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Basement Impact Assessment Audit

4 The Grove, London N6 6JU

For
London Borough of Camden

Project No.
14006-27

Date
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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 4 The Grove, London, N6 6JU (planning reference 2023/2876/P & 2023/2939/L). 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 Basement Impact Assessment (BIA) has been carried out by engineering consultants Tier Consult (TC). The individuals concerned in its production have suitable qualifications for the land stability and surface flow and flooding assessments however, evidence of suitable qualification and experience for the subterranean flow assessment is required.

1.5 The proposed basement comprises a single storey extension of the existing basement. The extension is situated beneath the front garden and will be 'roughly 4m' in depth.

1.6 A Ground Investigation Report (GIR) confirms the ground comprises Made Ground of up to 2.7m bgl over interbedded firm clays and sands of the Bagshot Formation.

1.7 Groundwater was not encountered in any of the exploratory hole locations within the front garden. Localised perched groundwater was recorded in the rear garden at depths of 3.7m and 5.0m.

1.8 The Ground Investigation Report provides geotechnical parameters for the retaining wall design. The bearing capacity of the ground at the proposed depth of the basement foundation should be included.

1.9 Screening and scoping assessments are provided, supported by desk study information.

1.10 The screening highlighted that the basement will be within 5m of a highway or pedestrian right of way; the pavement adjacent site will need to be partially blocked off during construction. It is therefore assumed an approval in principle will be required as part of the scheme.

1.11 Further information regarding the neighbouring basements is requested. This should include confirmation of the distance and depths of their foundations relative to the proposed extension.

1.12 It is accepted that there will be no impact to the surface water and flooding.

1.13 The outline underpinning construction sequence of the host listed building is required. Additional information on how the basement walls will be cast against the sheet piles to prevent damage occurring during the sheet pile removal is also requested.

1.14 Outline retaining wall calculations should be presented to show the design is suitable based on the ground conditions encountered.

1.15 A Ground Movement Assessment has been carried out however, the depth of underpinning stated in the report doesn't appear to match the drawings provided. Fully dimensioned drawings with levels are requested to confirm the maximum depth of underpinning required and the GMA should be updated to consider suitably conservative assumptions. In addition, the GMA should also include clarification of potential movements resulting from the removal of the sheet piles and associated impacts.

1.16 The loading of the new foundations has not been provided and is requested.

1.17 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 15/08/2023 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 4 The Grove, London, N6 6JU and Planning Reference No. 2023/2876/P & 2023/2939/L.

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

- 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

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 under front garden; landscaping works in front garden; associated works."*

2.6 The Audit Instruction confirmed 4 The Grove is a Grade II listed building.

2.7 CampbellReith accessed LBC's Planning Portal on 29/08/2023 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA), by Tier Consult, SE/23/0073, issued 9th June 2023.
- Ground Investigation Report, by Tier Consult Group, TE1723-TE-00-XX-RP-GE-001-V02, revision 2.0, issued 15th June 2023.
- Flood Risk Assessment, by Tier Consult Group, TE1723-TE-00-XX-RP-GE-002-V02, revision 2.0, issued 15th June 2023.

- Design and Access Statement, by SODA Studio
- Heritage Statement, by Jon Lowe Heritage, 00411 V.1, issued in June 2023
- Archaeological Desk Based Assessment, by Abrams Archaeology, 00295, revision 1.1, issued February 2023.
- Arboricultural Impact Assessment, by SJ Stephens Associates, 2057, issued 5th July 2023
- Letter from History England providing recommended archaeology conditions, dated 19th June 2023.
- Drawing by Tier Consults of the construction sequence, 073-TCE-XX-ZZ-D-S-216, P1
- Drawings by SODA issued in June 2023 including:
  - A site location plan, A482 001 P01
  - Existing lower ground floor plan, A482 01B P01
  - Proposed layout ground floor plan, A482 02B P01
  - Cross sections of the existing layout, A482 drawings 080-083 P01
  - Cross sections of the strip out and demolition, A482 drawings 090-093 P01
- Planning consultation comments.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	Qualifications provided are not within the requirements for the subterranean (groundwater) flow as set out in the CPG.
Is data required by Cl.233 of the GSD presented?	No	Clarification of the neighbouring foundations and depth of underpinning of the existing foundations required.
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?	No	Maps/plans not provided in BIA report however, a groundsure report and historical maps are included in the Ground Investigation Report appendices.
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	
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Is a conceptual model presented?	Yes	

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	However, some clarification required.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	Yes	Ground Investigation Report provided under a separate cover.
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	However, no information of basement foundation depths provided for the neighbouring properties.
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	Included in Table 9.1 of the Ground Investigation Report.
Are reports on other investigations required by screening and scoping presented?	Yes	Ground Investigation Report, Flood Risk Assessment and Arboricultural Impact Assessment reports provided.
Are the baseline conditions described, based on the GSD?	No	Require confirmation of the depth of existing foundations relative to the proposed basement.
Do the base line conditions consider adjacent or nearby basements?	Yes	However, further clarification required.

