

11-12 Ingestre Road,
London, NW5 1UX

Basement Impact Assessment
Audit

For
London Borough of Camden

Project Number: 12985-24
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June 2019

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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 11 – 12 Ingestre Road (Camden planning reference 2018/4449/P). The basement is considered to fall within Category C 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 checklist.
- 1.4. The qualifications of the individuals involved in the BIA now meet the LBC requirements.
- 1.5. The BIA has been updated to reference current guidance, as requested.
- 1.6. The Flood Risk Assessment (FRA) has been updated and is accepted.
- 1.7. The proposed development is indicated to comprise the demolition of existing buildings and erection of a six storey plus single basement building.
- 1.8. The proposed and existing section drawings of the structure have been presented, as requested.
- 1.9. The construction methodology/sequence has been adequately presented in the revised BIA. Outline retaining wall calculations to demonstrate lateral stability are provided.
- 1.10. The conceptual model adopted for assessment has been presented in an indicative section, which is considered reasonably conservative.
- 1.11. The SuDS assessment report confirms surface water will be attenuated to discharge to the local sewer at appropriate flow rates. The final drainage design should be agreed with LBC and Thames Water.
- 1.12. Clarification is now provided on the number of trees to be removed and the impacts to neighbouring properties have been assessed.
- 1.13. Outline geotechnical design parameters have been updated based on previous audit comments.
- 1.14. The queries previously raised with regard to the GMA have now been adequately addressed, including impact assessment of the highway and underlying utilities.
- 1.15. Clarification is provided on the proposed piling methodology.

- 1.16. The previous request for an outline monitoring strategy with trigger levels based on the movements from the GMA is now available.
- 1.17. It is accepted that there are no impacts to slope stability or the wider hydrogeological environment and the site is not in an area prone to flooding.
- 1.18. Queries and requests for information have been adequately addressed. These are discussed in Section 4 and summarised in Appendix 2. The BIA meets the requirements of CPG Basements.

2.0 INTRODUCTION

- 2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 1 November 2018 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 11 – 12 Ingestre Road, NW5 1UX (2018/4449/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 Basements. March 2018.
 - 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;
 - c) avoid cumulative impacts upon structural stability or the water environment in the local area, and;
 - d) 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 *"Erection of a six storey building plus single storey basement to provide 50 Assisted Living residential units (1 x 1 bed, 41 x 2 bed, 8 x 3 bed), following demolition of the existing building together with associated communal facilities, plant equipment, landscaping and 10 car parking spaces"*.
- 2.6. The Audit Instruction also confirmed 11- 12 Ingestre Road did not involve, nor is it a neighbour to listed buildings.

- 2.7. CampbellReith accessed LBC's Planning Portal on 8 November 2018 and gained access to the following relevant documents for audit purposes:
- Basement Impact Assessment, Create Consulting Engineers Ltd, dated August 2018.
 - Flood Risk and drainage strategy, Create Consulting Engineers Ltd, dated July 2018.
 - Design and Access Statement, Barton Wilmore, dated September 2018.
 - Barton Wilmore Planning application drawings comprising:
 - Location Plan (27463-A-E11-01)
 - Existing lower ground and ground floor plans (27463-A-E11-03 and 27463-A-E11-04)
 - Existing elevations (27463-A-E13-01)
 - Demolition site plan (27463-A-D11-01)
 - Demolition floor plan – lower ground and ground (27463-A-E11-02 and 27463-A-E11-03)
 - Demolition elevations (27463-A-E13-01)
 - Proposed floor plan – basement and ground floor (27463-A-P11-00 and 27463-A-P11-01c)
 - Proposed site sections (27463-A-P12-01)
 - Proposed building section (27463-A-P12-02c)
 - Proposed elevations (27463-A-P13-01, 27463-A-P13-02 and 27463-A-P13-03)
 - Soft landscape – ground floor (RG-L-03-1)
 - 3 No (pertinent to the BIA) consultation responses.
- 2.8. Supplementary information was received in February 2019 via email and comprised the following:
- 11- 12 Ingestre Road Audit Query Tracker 280119_1.0 (see Appendix 3)
 - Basement Impact Assessment (Volumes 1 to 4), Create Consulting Engineers Ltd, dated February 2019 (not included in Appendix 3 due to file size but available on the LBC planning portal).
- 2.9. Supplementary information was received in May 2019 via email and comprised the following:
- 11- 12 Ingestre Road Audit Query Tracker 260419 (see Appendix 3)
 - Basement Impact Assessment (Volumes 1 to 6), Create Consulting Engineers Ltd, dated April 2019 (not included in Appendix 3 due to file size but available on the LBC planning portal).
 - Flood Risk Assessment and Drainage Strategy –Rev B (Volume 1 to 3), Create Consulting Engineers Ltd, dated July 2018 (not included in Appendix 3 due to file size but available on the LBC planning portal).
 - Additional drawings presented include:
 - Existing Elevations (27463-A-E13-01)

