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Basement Impact Assessment Audit

University College School Frognal, London NW3 6XH

For
London Borough of Camden

Project No.
14006-47

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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 University College School Frognal, London NW3 6XH (planning reference 2023/5366/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 (BIA) has been carried out by engineering consultants Price and Myers (P&M); the individuals concerned in its production do not provide evidence to show that they have suitable experience and qualifications required for the assessments as outlined in the Camden Planning Guidance (CPG) for Basements.

1.5 Full size copies of the drawings included in the BIA should be provided.

1.6 The intrusive ground investigation identified that the site comprises a thin cover of Made Ground over the soft to firm clays of the Claygate Member and London Clay Formation.

1.7 It is anticipated that the groundwater table is above the basement foundation level however, clarification on the groundwater level, in relation to the proposed basement, should be clearly presented in the BIA.

1.8 Several of the screening questions are missing justification, these should be included within the screening tables.

1.9 The screening and scoping responses provided require updating and should be consistent with the desktop study and intrusive ground investigation findings. The additional assessments identified within the scoping should be included within the BIA.

1.10 The proposed construction sequence and foundation details of the basement are not clearly presented in the BIA and are requested.

1.11 The impact assessment should be revised following the queries in Appendix 2 being addressed.

1.12 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.

2.0 INTRODUCTION

2.1 CampbellReith was instructed by London Borough of Camden (LBC) on 02/01/2024 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for University College School Frognal London NW3 6XH and Planning Reference No. 2023/5366/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 "Partial demolition of Giles Slaughter Wing and full demolition of Fives Building, maintenance hut and outdoor stepped seating; erection of part 1 and part 2 storey school building consisting of classrooms, medical and wellbeing rooms, music recital room, music teaching rooms and stores, drama studios, and ancillary cafeteria and offices (Class F1(a)) with associated plant, sports area and court lighting posts and new retaining walls and landscaping; new hard and soft landscaping and drainage; new cycle parking and replacement car parking; and erection of 2no. part 1 and part 2 storey temporary accommodation buildings for the construction period only."

2.5.1 The Audit Instruction confirmed the University College School Frognal site contains and is neighbour to, Grade II listed buildings.

2.6 CampbellReith accessed LBC's Planning Portal on 05/01/2024 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report issued by Prices and Myers in November 2023, reference 30645, revision 3. Within the appendices of the report were the following reports:
  - Phase I Desk Study issued by A2 Site Investigation in July 2023, reference 32823-A2SI-XX-XX-RP-Y-0001-01, revision 01.
  - Factual Report issued by A2 Site Investigation in August 2023, reference 32823-A2SI-XX-XX-RP-Y-0002-01, revision 01.
  - Interpretive Report issued by A2 Site Investigation in August 2023, reference 32823-A2SI-XX-XX-RP-Y-0003-00, revision 00.
- Design and Access Statement issued Ed Toovey Architects in December 2023.
- Flood Risk Assessment issued by Prices and Myers in December 2023, reference 30645, revision 1.
- Construction Management Plan issued by Blue Sky Buillding in December 2023.
- Drawings and cross sections by Ed Toovey Architects including:
  - Site Plan Existing (2037/GL/002) and Proposed (2037/GL/012)
  - Ground Floor Plan Existing (2037/GA/001) and Proposed (2037/GA/011)
  - West Elevation [south] existing (2037/GE/001) and proposed (2037/GE/012)
  - West Elevation [north] proposed (2037/GE/013)
  - West Elevation full proposed (2037/GE/011)
  - South Elevation Existing (2037/GE/004) and proposed with no boundary wall (2037/GE/020)
  - East Elevation/section Full proposed (2037/GE/015)
  - EW Section AA existing (2037/GS/001) and proposed (2037/GS/011)
  - EW Section BB existing (2037/GS/002) and proposed (2037/GS/012)
  - NS Section CC [south] existing (2037/GS/003) and proposed (2037/GS/013)
  - NS Section CC [north] existing (2037/GS/004)
  - NS Section C full proposed (2037/GS/018)
  - EW Section DD existing (2037/GS/005) and proposed (2037/GS/015)
  - EW Section EE existing (2037/GS/006) and proposed (2037/GS/016)
  - EW Section FF existing (2037/GS/007) and proposed (2037/GS/017)

