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Basement Impact Assessment Audit

Land west of Ashley Court (Frognal Garages), Frognal Lane, London, NW3 7DX

For
London Borough of Camden

Project No.
14291-23

Date
May 2025

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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 Land west of Ashley Court (Frognal Garages), Frognal Lane, London, NW3 7DX (planning reference 2025/1084/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 prepared by Soils Ltd; confirmation that the individuals undertaking the BIA hold suitable qualifications and experience, as required within the CPG: basements, is requested.

1.5 The BIA confirms that the proposed basement will extend through a cover of Made Ground into underlying clays of the London Clay Formation.

1.6 The screening responses should be updated to include comment on the historical subsidence of neighbouring properties mentioned within several consultation responses.

1.7 The screening responses and Flood Risk Assessment should include consideration of all relevant information provided within the RedFrog Sub-surface Water Features Mapping report.

1.8 The Structural Engineering Construction Method Statement outlines that the basement will be constructed by an embedded contiguous retaining wall along three edges of the basement. The ground model should be presented consistently across all documents and further details of the foundations for the retaining wall along the southeastern boundary are requested.

1.9 The potential impacts of the proposed dewatering methods are requested.

1.10 The Ground Movement Assessment (GMA) suggests that a maximum damage category of 1 (very slight) can be achieved however, the methodology is not considered to be moderately conservative, and it is recommended that the GMA is revised using an alternative method.

1.11 Trigger values should be reviewed to consider the anticipated movements modelled in the GMA.

1.12 As described in Section 5, it cannot be confirmed that the BIA complies with the requirements of CPG: Basements and the Principles for Audit set out in the Basement Impact Assessment (BIA) Audit Service Terms of Reference & Audit Process. Queries and comments on the BIA are described in Section 4 and Appendix 2.

2.0 INTRODUCTION

2.1 CampbellReith was instructed by London Borough of Camden (LBC) on 19th April 2025 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Land west of Ashley Court (Frognal Garages), Frognal Lane, London, NW3 7DX (reference 2025/1084/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

- 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.
- Redington and Frognal 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 "Demolition of the existing garages and redevelopment of the site to erect a three-storey building, plus lower ground, to provide seven residential units (Use Class C3), with excavation of basement, associated amenity space, two replacement garages, front and rear landscaping and associated works."

2.6 The Audit Instruction confirmed Land west of Ashley Court (Frognal Garages) is not listed and is not a neighbour to, listed buildings.

2.7 CampbellReith accessed LBC's Planning Portal on 22nd April 2025 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment by Soils Ltd, dated March 2025, ref. 21761/BIA Rev 1.0. Appendix B.3 of the BIA includes the following structural drawings and Structural Engineering Construction Method Statement produced by Elite Designers Structural Engineers:

  - Stages Of Work and Proposed Temporary Works, ref. 2025-013-01, rev. A
  - Basement Plan Showing Foundations, ref. 2025-013-02, rev. A
  - Basement Plan, ref. 2025-013-03, rev. A
  - Section A-A & Section B-B, ref. 2025-013-04 and 2025-013-05, rev. A
  - Structural Engineering Construction Method Statement, ref. 2025-013, rev. A
- Preliminary Investigation Report by Soils Ltd, February 2025, ref. 21334/PIR Rev2.2
- Geotechnical Investigation Report by Soils Ltd, February 2025, ref. 21761/GIR Rev1.1
- Flood Risk Assessment – Level 1 Screening Study by Soils Ltd, dated February 2025, ref. 21428/FRA_Rev1.3
- Sustainable Drainage Strategy by Soils Ltd, dated February 2025, ref. 21428/SDS_Rev1.3
- Design and Access Statement by TODD architects, dated 5th March 2025, ref. FGG-TOD-03-ZZ-PP-A-03006, rev. 01
- Tree Survey, Arboricultural Implications Assessment & Method Statement by Indigo Surveys Ltd, dated March 2025, ref. 231885/AIA/A2 Rev A
- Drawings produced by TODD architects include the following:
  - Existing Site Plan, ref. FGG-TOD-10-ZZ-DR-A-10001, rev. P01
  - Proposed Site Plan, ref. FGG-TOD-10-ZZ-DR-A-10002, rev. P01
  - Site Location Plan, ref. FGG-TOD-10-ZZ-DR-A-10003, rev. P01
  - GA Plan – Level LG, ref. FGG-TOD-20-LG-DR-A-20001, rev P01
  - GA Plan – Lebel UG, ref. FGG-TOD-20-UG-DR-A-20002, rev. P01
  - GA Elevation – South, ref. FGG-TOD-30-ZZ-DR-A-30002, rev. P01
  - GA Elevation – North, ref. FGG-TOD-30-ZZ-DR-A-30001, rev. P01
  - GA Elevation – East & West, ref. FGG-TOD-30-ZZ-DR-A-30003, rev. P01
  - GA Section AA, ref. FGG-TOD-40-ZZ-DR-A-40001, rev. P01
  - GA Section BB, ref. FGG-TOD-40-ZZ-DR-A-40002, rev. P01
- Consultation responses (summary provided in Appendix 1)

