CampbellReith
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15 Glenmore Road, Belsize, London NW3 4BY

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12466-74

Revision: D1

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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 15 Glenmore Road, Belsize, London NW3 4BY, (planning reference 2017/2153/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 proposed development involves conversion of a single dwelling house into 4 x 2 bed flats; enlargement of existing basement level; creation of rear lightwell and enlargement of existing front lightwell.

1.5. The BIA has been prepared by Ecos Maclean with some of the supporting documents prepared by London Design Office.

1.6. The combined authors' qualifications are in accordance with LBC's requirements for comment on surface flow and flooding and land stability, but insufficient for comment on subterranean flow.

1.7. Desk study information required to inform the BIA process should be provided, including the provision of historical mapping and details of a site walkover, to describe conditions at and local to the site according to the guidance in Appendix G of the GSD.

1.8. The presence or absence of underground infrastructure/services is to be identified in the BIA.

1.9. Non-technical summaries are required against each stage of the BIA, as described in CPG4.

1.10. The site is within an area of Very Low flood risk from surface water, and not in a zone at risk from flooding by rivers, which has been identified within the BIA. A site-specific flood risk assessment is not required.

1.11. Ground and groundwater conditions are based on information gained from various on and off site intrusive investigations, namely 3 foundation inspection pits on site, a borehole drilled to 8.45m bgl at the neighbouring property, 13 Glenmore Road, and historic borehole records from some 300m away. The BIA states that the site is underlain by 1.5m of Made Ground overlying

London Clay. It is stated that a perched water table does not exist at the site, although no groundwater monitoring has been recorded. Considering the proposed construction methodology, further site investigation is required which should include investigation to at least the full depth of proposed foundations with appropriate insitu and laboratory testing and groundwater monitoring.

1.12. The proposed basement is to be constructed by a combination of mass concrete underpinning and reinforced concrete floor to act as retaining structure for adjacent soils. The lightwell is to be constructed as reinforced concrete with floor and side walls acting as restraint of the adjacent soil and pavement. These methodologies should be confirmed as appropriate following further site investigation. Updated geotechnical design parameters and outline retaining wall calculations should also be presented.

1.13. A conceptual site model has been provided but should be updated once further SI to the full depth of proposed foundations and groundwater monitoring data is available.

1.14. Although it is accepted that the depth of underpinning is relatively shallow, between 1.3m and 2.3m, a quantitative ground movement assessment should be provided to include a defined zone of influence due to the proposed development. Damage impacts should be calculated for all structures within the zone, including the highway and any sensitive underground infrastructure (utilities).

1.15. The structural monitoring proposed should be updated, to be linked to the ground movement assessment. It should include trigger values and contingency actions in order to ensure damage impacts are limited to a maximum of Category 1 (Very Slight).

1.16. The BIA states that the proposed development will lead to an increase in impermeable site area so no increase in groundwater flow is anticipated. The drainage assessment states that surface water will be directed into the existing system with no change to off-site discharge flows, and water falling into the proposed lightwells will be returned to the existing drainage system via sump pumps.

1.17. Queries and matters requiring further information or clarification are discussed in Section 4 and summarised in Appendix 2. Until the additional information requested has been provided the requirements of CPG4 have not been met.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 25 April 2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 15 Glenmore Road, Belsize, London NW3, Camden Reference 2017/2153/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:

- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Camden Planning Guidance (CPG) 4: Basements and Lightwells.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.

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; and,

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: *"Conversion of single dwelling house into 4 x 2 bed flats; enlargement of existing basement level; creation of rear lightwell and enlargement of existing front lightwell.*"

