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Basement Impact Assessment Audit

194 Goldhurst Terrace, London NW6 3HN

For
London Borough of Camden

Project No.
14006-53

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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 194 Goldhurst Terrace, London NW6 3HN (planning reference 2024/0012/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 BIA has been carried out by engineering consultants Axiom Structures Ltd. The individuals concerned in its production do not demonstrate they hold suitable qualifications for the subterranean flow assessment in accordance with the CPG for Basements.

1.5 The proposed development includes partial demolition of the existing building and the construction of a new basement extending beneath much of the main structure. A new single storey house with basement is also proposed. The depth of the basement should be confirmed and presented consistently throughout the report.

1.6 The basement will be founded in stiff clay of the London Clay Formation. It is not anticipated that groundwater will be encountered however allowance for dewatering small areas of perched water using sump pumps has been recommended.

1.7 The distance of any lost rivers in proximity to site should be provided within the BIA.

1.8 It is accepted that the proposed basement will not adversely impact the hydrology of the area however, it is assumed that the FRA will be reviewed by the LLFA and Thames Water.

1.9 The land stability scoping responses include a contradiction regarding the proximity to trees and the possible impact of seasonal shrink-swell subsidence. This should be reviewed and updated.

1.10 The scoping responses should be updated to confirm the anticipated impact of the proposed development to the highway and pedestrian right of way.

1.11 Further details of the proposed construction methodology are requested to confirm how the stability of neighbouring foundations will be maintained.

1.12 The Structural Engineer's Statement indicates some of the proposed loads may exceed the assumed allowable bearing pressure of the founding soils; this should be reviewed and updated.

1.13 A Ground Movement Assessment (GMA) has been undertaken and has been queried, as detailed in Section 4.

1.14 A maximum damage category of Burland Category 1 (Very Slight) has been calculated based on the results of the GMA, however, the assessment should be revisited and should consider walls perpendicular to the basement excavation.

1.15 Outline proposals are provided for a movement monitoring strategy during excavation and construction. Further consideration of the trigger values is requested.

1.16 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) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 194 Goldhurst Terrace, London, NW6 3HN (planning reference 2024/0012/P). The basement is considered to fall within Category B as defined by the Terms of Reference.

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.

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 single storey side extensions and erection of three storey side extension, together with excavation of part basement and lightwells to create 8no. flats and associated external alterations. Relocation and rebuilding of existing detached garage and single storey side and rear extensions to create 1no. house together with basement excavation."

2.6 The Audit Instruction confirmed 194 Goldhurst Terrace neither involves, nor is neighbour to, listed buildings.

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

- Basement Impact Assessment Report by Axiom Structure Ltd, issued December 2023, reference 23091, revision P1.
- Design and Access Statement by ArchiSeDe Ltd.

- Flood Risk Assessment & SuDs Strategy by Nimbus Engineering Consultants, issued January 2024, reference C3146-R1-REV-D.
- Garage Relocation Method Statement by ArchiSiDe Ltd.
- Tree survey and Arboricultural Impact Assessment by ghatrees, issued December 2023, reference GHA/DS/160222:23.
- Heritage Impact Assessment by Handforth Heritage, issued December 2023.
- Town Planning Statement by Savills, issued December 2023.
- Preliminary Ecological Appraisal and Preliminary Roost Assessment by MKA Ecology, issued December 2023, reference 147323, revision 2.0.
- Drawings and sections provided by ArchiSiDe Ltd, issued in December 2023, including:
  - Existing Site Plan; Existing Basement Plan; Existing Ground Floor Plan; Existing North Elevation; Existing East Elevation; Existing South Elevation; Existing West Elevation; Demolition Plan; Existing Sections A-A, B-B, C-C, and D-D.
  - Proposed Site Plan; Proposed Basement Plan; Proposed Ground Floor Plan; Proposed Garden Floor Plan; Proposed North Elevation; Proposed East Elevation; Proposed South Elevation; Proposed West Elevation; Demolition Plan; Proposed Sections A-A, B-B, C-C, D-D, and E-E.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	No evidence the authors have suitable qualifications for the subterranean flow assessment in accordance with the CPG.
Is data required by Cl.233 of the GSD presented?	Yes	However, some clarification required as discussed in Section 4.0.
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	
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	However, some clarifications are required as set out in Section 4.0.