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	Provide clarification on the relevant qualifications and experience of the authors.
Is data required by Cl.233 of the GSD presented?	No	Additional details on the proposed foundations along the southern boundary are required.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	No	See above. Additionally, potential impacts of the proposed dewatering methods are required.
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?	No	Clarification on the historical subsidence to neighbouring properties is required.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Include comment on all relevant data provided within the RedFrog SSWFM report.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Is a conceptual model presented?	Yes	Section 6.0 of the BIA

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	However, this should be reviewed following the screening being updated.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	Section 6.2 of the BIA
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	
Is a geotechnical interpretation presented?	Yes	Table 7.1 of the BIA
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	Yes	However, the FRA should consider all relevant data provided within the RedFrog SSWFM.
Are the baseline conditions described, based on the GSD?	No	The current condition of the neighbouring properties has not been established.
Do the baseline conditions consider adjacent or nearby basements?	Yes	

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	Section 8.0 of the BIA
Are estimates of ground movement and structural impact presented?	Yes	However, consideration of the existing condition of the neighbouring properties should be confirmed.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	No	See above comment.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	See above comment.
Has the need for monitoring during construction been considered?	Yes	However, the trigger values should be reviewed or sensitivity analysis undertaken.
Have the residual (after mitigation) impacts been clearly identified?	No	See above.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	However, this should be confirmed following review of information provided in the RedFrog SSWFM.
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, this requires review.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1 The Basement Impact Assessment (BIA) has been carried out by engineering consultants Soils Ltd; clarification of the relevant experience of the individuals who undertook the assessment is required as outlined in the CPG.

4.2 The LBC Instruction to proceed states that the site is not listed and is not a neighbour to any listed buildings. The BIA confirms St Andrew's United Reform Church, a grade II listed building, is located 15.60m from the site. It also notes the proposed basement is located within a Critical Drainage Area.

4.3 The proposed development includes the demolition of the existing garages and construction of a four-storey apartment building with a lower ground floor. Due to the site being located across sloped ground, the depth of the lower ground floor varies, measuring c. 1.00m to 2.00m along the southeast and between c. 2.60m and 3.60m across the northwest. A CFA contiguous piled wall is proposed to construct the lower ground floor.

4.4 The BIA desk study review identifies that the site is directly underlain by the London Clay Formation.

4.5 A topography survey has been carried out across the site and is referenced in the BIA. The report summarises that the existing driveways step down from the northeast to the southwest with the overall slope of the driveways at 4.5°. The garden area, along the southeastern side of site, is c. 1.10m and 1.70m below the current driveway and garage floor level.

4.6 The screening tables are provided in Section 4.0 of the BIA and the responses have been based on desktop study information.

4.7 The groundwater flow screening confirms the following:

- The site is not underlain by an aquifer but it is unknown if the basement extends beneath the water table.
- The RedFrog Sub-surface Water Features Mapping (SSWFM) report shows the Claygate Member Spring line is c. 85m north of site. The screening response does not include consideration of the 'watercourse markers' shown directly north of site (discussed in Section 3.5 of the BIA). Further comment on these features within the screening is requested; where required the scoping should be updated.
- The proposed development will not increase the proportion of hardstanding.

4.8 The screening for land stability confirms the following:

- Based on the topographic survey, the site and surrounding areas do not include slopes of gradients steeper than 7 degrees.
- London Clay is the shallowest stratum and no trees are proposed to be felled as part of the proposed basement.
- The screening states that there is no evidence of subsidence at the site however, several consultation responses refer to historical subsidence of the neighbouring buildings and

the subsequent need for repairs and remediation. Further comment is therefore requested.

- The site is within 5m of a highway (Frognal Lane) and will significantly increase the differential depth of foundations to neighbouring properties.
- The site is not in proximity to any exclusion zones or major buried utilities (i.e. Thames Water trunk sewers).

4.9 The screening for the surface water flow confirms the following:

- The site is not within the catchment of the pond chains on Hampstead Heath.
- The proposed basement will not result in any significant changes to the surface water flow existing route or profile of inflows of surface water to downstream receptors.
- The site is within an area identified to have surface water risk.

