comprising Made Ground. The calculations are accepted on the basis that the basement walls will be propped both in the temporary and permanent cases, but detailed design should consider the ground model described in the BIA&GIR.

4.10. The BIA&GIR considers likely settlement due to the altered foundation arrangements. As noted above, clarification is required with respect to the existing and proposed structural loads and form of foundations. Tables presenting limiting bearing capacities and estimated settlements are presented. In some cases the bearing pressure for which settlement is calculated significantly exceeds the limiting bearing capacity.

4.11. Estimates of heave are presented on the assumption that the basement slab is to be suspended. This is at odds with the SFR which shows a ground bearing slab.

4.12. A ground movement assessment has been presented estimating ground movements associated with the basement construction after CIRIA C760. It is recognised that this is not an entirely appropriate method. Three approaches are presented, described as 'conservative', 'moderate' and 'realistic' (also called 'actual'). It should be clearly stated which approach is appropriate

(noting that Camden's Terms of Reference require conservative assessments). Building damage up to Burland Category 3 is predicted to nos 41 and 45 Burghley Road using the 'conservative' approach and damage up to Category 2 is predicted using the 'realistic' approach. The Local Plan requires that damage is limited to Burland Category 1. It should be confirmed whether the GMA considers the settlements predicted due to the altered loading arrangement.

4.13. It is noted that the SFR predicts up to 12mm settlement due to the underpinning and Category 1 damage. These discrepancies between the documents should be clarified.

4.14. The BIA&GIR states that allowance should be made for up to 1m accidental overdig. This could have a significant impact on stability which should be considered further in the BIA&GIR and SFR.

4.15. The SFR includes an outline monitoring regime to be adopted during construction.

4.16. With respect to hydrogeology, the groundwater BIA&GIR identified perched water in the Made Ground and a water level in the London Clay at around 3.30m depth. The BIA&GIR states that there will be a small increase in impermeable area, whilst the SFR notes that this is not the case. Despite this discrepancy, it is noted that it is intended to install an attenuation tank.

4.17. The results of groundwater monitoring are described and it is recommended that 2m head of water is assumed for the design of the basement. It is agreed that this is conservative, and this assumption has been carried through to outline design. The BIA&GIR advises that significant perched water will be encountered and that consideration should be given to forming the basement within a cofferdam. This is at odds with the SFR and should be clarified.

4.18. The structural engineering information identifies the potential requirement for dewatering during construction and provides details of a French drain and system to prevent water backing up against the basement.

4.19. It is noted that the site lies in area potentially at risk from sewer flooding. A description of the topography is given identifying that the basement is not at risk and proposals for a drain around the basement and an attenuation tank are provided. These measures are accepted.

4.20. A neighbour has suggested that a tree to the front of the property may be affected by the basement proposals. An arboricultural impact assessment confirms that the encroachment into the root protection zone is minimal and not significant.

## 5.0 CONCLUSIONS

5.1. The BIA documents listed in Section 2 have been prepared by personnel who have qualifications complying with the requirements of CPG4, although the input by one of the named parties should be confirmed.

5.2. The proposed development comprises a single storey basement construction beneath the footprint of the existing building with small light wells planned to the front and rear of the house. The nature of, and loadings on, the existing and proposed foundations should be clarified. This should include confirmation of the basement slab and any allowance for heave.

5.3. The BIA&GIR recommends that allowance is made for accidental overdig up to 1m. This requirement should be reviewed and incorporated into the construction sequence/stability assessment if appropriate.

5.4. The site is underlain by Made Ground and London Clay and underpins will be formed in the London Clay. The significance of the shallow perched groundwater with respect to temporary works should be clarified and requirements for dewatering confirmed.

5.5. The BIA assesses the impact of the basement proposals on a slope to the rear of the property. Queries are raised with respect to some of the assumptions made.

5.6. A ground movement and building damage assessment is presented in the BIA. Damage up to Burland Category 3 is predicted. This exceeds permissible damage and contradicts the Structural Feasibility Report. Likely ground movements and resultant building damage are to be confirmed. Predicted settlements should be confirmed once building loads are clarified.

5.7. Outline structural calculations are presented which are accepted, although they require to be developed as part of detailed design and should consider the ground model presented in the BIA. If existing underpinning at the front of the property is to be utilised as a basement retaining wall, its adequacy should be confirmed. The Structural Feasibility Report provides an outline monitoring strategy which should be developed as part of detailed design.

5.8. An arboricultural assessment confirms the basement will encroach marginally into the root protection zone of a tree at the front of the property, but the effect is insignificant.

5.9. Measures to protect the highway are recommended in the BIA. It is accepted that no other significant impacts to land stability exist.

5.10. The hydrology and hydrogeology screening and scoping identify no significant impacts on the local and wider water environment. Mitigation measures in the form of drainage around the basement and an attenuation tank are presented.

5.11. Until the missing information is provided it is not possible to conclude that the criteria contained in CPG4 and DP27 have been met.

# Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

| Surname | Address | Date | Issue raised | Response |
|---|---|---|---|---|
| Derwent May | Not given | Uploaded 06/01/2016 | Concerns over subsidence | See audit report paras 4.12 + 4.13 |
| O'Sullivan | 47 Burghley Road | 07/01/2016 | Effect of construction on tree to the front of the property. | See audit report paras 4.20 |
| Benson | 41 Burghley Road | Uploaded 14/01/2016 | Concerns over subsidence | See audit report paras 4.12 + 4.13 |

# Appendix 2: Audit Query Tracker

Audit Query Tracker

| Query No | Subject | Query | Status | Date closed out |
|---|---|---|---|---|
| 1 | BIA | Verification of BIA by Ian Harben to be confirmed. | Open | |
| 2 | BIA | Outline construction programme to be provided. | Open | |
| 3 | Land stability | Existing and proposed foundation configuration and loading arrangements to be clarified (refer to Section 4). | Open | |
| 4 | Land stability | Queries raised with respect to ground movement and building damage assessment. | Open | |
| 5 | Land stability | Predicted building damage exceeds permissible limits. | Open | |
| 6 | Land stability | Discrepancies between documents with respect to predicted settlement and damage impacts to be clarified (refer to Section 4). | Open | |
| 7 | Land stability | Queries raised with respect to slope stability assessment (refer to Section 4). | Open | |
| 8 | Land stability | Potential impacts of accidental overdig to be considered (refer to Section 4). | Open | |
| 9 | Hydrogeology/Land stability | Requirements for temporary dewatering to be confirmed (refer to Section 4). | Open | |

## Appendix 3: Supplementary Supporting Documents

None

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