Item	Yes/No/NA	Comment
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?	No	However, a review of historical boreholes logs has been included.
Is monitoring data presented?	No	
Is the ground investigation informed by a desk study?	N/A	
Has a site walkover been undertaken?	Unknown	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Neighbouring foundations assumed to be 0.75m bgl.
Is a geotechnical interpretation presented?	Yes	Section 7.0 of BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	Yes	Flood Risk Assessment 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	However, further clarifications required as outlined in Section 4.0.

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	However, some further clarification is required as outlined in Section 4.0.
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	
Has the need for monitoring during construction been considered?	Yes	However, trigger level values require further consideration.
Have the residual (after mitigation) impacts been clearly identified?	No	Consideration of trees, impact to highways
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	See comments in Section 4.0.
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	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	However, the GMA requires further consideration.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1 The Basement Impact Assessment (BIA) has been carried out by engineering consultants Axiom Structures Ltd.; the individuals concerned in its production do not demonstrate that they hold suitable qualifications in accordance with the CPG.

4.2 The Structural Engineer's Statement (SES) has also been carried out by Axiom Structures Ltd.

4.3 The LBC Instruction to proceed with the audit identified that the basement proposal does not involve, and is not adjacent to, any listed buildings.

4.4 The site currently comprises a three-storey detached block of flats housing an existing basement beneath the rear section and some modern single-storey extensions. The site also includes a standalone garage, a grass landscaped area and overgrown bushes and trees.

4.5 The proposed development includes creating 8 new flats through the demolition of the single storey extensions, replacing them with a new three-storey side extension. A new basement is proposed, extending beneath much of the main building and the new side extension. The works also include the dismantling of the standalone garage (reconstructing it to the west) to allow construction of a new detached single storey house with a single basement beneath.

4.6 Clause 7.2.6 of the BIA report indicates that the basement works will extend to approximately 3.50m below ground level (bgl) however, within the Ground Movement Assessment (GMA) the depth of the works is assumed to be 2.50m bgl. Confirmation is required and the BIA and GMA should be updated to be consistent throughout.

4.7 The intrusive ground investigation carried out on site is limited to two foundation inspection pits carried out to confirm the condition and depth of the existing foundations. However, the desktop study assessment, provided in the BIA, also includes review of historical borehole data.

4.8 Based on the available information the conceptual site model assumes a thin cover of Made Ground over stiff clay of the London Clay Formation. Clause 8.1.1 of the BIA states that the '*proven ground conditions*' are stiff clays however, as no intrusive ground investigation has been undertaken, the ground conditions have not yet been proven.

4.9 Groundwater is presumed to be outside the influence of the proposed works however, limited pockets of perched groundwater maybe encountered. These are anticipated to be easily controlled using sump pumps.

4.10 The BIA recommends that a site-specific ground investigation is carried out to confirm the ground conditions.

4.11 The two foundation inspection pits confirmed that the foundations of the existing building are at approximately 1.2m bgl on conventional strip footings.

4.12 Geotechnical parameters have been provided within Section 7.0 of the BIA, these are accepted to be suitable for the assumed ground conditions described above.

4.13 The surface water and flooding screening responses highlight that the site is situated within a street that flooded in both the 1975 and 2002 flood events and is located in the Goldhurst local Flood Risk Zone. In addition, the development will include an increase in hard surfacing. The Flood Risk Assessment (FRA) provided includes a scheme to manage the surface water by reducing the rate of discharge. This is proposed to be done using wall mounted rainwater harvesting tanks and green or sedum roofing. Hardstanding areas will be formed of porous surfacing. The remaining surface water runoff will be attenuated to restrict flow rates into the public drains. It is assumed that the FRA will be reviewed by the LLFA and Thames Water.

4.14 The hydrogeology screening and scoping identifies that the site is within an unproductive aquifer and thus, the risk of water inflows during excavation are unlikely. However, as a residual risk remains, an allowance for localised dewatering is recommended within the BIA. The distances of any lost rivers in proximity to the site should be confirmed.