2.6. CampbellReith accessed LBC's Planning Portal on 15 May 2017 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment, 15 Glenmore Rd NW3 4BY (ref 16058) dated March 2017 by Ecos Maclean.
- Basement Impact Assessment Appendices 2-4, 5a, 5b & 6, for 15 Glenmore Road, Belsize, London NW3 dated February 2017 by Ecos Maclean and London Design Office.
- Location and Block plan file name A1.100 dated March 2016, by London Design Office.
- Proposed and existing plans, elevations and sections by London Design Office and Ecos Maclean numbered A1109, A1110 GF, A1111 1F, A1112 2F, A1113 3F, A1301, A1302, A1401, A1402, A1X301, dated October 2016 and March 2017.
- Design and Access Statement, 15 Glenmore Road, dated March 2017 by London Design Office.
- No comments and objections to the proposed development from local residents were available at the time of writing.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	Sufficient for surface flow and flooding and land stability comment but insufficient for ground water flow comment.
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	The BIA report and associated appendices considers both temporary and permanent cases.
Are suitable plans/maps included?	No	Historical mapping to evidence desk study required.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	No	As above.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Appendix 6 of the BIA references the LBC GSD guidance. Underground infrastructure in the vicinity should be identified or confirmed to be absent.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	The nearest watercourse to the site is a culverted tributary of the River Tyburn some 70m to the northwest. The site is not underlain by an aquifer and shallow groundwater is not anticipated at the site.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Is a conceptual model presented?	Yes	A conceptual site model is presented in the BIA.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes Yes	
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Hydrogeology screening identified no significant risks associated with groundwater, however groundwater monitoring to confirm the absence of perched water is required. Consideration of the combined impact from this proposal and an adjacent basement proposal at no. 13 is not given.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	The proposed development is not within an area of Flood Risk. A detailed Flood Risk Assessment is not required.
Is factual ground investigation data provided?	No	Three foundation inspection pits were dug inside the building and unlabelled photographs are provided. Site investigation factual and interpretative reports are required as per GSD G2 and G3. Reference is made to a borehole drilled to 8.45m at the adjacent property but no engineers logs or laboratory test data are provided.
Is monitoring data presented?	No	Groundwater monitoring is required.
Is the ground investigation informed by a desk study?	Unknown	The SI is limited in extent.
Has a site walkover been undertaken?	Yes	Reference is made to a Site Walkover Survey in the BIA but insufficient detail is presented.
Is the presence/absence of adjacent or nearby basements confirmed?	No	
Is a geotechnical interpretation presented?	Yes	Design parameters and assumptions are presented in Appendix 4 but not discussed in the BIA text. Considering the proposed underpinning, investigation to at least the full depth of the basement should be undertaken.

Item	Yes/No/NA	Comment
Does the geotechnical interpretation include information on retaining wall design?	Yes	Underpinning and retaining wall methodology in Appendix 5b.
Are reports on other investigations required by screening and scoping presented?	No	Site Investigation information at the adjacent property is not presented.
Are baseline conditions described, based on the GSD?	Yes	Although groundwater levels have not been confirmed.
Do the base line conditions consider adjacent or nearby basements?	No	The report mentions a BIA submitted for the adjacent property at 13 Glenmore Road, but does not consider the cumulative impact of adjacent basements.
Is an Impact Assessment provided?	Yes	However, not all impacts considered.
Are estimates of ground movement and structural impact presented?	No	A quantitative GMA is required. Damage impacts estimated but not evidenced. Monitoring strategy should be linked to the GMA.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	Impact assessment considers flood risk, groundwater issues, drainage and land stability. However, requires revision pending audit queries.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Requires consideration pending audit queries e.g. damage impacts / ground movements.
Has the need for monitoring during construction been considered?	Yes	However, proposals to be updated. Current proposal not sufficient.
Have the residual (after mitigation) impacts been clearly identified?	N/A	To be outlined, as applicable, pending updated assessments.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	GMA requires revision, pending confirmed ground / groundwater conditions.

Item	Yes/No/NA	Comment
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	Drainage assessment required. Groundwater conditions to be confirmed.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	GMA requires revision, pending confirmed ground / groundwater conditions.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, GMA to be revised.
Are non-technical summaries provided?	No	Non-technical summaries against each stage of the BIA are required.

4.0 DISCUSSION

4.1. The proposed development involves conversion of a single dwelling house into 4 x 2 bed flats; enlargement of existing basement level; creation of rear lightwell and enlargement of existing front lightwell.

4.2. The BIA has been prepared by Ecos Maclean with some of the supporting documents prepared by London Design Office. The combined authors' qualifications are in accordance with LBC's requirements for comment on surface flow and flooding and land stability, but insufficient for comment on subterranean flow, in accordance with the requirements of CPG4.

