CampbellReith
consulting engineers

Flat 1, 31 Heath Drive, London, NW3 7SB

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12066-29
Rev: F1

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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 Flat 1, 31 Heath Drive, NW3 7SB (planning reference 2015/3738/P). The basement is considered to fall within Category A as defined by the Terms of Reference.

1.2. The Audit reviewed the Basement Impact Assessment (BIA) 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 has been prepared by UK-Hydrosciences, using individuals who possess suitable qualifications, although further information is required for the qualifications of the authors of the Flood Risk Assessment (FRA) and the Structural Design Calculations. This information was provided on 22nd December 2015.

1.5. The proposal includes the lowering of an existing basement as well as extending this basement horizontally to increase the internal area.

1.6. The BIA has confirmed the basement foundations and underpins will be founded below the depth of Made Ground and into a suitable stratum. At the depths described in the method statement it is expected this would be within the Superficial Head.

1.7. It is not expected that ground water will be encountered during the basement foundation excavation.

1.8. The Structural Design Calculations (SDC) discuss the basement construction proposal of underpinning with assumptions on the soil parameters. The assumed parameters are not a cautious or moderately conservative estimate in all cases, however, further details to support the use of the design values was provided in the Audit Response documents on 22nd December 2015.

1.9. It is stated that damage to surrounding properties should not exceed Burland Category 1. However, no ground movement or building damage assessment is provided to confirm this. It is reported that there is a history of subsidence at the property. It is therefore recommended that condition surveys of this and the neighbouring properties are carried out. Both the detailed analysis and the requirement for condition surveys were provided in the Audit Response documents on 22nd December 2015.

1.10. No analysis had been undertaken of horizontal and vertical ground movements and this should be carried out considering the basement construction method of underpins. This was provided in the Audit Response documents on 22nd December 2015.

1.11. Proposals are provided for a movement monitoring strategy during excavation and construction. These are described in the Contractors Method Statement (CMS).

1.12. Further information is required with regard to the proximity of the lost River Westbourne before it is accepted that the development will not impact further on the hydrogeology of the local area. This was provided through confirmation from Thames Water in the Audit Response documents on 22nd December 2015.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 28/07/2015 to carry out a Category A Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Flat 1, 31 Heath Drive, NW3 7SB (2015/3738/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 "*Extension of the existing basement, internal alterations at ground floor level and creation of new openings.*"

The Audit Instruction also confirmed 31 Heath Drive involved, or was a neighbour to, listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 21st August 2015 and gained access to the following relevant documents for audit purposes:

- BIA - UK-Hydro
- FRA and Soil Report

- CMP Part 1
- CMP Part 2 - Appendix A - Structural Design Calculations
- CMP Part 3 - Appendix A - Structural Dwg No 4467 01
- CMP Part 4 - Appendix A - Structural Dwg No 4467 02
- CMP Part 6 - Appendix B - Propping Diagram
- CMP Part 7 - Appendix C - Proposed Site Set Up
- CMP Part 8 - Appendix D
- CMP Part 9 - Appendix E
- CMP Part 10 - Appendix F – CMS
- Context Plan
- Design and Access Statement
- Existing Drawings:
    - Existing Basement Floor Plan - Heritage Assessment
    - Existing Basement Floor Plan (b and a)
    - Existing Front and Rear Elevations - Heritage Assessment
    - Existing Ground Floor Plan - Heritage Assmnt(2)
    - Existing Ground Floor Plan (b and w)
    - Existing Section 1 - Heritage Assessment
    - Existing Section 2
    - Existing Section 3
    - Existing Side Elevations A and B - Heritage Assessment
    - Historic Basement Floor Plan - Pre-1970s Flat Conversion
    - Historic Ground Floor Plan - Pre-1970s Flat Conversion
- Proposed Drawings:
    - Proposed Basement Floor Plan - Floor and Wall Finishes
    - Proposed Basement Floor Plan (b and w)

- Proposed Basement Floor Plan
- Proposed Basement RCP
- Proposed Basement Sliding Pocket Doors
- Proposed External Elevations A and B
- Proposed Ground Floor Bedroom 2
- Proposed Ground Floor Dining Room French Windows
- Proposed Ground Floor Drawing Room Elevation A
- Proposed Ground Floor Glazed Stairwell Wall
- Proposed Ground Floor Plan - Floor and Wall Finishes
- Proposed Ground Floor Plan (b and w)
- Proposed Ground Floor Plan
- Proposed Ground Floor RCP
- Proposed Ground to Basement Floor Stairs
- Proposed Section 1
- Proposed Section 2
- Proposed Section 3

A number of resident's comments were also provided to CampbellReith on 9th September 2015.