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	GMA provided however, some clarification, as detailed in section 4.0, is required.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	However, some clarification, as detailed in section 4.0, is required.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	
Has the need for monitoring during construction been considered?	Yes	
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, some clarification, as detailed in section 4.0, is required.
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	
Does the report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	However, some clarification, as detailed in section 4.0, is required.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1 The Basement Impact Assessment (BIA) has been carried out by engineering consultants Tier Consult (TC). The individuals concerned in its production have suitable qualifications for the land stability and surface flow and flooding assessments however, evidence of suitable qualifications and experience for the subterranean flow assessment is required.

4.2 The LBC Instruction to proceed with the audit identified that 4 The Grove is a grade II listed building. The BIA confirms the site is within the Highgate Tier 2 Archaeological Priority Area.

4.3 The proposed basement comprises a single storey extension of the existing basement. The extension is situated beneath the front garden, measuring approximately 10m by 6m and connects to the existing wine cellar. The BIA suggests the proposed extension will be 'roughly 4m' in depth.

4.4 A Ground Investigation Report (GIR) confirms the ground conditions at the front of the house comprises, Made Ground of up to 2.7m bgl over interbedded firm clays and sands of the Bagshot Formation.

4.5 Groundwater was not encountered in any of the exploratory hole locations within the front garden however, water was struck in two locations within the rear garden at depths of 3.7m and 5.0m.

4.6 A single groundwater monitoring visit recorded groundwater in one borehole situated in the rear garden. No groundwater was recorded in the two installations within the front garden area. The groundwater present in the rear garden installation is thought to be perched groundwater within a confined granular Bagshot Formation layer.

4.7 The Ground Investigation Report provides geotechnical parameters for the retaining wall design. The bearing capacity of the ground at the proposed depth of the basement foundation is not presented and should be included in the report.

4.8 The subterranean and slope stability screening have identified that the site is underlain by the Bagshot Formation which is classified as a secondary A aquifer. The scoping includes the GIR information that suggests the proposed basement will not extend below the water table, with the highest perched water recorded some 7.6m below the base of the extension floor. Based on these findings dewatering is unlikely to be required. It is accepted that the proposed basement will not have a significant impact on the hydrogeology of the area.

4.9 The slope stability screening assessment highlighted that two category C trees will be removed as part of the works and the proposed extension will encroach within 3% of the root protection area of a retained tree. This has not been brought through to scoping however, an Arboricultural Impact Assessment report has been carried out.

4.10 The screening has also highlighted that the basement will be within 5m from a highway or pedestrian right of way. This has been brought through to scoping which states an application will be made to use part of the pavement for construction activity. It is therefore assumed an approval in principle will be required as part of the scheme.

4.11 The slope stability screening responses state the proposed basement will not significantly increase the differential depth of foundations relative to neighbouring properties. Further information of the neighbouring foundations and basements is requested. This should include confirmation of the distance and depths of the neighbouring foundations to the proposed extension. The scoping remarks that the new foundations are only "marginally deeper" than the existing, fully dimensioned drawings with levels are requested.

4.12 Screening of the surface water and flooding did not identify any issues needing to be brought through to scoping. The responses within the screening are accepted to be sufficiently justified.

4.13 The construction methodology and sequence section, provided within the BIA, outlines the proposed works are to be carried out in multiple stages. The first stage is to deconstruct the front garden wall and relocate any underground services. A sheet piled wall will then be installed along two sides of the basement (with the existing property/ wine cellar being along the other two sides). Once the sheet piles are installed the area will be partially excavated down to the base of the existing lightwell foundations. The ground will be battered back until suitable support is installed against the sheet piled wall. Once this has been completed the partial excavation will be levelled. Excavation of two pits, to below new formation level, will be carried out to allow construction of new pad foundations for the temporary lightwell supports. Following the lightwell being propped and supported on the new pads, the area will be excavated to the base of the existing basement foundations. These foundations will then be underpinned. Once underpinning is complete the excavation will continue down to the new basement level and a reinforced concrete raft slab can be constructed. The reinforced concrete walls will then be formed along with the new permanent support structure for the retained lightwell. Finally, the basement roof slab will be cast, completing the "basement box" and, the temporary supports and sheet piles are to be removed.

4.14 Details of the underpinning construction sequence beneath the host listed building foundations is required. Additional information on how the basement walls will be cast against the sheet piles to prevent damage occurring during the sheet pile removal is also requested.

4.15 Outline retaining wall calculations should be presented to show the design is suitable based on the ground conditions encountered.

4.16 The Ground Movement Assessment (GMA) has not allowed for any settlement along the underpinned walls as it assumes the basement is less than 1m deeper than the main body of the house and of similar depth of the existing basement extension (the wine cellar). However, the drawings provided appear to show the difference in depth between the extension and the existing property is up to 1.85m in areas (shown in sections D). Fully dimensioned drawings with levels are requested to confirm the maximum depth of underpinning required.

4.17 It should be noted that it is a requirement of LBC policy that the assessment use moderately conservative or cautious estimates. As the control of movement during underpinning is predominantly limited by good workmanship, and the CIRIA methodology used in the GMA is intended for embedded retaining walls, a minimum conservative value of 5mm movement both horizontally and vertically is typically assumed per lift of underpinning. The assumptions made within the GMA are therefore not considered to be appropriately conservative and the assessment should be revised. Consideration of the impact to the host building should be included in the assessments due to its listed status. The GMA should also include clarification of potential movements resulting from the removal of the sheet piles and associated impacts.