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	See Audit paragraph 4.1.
Is data required by Cl.233 of the GSD presented?	Yes	
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	
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	
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 4.4 of the initial Create Consulting Engineers (CCE) BIA.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 4.6 of the initial CCE BIA.
Is a conceptual model presented?	Yes	Section 6 of the CCE BIA. Sections indicating proposed changes previously requested and was provided.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Table 5.3 of the CCE BIA (see Audit paragraphs 4.11 to 4.14).

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Table 5.2 of the CCE BIA.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Table 5.1 of the CCE BIA.
Is factual ground investigation data provided?	Yes	Appendix E of the CCE BIA.
Is monitoring data presented?	Yes	Section 6 and Appendix E of the CCE BIA.
Is the ground investigation informed by a desk study?	Yes	Section 3 of the CCE BIA.
Has a site walkover been undertaken?	Yes	Section 2.4.3 of the CCE BIA
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Appendix P, sheet 31 provides a N-S x-section across the site and for adjacent sites. However, it should be noted that this is still based on assumptions and a survey is still required to confirm the information.
Is a geotechnical interpretation presented?	Yes	Information presented in Section 7 of the BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Table 7.1 of the revised CCE BIA (dated April 2019)
Are reports on other investigations required by screening and scoping presented?	Yes	Ground investigation and flood risk assessment reports provided.
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	Section 8 of the CCE BIA.

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	Provided in Section 8 and Appendix F of the revised BIA.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Issues identified and adequately addressed.
Has the need for monitoring during construction been considered?	Yes	Mentioned in Section 7.4 of the BIA, however, outline proposals still not presented (see Audit paragraph 4.29).
Have the residual (after mitigation) impacts been clearly identified?	Yes	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	However, a survey has to be carried out to confirm the type and depth of foundation of neighbouring properties before construction.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	BIA and FRA.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Demonstrated as Category 1 in the revised BIA
Are non-technical summaries provided?	Yes	CCE BIA.

4.0 DISCUSSION

- 4.1. The Basement Impact Assessment (BIA) was undertaken by Create Consulting Engineers (CCE) Ltd. Two of the individuals involved hold CGeol and MStructE qualifications. In regards to hydrological assessment, a separate flood risk assessment (FRA) was also undertaken by CCE with one of the authors holding a MCIWEM qualification.
- 4.2. Following the initial audit, it was requested that the land stability assessment be completed by a Chartered Civil Engineer (MICE) or a Chartered Structural Engineer (MStructE) with demonstrable experience of engineering geology. This experience has now been provided.
- 4.3. The initial BIA made reference to CPG4 2015 in Section 2.3.1 and CIRIA C580 in Section 2.3.2 respectively, which are both superseded. The current documents are now referenced in the revised BIA.
- 4.4. The previous audit requested for an update in the FRA to render it consistent with the BIA document with reference to the site description and regarding the use of site specific ground investigation data for assessment rather than historic information. This has now been actioned in the updated FRA document
- 4.5. It was stated in Section 1.1.2 of the initial BIA that the site comprises a part two and three storey elderly person's home building comprising four wings around a central courtyard. It was stated that the site slopes from east to west and is accessed at several levels. The ground levels of these different areas are now provided under Section 2.4.7 following the comments in the previous audit report.
- 4.6. Site descriptions within the BIA and FRA were presented inconsistently. The existing ground levels are indicated to be between 51.10m AOD in the south eastern corner to 46.53m AOD in the northwest. In the revised FRA, site levels are consistent with the BIA.
- 4.7. The proposed development was indicated to comprise the demolition of existing buildings and erection of a six storey plus single basement building accommodating 50 assisted living residential apartments with associated communal facilities. The depth of the basement was not originally stated in the BIA text nor was it indicated on the drawings (building sections and plans), which did not include levels. The existing and proposed sections including levels have been presented.
- 4.8. It was initially stated in Section 2.4.15 that the basement is to be formed using driven contiguous piles designed as cantilevers (unpropped during excavation until the ground floor slab is constructed). The ground movement assessment indicated that the anticipated pile

