

19-37 Highgate Road, London
NW5 1LB

Basement Impact Assessment
Audit

For
London Borough of Camden

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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 19-37 Highgate Road, London, NW5 1LB (planning reference 2022/1603/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 have been carried out by individuals who possess suitable qualifications.
- 1.5. The BIA has confirmed that the proposed basement will 3.50m bgl and be founded within Alluvium and where absent in the London Clay.
- 1.6. The basement footprint should be presented consistently in all documents. A construction method statement and outline structural information are not provided and are requested.
- 1.7. It is accepted that the development will not have a significant impact on the surrounding slopes.
- 1.8. It is accepted that the proposed development will not impact the hydrogeology of the surrounding area. It is likely that shallow ground water perched on the London Clay, will be encountered during basement excavation and will be dealt with using sump pumping.
- 1.9. The basement will be constructed using sheet piles to support excavations in the temporary and permanent case. The building will be supported on a piled foundation.
- 1.10. It is proposed to use SuDS measures comprising a blue roof and deep manhole storage to mitigate the run-off from the increase in hard surfaced areas. The proposals will require approval from Thames Water.
- 1.11. A ground movement assessment (GMA) and building damage assessment (BDA) have been undertaken and indicate that damage will not exceed Burland Category 0 (Negligible). The basement layout should be confirmed and the GMA should be updated to include an assessment of the adjacent highway and utilities identified therein.
- 1.12. A GMA considering the adjacent Thame Water asset, which runs along the south-eastern boundary, will be undertaken separately and submitted for approval by the asset owner.

- 1.13. Movement monitoring is proposed during construction.
- 1.14. 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 01/06/2022 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 19-37 Highgate Road, London, NW5 1LB and Planning Reference 2022/1603/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.
- Kentish Town 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 *"Variation of Conditions 2 (development in accordance with approved plans) and 15 (social enterprise unit opening hours) granted under reference 2013/5947/P, dated 18/06/2014 (as amended by reference 2015/3151/P, 2016/0936/P, 2017/0363/P, 2017/01518/P, 2021/5384/P and 2022/0929/P) (for: Demolition of existing buildings and redevelopment to provide: a new Centre for Independent Living at Greenwood Place; and mixed-use development at Highgate Road comprising residential units, including supported affordable housing units, and social enterprise space;*

highway improvements; plant, landscaping; servicing; disabled car parking etc.). Amendments to Highgate Road site to include excavation of basement, installation of substation at ground floor, reconfiguration of internal layout, provision of 5x supported living units at ground floor level, 5x net additional residential units, elevational changes, material changes and associated plant, landscaping, servicing, cycle and refuse storage alterations."

- 2.6. The Audit Instruction confirmed 19-37 Highgate Road is a neighbour to the Grade II listed Christ Apostolic Church located to the south-east.
- 2.7. CampbellReith accessed LBC's Planning Portal on 13/06/2022 and gained access to the following relevant documents for audit purposes:
- Ground Investigation, Basement Impact Assessment & Ground Movement Analysis Report (BIA) by GEA, ref J21343B, Revision 0, dated 27 May 2022.
 - Desk Study & Basement Impact Assessment Report by GEA, ref J21343B, Revision 1, dated 21 May 2022.
 - Level 1 and 2 - Flood Risk Assessment by Engineeria, ref E0751-EEE-R-C-001, Revision P01, dated 27 May 2022.
 - Drainage Statement by Engineeria, ref E0751-EEE-R-C-002, rev P01, dated 5 July 2022.
 - Planning Application Drawings by AHR Architects, Revision C1, dated March 2022 consisting of:
 - Location and Site Location Plan
 - Existing Plans, Section and Elevations
 - Proposed Plans, Sections and Elevations
 - Arboricultural Development Statement by CBA trees, ref CBA11577, v2, dated November 2021.
 - Design and Access Statement Addendum (DAS) by AHR Architects, dated March 2022.