2.7 Following the consultation period, ending on the 28th January 2024, CampbellReith accessed LBC's Planning Portal on 29/01/2024. A summary of the responses are included in Appendix 1.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	No evidence has been provided to show that the assessments have been carried out by individuals with relevant experience and qualifications as required by the CPG.
Is data required by Cl.233 of the GSD presented?	No	Further details 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?	No	Further details required as discussed in section 4.0.
Are suitable plan/maps included?	Yes	However, full scale copies of some drawings provided in the BIA report are requested.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	However, full scale copies of some drawings provided in the BIA report are requested.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Written justification is missing for several responses and further clarification required for responses provided.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Further clarification required for responses provided as discussed in section 4.0.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Written justification is missing for several responses and further clarification required for responses provided.
Is a conceptual model presented?	Yes	Within the interpretive report provided in Appendix D of the BIA however, clarification required as outlined in Section 4.0.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	However, further clarification is required as set out in Section 4.0.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	However, this should be updated following comments on the screening being addressed.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	Yes	Appendix D of the BIA
Is monitoring data presented?	Yes	Appendix D of the BIA
Is the ground investigation informed by a desk study?	Yes	Appendix C of the BIA
Has a site walkover been undertaken?	Yes	Appendix C of the BIA
Is the presence/absence of adjacent or nearby basements confirmed?	No	
Is a geotechnical interpretation presented?	Yes	Appendix D of the BIA
Does the geotechnical interpretation include information on retaining wall design?	Yes	However, some clarification is requested.
Are reports on other investigations required by screening and scoping presented?	No	A Flood Risk Assessment is provided however, the additional assessments, recommended in the scoping, regarding the hydrogeology and land stability impacts have not been provided.
Are the baseline conditions described, based on the GSD?	Yes	However, some clarification is requested as discussed in section 4.0.

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	Unknown	Clarification is required.
Is an Impact Assessment provided?	Yes	However, clarification and further justification required.
Are estimates of ground movement and structural impact presented?	No	See comments in section 4.0.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	No	Further details, as discussed in Section 4.0, are required.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	However, further clarification is required.
Has the need for monitoring during construction been considered?	Yes	
Have the residual (after mitigation) impacts been clearly identified?	No	
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	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	
Does the report state that damage to surrounding buildings will be no worse than Burland Category 1?	No	No assessment has been provided.

Item	Yes/No/NA	Comment
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1 The Basement Impact Assessment (BIA) has been carried out by engineering consultants Price and Myers (P&M); the individuals concerned in its production do not provide evidence to show that they have suitable experience and qualifications required for the assessments as outlined in the Camden Planning Guidance (CPG) for Basements.

4.2 A Construction Management Plan has been produced by Blue Sky Building however, this document does not provide any specific information regarding the construction methodology of the proposed basements.

4.3 The Design & Access Statement identifies that the main school building, situated just west of the proposed development, is a Grade II listed building.

4.4 The site currently comprises two raised tennis courts with a two-storey block (Giles Slaughter Wing) in the southeastern corner housing an existing basement partially bounded by a contiguous pile retaining wall. The proposed development is located on the eastern edge of the school site, situated within sloped ground that rises towards the east. The new development includes partial demolition of the Giles Slaughter Wing and existing retaining wall and the demolition of two small maintenance blocks in the southern edge of the site. A new two-storey block will replace the Giles Slaughter Wing, re-using the existing floor slab and parts of the existing retaining wall. A new single storey block will extend northwards along the eastern edge of the school site with a new retaining wall (sheet or secant pile) to be constructed along the eastern and northern edges. The new block will be set back into the slope with two basements within the southern and northern edges of the development.

4.5 A proposed ground floor plan (2037/GA/011, dated November 2023) shows part of the development to be outside the site boundary, clarification is required.

