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Basement Impact Assessment Audit

Frognal Garages on land west of Ashley Court, Frognal Lane, London, NW3 7DX

For
London Borough of Camden

Project No.
14006-85

Date
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CONTENTS

1.0 NON-TECHNICAL SUMMARY 4
2.0 INTRODUCTION 5
3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST 7
4.0 DISCUSSION 10
5.0 CONCLUSIONS 14

APPENDICES

Appendix 1 Consultation Responses
Appendix 2 Audit Query Tracker
Appendix 3 Supplementary Supporting Documents

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 Frognal Garages on land west of Ashley Court (planning reference 2024/1122/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 Basement Impact Assessment was produced individuals who hold suitable qualifications.

1.5 The proposed redevelopment involves the demolition of the existing garages and the construction of a three storeyed residential building with a basement.

1.6 Screening and scoping assessments are presented, supported by desk study information. Site investigations confirm ground conditions on site to be Made Ground overlying London Clay Formation.

1.7 The presence of basements in neighbouring buildings should be confirmed and shown on relevant plans and sections.

1.8 It is accepted that the development will not impact the hydrogeology of the area.

1.9 It is accepted that, with the inclusion of appropriate mitigation measures, the proposed basement will not impact the hydrology of the area.

1.10 Outline structural calculations to support assumed pile length should be provided. Utility plans should be provided.

1.11 A Ground Movement Assessment (GMA) has been undertaken, however it does not consider the impact to the neighbouring building at Ashley Court or to Frognal Lane and therefore requires revision.

1.12 The BIA includes a damage category assessment for one neighbouring building and concludes damage will not exceed Burland Category 1 (very slight). on the Burland Scale, however, this should be revisited to include all neighbouring structures/roads and should use appropriate values of horizontal strain.

1.13 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 16 July 2024 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Frognal Garages on land west of Ashley Court, Frognal Lane, London, NW3 7DX, Planning reference 2024/1122/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.
- Neighbourhood Plan – Redington and Frognal

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 garages and the erection of 2 x dwellinghouses (Class C3) with excavation of basement, associated amenity space, four new garage spaces, front and rear landscaping and associated works."

2.6 The Audit Instruction confirmed Frognal Garages neither involves, nor is a neighbour to, listed buildings.

2.7 CampbellReith accessed LBC's Planning Portal on 19 July 2024 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment by Soils Limited, ref. 21109/BIA Rev 2.1, dated March 2024
- Flood risk assessment by Soils Limited, ref. 21428/FRA_Rev1.1, dated May 2024
- Sustainable Drainage Strategy by Soils limited, ref. 21428/SDS_Rev 1.1, dated May 2024

- Planning Statement by DP9 Ltd, dated March 2024
- Planning Application Drawings consisting of:
- Location Plans by TODD Architects, ref. FGG-TOD-03-ZZ-PP-A-03001 rev. P01, dated 18 March 2024
- Existing Plans by TODD Architects, ref. FGG-TOD-03-ZZ-PP-A-03001 rev. P01, dated 1 March 2024
- Proposed Plans by TODD Architects, ref. FGG-TOD-03-ZZ-PP-A-03001 rev. P01, dated 1 March 2024
- Design & Access Statement by TODD Architects, ref. FGG-TOD-03-ZZ-PP-A-03001 rev. P01, dated 18 March 2024
- Planning Consultation Responses

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	
Is data required by Cl.233 of the GSD presented?	Yes	
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	
Are suitable plan/maps included?	Yes	Relevant ARUP GSD maps are referenced in the BIA and some extracts included in the BIA.
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 the BIA
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.2 of the BIA. Clarifications regarding the hard surfaced areas are requested.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.4 of the BIA. Clarifications regarding the hard surfaced areas are requested.
Is a conceptual model presented?	Yes	Section 7.1 of the BIA
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4 of the BIA

