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33 Hampstead Lane, London, N6 4RT

Basement Impact Assessment Audit

For
London Borough of Camden

Project No. 13693-48
Revision
D1

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APPENDICES

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 Address (planning reference 2021/6266/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 proposals include forming a two-storey property, including a single level full width basement founded within the Claygate Member. Clarification is required regarding the constructions sequence as outlined in Section 4.

1.5 The BIA references superseded guidance and planning drawings and does not consider the arboricultural assessment nor has it been carried out by individuals who possess suitable qualifications in accordance with LBC guidance.

1.6 A screening and scoping assessment are presented, supported by desk study information.

1.7 A ground investigation has been carried out and groundwater monitoring has been undertaken. It is considered likely that groundwater will be encountered during basement excavation.

1.8 The hydrology and hydrogeology screening and scoping require supporting evidence be provided to demonstrate the change in proportion of hardstanding and the proposed drainage regime, particularly given the sites location within a critical drainage area.

1.9 A Ground Movement Assessment (GMA) has been undertaken. However, it should be reviewed in accordance with the comments presented in Section 4.

1.10 Assessment of the highway is also to be presented.

1.11 The proposed monitoring trigger limits do not reflect the findings of the GMA.

1.12 The structural engineering assessment is to be revised to reflect the recommendations contained within the geotechnical interpretation.

1.13 It cannot be confirmed that the BIA complies with the requirements of CPG: Basements until the queries raised in Section 4 and Appendix 2 are addressed.

2.0 INTRODUCTION

2.1 CampbellReith was instructed by London Borough of Camden (LBC) on 30th March 2022 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 33 Hampstead Lane, London, N6 4RT, planning reference 2021/6266/P. At the time the original BIA did not contain a ground investigation nor ground moment assessment. The BIA was subsequently updated and resubmitted in January 2023 and has been subject to the audit.

2.2 The audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the BIA 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:

- Camden Local Plan 2017 - Policy A5 Basements.
- Camden Planning Guidance (CPG): Basements. January 2021.
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Highgate Neighbourhood Plan (Policy DH7: 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 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 *"Demolition of existing garage and erection of a one storey (with full basement below) two bedroom dwelling."*

2.6 CampbellReith accessed LBC's Planning Portal on 1st April 2022 and subsequently on 13th January 2023 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment by Morph Structures, ref. 3054, Revision P2 dated 23rd December 2022.
- Arboricultural Impact Assessment by ACS Trees, ref. ha/an1/33hampsteadla/2021 dated 13th December 2021.
- Design and Access Statement by Robert Dye dated November 2021.
- Existing Plans and Sections by Robert Dye (LA000, EX001 – EX003, EX101 – EX102, EX201 – EX205), dated October 2021 and

- Proposed Plans and Sections by Robert Dye (PA000 – PA002, PA101 – PA102, PA 201 – PA206) dated December 2021 [No revision provided, status for Planning].
- Planning Consultation Responses.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	Further evidence requested to demonstrate compliance with CPG.
Is data required by Cl.233 of the GSD presented?	Yes	MorphStructures BIA, Soiltechnics BIA and Architects drawings.
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	Section 3.3 of Soiltechnics BIA.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Section 3.2 of Soiltechnics BIA. Further evidence required to demonstrate change in proportion of hardstanding and the proposed site drainage.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Section 3.4 of Soiltechnics BIA. Further evidence required to demonstrate change in proportion of hardstanding and the proposed site drainage.
Is a conceptual model presented?	Yes	Section 5.2 of Soiltechnics BIA.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4 of Soiltechnics BIA.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4 of Soiltechnics BIA. However, clarifications required as Section 4.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	Not required based on hydrogeology screening. However, clarifications required as Section 4.
Is factual ground investigation data provided?	Yes	Soiltechnics Ground Investigation Report
Is monitoring data presented?	Yes	Section 6.2 of Soiltechnics Ground Investigation Report. However, full set of data is missing from appendices.
Is the ground investigation informed by a desk study?	Yes	Soiltechnics Preliminary Investigation Report.
Has a site walkover been undertaken?	Yes	Section 3.2 of Soiltechnics Preliminary Investigation Report.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Section 6.3 of Soiltechnics Preliminary Investigation Report.
Is a geotechnical interpretation presented?	Yes	Section 7 of Soiltechnics Ground Investigation Report.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 7 of Soiltechnics Ground Investigation Report.
Are reports on other investigations required by screening and scoping presented?	No	Not required. However, clarification required as Section 4 in relation to hydrology and hydrogeology screening which could impact whether other investigations are required.

Item	Yes/No/NA	Comment
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	Sections 6 and 7 of Soiltechnics BIA.
Are estimates of ground movement and structural impact presented?	Yes	Sections 6 and 7 of Soiltechnics BIA. However, clarifications required as per Section 4.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	No	Damage to highways to be assessed. Groundwater level to be reviewed against basement depth.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	However, may require updating after clarifications on the impact assessment.
Has the need for monitoring during construction been considered?	Yes	Section 7.4 of Soiltechnics BIA.
Have the residual (after mitigation) impacts been clearly identified?	Yes	However, may require updating after clarifications on the impact assessment.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	The GMA requires further consideration.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	Clarifications on hydrology and hydrogeology screening required.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	The GMA requires further consideration.