2.7. A Response to the Audit Report (RAR) was provided on 22nd December 2015 and included the following documents:

- Heath Drive (31 - F1) 1 - GEA - BIA Audit Response - 16.12.15
- Heath Drive (31 - F1) 1 - GEA - FRA Audit response - 16.12.15
- Heath Drive (31 - F1) 1 - GEA - Ground Movement Assessment Report - December 2015.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	YES	Confirmed in RAR
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	See BIA Table 1.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	YES	See BIA Table 1.
Is a conceptual model presented?	YES	See BIA Section 3.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	YES	Confirmed in RAR

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	YES	See BIA Section 4.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	NA	Not required following screening process.
Is factual ground investigation data provided?	YES	See Soil Report.
Is monitoring data presented?	NA	No groundwater encountered.
Is the ground investigation informed by a desk study?	YES	
Has a site walkover been undertaken?	YES	Stated in BIA Section 2.4.
Is the presence/absence of adjacent or nearby basements confirmed?	YES	Confirmed in RAR
Is a geotechnical interpretation presented?	YES	Confirmed in RAR
Does the geotechnical interpretation include information on retaining wall design?	YES	Confirmed in RAR
Are reports on other investigations required by screening and scoping presented?	NA	Screening and Scoping suggest no further investigations required.
Are baseline conditions described, based on the GSD?	YES	See BIA Table 1, although Q1 missing from Land Stability Screening.
Do the base line conditions consider adjacent or nearby basements?	YES	See BIA Table 1, although further investigation required.
Is an Impact Assessment provided?	NO	
Are estimates of ground movement and structural impact presented?	YES	See Section 9 of CMS, although no evidence of how these estimates have been calculated.

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	NA	No Impact Assessment provided.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	NA	No Impact Assessment provided.
Has the need for monitoring during construction been considered?	YES	Detailed description in Section 9 of CMS
Have the residual (after mitigation) impacts been clearly identified?	YES	Mentioned in CMS Part 2 Section 3.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	YES	However, movement assessment calculations are outstanding.
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?	YES	Confirmed in RAR
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	YES	Suggests Burland Category 0 – 1, but no evidence of how this has been derived. Evidence provided in RAR
Are non-technical summaries provided?	NO	

4.0 DISCUSSION

4.1. The BIA has been prepared by UK-Hydrosciences, using individuals who possess suitable qualifications, although further information was requested for the qualifications of the authors of the Flood Risk Assessment (FRA). This further information was provided in RAR on 22nd Dec 2015.

4.2. The SDC have been carried out by MMP Design. The author is a chartered structural engineer but no proof of expertise in engineering geology was provided, as required by CPG4. Evidence was subsequently provided in the RAR on 22nd Dec 2015.

4.3. The LBC Instruction to proceed with the audit identified that the basement proposal either involved a listed building or was adjacent to listed buildings but gave no details. A Heritage Statement has been provided that identifies 31 Heath Drive as a Grade II listed building within the Reddington and Frognal Conservation Area.

4.4. The proposed basement consists of a single storey construction formed by lowering an existing lower ground floor area by approximately 450mm, and extending this level sideways to enlarge the basement. The depth of the proposed works is 2.4m below ground level.

4.5. The BIA has identified that the soil conditions as 1.9m of Made Ground over 1.0m of Superficial Head over London Clay Formation to a depth of 5.45m (where the borehole ended). No ground water was encountered and the material removed in the borehole remained dry throughout.

4.6. The underpins and retaining walls have been designed using soil parameters based on experience and guidance rather than soil testing. The SDC suggests this provides a conservative design. However, was considered that the assumed angle of internal fiction was not conservative and could lead to an underestimate of earth pressures on the back of the basement retaining walls. Further information was provided in the RAR on 22nd Dec 2015 to close out this issue.

4.7. The proposal includes some walls being underpinned with other basement walls being constructed as retaining walls in front of the existing foundation. Where the basement walls are acting as simple retaining walls the surcharge of the existing foundation behind appears to have been included in the design calculations.

4.8. A buoyancy check has been carried out assuming a high water level despite not encountering any ground water during the soil investigation.

