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Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 13398-81
Revision: F1

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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 8 Inglewood Road, NW6 1QZ (planning reference 2020/4360/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 (BIA) 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 site currently comprises a three storey terraced property with a partial basement to the front of the property. The proposed development includes deepening of the basement and extension of basement area to the rear of the property.

1.5. The qualifications of the individuals involved in the BIA are in accordance with LBC guidance.

1.6. Screening and scoping assessments are presented, supported by desk study information.

1.7. The qualifications of the individuals involved in the BIA are in accordance with LBC guidance.

1.8. Screening and scoping assessments are presented, supported by desk study information.

1.9. The existing basement floor level, the proposed basement floor level and associated maximum excavation depth and proposed formation level have been confirmed in the BIA.

1.10. A culverted river may be present nearby or even below the site. Adequate mitigation measures to deal with the potential interception of alluvial deposits associated with the river during the basement excavation have been presented in the BIA.

1.11. The impact assessment on the wider hydrogeological environment has been revised and it is accepted that there will not be any adverse impact on it.

1.12. The site is confirmed to have a high risk from surface water flooding. The FRA indicates various mitigation measures to deal with surface water flooding which should be adopted during construction.

1.13. The site is within a critical drainage area and the FRA presented mitigation measures against the potential of increased flow rates into the public sewer. It is noted that the final drainage scheme will require approval by the local flood authority and the owner of the public sewer system present

in the area (Thames Water).

1.14. Geotechnical parameters to inform settlement, retaining wall calculations and foundation design have been presented in the BIA.

1.15. A Ground Movement Assessment (GMA) has been undertaken. The analysis indicates that the anticipated damage from the basement excavation will be within LBC's policy criteria.

1.16. The BIA confirmed that a shrink/swell assessment is not needed for the site.

1.17. Queries and requests for information are summarised in Appendix 2. Considering the additional information presented, the BIA meets the requirements of Camden Planning Guidance: Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 5 February 2021 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 8 Inglewood Road, London NW6 1QZ, Camden Reference 2020/4360/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: Basements. March 2018.
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.

2.4. The BIA should demonstrate that schemes:

a) maintain the structural stability of the building and neighbouring properties;

b) avoid adversely affecting drainage and run off or causing other damage to the water environment;

c) avoid cumulative impacts upon structural stability or the water environment in the local area,

and evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.

2.5. LBC's Audit Instruction described the planning proposal as "*Extension of basement to form 1 x 2 bedroom flat, associated alterations*."

2.6. The Audit Instruction confirmed applicant's property and neighbouring properties are not listed.

2.7. CampbellReith accessed LBC's Planning Portal on 23rd February 2021 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (ref.:18481/BIA_R38), dated September 2020, by Soils Limited;
- Basement Construction Method Statement (ref.: 5492/13/RJ/PG LR1), dated December 2020 by Arcelle Consulting;

- Flood Risk Assessment (ref.: 18846/FRA), dated November 2020 by Soils Limited;
- Arboricultural Impact Assessment (ref.: IGS/8IWR/AIA/01), dated 3rd August 2020, by Landmark Trees.
- Planning Application Drawings consisting of Location Plan, Existing and Proposed Plans, Existing and Proposed Sections dated September 2020 by Iungo Studio.

2.8. CampbellReith issued an initial audit report on 08/03/2021 (NSemb13398-81-080321-8 Inglewood Road-D1) with comments on the above BIA documents.

2.9. In response to the initial audit report and following email exchanges between 15/03/2021 and 16/04/2021, CampbellReith received the revised Basement Construction Method Statement (Rev. B, dated April 2021) and Basement Impact Assessment (rev. 1.02, dated March 2021).

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Document Control Section of the BIA.
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	Section 2, 3 and 4 of the BIA.
Are suitable plan/maps included?	Yes	The assessment is supported by suitable drawings of existing and proposed development and by suitable maps to describe the environmental setting.
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 of the BIA.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3 of the BIA.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3 of the BIA.
Is a conceptual model presented?	Yes	Section 5 of the BIA.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4 of the BIA.
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	Updated in revised submissions.
Is monitoring data presented?	Yes	Section 5.5 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	The BIA confirms that the adjoining properties at 6 and 10 Inglewood Road have similar layout to the applicant's building and similar existing basement underneath.
Is a geotechnical interpretation presented?	Yes	Updated in revised submissions.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 9 of the BIA. Updated in revised submissions.
Are reports on other investigations required by screening and scoping presented?	Yes	Flood Risk Assessment and Arboricultural Impact Assessment presented.
Are the baseline conditions described, based on the GSD?	Yes	

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	Yes	The BIA confirms that the adjoining properties at 6 and 10 Inglewood Road have similar layout to the applicant's building and similar existing basement underneath.
Is an Impact Assessment provided?	Yes	Section 8 and 9 of the BIA.
Are estimates of ground movement and structural impact presented?	Yes	Section 9 and 10 of the BIA.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	Updated in revised submissions. Mitigation measures to deal with the potential presence of softer, shallow soils potentially associated with an historic culverted river on site have been presented in 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	Section 10 of the BIA.
Have the residual (after mitigation) impacts been clearly identified?	Yes	The BIA concludes that residual impacts will be negligible.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	
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	As above.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	
Are non-technical summaries provided?	Yes	Section 11.2 of the BIA.