4.6 The drawings provided within the BIA appendices are of poor resolution and full-size copies of the drawings are requested.

4.7 A desktop study and an intrusive ground investigation have been carried out by A2 Site Investigation and copies of the reports are provided in Appendix C and Appendix D of the BIA. The intrusive ground investigation included 3no. cable percussive boreholes to 22m below ground level (bgl), 4no. hand excavated trial pits to determine the extent and thickness of the existing foundations, 2no. California Bearing Ratio tests, 1no. infiltration test and installation and monitoring of groundwater monitoring wells.

4.8 The intrusive ground investigation recorded a cover of Made Ground, up to 1.10m thick, across the site underlain by soft grey-brown mottled orange and dark grey, slightly sandy silty clay. Table 9.1 of the Factual Report (included in Appendix A of the Interpretive Report) suggests that the soft clays, interpreted as being within the Claygate Member, are present to depths of between 5.00m and 10.00m. These soils are underlain by soft, becoming firm, dark grey slightly sandy silty clays interpreted to be of the London Clay Formation.

4.9 The hand excavated trial pits confirmed the thickness of the raft foundation of the Giles Slaughter Wing is between 0.90m and 1.10m bgl and steps out between 0.20m and 0.90m from the external wall.

4.10 A parallel seismic test was carried out in one of the boreholes to establish the condition of the existing contiguous piled wall. The pile length was estimated to be approximately 12.30m (with the toe being at 75.70m AOD).

4.11 Water strikes were encountered in two boreholes at 4.20m and 6.00m bgl within the Claygate Member. Seepages of groundwater was also recorded in a trial pit at 0.90m bgl within the Made Ground. Subsequent monitoring recorded groundwater to be between 85.58m and 87.51m AOD. Based on these findings the interpretive report suggests groundwater should be assumed to be a maximum of 1m bgl for structural design. It is unclear in the report where 'ground level' has been assumed and this should be confirmed.

4.12 The interpretive report recommends that a hydrogeological impact assessment is carried out to prove that the basement box will not cause groundwater flooding or create adverse impacts to the shallow groundwater flow paths.

4.13 Proposed geotechnical parameters are provided in Table 5.2 of the Interpretive report however, the stratum referenced in the table does not match those provided in the ground model. Clarification of the ground model and associated parameters should be provided.

4.14 Several of the screening questions are missing justification. As stated within the CPG 'no' answers require written justification.

4.15 The slope stability screening table highlights that the site and surrounding area contain slopes with gradients over 10 degrees. It also indicates the London Clay is overlain by c. 1m thick deposits of the Claygate Member and that existing trees will be removed as part of the development. The thickness of Claygate Member assumed in the screening response contradicts what is outlined in the ground investigation. As aforementioned clarification of the site ground model is requested.

4.16 The site is within 5m of a pedestrian right of way however, this has not been brought through to scoping.

4.17 The screening response to Q13 of the land stability assessment suggests that the proposed basements involve minor changes to the ground floor levels and neighbouring properties are at a sufficient distance from the development. Further details are required to confirm the distances and assumed foundation depths of the neighbouring structures. This should include specific mention of the Grade II listed building.

4.18 The scoping assessment of the land stability recommends a preliminary assessment is undertaken to analyse the global stability of the slope. No such assessment has been provided and should be included within the BIA.

4.19 The hydrogeology screening identifies that the site is located directly over the Claygate Member which is a Secondary A aquifer and that the proposed basement will extend beneath the water table surface. However, the screening does not include reference to the lost river identified within the desktop study (some 40m from site). Consideration of the lost river should be included within the screening and, if required, be brought through to scoping.

4.20 The BIA should provide clarification of the anticipated level of groundwater in relation to the basement. In addition, the scoping recommends that the requirements for dewatering and the subsequent ground movements will need to be considered within the basement design. Further details of the proposed dewatering regime and potential impact to ground movements should be included within the BIA.