4.9. No analytical assessment of vertical and horizontal ground movements has been produced, although the predicted damage was described as falling within Burland Category 0 to 1. It was

recommended that a Ground Movement Analysis be carried out in conjunction with the construction method. Further investigation of the foundations to the surrounding properties was also recommended. A ground movement and building damage assessment confirming the above assumptions was provided in the RAR on 22nd Dec 2015.

4.10. It is accepted that the area of surface water run-off will not change as the development does not extend outside of the footprint of the existing floor plan.

4.11. The BIA has stated that although the development is close to a tributary of the "lost" River Westbourne, it will not impact on the wider hydrogeology of the area, any other watercourses, springs or the Hampstead Heath Pond chain catchment area.

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

4.13. It is reported that there is a history of subsidence at the property. As the Burland categories of damage are only appropriate to structures in sound condition, it is recommended that condition surveys of this and neighbouring properties are undertaken. Condition Surveys are now requested in the RAR issued on 22nd December 2015.

5.0 CONCLUSIONS

5.1. The BIA has been prepared by UK-Hydrosciences, using individuals who possess suitable qualifications, although further information was requested for the qualifications of the authors of the Flood Risk Assessment (FRA) and Structural Design Calculations. This was provided in the RAR on 22nd December 2015.

5.2. The development is not expected to encounter the ground water table during basement foundation excavation.

5.3. It was recommended that further investigation of the neighbouring foundations was carried out. This was completed and reported in the RAR issued on 22nd December 2015.

5.4. No analysis had been undertaken of horizontal and vertical ground movements and it was recommended this was carried out based on the proposed method of construction. It was not considered that the soil parameters assumed for design were cautious and moderately conservative. Both of these issues were closed out by the information provided in the RAR on 22nd December 2015.

5.5. It was stated that damage to surrounding propertied should not exceed Burland Category 1. However, no ground movement or building damage assessment was provided to confirm this. It was also reported that there is a history of subsidence at the property and condition surveys of this and the neighbouring properties we recommend. Condition Surveys are now requested in the RAR issued 22nd December 2015.

5.6. Proposals are provided for a movement monitoring strategy during excavation and construction.

5.7. Following receipt of the RAR on 22nd December 2015, it is accepted that the surrounding slopes to the development site are stable.

5.8. Following receipt of the RAR on 22nd December 2015, it is accepted that the development will not impact further on the hydrogeology of the local area.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Fernandez	Unknown	05/08/15	See Letter in Appendix 3	A request for further calculations to be carried out to clarify expected movements has been added to the Audit Query Tracker. A programme of works is also provided in this report.
Mayo (Redington Frognal Association)	Unknown	28/07/15	See Letter in Appendix 3	The proximity of the Westbourne River has been added to the Audit Query Tracker, although it should be noted that this former river is now enclosed in a sewer. Further clarification on predicated movements of the existing structure has similarly been added to the Tracker. The BIA has confirmed the amount of hard surfacing will not increase as part of the works.

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Hydrology	Confirm qualifications of Author/Reviewer of Flood Risk Assessment.	Closed – Qualifications now confirmed.	04/01/16
2	Stability	Confirm structural basement design has been carried out in conjunction with a Chartered Geologist.	Closed - Confirmed in RAR.	04/01/16
3	Stability	Assumed soil parameters are not based on cautious moderately conservative values.	Closed – Further clarity provided in RAR.	04/01/16
4	Stability	It is not clear how the Burland Category of 0-1 was calculated. Please provide further evidence.	Closed – Explanation and analysis provided in RAR.	04/01/16
5	Stability	Burland damage assessment relies on buildings being structurally sound. No condition surveys are proposed.	Closed – Condition Survey proposed in RAR.	04/01/16
6	Stability	Confirm size and depth of neighbouring and party wall foundations in order to confirm design assumptions for party wall surcharge on new retaining walls.	Closed – Trial pit investigation provided in RAR.	04/01/16
7	Stability	Confirmation required of any existing tunnels in the vicinity of the basement extension.	Closed – Confirmation from TfL and Thames Water provided in RAR.	04/01/16
8	Hydrogeology/Stability	Confirm proximity of the River Westbourne Sewer and whether the basement proposal will be within any exclusion zones required by the sewer.	Closed – Confirmation from Thames Water provided in RAR.	04/01/16

Appendix 3: Supplementary Supporting Documents

None

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