depths are 12m bgl (c.35.3m AOD) with the basement formation level 4m bgl (44.3m AOD). A construction method statement was included in Section 7.2.7 of the BIA.

- 4.9. It is now understood that the piles would be bored and temporary props would be introduced during basement construction. The indicative location of the temporary props is provided under Figure 7.2 of the BIA. Sketches are now available under section 7.2.9 of the BIA illustrating the construction sequence. An analysis for the lateral stability of the contiguous piles is presented in Appendix G.
- 4.10. Some of the relevant figures/maps from the Arup GSD and other guidance documents with the site location indicated were provided to support the responses to the screening questions. The responses within the updated BIA are now found to be satisfactory.
- 4.11. A 'No' response was given to Question 13 of the land stability screening in the initial BIA, regarding differential depth in foundations. The justification was based on assumptions of the foundation types of the neighbouring properties; however, no supporting evidence was provided. Appendix P of the revised BIA provides a sectional drawing providing indicative depths of neighbouring foundations. Although it is noted that these levels are not based on an actual survey of the foundations, the details provided are accepted on the basis of reasonably conservative assessment assumptions. It is, however, recommended that a survey be carried out to confirm these before construction.
- 4.12. Question 6 of the land stability screening, regarding trees, was carried forward to scoping; however, this was not considered to be adequately addressed. The issue of tree removal is now discussed in more detail on Table 5.3 of the revised BIA and is considered to be adequately addressed.
- 4.13. It was stated on the surface water and flooding assessment that there will be a small change in the hardstanding area as part of the proposed development and that SUDs (blue roof and geo cellular attenuation) are proposed that will reduce peak runoff rates to the local sewer network. A separate flood risk assessment was provided which indicated an impermeable area increase of 0.017ha. The surface water drainage proposals meet policy requirements and a final design should be agreed with Thames Water and LBC. The site is indicated to be at a very low risk of surface water flooding and from all other sources.
- 4.14. A ground investigation comprising 3 No. boreholes to 25m bgl (23.3m AOD) together with in-situ and laboratory testing was undertaken. Made Ground was encountered to between 1.70m and 2.10m bgl (46.6 and 46.20m AOD) over London Clay, although it was stated in the BIA that Alluvium (0.40m thick) was locally encountered in one of the boreholes. Groundwater was not encountered during drilling but was recorded at between 0.88m and 6.30m bgl during the three monitoring visits following completion. It was stated in the BIA that the shallow groundwater

was considered to be perched and that dewatering will be implemented during construction as a mitigation measure to deal with potential inflows in the excavation, as indicated in Table 6.6.