4.21 The BIA states that the quantity of surface water being discharged to the ground will not increase and that the proposed development will result in a decrease of impermeable surface by a total of 20m^2. It also highlights that the proposed site drainage will alter the existing route of the surface water.

4.22 The Flood Risk Assessment (FRA) provided outlines that the drainage scheme has been designed to direct surface water run off away from the buildings and sensitive areas. The FRA also includes proposals to mitigate surface water run off through a combination of detention basins, permeable paving, and below ground attenuation tanks. The surface water will then be discharged off site into an existing combined sewer situated in Arkwright Road.

4.23 The BIA report confirms that the proposed development construction sequence will include excavation of the basements with temporary props installed where required. Appendix B of the BIA includes a construction sequence for the new secant piled wall behind the existing wall. It is not understood how the basement construction along the north end is proposed and further details are requested.

4.24 The proposed foundation scheme for the basements should be provided and should include confirmation of the founding stratum, depth and/or level and, the proposed loads.

4.25 The interpretive report provides an indicative allowable bearing pressure of 200kPa for strip footings founded in the Thames Group. Further clarification regarding these calculations is requested as the allowable bearing pressure provided is significantly higher than would typically be expected for the ground conditions described within the factual report.

4.26 The BIA indicates that the excavation of the proposed basement areas, to the north and southern boundaries, will extend below the groundwater table. As discussed above, details of the proposed dewatering scheme are required.

4.27 Within section 1.1.7 of the BIA there is reference to underpinning. No details of the location, depth or underpinning sequence has been provided and are required. Additionally, outline structural designs of the proposed retaining wall have not been provided and are requested. These should demonstrate that the proposed wall is suitable for the ground conditions present at the site.

4.28 It is stated within section 7.3 of the BIA that a Ground Movement Assessment (GMA) has not been carried out 'due to the lack of an actual basement' however, the development is considered a basement according to LBC policy and the need for a GMA to be undertaken should be informed by the screening and scoping.

4.29 The Impact Assessment provided in Section 8 of the BIA outlines that there will be no risk of instability to the development or adjacent sites. This contradicts the statement made within the scoping which recommends that a slope stability assessment is undertaken.

4.30 Due to the proximity of the proposed development to a Grade II listed building consideration of any potential impact to this structure should be clearly presented within the impact assessment.

4.31 The risk of surface water flooding has been addressed with a range of mitigation measures which are outlined in the FRA. It is accepted that the proposed development is not in an area prone to flooding however, the presence of the lost river in proximity to the site should be addressed within the screening as discussed above. In addition, further consideration of the impact to the hydrogeology is required as discussed above.

4.32 The BIA writes that an appropriate movement monitoring strategy should be implemented and will consider the 'recommended limits provided in the BIA'. It is unclear where these limits are presented within the report and clarification is required.

5.0 CONCLUSIONS

5.1 The Basement Impact Assessment (BIA) has been carried out by engineering consultants Price and Myers (P&M); the individuals concerned in its production do not provide evidence to show that they have suitable experience and qualifications required for the assessments as outlined in the Camden Planning Guidance (CPG) for Basements.

5.2 A Construction Management Plan has been produced by Blue Sky Building however, this document does not provide any specific information regarding the construction methodology of the proposed basements.

5.3 The Design & Access Statement identifies that the main school building, situated just west of the proposed development, is a Grade II listed building.

5.4 The proposed development is located on the eastern edge of the school site, situated within sloped ground that rises towards the east. The proposed works includes partial demolition of the existing contiguous piled wall and the existing block, Giles Slaughter Wing, with the complete demolition two maintenance blocks. The new development comprises the construction of a new two-storey structure over the Giles Slaughter Wing, re-using the existing floor slab and parts of the retaining wall. A new single storey block will extend northwards along the eastern edge of the school site with a new retaining wall (sheet or secant piled) to be constructed along the eastern and northern edges. The new block will be set back into the slope with two basements within the southern and northern edges of the development.

5.5 The BIA should clearly outline the proposed excavation depths for the development and provide clarification of how the existing slope will be altered.