4.15 Land stability screening determines that the London Clay is the shallowest strata and that trees will be felled as part of the development works. The BIA also identifies that there is a history of shrink-swell subsidence in the local area.

4.16 The scoping response relating to shrinkable soils states that there are "*no significant trees or planting to impact seasonal movement of soil and buildings*". This contradicts the following paragraph that highlights areas of the proposed basement that are within a Root Protection Area and thus in proximity to trees. In addition, the annotated tree plan included in Appendix 1 of the BIA confirms that a number of trees are to be removed to facilitate the construction of the detached house. Consideration of the impact to the basement should be included within the BIA.

4.17 The screening and scoping also suggest that the development is within 5m of a highway or pedestrian right of way and will increase the differential depths of foundations relative to neighbouring properties. The scoping identifies that the neighbouring properties closest to the proposed basements include No. 192 and No. 196 of Goldhurst Terrace and thus a Ground Movement Assessment has been carried out. The anticipated impact to the highway has not been included and should be assessed.

4.18 The proposed temporary and permanent works, included in Section 7.0 of the BIA, outlines that the existing building will be underpinned via a hit and miss sequence. The new basement will be constructed with reinforced concrete (RC) walls connected to a RC basement slab. In paragraph 7.2.12 of the BIA it is stated that the outline construction sequence and temporary works presented therein will be superseded by the contractor's proposals. It should be noted that any changes made to the information provided to support this BIA may require additional assessment to confirm the impacts still meet the requirements of CPG Basements.

4.19 A sequence of the underpinning is included in Appendix 5 of the BIA. The proposed garden floor plan drawing (P.02, Rev. A) provided in Appendix 5 indicates that part of the basement excavation abuts a party wall with No. 196. Due to the proximity of the proposed excavation within this area, clarification of how the stability of the neighbouring foundations will be maintained during construction is requested.

4.20 An allowable bearing pressure of 150kN/m^2 for the basement founding stratum is suggested within the scheme calculations included in Appendix 5 of the BIA. A load takedown of the proposed development (also included in Appendix 5) shows some areas with loads of up to 176kN/m. The footing widths are indicated to be c. 1m and therefore these loads exceed the allowable bearing pressure provided. This must be reviewed and updated, or additional justification should be provided.

4.21 The Ground Movement Assessment (GMA) is included in Appendix 4 of the BIA report. Ground displacement curves presented in CIRIA C760 and CIRIA C580 were used within the GMA. Whilst the CIRIA approach is intended for embedded retaining walls, it is accepted that the predicted ground movements can be within the range typically anticipated for a single lift of underpinning with the use of good workmanship and construction techniques. 5mm to 10mm movement, both vertically and horizontally, is generally recognised in the industry as being a reasonable estimate for movement associated with a single lift of underpinning.

4.22 The following points relating to the GMA should be clarified or reviewed:

- The GMA calculations use a basement depth of 2.50m, however the BIA indicates the maximum excavation depth is 3.50m.
- The total maximum ground movements predicted were horizontal movements of 5mm and vertical settlement of 3.75mm. This should be updated to consider the maximum excavation depth of 3.50m.
- The calculation table for horizontal movement includes negative values due to the nature of the equation used to calculate the values. The calculations should be revised so that negative values are not included.
- The walls included in the assessment are broadly parallel to the development. Assessment of the walls perpendicular to the proposed basements should be included in the GMA, as these walls are anticipated to be more susceptible to differential movements from the basement construction.
- It is unclear how a maximum distance of 6m was derived, clarification of this should be provided. It may be beneficial to include a plan showing the development, neighbouring walls, distances from the basement to the wall and wall lengths.

4.23 It is noted that the damage category calculations for the property at No. 194 includes an additional 5mm settlement and that the maximum Burland damage category is 1 (slight). The damage category should be revised once the above comments have been considered in the GMA.