- 4.15. Outline geotechnical design parameters were originally queried. The current BIA provides reasonably conservative parameters.
- 4.16. A ground movement assessment (GMA) and resulting damage assessment was undertaken for the neighbouring properties. Hand calculations based on CIRIA C760 (C580 referenced in BIA) for the neighbouring properties indicated on Figure 1.2 (Plan of Ingestre Road) are included. The use of props to ensure high stiffness walls has been confirmed.
- 4.17. The closest structures/properties are a retaining wall and the Tideswell and Hambrook properties located at 3.30m and 5.50m respectively to the south of the site. The remaining properties in the west, north and east are the Calver, Grangemill and Fletcher Court buildings located at between 13m and approximately 18m away.
- 4.18. Moderate (Category 3) damage was originally indicated for the Hambrook and Tideswell properties and it was stated this '*can be reduced to negligible were it to be determined that these structures and the retaining wall are founded on piles rather than the worse case scenario of shallow foundations*'. A temporary propping system is proposed as a mitigation measure '*if the foundation type for these buildings cannot be determined...as a moderate category of damage would not be acceptable*'. Negligible damage was indicated for the remaining properties.
- 4.19. The approach of the original GMA and the assumptions made were not accepted. The LBC guidance requires damage to neighbouring properties to be limited to no more than Category 1 (Very Slight) and it was requested in the initial audit for this should be demonstrated as feasible. The calculations assumed high support stiffness based on a top down construction sequence which was contradictory to information in the earlier sections of the report (Section 2.4.15) which stated the basement is to be constructed as a cantilever wall from bottom up. Furthermore, the mitigation measure proposed was not accepted given the calculations which resulted in Category 3 damage already assumed high support stiffness.
- 4.20. It was recommended that the GMA and the BIA be further revised. The calculations have now been revised and are considered to be in accordance with the guidance. A maximum impact of Category 1 damage to neighbours is predicted.
- 4.21. A utilities search has been undertaken. The BIA assesses impacts to highways and utilities to be negligible. Asset protection agreements should be entered into with asset owners.
- 4.22. Section 7.4.1 of the BIA recommended movement monitoring as part of proposals to control ground movements with generic advice. Trigger values were not originally provided. The

revised BIA now includes an outline monitoring strategy with trigger values as previously requested.

- 4.23. An indicative works duration was included on Section 2.4.16 of the previous BIA. A detailed programme should be provided by the appointed contractor at a later date.
- 4.24. It is accepted there are no slope stability concerns or wider hydrogeological impacts regarding the proposed development and the site is not in an area prone to flooding.

5.0 CONCLUSIONS

- 5.1. The BIA authors hold relevant qualifications.
- 5.2. The BIA has been updated to include correct LBC guidance references.
- 5.3. The BIA has been updated to correct previously queried inconsistencies and clarify the basis of assessment.
- 5.4. The construction methodology and sequence is satisfactorily presented in the revised BIA. Outline retaining wall calculations to demonstrate lateral stability are now provided. Geotechnical design parameters are considered to be reasonably conservative.
- 5.5. SUDs will be adopted to mitigate hydrological impacts.
- 5.6. The GMA has been revised. A maximum of Category 1 damage to neighbours is predicted.
- 5.7. An outline monitoring strategy is presented.
- 5.8. It is accepted that there are no impacts to slope stability or the wider hydrogeological environment and the site is not in an area prone to flooding.
- 5.9. Queries and requests have been adequately addressed. The BIA meets the requirements of CPG Basements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Rampersad	Not provided	14/10/2018	Driven piles and vibration	Query raised – Section 4.
Chu	Not provided	07/10/2018	Risk of subsidence to nearby properties such as Grangemill	Query on ground movement assessment raised – Section 4.
Ikola	Not provided	07/10/2018	Risk of subsidence to nearby properties such as Grangemill	Query on ground movement assessment raised – Section 4.

Appendix 2: Audit Query Tracker

Audit Query Tracker*

Query No	Subject	Query	Status	Date closed out
1	BIA format	Author qualifications	Close	March 2019
2	BIA format	Superseded documents referenced	Closed	March 2019
3	BIA format/baseline conditions	Contradictory information in BIA and FRA.	Close	May 2019
4	BIA format/proposed development	Proposal not sufficiently detailed	Close	May 2019
5	BIA format/proposed construction methodology	Contradictory information in BIA and GMA	Closed	May 2019
6	Stability	Tree removal	Closed	March 2019
7	Stability/retaining wall parameters	Incomplete and not reasonably conservative	Closed	May 2019
8	Stability/neighbouring property foundation depths	No evidence provided for assumptions made on the foundation depths.	Nature and depth of the neighbouring property foundations and presence or absence of basements beneath these to be confirmed prior to construction.	N/A
9	Stability	Ground movement assessment methodology, assumptions and results not accepted	Closed	May 2019
10	Stability	Movement monitoring	Closed	May 2019

Appendix 3: Supplementary Supporting Documents

None

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