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?	No	Basement footprint is not presented consistently. Construction method statement and outline structural information not provided.
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	Section 3.2 of BIA
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1 of BIA.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.3 of BIA
Is a conceptual model presented?	Yes	Section 5.0 of BIA
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.0 of BIA.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	No	Section 4.0 of BIA. The increase in hard surfaced areas has been identified but isn't carried forward to scoping. However, a flood risk assessment and drainage strategy are provided to mitigate this.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	Section 4.0 of BIA. As above regarding the increase in hard surfaced areas.
Is factual ground investigation data provided?	Yes	Within BIA appendix
Is monitoring data presented?	Yes	Within BIA appendix
Is the ground investigation informed by a desk study?	Yes	Section 2.0 of BIA
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	No	Section 9.1 of the BIA describes the assumed depth of foundations for neighbouring structures.
Is a geotechnical interpretation presented?	Yes	Section 8.0 and Section 10.1.2 of BIA
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 8.1.1 of BIA
Are reports on other investigations required by screening and scoping presented?	Yes	Arboricultural Statement and Flood Risk Assessment are provided.
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	No	
Is an Impact Assessment provided?	Yes	Section 13.0 of BIA
Are estimates of ground movement and structural impact presented?	Yes	Section 10 of BIA

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	No	Damage to highways and utilities to be assessed.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	However some elements will require further consideration following updates to the BIA.
Has the need for monitoring during construction been considered?	Yes	Section 11.2 of BIA.
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	Damage to highways and utilities therein to be assessed.
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	As above
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Section 11.0 of BIA
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

- 4.1. The Basement Impact Assessment (BIA) has been carried out by engineering consultants Geotechnical & Environmental Associates (GEA) and the individuals concerned in its production have suitable qualifications.
- 4.2. The LBC Instruction to proceed with the audit identified that the basement proposal is adjacent to a Grade II listed building, Christ Apostolic Church to the southeast. The site is within the Kentish Town Neighbourhood Plan.
- 4.3. The proposed development involves the demolition of the existing Highgate Day Centre, and the subsequent construction of a part five- and part seven-storey mixed use building, with a single-storey basement beneath part of the building footprint, which is to be used as a plant room.
- 4.4. The basement will be stepped and be constructed at two different levels. The southern portion will extend to a depth of 3.10m bgl (33.985m OD), whilst the northern section will extend to a depth of 3.50m bgl (33.575m OD). It is proposed to use sheet pile walls to construct the basement.
- 4.5. It is noted that the shape of the basement presented in the proposed drawing (ref. HR-AHR-B1-B1-DR-A-20-099, rev C1, issue S1) differs from proposed basement shown in Section 9.2 of the BIA, the shape of which was then used in the subsequent Ground Movement Assessment (GMA). The basement proposals and footprint should be presented consistently. A construction method statement and outline structural information are not provided and are requested.
- 4.6. A screening and scoping assessment are presented, supported by desk study data.
- 4.7. A site-specific ground investigation was undertaken by GEA comprising a single borehole to 30.00m depth, 6no. windowless samplers to a depth ranging from 0.50m – 5.45m and 6no. trial pits. The ground conditions encountered were a variable thickness of Made Ground to a maximum depth of 2.50m below ground level (bgl), underlain by variable thickness of Alluvium to c. 3.50m bgl and followed by London Clay to depth. Perched groundwater was encountered within the Made Ground and Alluvium and subsequent monitoring visits indicate water to be present between 1.07m and 1.70m bgl.
- 4.8. The shallowest stratum at the site is identified as an unproductive aquifer. The BIA considers the groundwater encountered during the ground investigation to represent perched water held within the Alluvium or Made Ground and will be dealt with using sump pumping. It is accepted the proposed basement will not have a significant impact on the hydrogeology of the local and wider area.