4.3. Reference desk study information provided within the BIA should be in accordance with the GSD Appendix G1. Provision of historical maps, and a description of the site and surrounding properties from a walkover has not been provided. A site walk over is referred to in the screening table in the BIA but insufficient detail is provided of this survey.

4.4. The presence or absence of underground infrastructure/services is to be identified in the BIA.

4.5. Non-technical summaries are required against each stage of the BIA, as described in CPG4.

4.6. The BIA identified that the nearest watercourse to the site is a culverted tributary of the River Tyburn some 70m to the northwest. The site is not underlain by an aquifer and shallow groundwater in hydraulic continuity is not anticipated at the site, however groundwater monitoring to prove the presence or absence of seasonal perched water should be carried out.

4.7. The screening stage identified that the site lies in an area of Very Low flood risk from surface water. The Environment Agency indicates the site not in an area at risk from flooding from rivers. A site-specific flood risk assessment is therefore not required.

4.8. The BIA states that the site lies on Made Ground overlying designated unproductive strata, the London Clay. The London Clay is identified as the bearing formation for the proposed foundations. The site investigation comprised three hand-dug trial pits which encountered Made Ground to some 1.5m bgl over London Clay to the full depth of exploration. This depth was not detailed or the materials encountered described. There is no factual Ground Investigation report included with the BIA, engineering logs or provision of any insitu or laboratory test data. A borehole from an adjacent site is referred to, along with historic BGS borehole information from 300m away, which together form the basis for the determined ground conditions and geotechnical parameters.

4.9. Given that the proposed basement is reliant on underpinning to form some of the structure, a site-specific site investigation should be undertaken. A geotechnical assessment in line with the GSD Appendix G3 should be presented.

4.10. Groundwater was not detected in the trial pits which terminated at an unknown depth and no standpipe installation or subsequent water monitoring was carried out. It is accepted that any water held in the London Clay is likely to be held in discrete units and not be laterally continuous. However, perched water may exist in the London Clay, and also within Made Ground. Additional site investigation is required.

4.11. Following further site investigation and groundwater monitoring the BIA should be updated, to include any requirements for temporary dewatering during construction, permanent waterproofing requirements, and any potential impacts to neighbouring properties / basements and cumulative effects of adjacent basements.

4.12. The screening and scoping stage does not consider the potential for seasonal shrink swell subsidence in the London Clay at the site. The BIA does not state if trees are required to be felled as part of the proposal, although an arboricultural report is included in the provided documents. This should be referred to in the BIA. As 4.6 and 4.7, insitu testing to confirm geotechnical properties should be undertaken.

4.13. The scheme utilises mass concrete underpinning and reinforced concrete floors for the basement construction and reinforced concrete for the lightwell, with floor and side walls acting as restraint of the adjacent soil and pavement. Construction methodology and sequencing is outlined in the BIA appendices. Whilst geotechnical design parameters are presented these should be confirmed following additional site investigation.

4.14. Temporary works and propping arrangements are detailed in the Construction Method Statement (CMS). These are generally considered appropriate, pending clarification of the construction methodology as described in 4.11 and confirmation of ground conditions following further site investigation. Propping and sequencing drawings of the temporary works should be provided. Methodologies for groundwater control should be updated, if required.

4.15. The BIA includes an estimated damage impact assessment indicating the maximum damage predicted for adjacent properties and the highway is Burland Category 1 (Very Slight). Although it is accepted that the depth of underpinning is relatively shallow, between 1.3m and 2.3m, a quantitative ground movement assessment should be provided. A contour plan in accordance with CIRIA C580 should be presented, identifying the load bearing walls, the movements along them and the consequential predicted damage. Damage impacts should be calculated for all structures within the zone of influence, including the highway and any sensitive underground infrastructure (utilities).

4.16. The damage assessment states that 'if the design and construction method is followed' cracking of the adjoining party wall will be no more than Category 1 on the Burland Scale. Considering that ground conditions have not yet been proven across the full depth of the proposed underpinning, this is not considered reasonably conservative. Following further site investigation, the settlement / movements generated by underpinning should be re-assessed. If a specialist underpinning contractor is to be appointed, their review of the scheme and their confirmation of predicted ground movements would be beneficial.