4.0 DISCUSSION

4.1. The BIA was undertaken by Soils Ltd. The qualifications of the authors are in line with those requested by LBC guidance.

4.2. The site is currently occupied by a three storey property which is part of a terrace along Inglewood Road. There is an existing basement covering part of the footprint of the building, which is accessible via an open air stairwell to the front of the property. The current basement floor level is considered to be at about 2.00m bgl. A row of large mature trees is present along the northern boundary of the site.

4.3. The proposed works comprise the lateral extension and deepening of the existing part basement to cover approximately the entire footprint of the building. The proposed finished basement floor level will be generally at 2.76m bgl, except to the rear, where the finished floor level is proposed at 3.13m below ground level. A formation level of c. 3.20m bgl and 3.60m bgl is anticipated for the two areas respectively. A maximum excavation depth of 3.60m bgl has been assumed in the BIA.

4.4. The LBC Instruction to proceed with the audit confirmed that both applicant's property and neighbouring properties are not listed. The BIA confirms that the adjoining properties at 6 and 10 Inglewood Road have similar layout to the applicant's building and similar existing basement underneath.

4.5. Screening and scoping assessments are presented and informed by desktop study information. Most of the relevant figures/maps from the Arup GSD and other guidance documents are referenced within the BIA to support responses to the screening questions.

4.6. The BIA states that underground infrastructure present beneath/close to the site is limited to simple utilities and no underground tunnels are present near the site. The report confirms that a culverted river (the 'Lost River Westbourne') may be present in close proximity of the site or even below the property.

4.7. A site investigation was undertaken in January 2020 to inform the basement design. A total of one cable percussive borehole (BH1), one window sample borehole (WS1) and two foundation inspection pits (TP1, TP3) were completed. The soil descriptions presented in the logs and the results of in situ and laboratory testing suggest the presence of either Head Deposits or Alluvium below the Made Ground to depths of between 3.00m bgl (BH1) to greater than 4.00m bgl (WS1), potentially associated with the presence of the culverted river.

4.8. Mitigation measures were proposed with regards to the potential interception of soft soil deposits associated with the culverted river during the basement construction. The BIA states that

excavations must be inspected by an experienced geotechnical engineer and, where soft soils are encountered at proposed formation level, the unsuitable soils could be dug out and replaced with mass concrete or granular fill material, compacted to suitable standards. If the soft soil persists to greater depths, making soil replacement unfeasible, the preferred mitigation measure indicated in the updated BIA and Construction Method Statement would be the use of chemical grouting, for which a qualitative method statement is presented. This includes minimum bearing capacity to be achieved with the treatment, recommendations on injected material and methodology, and ground movement monitoring during the operations of resin injections.

4.9. Groundwater was not struck during drilling, however it was monitored between 0.93 and 1.84m bgl during three subsequent monitoring visits. The monitored groundwater levels are above the proposed formation level. The BIA states that groundwater control measures will be required and that localised dewatering may be required to deal with groundwater ingress into the excavation.

4.10. In regard to potential for groundwater rise caused by the basement construction, the revised BIA states that considering the long axis of the footprint of the proposed basement is to be in alignment with existing groundwater flow, there will be only a minor deflection from its original path. In addition, the ground investigation showed the presence of predominantly cohesive soils at the site, which have very low permeability. It is accepted that the potential presence of granular soils of higher permeability would be of only local importance as laterally discontinuous and underlain by an aquiclude (London Clay) and consequently unlikely to create significant flow paths and groundwater raise.

4.11. A Flood Risk Assessment (FRA) has been presented in the BIA. The site is at very low risk from flooding from rivers, seas and reservoirs, and from groundwater, while it is at high risk from surface water flooding. The FRA indicates various mitigation measures to deal with surface water flooding which should be adopted during construction.

4.12. The site is within a Critical Drainage Area. The BIA and the FRA confirmed that impermeable areas of the site will not increase as a result of the proposed development. An outline drainage strategy is presented in Section 5 of the FRA. The FRA recommends the development to utilise a sustainable drainage system (SuDS) to reduce the pressure on the combined sewer network. The SuDS should aim to achieve greenfield run-off rates. It is noted that the final drainage scheme will require approval by the local flood authority and the owner of the public sewer system present in the area (Thames Water).

4.13. An outline construction sequence and outline structural calculations are presented in the Basement Construction Method Statement (BCMS). It is proposed to construct the new basement using traditional reinforced concrete underpinning following a typical ‘hit and miss’ sequence. The sequence confirmed that temporary propping is proposed in the short term and that the new retaining walls will not be cantilevered at any stage.