Item	Yes/No/NA	Comment
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Section 6 and 7 of Soiltechnics BIA. But GMA to be reviewed.
Are non-technical summaries provided?	Yes	Section 1 of MS BIA and beginning Soiltechnics BIA.

4.0 DISCUSSION

4.1 The Basement Impact Assessment (BIA) has been prepared by MorphStructures (MS) supported by a BIA Report, Ground Investigation Report (GIR) and a Preliminary Investigation Report prepared by Soiltechnics. The BIA and supporting documents have been written by individuals possessing MEng CEng MIStructE and CEng MICE UK RoGEP qualifications. Further evidence is requested to demonstrate that individuals possess the required qualifications in the assessment of surface flow and flooding and subterranean (groundwater) flow as detailed in CPG.

4.2 The site currently comprises a single storey garage servicing the neighbouring four storey semi-detached property, 33 Hampstead Lane. A small, lowered garden is present at the rear, with a small retaining wall separating the garden from the garage. To the west is another four-storey semi-detached property, 35 Hampstead Lane. Both properties have a lower ground floor.

4.3 It is proposed to demolish the garage and to construct a two-storey property, including a single level full width basement (approximately 3m deep) and lowered garden with planters stepping up to ground level. All paving is to be permeable.

4.4 The basement is to be formed using strip foundations with a suspended lower ground floor with compressible heave board beneath to mitigate potential heave effects.

4.5 The site is at a higher elevation than number 35, and as such the retaining wall on the east will retain 3m and the wall on the west 1.8m, with lateral stability provided through ground friction in addition to passive earth pressures.

4.6 The proposed construction sequence comprises demolition of the existing garage, battering the ground and excavating as much soil as possible without undermining the foundations to numbers 33 and 35 or the party garden wall between the two, followed by a traditional hit and miss underpinning sequence to form the basement. Further clarification is required as to define the initial phase of excavation (battering and excavating as much soil as possible) and what control measures are to be implemented to avoid undermining the existing foundations.

4.7 It is noted that the MS and Soiltechnics BIAs refer to the 2018 rather than 2021 version of the CPG.

4.8 The Soiltechnics BIA indicates the proposed basement is 2m deep, which conflicts with the MS BIA which states the proposed basement is 3m deep. As such the BIAs should be reviewed and updated, including reassessing the depth of the basement in relation to the groundwater level and the GMA.

4.9 The Soiltechnics BIA was written in December 2022 and refers to Robert Dye architects' "Pre-App" drawings dated May 2021. However, more recent architects "Planning" drawings exist dated December 2021. The Soiltechnics BIA should be reviewed and updated where necessary.

4.10 The MS BIA refers to an apple tree present in southeast which is to be retained. It is understood that no Tree Protection Order (TPO) is associated with the tree. However, the report states that an arboriculturist has not been appointed at this stage, which conflicts with the Arboricultural Impact Assessment prepared by ACS (TREES) for the site which outlines tree protection measures to be implemented during construction.

4.11 Desk study information and a screening and scoping assessment are presented in the Soiltechnics BIA. Relevant figures/maps and other guidance documents are referred to within the BIA to support responses to land quality screening questions.

4.12 The ground investigation undertaken by Soiltechnics comprised two dynamic windowless sampler boreholes to 9m below ground level (bgl) and six hand dug trial pits to examine the depth of existing foundations. The ground conditions were reported to comprise 1m of Made Ground over the Claygate Member, described as a firm sandy clay. Existing foundations were found to be at least 1.10m bgl.

4.13 Groundwater was reported to be present between 2m and 3m bgl as pockets of permeable water bearing soil, with pumping from sumps concluded likely to be sufficient, however, the monitoring data is missing from the Soiltechnics GIR, and an incorrect basement depth has been reported. It is also understood the basement is conservatively designed for the presence of water at ground level. This should be reviewed and confirmed by the author once the missing monitoring data has been provided and the basement depth updated.

4.14 Section 7.1 of the MS BIA outlines design parameters and loads adopted in the basement design. The buried concrete classification and friction angle for the Claygate Member contradict the recommended values in the Soiltechnics GIR.

4.15 A GMA has been undertaken to demonstrate that ground movements resulting from the basement construction and the associated impact on neighbouring properties will be within LBC's policy requirements. Ground movements due to underpinning and excavation have been modelled using OASYS PDisp and XDisp software. The following points require further clarification or revision:

- The GMA assesses the impact on the neighbouring properties, namely 33 and 35 Hampstead Lane, but does not assess the impact on the adjacent highway.
- Settlement due to structural loading and heave as a result of the basement excavation are reported to be up to 2.5mm and 1.5mm respectively from the PDisp modelling. This is not considered representative of the movements likely to occur as a result of the underpinning loads and a 3m deep excavation. The PDisp analysis has been undertaken using undrained stiffness parameters and as such has underestimated ground movements. The actual depth of the basement excavation, i.e. 3m should be modelled to fully capture the magnitude of movements expected to occur as part of the design. In addition, the model is not sufficiently deep to capture the full pressure bulb of the change in stress due to the proposed excavation.