4.17. The structural monitoring proposed should be updated, to be linked to the ground movement assessment. It should include trigger values and contingency actions in order to ensure damage impacts are limited to a maximum of Category 1 (Very Slight). Currently it is proposed to stop works and review construction methodology if 5mm cracks to party walls are observed. This would indicate Category 3 (Moderate) damage, which is not acceptable. Alternately movement monitoring is proposed, with construction methodology reviewed if 5mm of movement is observed. However, this has not been considered in relation to any predicted ground movements and therefore does not demonstrate that damage will be limited to an acceptable level.

4.18. The BIA indicates there will be an increase in impermeable site area due to the proposed development and proposes utilising the existing site drainage system, with use of sump pumps in proposed lightwells. In accordance with CPG4, section 3.51, a drainage assessment considering the implementation of attenuation SUDS should be presented.

4.19. A conceptual site model is presented but should be updated to collectively identify ground and groundwater conditions, extent and form of the proposed basement, proximity of sensitive buildings and infrastructure, and annotated identifying potential risks, impacts and mitigation measures should be presented.

5.0 CONCLUSIONS

5.1. The proposed development involves conversion of a single dwelling house into 4 x 2 bed flats; enlargement of existing basement level; creation of rear lightwell and enlargement of existing front lightwell.

5.2. The BIA has been prepared by Ecos Maclean with some of the supporting documents prepared by London Design Office. The combined authors' qualifications are in accordance with LBC's requirements for comment on surface flow and flooding and land stability, but insufficient for comment on subterranean flow.

5.3. Desk study information, including historical mapping and a site walkover to assess conditions at and local to the site, should be provided. Underground infrastructures / utilities information is required.

5.4. The site is located within an area of Very Low flood risk from surface water and as such a site-specific flood risk assessment is not required.

5.5. Insufficient site investigation has been undertaken. Further site investigation should be provided to at least the proposed depth of foundations, with appropriate insitu and laboratory testing and monitoring of groundwater levels.

5.6. The construction methodology, including temporary and permanent works, geotechnical design parameters and outline retaining wall calculations should be provided, following additional site investigation.

5.7. A quantitative ground movement assessment and damage impact assessment should be provided, following further site investigation and confirmation of construction methodology. Any revision should identify a zone of influence, assess defined structural walls, assess the short and long-term heave effects separately and take a 'reasonably conservative' approach. Impact on adjacent basements and cumulative impact of adjacent basements to be considered.

5.8. A drainage assessment to consider the implementation of attenuation SUDS, in accordance with LBC guidance, should be provided.

5.9. A conceptual site model which collectively identifies ground and groundwater conditions, extent and form of the proposed basement, proximity of sensitive buildings and infrastructure, and annotated identifying potential risks, impacts and mitigation measures should be presented.

5.10. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the additional information requested has been provided the BIA does not meet the requirements of CPG4.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA	Desk Study information and assessment – historical mapping, site walkover and services information.	Open – to be provided as 4.3, 4.4.	
2	BIA	Non-technical summaries.	Open – to be provided as 4.5.	
3	Stability / Hydrogeology	Site specific investigation required – including insitu testing and groundwater monitoring.	Open – to be provided as 4.9, 4.10, 4.11.	
4	Hydrogeology	Temporary dewatering, waterproofing, impacts to neighbouring basements and cumulative impact of adjacent basements.	Open – to be provided as 4.11.	
5	Stability	Geotechnical parameters.	Open – to be provided as 4.13.	
6	Stability	Temporary works methodologies to be confirmed and updated, if required, following additional site investigation to include further mitigation.	Open – to be provided as 4.14.	
7	Stability	Seasonal shrink swell subsidence and arboriculturalist recommendations.	Open – to be provided as 4.12.	
7	Stability	Ground movement and damage impact assessments – to be revised.	Open – to be provided as 4.15 to 4.17.	
8	Hydrology	Attenuation SUDS Assessment in accordance with CPG4 3.51.	Open – to be provided as 4.18.	
9	BIA	Conceptual Site Model.	Open – to be provided as 4.19.	

Appendix 3: Supplementary Supporting Documents

None