4.18 Settlement calculations of the excavation behind the retaining wall, to be installed along the eastern edge of the proposed basement, suggest maximum horizontal settlements of up to 8mm and vertical settlements of up to 6mm. Due to the corner effects the magnitude of settlement occurring is considered to be limited to 4mm both horizontally and vertically.

4.19 Net unloading has been estimated as 53kPa, with long-term heave at the centre of the excavation predicted to be 8mm, reducing to 4mm at the centre of the perimeter wall. Short term heave is estimated to be up to c. 5mm.

4.20 As aforementioned, the depth and distance of the neighbouring foundations, 5 The Grove to the north and 3 The Grove to the south, need to be clearly presented in the BIA.

4.21 The loading of the new foundations has not been provided and is requested.

5.0 CONCLUSIONS

5.1 The Basement Impact Assessment (BIA) has been carried out by engineering consultants Tier Consult (TC). The individuals concerned in its production have suitable qualifications for the land stability and surface flow and flooding assessments however, evidence of suitable qualifications and experience for the subterranean flow assessment is required.

5.2 The proposed basement comprises a single storey extension of the existing basement. The extension is situated beneath the front garden. The BIA suggests the proposed extension will be 'roughly 4m' in depth.

5.3 A Ground Investigation Report (GIR) confirms the ground comprises, Made Ground of up to 2.7m bgl over interbedded firm clays and sands of the Bagshot Formation.

5.4 Groundwater was not encountered in any of the exploratory hole locations within the front garden. Localised perched groundwater was recorded in the rear garden at depths of 3.7m and 5.0m.

5.5 The Ground Investigation Report provides geotechnical parameters for the retaining wall design. The bearing capacity of the ground at the proposed depth of the basement foundation should be included.

5.6 Screening and scoping assessments are provided, supported by desk study information.

5.7 The screening highlighted that the basement will be within 5m of a highway or pedestrian right of way; the pavement adjacent to site will need to be partially blocked off during construction. It is therefore assumed an approval in principle will be required as part of the scheme.

5.8 Further information regarding the neighbouring basements is requested. This should include confirmation of the distance and depths of the neighbouring foundations relative to the proposed extension.

5.9 It is accepted that there will be no impact to the surface water and flooding.

5.10 The proposed basement will be constructed in phases. These include; the installation of a sheet piled wall, multiple stages of excavation to allow temporary support of the existing lightwell and underpinning of the existing foundations and, construction of the reinforced 'basement box'. The sheet piled wall will be removed following completion of the basement construction.

5.11 The outline underpinning construction sequence of the host listed building is required. Details of how the basement walls will be cast to avoid potential damage during removal of the sheet piles is also requested.

5.12 Outline retaining wall calculations should be presented to show the design is suitable based on the ground conditions encountered.

5.13 The Ground Movement Assessment states that the underpinning of the existing property foundations will be less than 1.0m however, the drawings provided suggest it may be up to 1.85m. Fully dimensioned drawings with levels are requested to confirm the maximum depth of underpinning required and the GMA should be updated to consider suitably conservative assumptions. In addition, the GMA should also include clarification of potential movements resulting from the removal of the sheet piles and associated impacts.

5.14 The settlement analysis carried out estimates horizontal and vertical settlements up to 8mm and 6mm respectively.

5.15 The long term heave has been calculated to be up to 8mm with short term heave of up to c. 5mm.

5.16 The loading of the new foundations has not been provided and is requested.

5.17 Until the queries described above and summarised in Appendix 2 are addressed, it cannot be confirmed that the BIA complies with CPG Basements.

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Appendix 1

Consultation Responses

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Lewis	Unknown	12/08/2023	Removal of trees and lack of proposed landscaping details.	Outside the scope of this report.

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Appendix 2

Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Qualifications	Provide evidence of suitable qualifications/ experience, as set out in the CPG, for the subterranean (groundwater) flow assessment.	Open	
2	Construction	Confirm the depth and distance of the foundations of the existing property and neighbouring houses in relation to the proposed basement extension.	Open	
3	Construction	Provide an outline construction sequence of the underpinning of the host listed building. Clarify how the basement walls will be cast against the sheet piles to prevent damage occurring during the removal of the sheet piles.	Open	
4	GMA	Provide fully dimensioned drawings with levels to confirm the maximum depth of underpinning to be carried out beneath the existing foundations.	Open	
5	GMA	Include consideration of settlement from underpinning the host listed building within the GMA. Provide clarification of potential movements resulting from the removal of the sheet piles and associated impacts.	Open	
6	Ground Investigation Report	Confirm the bearing capacity for the proposed basement foundations.	Open	
7	Land Stability	Provide the proposed loading of the new foundations.	Open	
8	Land Stability	Provide outline retaining wall calculations to show the design is suitable for the ground conditions at the site.	Open	

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Appendix 3

Supplementary Supporting Documents

None

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