- The XDisp analysis models horizontal installation movement from CIRIA C760 for a 0.90m deep planar diaphragm wall and horizontal excavation movement from C760 for a 0.90m deep high support stiffness excavation. Whilst it is accepted that a net difference has been adopted based on a minimum founding depth of 1.10m for the neighbouring properties, this should be reviewed given the basement is 3m not 2m deep. Predicted horizontal ground movement is not considered to be moderately conservative as it would typically be expected that a minimum of 5mm horizontal movement would occur as a result of underpinning and basement construction.
- The XDisp analysis models vertical installation movement of 5mm at the wall, linearly reducing to zero over 1.5 times the wall depth, which has been set as 0.90m. Whilst it is accepted that a net difference has been adopted based on a minimum founding depth of 1.10m for the neighbouring properties, this should be reviewed given the basement is 3m not 2m deep.

4.16 The results of the Building Damage Assessment currently indicate that the damage to neighbouring properties will not exceed Burland Category 0 (negligible); however, the GMA requires further consideration and revision in line with points raised above.

4.17 The MS BIA states Category 1 (slight) damage is expected as a result of the proposed development, which is in conflict with the Soiltechnics BIA.

4.18 The MS BIA indicates a movement monitoring regime is to be implemented and outlines trigger values. However, these trigger values do not bare relation to the movements determine from the GMA and require further consideration.

4.19 The Soiltechnics BIA concludes no matters beyond screening require consideration in relation to surface flow and flooding. Further evidence is required to demonstrate the change in proportion of hardstanding and the proposed drainage regime, particularly given the site is in a critical drainage area.

4.20 The Soiltechnics BIA concludes a negligible impact on the wider hydrogeological environment and that groundwater is below the base of the proposed basement. This should be reviewed given the above discrepancy with the basement depth assumed in the Soiltechnics BIA. In addition, further evidence is required to demonstrate the change in proportion of hardstanding and the proposed drainage regime.

4.21 The MS BIA states, 'The BIA has concluded there are impacts/no impacts to the wider hydrogeological environment'. This should be amended for completeness to reflect the Soiltechnics BIA.

5.0 CONCLUSIONS

5.1 The proposals include forming a two storey property, including a single level full width basement founded within the Claygate Member. Clarification is required regarding the construction sequence as outlined in Section 4.

5.2 The BIA references superseded guidance and planning drawings and does not consider the arboricultural assessment nor has it been carried out by individuals who possess suitable qualifications.

5.3 A screening and scoping assessment are presented, supported by desk study information.

5.4 A ground investigation has been carried out and groundwater monitoring has been undertaken. It is considered likely that groundwater will be encountered during basement excavation.

5.5 The hydrology and hydrogeology screening and scoping require supporting evidence be provided to demonstrate the change in proportion of hardstanding and the proposed drainage regime, particularly given the site's location within a critical drainage area.

5.6 The GMA should be reviewed in accordance with the comments presented in Section 4.

5.7 Assessment of the highway is also to be presented.

5.8 The proposed monitoring trigger limits do not reflect the findings of the GMA.

5.9 The structural engineering assessment is to be revised to reflect the recommendations contained within the geotechnical interpretation.

5.10 It cannot be confirmed that the BIA complies with the requirements of CPG: Basements until the queries raised in Section 4 and Appendix 2 are addressed.

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Appendix 1

Consultation Responses

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Flack	35 Hampstead Lane	2nd March 2022	No ground investigation.	Section 4.12 and 4.13.
Cassidy	N/A	4th March 2022	Clarity on hydrogeological impact.	Section 4.11, 4.20 and 4.21.

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Appendix 2

Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA	Evidence required authors possess required qualifications in CPG.	Open. Section 4.1.	
2	Land stability	Initial phase of construction to be reviewed/confirmed.	Open. Section 4.6	
3	BIA	BIA to reference current Camden Planning Guidance on Basements, current planning drawings, arboriculturist's report.	Open. Section 4.7, 4.9 and 4.10.	
4	BIA	Basement depth in BIA to be reviewed.	Open. Section 4.8.	
5	Hydrology and hydrogeology	Evidence required to demonstrate change in proportion of hardstanding and proposed drainage regime.	Open. Section 4.11.	
6	Hydrology and hydrogeology	Groundwater level versus proposed basement depth to be reviewed.	Open. Section 4.13.	
7	Land stability	Geotechnical parameters adopted by Structural Engineer to be reviewed.	Open. Section 4.14.	
8	Land stability	GMA to be updated with comments in Section 4.	Open. Section 4.15.	
9	Land stability	Proposed trigger limits do not reflect the findings of the GMA.	Open. Section 4.18.	

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Appendix 3

Supplementary Supporting Documents

None

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