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4 of the BIA
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4 of the BIA
Is factual ground investigation data provided?	Yes	Section 6 of the BIA
Is monitoring data presented?	Yes	Section 5.5 of the BIA
Is the ground investigation informed by a desk study?	Yes	Section 2 of the BIA
Has a site walkover been undertaken?	Yes	Not directly mentioned
Is the presence/absence of adjacent or nearby basements confirmed?	No	Limited information about presence of adjacent basements is provided
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 10.2 of the BIA
Are reports on other investigations required by screening and scoping presented?	Yes	FRA provided
Are the baseline conditions described, based on the GSD?	Yes	Limited information about neighbouring basements
Do the base line conditions consider adjacent or nearby basements?	No	Unclear, limited information about presence of adjacent basements, floor levels unknown

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	Section 9 of the BIA
Are estimates of ground movement and structural impact presented?	Yes	GMA provided, Section 10 of the BIA
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	Section 9 of the BIA
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?	No	Clarifications regarding how critical sections are adopted are requested.
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 report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Building Damage Assessment needs to be reviewed.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1 The BIA has been prepared by Soils Limited, and the individuals concerned with its production have suitable qualifications. The Flood Risk Assessment and Ground Movement Assessment were also prepared by Soils Limited.

4.2 The site comprises of a row of eight garages each with a front concrete driveway facing Frognal Lane. The site lies in a residential area with two six storey residential blocks to the north-east and the south-west. The block located to the north-east is Ashley Court and the block to the south-west is 18-28 Palace Road. The ground slopes downwards towards the western end of the site, from 81m AOD near the easternmost garage to approximately 79m AOD near the westernmost garage. The St. Andrew's United Reform Church, a listed building, sits approximately 15.6m to the north-west of the site.

4.3 The proposed redevelopment involves the demolition of existing garages and the construction of a new building that forms 2no. two- to three-storey semi-detached residential properties with ground level garages, a single basement level beneath the full footprint of the building and driveway/front garden areas.

4.4 The maximum depth of the basement development is given as 3.50m in the BIA. A proposed construction sequence is provided in Section 10.3 of the BIA. The BIA states the basement walls will be formed using a contiguous pile embedded retaining wall.

4.5 Screening and scoping assessments are presented and are informed by desk study information.

4.6 Ground investigations carried out by Soils Limited during October 2023 revealed Made Ground of average thickness of 1.30m over London Clay formation. The ground investigation comprised of three windowless sampler boreholes, three super heavy dynamic probes (DPSH) and ground water monitoring wells.

4.7 Groundwater was not encountered within the windowless sampler boreholes WS1 and WS2 during the time of drilling, however further groundwater monitoring identified water at 3.19m in WS1 and 1.50m in WS2. The BIA suggests that the changes in groundwater levels could be due to seasonal effects and variations in drainage, and the groundwater encountered represents water that is perched within the sandy lenses of the London Clay formation. The BIA states that any groundwater flows encountered during construction would be extremely slow and could be controlled by localised pumping techniques.

4.8 The BIA states that the average slope at the site of the site does not exceed 5° and the BGS Ordnance Survey Terrain 50 Slope maps indicate slopes of up to 6° at the site and the adjacent areas.

4.9 The BIA indicates that the site lies immediately outside the area identified by Arup's Camden Geological, Hydrogeological and Hydrological Study maps as at risk of land instability. Section 9.3 of the BIA recommends piled wall foundations for the stability of the excavation, and states that the installation of piles would significantly reduce the risk of slope instability on site.

4.10 The land stability screening section of the BIA states that no trees were present within the area of the proposed development. Section 5.4 of the BIA mentions that roots were encountered in all the windowless sampler boreholes and photographs of the site show vegetation to the rear of the garages and within the private gardens of the neighbouring properties. A tree survey has been presented and identifies 3 trees within the footpath of Frognal Lane.

4.11 The BIA states that the presence of basements in neighbouring buildings is unknown. The Redington Frognal Neighbourhood Plan requires appropriate drawings and details of the engineering designs to illustrate how the construction addresses adjoining buildings and structures. Plans and sections showing the foundation details of adjacent buildings are requested.

4.12 The screening responses for the subterranean flow indicates that the site lies outside of the catchment of the pond chains on Hampstead Heath. The BIA states that the site is not on an indicative spring area, as the site lies beyond the extent of the historic river Kilbourne and its tributaries. The BIA anticipates no alterations to existing groundwater regime, due to the predominantly cohesive and low permeability soils expected.