5.6 Full size copies of the drawings included in the BIA should be provided. In addition, the basement layout presented in drawing 2037/GA/011 (dated November 2023) should be checked.

5.7 A desktop study and intrusive ground investigation have been carried out at the site. The factual report indicates that the site comprises a thin cover of Made Ground over soft clays of the Claygate Member. These are underlain by soft, becoming firm with depth, clays of the London Clay Formation. The strata parameters provided are referenced against different units, clarification on the ground model is requested as is confirmation on the proposed founding stratum.

5.8 The interpretive report suggests groundwater should be assumed to be a maximum of 1m bgl for structural design. Clarification of where ground level has been assumed is required.

5.9 Several of the screening questions are missing justification, these should be included within the screening tables.

5.10 The screening and scoping responses require updating and should be consistent with the desktop study and intrusive ground investigation findings. The additional assessments identified within the scoping should be included within the BIA.

5.11 Further details of the construction sequence for the proposed basement in the north area of site is required.

5.12 The proposed foundation scheme for the basements should be provided and should include confirmation of the founding stratum, depth/ level and, the proposed loads.

5.13 Clarification regarding the allowable bearing pressure provided is requested.

5.14 Confirmation of underpinning included within the scheme is required and outline structural designs of the proposed retaining wall are requested.

5.15 The impact assessment should be updated following the above comments.

5.16 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.

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Appendix 1

Consultation Responses

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Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Redington Frognal Neighbourhood Forum	NA	24/01/2024	Excavation will likely impact the local hydrology. Existing issues with flooding of the area and downstream should be mitigated by significantly reducing the surface water run-off.	This has been raised in Section 4.0 above. The proposals have included mitigation measure to prevent increased surface water runoff and any further assessment is outside the scope of this report. It is assumed that the FRA will be reviewed by the LLFA and Thames Water.
Malakar	NA	25/01/2024	Issues raised are not covered within the scope of the BIA.	
South Hampstead Flood Action Group	NA	26/01/2024	Existing issues with flooding of the area and downstream should be further mitigated by installing additional stormwater attenuation tanks. Recent flooding, from 2021, has not been considered within the assessment.	The proposals have included mitigation measure to prevent increased surface water runoff and any further assessment is outside the scope of this report. It is assumed that the FRA will be reviewed by the LLFA and Thames Water.

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Appendix 2

Audit Query Tracker

Audit Query Tracker

Query No.	Subject	Query	Status	Date closed out
1	Qualification	Provide evidence to show that the author(s) of the BIA have suitable experience and qualifications for the assessments as set out in the CPG.	Open	
2	Drawings	Provide full size copies of the drawings presented in the BIA and appendices and provide the basement plan drawing. 2037/GA/011 shows an area of basement outside of the site boundary, provide clarification.	Open	
3	Ground model and parameters	Provide clarification of the ground model and the assigned parameters.	Open	
4	Screening responses	Several of the screening questions are missing justification for the response 'no'. These should be provided.	Open	
5	Hydrogeology	Include reference to the lost river identified within the desktop study.	Open	
6	Land stability	Provide clarification for Q5 and Q13 of the land stability screening responses, including reference to the listed building. Ensure all items of the screening are brought through to scoping.	Open	
7	Hydrogeology/ Land stability	The additional assessments identified within the scoping should be included within the BIA.	Open	
8	Construction Sequence	Confirm the construction methodology for the proposed basements.	Open	

Query No.	Subject	Query	Status	Date closed out
9	Construction Sequence	Provide the proposed foundation scheme for the basements including confirmation of the founding stratum, depth and/or level and, the proposed loads.	Open	
10	Land stability	Provide further justification for the allowable bearing capacity.	Open	
11	Construction sequence	Confirm the details of the underpinning referenced in 1.1.7 of the BIA.	Open	
12	Impact Assessment	Update the impact assessment following review of the above actions.	Open	
13	Impact Assessment	Confirm location of the recommended limits referenced in section 7.4 the BIA.	Open	

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Appendix 3

Supplementary Supporting Documents

None

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