CampbellReith
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The Coach House, 50A Belsize Square, London NW3

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12466-91

Revision: D1

August 2017

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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 The Coach House, 50A Belsize Square, London NW3 4HN (planning reference 2017/3348/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 comprises the demolition of the existing dwelling and the erection of a new dwelling including excavation of a basement level. The basement will be 3.5m deep from the existing pavement level and it will extend beneath the entire building footprint, beneath the front driveway and into the rear garden by approximately 5.0m.

1.5. The BIA has been prepared by Geotechnical & Environmental Associates (GEA) and the qualifications of the authors are in accordance with LBC guidance.

1.6. The BIA includes the majority of the information required from a desk study in line with LBC guidance. However, utility companies should be approached with regards to underground infrastructure which may be within the development's zone of influence. A private sewer is identified, that serves the site and the adjacent 50 Belsize Park.

1.7. A site investigation indicates the underlying ground conditions to comprise Made Ground overlying London Clay. However, the BIA recommends further investigation in advance of construction due to the presence of soft clay at the front of the house to a depth of 4.0m below ground level.

1.8. Monitoring data indicates that inflows of perched water are likely to be encountered during construction. The BIA recommends that further trial excavations are undertaken to confirm the likely groundwater conditions, which should be undertaken to inform temporary works designs. It is accepted that the development will not impact upon the wider hydrogeological environment.

1.9. It is accepted that the site is not in a Flood Risk Zone and is at low risk of flooding. Flood risk mitigation measures should be provided, as described.

1.10. The site is within a Critical Drainage Area (Group 3-005). The development will not increase the impermeable site area or impact the wider hydrological environment.

1.11. Retaining wall design has been referred to in the BIA but construction method is not confirmed and no structural calculations have been provided. Outline retaining wall design information should be presented. Outline permanent and temporary works proposals should be provided including sequencing and propping arrangements. The requirement for groundwater control should be considered, including any potential stability impacts.

1.12. The BIA states that basement formation level will be 3.5m below pavement level, but recommends that it is deepened to 4.0m to avoid founding in soft clay. The final founding levels should be confirmed.

1.13. An outline construction programme should be provided.

1.14. The Ground Movement Assessment (GMA) identifies some of the potentially sensitive structures within the zone of impact of the proposed development, which includes neighbouring buildings but does not include the garden / boundary retaining walls, sewer or highway. For the structures assessed, Category 0 to 1 (Negligible to Very Slight) damage is predicted in accordance with the Burland Scale. Confirmation of any impacts to garden / boundary retaining walls should be provided.

1.15. The site investigation identifies the foundation depth of the adjacent 50 Belsize Park, but it is unclear if this is the level used within GMA calculations.

1.16. Once a final founding level has been established, the results of the GMA and damage assessment should be confirmed. These should also consider the confirmed construction method, foundation levels of adjacent structures and the effects of dewatering.

1.17. A structural monitoring strategy should be presented, including proposed trigger values and contingency actions.

1.18. A conceptual site model should be presented which indicates the potential risks and impacts due to the proposed development in the context of the surrounding ground and groundwater conditions and adjacent structures, clearly indicating existing and proposed foundation levels, ground levels across the site, foundation levels of adjacent structures and retaining walls.

1.19. 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 21 July 2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for The Coach House, 50A Belsize Square, London NW3 4HN, Camden Reference 2017/3348/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 Planning Portal describes the planning proposal as: "*Demolition of dwelling and erection of new dwelling including rear extension, raised mansard roof and excavation of basement level*."

The Planning Portal also confirmed that the site lies within Belsize Park Conservation Area but that the proposal did not involve a listed building. To the south of the site (opposite) is the Church of St Peter, a Grade II listed building.

2.6. CampbellReith accessed LBC's Planning Portal on 10th August 2017 and gained access to the following relevant documents for audit purposes:

- Desk Study and Ground Investigation Report (including basement impact and ground movement assessments) (ref J17062) dated June 2017 by GEA Ltd.
- Application Drawings – Existing and Proposed plans of floor plans, elevations and sections dated May 2017 by Studio Gil Ltd.
- Design and Access Statement dated May 2017 by Studio Gil Ltd.
- Heritage Statement dated May 2017 by Studio Gil Ltd.
- Comments and objections to the proposed development from local residents.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	The qualifications of the authors of the BIA prepared by GEA are in accordance with CPG4 guidelines.
Is data required by Cl.233 of the GSD presented?	No	Underground infrastructure which may be within the development's zone of influence should be confirmed. Outline construction programme should be presented.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	No	Formation kevel and construction method to be confirmed. Structural Calculations, drawings and further temporary works information required to confirm sequence, propping and dewatering.
Are suitable plans/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?	No	BIA Report, Section 3.1.2. Utility searches to be presented. Impacts to the western boundary should be considered. The north-western elevation of the existing house also appears to be retaining the adjacent private rear gardens which are approximately 1.5m below the top of the brick wall in the rear courtyard.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Report, Section 3.1.1.
Hydrology Screening:	Yes	BIA Report, Section 3.1.3.