4.13 The BIA states that the site is largely hard landscaped, and the proposed redevelopment would not increase the overall proportion of hardstanding areas on site.

4.14 The BIA anticipates no basements in the adjacent buildings, and states that the proposed basement structure would be isolated and would not significantly alter the existing groundwater regimes on site. The cumulative effects of groundwater flow are expected to be negligible by the BIA. It is accepted that the proposed basement will not impact the hydrogeology of the area.

4.15 The FRA states that the site is situated in Flood Zone 1 and has a very low probability of flooding from rivers and seas. It is noted that the site lies within a critical drainage area but lies outside of any Local Flood Risk Zone according to the LBC Strategic Flood Risk Assessment. A sustainable drainage strategy has been produced for the site and shows the inclusion of attenuation measures to control the discharge of surface water into the sewer network. It is accepted that, with the inclusion of appropriate mitigation measures, the proposed basement will not impact the hydrology of the area.

4.16 The BIA mentions that information on the presence of public utilities were unavailable during the time of producing the BIA. Utility plans should be provided, as required by the Engineering Scope of Services. It is noted that the sustainable drainage strategy report indicates a water main and combined sewer beneath Frognal Lane.

4.17 Section 10.3 of the BIA assumes the basement walls to be contiguous piles walls, made up of 600mm diameter piles of 15m length. The Scope of Engineering Services requires details of retaining wall design be provided within the BIA, including outline calculations with assumptions clearly stated. These outline calculations are requested.

4.18 A Ground Movement Assessment (GMA) was carried out using OASYS Programme PDISP for the evaluation of vertical ground movements. Lateral ground movements are estimated using WALLAP by Geosolve.

4.19 The analysis using WALLAP estimated the basement wall lateral deflection to be approximately 9mm. The semi-empirical relationship provided in CIRIA C760 was used to estimate the corresponding maximum vertical settlement to be 4.5mm. Section 10.6 of the BIA discusses the ground movements estimated from the GMA.

4.20 The total horizontal movements due to the basement construction is calculated as the sum of the maximum horizontal movements caused by bored pile installations and the maximum horizontal movements calculated from WALLAP.

4.21 Ground movements due to the excavation of the basement in the short term and long-term conditions were modelled using PDISP. Figure 18 in the BIA, the plot of vertical movements, suggests that the ground movements have been combined such that settlement is offset by heave movements. This approach is not considered appropriately conservative, as required by LBC guidance, and clarification is requested.

4.22 The BIA identifies that the neighbouring buildings at 18-28 Palace Road and Ashley Court would be affected by the proposed construction. The BIA does not anticipate any damage to the listed St. Andrew's United Reform Church due to the distance between the building and the site. The screening assessment also identifies a potential impact to the road infrastructure at Frognal Lane.

4.23 In Section 10.7 of the BIA a damage assessment has been undertaken for the building at 18-28 Palace Road only, as it is considered to be the critical scenario 'CS1'. The effects of the proposed basement construction on Ashley Court are not considered, despite this structure being closer to the proposed basement. Ashley Court should be included in the GMA and consideration of the impact to Frognal Lane, and any utilities therein, should be provided.

4.24 Section 10.3 of the BIA mentions that an average unit weight of 18kN/m^3 is used for the Made Ground due to absence of test results, and estimates an unloading pressure of 65kPa due to the 3.50m basement excavation. It is noted that the depth of Made Ground is incorrectly quoted as 3.50m instead of 1.30m identified in section 10.3 of the BIA. The PDISP analysis is noted to utilise an unloading pressure of 63kPa. The bulk densities of the Made Ground adopted in the WALLAP analysis are 15 kN/m^3 above water table and 18 kN/m^3 below water table.

4.25 Table 10.4 of the BIA gives a summary of the horizontal movements at the critical scenario CS1. However, it is noted the horizontal deflection and the horizontal strain along CS1 are incorrectly calculated and need to be reconsidered. The BIA states the GMA has been undertaken with reference to CIRIA C760. In accordance with CIRIA C760, the horizontal strain must consider the differential horizontal movement that occurs across the full length of the wall being assessed. The assessment should be revisited.