4.14. Geotechnical parameters to inform settlement, retaining wall calculations and foundation design have been presented in the BIA. The parameters (including bearing capacity value) have been updated according to the amendments of the ground model and are considered reasonable.

4.15. A Ground Movement Assessment (GMA) has been undertaken to demonstrate that ground movements and consequential damage to neighbouring properties will be within LBC's policy requirements. An estimation of heave occurring due to the basement excavation has been included in the GMA. Additional ground movements considered were due to excavation, application of structural loads and to workmanship. The horizontal deflection occurring at the proposed retaining wall has been calculated using the software WALLAP. Clarification on how the horizontal movements have been included in the analysis have been presented in the BIA. The GMA anticipates damages occurring at neighbouring properties to not exceed Category 1 of the Burland Scale as required by the CPG for basements.

4.16. It is confirmed in the GMA and in the BCMS that a ground movements monitoring regime will be implemented throughout construction of the basement, in accordance with current guidance.

4.17. The BIA indicates the London Clay to have a high volume change potential so that the area may be prone to seasonal shrink-swell which can result in foundation movements when located in the vicinity of trees. An Arboricultural Impact Assessment has been presented and the BIA does not recommend any tree removal as part of the development such that there will not be any adverse impact on neighbouring foundations.

5.0 CONCLUSIONS

5.1. The qualifications of the individuals involved in the BIA are in accordance with LBC guidance.

5.2. Screening and scoping assessments are presented, supported by desk study information.

5.3. The existing basement floor level, the proposed basement floor level and associated maximum excavation depth and proposed formation level have been confirmed in the BIA.

5.4. The ground investigation logs suggest the presence of either Head Deposits or Alluvium in the geological sequence and the ground has been updated accordingly.

5.5. A culverted river may be present nearby or even below the site. Adequate mitigation measures to deal with the potential interception of alluvial deposits associated with the river during the basement excavation have been presented in the BIA.

5.6. The impact assessment on the wider hydrogeological environment has been revised and it is accepted that there will not be any adverse impact on it.

5.7. The site is confirmed to have a high risk from surface water flooding. The FRA indicates various mitigation measures to deal with surface water flooding which should be adopted during construction.

5.8. The site is within a critical drainage area and the FRA presented mitigation measures against the potential of increased flow rates into the public sewer. It is noted that the final drainage scheme will require approval by the local flood authority and the owner of the public sewer system present in the area (Thames Water).

5.9. Geotechnical parameters to inform settlement, retaining wall calculations and foundation design have been presented in the BIA and are accepted.

5.10. A Ground Movement Assessment (GMA) has been undertaken. The analysis indicates that the anticipated damage from the basement excavation will be within LBC's policy criteria.

5.11. The BIA confirmed that a shrink/swell assessment in not needed for the site.

5.12. Queries and requests for information are summarised in Appendix 2. Considering the additional information presented, the BIA meets the requirements of Camden Planning Guidance: Basements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
MacLeod	Inglewood Road	29/01/2021	Flood Risk and culverted river	See Sections 4.5., 4.10 – 4.11 of this audit

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA format	The existing basement floor level and the proposed basement floor level should be clearly stated in the BIA to confirm the anticipated maximum excavation depth and formation level.	Closed – See 4.3.	April 2021
2	Ground model	The soil description presented in the ground investigation report and the results of in situ and laboratory testing suggest the presence of either Head Deposits or Alluvium below the Made Ground. This should be clarified and the ground model presented in Section 5.3 updated.	Closed – See 4.5. and 4.7.	April 2021
2	Hydrology Impact Assessment	A culverted river may be present nearby or even below the site. Mitigation measures to deal with the potential interception of alluvial deposits associated with an historic river during the basement excavation should be presented in the BIA.	Closed – See 4.8.	April 2021
3	Hydrogeology Impact Assessment	The impact assessment on the wider hydrogeological environment should be revised considering the potential presence of nearby basements and a revised ground model which could cause a cumulative effect and impact the groundwater level.	Closed – See 4.10.	April 2021
4	Geotechnical interpretation	There is a discrepancy between the BIA and the BCMS report on some geotechnical parameters. This should be clarified. The value for the bearing capacity (110kPa) should be reviewed in the BIA, and the outline structural calculation revised.	Closed – See 4.13.	April 2021
5	Land stability	The GMA should be revised to exclude ground movements due to heave as it this may result in an under-estimation of the category of damage occurring at neighbouring properties. Clarification on the propagation of horizontal movements at the back of the wall is required. Geotechnical parameters adopted in the analysis should be revised according to an updated ground model.	Closed – See 4.14 – 4.17.	May 2021
6	Land stability	The BIA should confirm if any tree is going to be removed as part of the development. If so, a shrink/swell assessment should be presented.	Closed – See 4.18.	April 2021

Appendix 3: Supplementary Supporting Documents

None

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