4.24 A preliminary structural monitoring strategy is to be carried out during the construction works; a monitoring layout plan and programme is to be agreed as part of the pre-commencement works and is subject to Party Wall agreements. Trigger values of 5mm (amber) and 10mm (red) for horizontal and vertical movement have been provisionally proposed. The movement predicted by the GMA was less than 10mm, therefore confirmation that using this value as a trigger level will not result in damage that exceeds Burland Category 1 (very Slight) is requested.

5.0 CONCLUSIONS

5.1 The BIA has been carried out by engineering consultants Axiom Structures Ltd.; the individuals concerned in its production do not demonstrate they hold suitable qualifications in accordance with the CPG.

5.2 The proposed development includes partial demolition of the existing building and the construction of a new basement extending beneath much of the main structure. A new single storey house with basement is also proposed. The depth of the basement is indicated to be 3.50m bgl within the main BIA report but referenced as 2.50m within the GMA. The depth of the development should be consistent throughout.

5.3 The basement will be founded in stiff clay of the London Clay Formation. It is not anticipated that groundwater will be encountered however allowance for dewatering small areas of perched water using sump pumps has been recommended.

5.4 It is accepted that the proposed basement will not adversely impact the hydrology however, it is assumed that the FRA will be reviewed by the LLFA and Thames Water.

5.5 The distances of any lost rivers in proximity to the site should be confirmed.

5.6 The land stability scoping responses include a contradiction regarding the proximity to trees and the possible impact of seasonal shrink-swell subsidence. This should be reviewed and updated.

5.7 The scoping responses should be updated to confirm the anticipated impact of the proposed development to the highway and pedestrian right of way.

5.8 The proposed basement layout drawings suggest a lightwell will be excavated adjacent to the site's northern boundary. Due to the proximity of the proposed excavation to the party wall of No. 192, clarification of how the neighbouring foundations will be stabilised is required.

5.9 The Structural Engineer's Statement indicates an allowable bearing pressure of 150kPa has been assumed however, the load takedown figure provided suggests this may be exceeded in some areas; this should be reviewed and updated.

5.10 The results of the GMA indicate a maximum damage category of Burland Category 1 (Very Slight) however, the assessment should be updated to considered the walls perpendicular to site and review the calculations to ensure they do not include negative horizontal movements.

5.11 Outline proposals are provided for a movement monitoring strategy during excavation and construction. The trigger values should be revised to ensure that the potential impact to the neighbouring properties, on reaching the maximum trigger value, has been considered in the assessment.

5.12 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

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Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Peel	Goldhurst Terrace	Unknown	The risk of flooding has not been sufficiently identified within the FRA and BIA. Groundwater monitoring has not been undertaken for the site and potential cause for groundwater flooding of the area.	A FRA has been provided and includes mitigation measures for the increase in surface run off. It is assumed this will be reviewed by the LLFA and Thames Water. The BIA identifies that site is underlain by an unproductive aquifer and the flooding events mentioned are related to sewer flooding and surface water issues.

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Appendix 2

Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Qualifications	Provide evidence that the BIA has been undertaken by individuals with suitable qualifications and experience in accordance with the CPG	Open	
2	Hydrogeology	Confirm the distances of any lost rivers in proximity to the site.	Open	
3	Land Stability/ Ground Movement Assessment	Confirm the depth of the proposed basement and, if required, update the Ground Movement Assessment calculations.	Open	
4	Land Stability	Provide further justification regarding the potential impact of vegetation on seasonal shrink-swell movements impacting the proposed basement.	Open	
5	Land Stability	Confirm the anticipated impact of the proposed basement to the highway and pedestrian right of way.	Open	
6	Construction Methodology/ Land stability	Confirm how the excavation of the lightwell adjacent to the north party wall will be carried out to ensure stability of the neighbouring foundations are maintained.	Open	
7	Land Stability	Confirm that the loading of the proposed basement will not exceed the allowable bearing pressure of the founding stratum.	Open	
8	Ground Movement Assessment	Update the Ground Movement Assessment to include the consideration of walls perpendicular to the proposed development. Revise the calculations as per the comments within Section 4.0.	Open	
9	Mitigation	Revise the trigger values to ensure the potential impact to the neighbouring properties on reaching the maximum trigger value has been considered in the assessment.	Open	

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Appendix 3

Supplementary Supporting Documents

None

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