4.10 Scoping is presented in Section 5.0 of the BIA and confirms that a ground investigation should be undertaken to confirm the ground conditions. In addition, a ground movement assessment (GMA) is required to confirm potential impacts to the neighbouring properties. The scoping also concludes that as the site is topographically below the Claygate Member Spring line, the site is hydraulically disconnected to groundwater flow associated with the spring line and thus will not be impacted by the proposed development.

4.11 A Flood Risk Assessment (FRA) confirms that the site is within a Critical Drainage Area but is not within a Local Flood Risk Zone. The report concludes there is a very low risk of flooding however, it is noted that the FRA has not referenced the RedFrog SSWFM within the assessment. The FRA should be updated to include review of the RedFrog SSWFM information.

4.12 It is accepted that the proposed development will not adversely affect the hydrology of the local or wider environment however, detailed drainage design will require approval from the lead local flood authority.

4.13 The ground investigation, carried out by Soils Ltd, contained four boreholes and three dynamic probes. The ground was found to comprise a cover of Made Ground from 0.95m to 2.00m thick over soft to very stiff clays with sand lenses of the London Clay Formation.

4.14 Groundwater monitoring wells were installed in three boreholes; the two monitoring visits reported groundwater to be between 1.50m and 3.19m bgl at two locations with the third installation being dry. The BIA suggests that the water encountered represents perched groundwater within the Made Ground or minor seepages from sand lenses.

4.15 The Structural Engineering Construction Method Statement (SECMS) and structural drawings are provided in Appendix B.3 of the BIA. These documents confirm that the lower ground floor will be formed by installing a contiguous CFA piled wall along the northwest, northeast and southwest perimeters. The drawings suggest that the piles will be c. 10m in length and 400mm in diameter. Temporary sheet piling will be used along the southeast boundary to facilitate the construction of a traditional reinforced concrete (RC) retaining wall which will step down from 2.80m to 1.00m following the natural ground levels.

4.16 The SECMS outlines the following construction sequence:

- Demolish the existing garage structures and install the piling mat.
- Construct the basement retaining walls using reinforced concrete piles.
- Construct the capping beams and install the temporary propping.
- Excavate the main basement in sections and construct the basement slabs and lining of walls in phases. Where required sheet piles will be used to provide temporary soil retention.
- Complete the internal structural elements and ground floor slab.

4.17 The structural drawings include a note stating foundations have been designed with a bearing pressure of 150kPa founding within a sandy gravel stratum. This contradicts the ground model provided in the BIA which records locally soft clay. Further details on the proposed foundation depth and assumed bearing capacity of the founding stratum for the retaining wall along the southeast boundary is requested.

4.18 The SECMS states heave resulting from the bulk excavation can be managed by the self-weight of the basement structure and use of heave protection products.

4.19 The SECMS includes comment that where groundwater is encountered, dewatering should be undertaken using dewatering wells and permeation grouting. Further details on the potential impacts of these methods are required within the BIA.

4.20 A ground movement assessment (GMA) and damage impact assessment are provided in Section 7.0 of the BIA to demonstrate that ground movements and consequential damage to neighbouring properties will be within the LBC's policy requirements. Nearby sensitive structures include 18-28 Palace Court to the southwest, Ashley Court to the northeast and Frognal Lane to the northwest.

4.21 The GMA has been undertaken using a combination of the following methods:

- Empirical data from CIRIA C760 for vertical and horizontal movements associated with pile installation and horizontal movements associated with excavation.
- Oasys, PDisp software has been used to estimate short-term and long-term ground movements from unloading of the ground due to excavation.
- WALLAP by Geosolve has been used to predict the vertical ground surface settlement caused from the wall deflection.

4.22 It is noted that the predicted ground settlements estimated from the WALLAP analysis (presented in Table 7.5 of the BIA) are not considered to be moderately conservative and it is recommended that an alternative method applying empirical data from CIRIA C760 is adopted. In addition, the construction sequence within the WALLAP models suggest that the temporary props and basement floor slab will be installed while a berm is still in-situ. Further details on this proposed sequencing are requested.

4.23 Ground movements due to the basement excavation in the short-term and long-term conditions were modelled using PDisp. Long-term ground movements excluding the effects of heave have also been included in the GMA. A summary of the calculated ground movements is provided in section 7.4 of the BIA. Heave would not be expected to occur beyond the boundary of the embedded wall and it is noted that combined vertical movements excluding heave have been considered for the Burland Damage Category Assessment (BDA).

4.24 The BDA is based on the assumption that the structures considered are in a good state of repair. It is noted that consultation responses included a number of comments referring to historical subsidence of the neighbouring buildings and the subsequent need for repairs and remediation. This should be taken into consideration in the BIA in relation to the BDA and mitigation measures. Further clarification of the current condition of the neighbouring buildings and consideration of that in the BDA is therefore required.