4.26 The BIA predicts the impact to neighbouring structures will not exceed Burland Damage Category 1 (very slight). However, this damage category should be updated once the GMA has been revisited, horizontal strains have been calculated correctly and all potentially impacted neighbouring structures included in the assessment.

4.27 The BIA recommends regular monitoring ground and structural movements to ensure that the movements do not exceed estimated values.

5.0 CONCLUSIONS

5.1 The qualifications of the individuals concerned with the production of the BIA are in accordance with LBC guidelines.

5.2 The proposed development involves the demolition of a row of existing garages and construction of two semi-detached residential buildings with a single basement level.

5.3 Screening and scoping assessments are presented, supported by desk study information. Site investigations confirm ground conditions on site to be Made Ground overlying London Clay Formation.

5.4 The presence of basements in neighbouring buildings should be confirmed and shown on relevant plans and sections.

5.5 It is possible that groundwater may be present in limited quantities within the sandy lenses of the London Clay Formation and could be encountered during construction. This would be dealt with using sump pumping. It is accepted that the development will not impact the hydrogeology of the area.

5.6 Geotechnical parameters to inform design have been provided.

5.7 The site has a very low probability of flooding from rivers and seas. It is accepted that, with the inclusion of appropriate mitigation measures, the proposed basement will not impact the hydrology of the area.

5.8 Outline structural calculations to support assumed pile length should be provided. Utility plans should be provided.

5.9 A Ground Movement Assessment (GMA) has been undertaken, however it does not consider the impact to the neighbouring building at Ashley Court or to Frognal Lane and therefore requires revision.

5.10 The BIA includes a damage category assessment for one neighbouring building and concludes damage will not exceed Burland Category 1 (very slight). on the Burland Scale, however, this should be revisited to include all neighbouring structures/roads and should use appropriate values of horizontal strain.

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:

- The methodologies and assumptions are not clearly stated and are not appropriate to the scale of the proposals and the nature of the site.
- 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.

- The conclusions provided within the BIA are not sufficiently robust and accurate and are not accompanied by sufficiently detailed amelioration/mitigation measures to support the grant of planning permission in accordance with Policy A5 of the Local Plan, in respect of:
  - maintaining the structural stability of the building, the ground and any neighbouring properties to within limits set out in the policy/guidance.
  - avoiding cumulative impacts on ground and structural stability or the water environment in the local area.

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

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Appendix 1

Consultation Responses

Basement Impact Assessment Audit
Frognal Garages on land west of Ashley Court,
Frognal Lane, London, NW3 7DX

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Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Omer Ali	Unknown	10/06/2024	Risk of slope instability and damage to neighbouring properties.	The BIA includes a Ground Movement Assessment (GMA) to address this and queries relating to the GMA have been raised by this audit.
Mazaheri	Unknown	09/06/2024		
Koumis	Palace Court resident	04/04/2024		
Lo, Lien	Unknown	Unknown	Increase in flooding risk	A Flood Risk Assessment (FRA) and sustainable drainage strategy have been provided and will require final approval by the LLFA and Thames Water.
Shukla	Palace Court resident	06/06/2024		
Shishkin	Unknown	06/06/2024		
I Khan	Unknown	10/06/2024		
Barik	Unknown	10/06/2024		
Thomas	Unknown	07/06/2024		
Chandoo	Unknown	10/06/2024		
Unsal	Unknown	07/06/2024		

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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	Presence of neighbouring basements should be shown in plan and section, in relation to the proposed development.	Open- see section 4.11	
2	BIA	Utility plans and requested.	Open- see section 4.16	
3	BIA	Outline calculations to support assumed pile lengths are requested.	Open- see section 4.17	
4	GMA	Ground movements are estimated after offsetting heave, which is not considered to represent a moderately conservative approach and should be reconsidered.	Open- see section 4.21	
5	GMA	Impacts to Ashley Court, Frognal Lane and any related utilities to be included in the assessment.	Open- see section 4.23	
6	GMA	Horizontal deflection and horizontal strains are incorrectly calculated and require revision.	Open- see section 4.25	
7	GMA	The Building Damage Category assessment requires updating following revision to the GMA.	Open- see section 4.26	

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Appendix 3

Supplementary Supporting Documents

None

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