- 4.9. The screening assessment indicates there will be an increase in hard surfaced areas as a result of the development but states that it will not change significantly, as existing soft landscaped areas will be removed and new landscaping will be introduced in other areas of the site. This item is not carried forward to scoping, however the site is identified as being within a critical drainage area and a flood risk assessment (FRA) has been completed, along with a drainage statement. The drainage strategy indicates a decrease in soft landscaping from 136m² to 58m².
- 4.10. The FRA states the implementation of SuDS will attenuate the discharge onto the existing drainage network. The drainage statement indicates that blue roof storage will be used to provide this attenuation, as the size of the development precludes the use of below ground attenuation tanks. The drainage statement indicates that consultation with Thames Water will be undertaken to confirm that the proposed discharge rates are acceptable.
- 4.11. It is accepted that the development will not impact the slope stability of the surrounding area.
- 4.12. An Arboricultural Impact Assessment is provided, which notes the removal of several trees placed on the site's perimeter. The BIA states that, due to the pile foundation and basement depth, any desiccated soils will be bypassed. The BIA states that foundations of neighbouring structures are outside the zone of influence of the trees to be removed and recommends that new ground floor slabs within the zone of influence of trees to be removed be suspended or suitably reinforced to withstand shrink/swell ground movement.
- 4.13. It is confirmed that the basement will be founded within the Alluvium and the London Clay. The basement will be formed using sheet piles with 250mm thick Reinforced Concrete liner walls and a 250mm to 300mm thick RC slab. The basement and building will use a piled foundation.
- 4.14. Section 10.1 presents an XDISP assessment to estimate ground movements associated with the basement construction and the resulting damage to neighbouring buildings. The assessment uses the movement curves for installation of a diaphragm wall, and excavation in from of a high stiffness wall. The assessment assumes that the sheet pile will be 11m deep.
- 4.15. The GMA predicts vertical movements of 6mm to 14mm and horizontal movements of 9mm to 15mm caused by installation and excavation. The anticipated damage category for the structures assessed is predicted to be Burland Category 0 (Negligible).
- 4.16. The GMA should include consideration of the impact to the adjacent highway and utilities therein. The BIA indicates that a separate ground movement analysis will be undertaken to assess the impact of the basement on the adjacent Thames Water sewer. The approval or otherwise of this assessment will be the responsibility of the asset owner and is beyond the scope of this audit. However, other utilities and the highway itself should also be considered as part of this GMA. It is noted that the shape of the basement was simplified for the two buildings

assessed in the GMA. This should be revised to reflect the confirmed basement layout and ensure any simplification does not result in an underestimation of ground movements for the highway and utilities therein.

- 4.17. A PDisp assessment has been carried out to assess the vertical movements associated with the bulk excavation to form the basement in the short and long term. The assessment assumes a conservative relationship for drained and undrained Young's Modulus values of $E_u=500c_u$ and $E'=300c_u$ respectively. The analysis calculates 22mm of heave within the basement and recommends that the basement slab be designed to accommodate the long term component of this movement.
- 4.18. The BIA recommends that movement monitoring of the surrounding buildings be undertaken during the construction stages and that condition surveys be undertaken before and after the proposed works.

5.0 CONCLUSIONS

- 5.1. The BIA have been carried out by individuals who possess suitable qualifications.
- 5.2. The BIA has confirmed that the proposed basement will 3.50m bgl and be founded within Alluvium and, where absent, in the London Clay.
- 5.3. The basement footprint should be presented consistently in all documents. A construction method statement and outline structural information are not provided and are requested.
- 5.4. It is accepted that the development will not have a significant impact on the surrounding slopes.
- 5.5. It is accepted that the proposed development will not impact the hydrogeology of the surrounding area. It is likely that shallow ground water perched on the London Clay, will be encountered during basement excavation and will be dealt with using sump pumping.
- 5.6. The basement will be constructed using sheet piles to support excavations in the temporary and permanent case. The building will be supported on piled foundations.
- 5.7. It is proposed to use SuDS measures comprising a blue roof and deep manhole storage to mitigate the run-off from the increase in hard surfaced areas. The proposals will require approval from Thames Water.
- 5.8. A ground movement assessment (GMA) and building damage assessment (BDA) have been undertaken using XDISP software. It is anticipated that damage to adjacent structures will not exceed Burland Category 0 (Negligible). The GMA should be updated to consider the actual basement footprint and include an assessment of the adjacent highway and utilities identified therein.
- 5.9. A GMA considering the adjacent Thame Water asset, which runs along the south-eastern boundary, will be undertaken separately and submitted for approval by the asset owner.
- 5.10. Movement monitoring is proposed during construction.
- 5.11. 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.

Appendix 1: Consultation Responses

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	GMA	Basement proposals should be presented consistently. A construction method statement and outline structural information should be provided.	Open – see 4.5 Open – see 4.5	
2	GMA	The GMA should use the confirmed basement layout The GMA should include consideration of the ground movements impacting the highway and utilities therein.	Open – see 4.5 and 4.16 Open – see 4.16	

Appendix 3: Supplementary Supporting Documents

None

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