4.25 A summary of the anticipated movements impacting the highway are provided in Section 7.6.4 of the BIA.

4.26 The results of the GMA indicate damage to neighbouring buildings not exceeding Category 1 (very slight) can be achieved however, further clarification is required as above.

4.27 The SECMS includes proposed trigger levels for the ground movement monitoring however, it is noted that the minimum trigger value exceeds the anticipated movement modelled within the BDA discussed above. The trigger values should therefore be revised or sensitivity analysis carried out to show a maximum damage category of 1 (very slight) can be achieved if the magnitude of movements equating to the trigger values are allowed to occur.

5.0 CONCLUSIONS

5.1 Confirmation that the individuals undertaking the BIA hold suitable qualifications and experience, as required within the CPG: basements, is requested.

5.2 Screening and scoping assessments are presented in the BIA and supported by desk study information.

5.3 Further comment on the 'water course markers' situated to the north of site is required.

5.4 The screening responses do not acknowledge the historical subsidence of the neighbouring properties.

5.5 The Flood Risk Assessment should include consideration of the data provided within the RedFrog Sub-surface Water Features Mapping report.

5.6 Contradictions of the ground model and proposed founding stratum are present between the BIA and Structural Engineering Construction Method Statement (SECMS). The ground model should be presented consistently across all documents and further details of the foundations for the retaining wall along the southeastern boundary are requested.

5.7 The SECMS includes mention of possible dewatering methods required for the basement construction. Further details on the potential impacts of these methods are required within the BIA.

5.8 The Ground Movement Assessment (GMA) methodology is not considered to be moderately conservative, and it is recommended that the GMA is revised using an alternative method.

5.9 Clarification of the current condition of the neighbouring buildings and consideration of that in the building damage assessment is requested.

5.10 The proposed trigger values are below the maximum movements modelled in the GMA and therefore need to be revised or sensitivity analysis undertaken.

5.11 It cannot be confirmed that the BIA complies with the requirements of CPG: Basements and the Principles for Audit set out in the Basement Impact Assessment (BIA) Audit Service Terms of Reference & Audit Process, specifically:

- Contradictions exist between the documents provided.
- The methodologies and assumptions are not clearly stated.
- The conclusions have not been arrived at based on all necessary and reasonable evidence and considerations, in a reliable, transparent manner, with sufficient attention paid to risk assessment and use of cautious or moderately conservative engineering values/estimates.

5.12 Queries and comments on the BIA are described in Section 4 and Appendix 2.

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Appendix 1

Consultation Responses

Residents' Consultation Comments
Due to the high number of responses received for this application the main issues relevant to the BIA have been summarised below:

Surname	Address	Date	Issue raised	Response
Various	NA	Between 14/04/2025 and 16/04/2025	Land stability issues due to basement construction and existing damage from subsidence within neighbouring buildings.	Further clarifications on the GMA have been requested as part of this audit.
			Concerns on increased risk to surface water flow and groundwater flooding.	The BIA confirms that the site in underlain by London Clay with is classified as an unproductive aquifer. No increase in hard standing is proposed as part of the basement development.
			Lack of structural engineering input	Structural drawings and outline calculations have been provided within the BIA however further clarifications have been requested.
Redington Frognal neighbourhood forum	NA	14/04/2025	The Flood Risk Assessment does not refer to two lost rivers	This has been queried as part of the audit.

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Appendix 2

Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA	Provide evidence to show that the individuals undertaking the BIA hold suitable qualifications and experience as required within the CPG: Basements.	Open – 4.1	
2	Subterranean flow and surface water flow	Update the screening and FRA with all relevant data provided with the RedFrog Sub-surface Water Features Mapping report. Where required the scoping should be revised.	Open – 4.7 & 4.11	
3	Land stability	Provide clarification of the current condition of the neighbouring buildings and confirm how this has been considered in the building damage assessment along with any required mitigation measures.	Open – 4.8 & 4.24	
4	Land stability	Provide clarification on the ground model along with the bearing capacity and foundation details for the proposed retaining wall along the southeastern boundary of the site. Ensure all documents are consistent.	Open – 4.17	
5	Land stability	Confirm the anticipated impacts of the proposed dewatering methods. Provide clarification on the construction sequence outlined in the WALLAP analysis. Update the trigger values in line with the movements considered in the GMA or provide sensitivity analysis on the current trigger values.	Open – 4.19, 4.22 & 4.27	
6	Land stability	The method of calculating the ground settlements estimated from the WALLAP analysis is not considered appropriate and requires revision. The BDA requires updating following revision to the GMA along with consideration of historic subsidence of neighbouring buildings.	Open – 4.22 & 4.24	

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Appendix 3

Supplementary Supporting Documents

None

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