Item	Yes/No/NA	Comment
Have appropriate data sources been consulted? Is justification provided for 'No' answers?		
Is a conceptual model presented?	No	This should indicate the changes between the existing and proposed development, in the context of ground and groundwater conditions and adjacent structures, annotated to highlight potential risks and impacts.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	No	BIA Report, Section 4.1. The basement is within 5m of the highway and presence of utilities should be confirmed, and impacts assessed if relevant. The development will increase the foundation depths relative to the neighbouring properties. Consideration of retaining wall on western boundary required.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	The BIA did not identify any issues relating to subterranean flow within the screening process. The site investigation has confirmed that there is a significant thickness of Made Ground at the front of the house and a limited thickness at the rear which overlies the London Clay. Groundwater has been measured at 0.65m at the rear of the house.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	The site is located within a Critical Drainage Area but not within a Local Flood Risk Zone.
Is factual ground investigation data provided?	Yes	BIA Report, Section 4.
Is monitoring data presented?	Yes	BIA Report, Section 5.3.
Is the ground investigation informed by a desk study?	Yes	BIA Report, Section 2.
Has a site walkover been undertaken?	Yes	

Item	Yes/No/NA	Comment
Is the presence/absence of adjacent or nearby basements confirmed?	No	BIA Report, Section 9.1.1 – assumes surrounding structures do not have basements and are founded at 1.0m bgl with the exception of 50 Belsize Square which is known to have a basement beneath the entire footprint of the main house at 3.5m bgl.
Is a geotechnical interpretation presented?	Yes	BIA Report, Sections 5 and 8.
Does the geotechnical interpretation include information on retaining wall design?	No	BIA Report, Section 8. Retaining wall options discussed but construction method not confirmed.
Are reports on other investigations required by screening and scoping presented?	No	Construction methodology, structural calculations etc required.
Are baseline conditions described, based on the GSD?	No	Confirmation of formation level, construction method etc required.
Do the base line conditions consider adjacent or nearby basements?	Yes	However, levels between buildings / foundation unclear.
Is an Impact Assessment provided?	Yes	BIA Report, Section 10. However, not all potential impacts considered.
Are estimates of ground movement and structural impact presented?	Yes	BIA Report, Section 9. However, these should be confirmed pending confirmation of formation level, construction method and temporary works. Foundation levels should be confirmed in the CSM.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	It does not address potential stability impacts to western boundary or the effects of groundwater on construction stability. Confirmation of formation level, construction method required.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Confirmation of formation level, construction methodology, temporary works etc required. Impacts to retaining walls to be considered.

Item	Yes/No/NA	Comment
Has the need for monitoring during construction been considered?	No	BIA Report, Section 9. Insufficient detail. Outline strategy including trigger levels required.
Have the residual (after mitigation) impacts been clearly identified?	No	To be further assessed, as applicable.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Confirmation of formation level, construction methodology, temporary works, structural calculations etc required. Impacts to retaining walls, sewers, highway, utilities etc to be considered.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	The development will not increase the impermeable area.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Confirmation of formation level, construction methodology, temporary works, structural calculations etc required. Impacts to retaining walls, sewers, highway, utilities etc to be considered.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	BIA Report, Section 9.3. To be confirmed pending confirmation of scheme formation level, construction methodology etc.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The BIA has been prepared by Geotechnical & Environmental Associates (GEA) which includes the desk study, screening and scoping, site investigation, ground movement assessment and impact assessment. The qualifications of the authors are in accordance with CPG4 guidelines.

4.2. The proposal is to demolish the existing three storey dwelling on site and construct a new four storey house with a new single level basement. The new basement will be 3.5m deep from the existing pavement level and will extend beneath the entire building footprint, beneath the front driveway and into the rear garden by approximately 5.0m. It is proposed that the new house will be supported by means of a new raft foundation.

4.3. The BIA includes the majority of the information required from a desk study in line with the GSD Appendix G1. However, utility companies have not been approached with regards to underground infrastructure which may be within the development's zone of influence. The presence of utilities should be confirmed, and impacts assessed if relevant. A private sewer is identified, that serves the site and the adjacent 50 Belsize Park.

4.4. A site investigation was undertaken by GEA in March 2017 comprising one 18m borehole, one window sampler borehole, one shallow trial pit and the installation of two groundwater monitoring standpipes. The ground conditions comprise a relatively significant thickness of Made Ground at the front of the house and a limited thickness of Made Ground at the rear. London Clay was encountered below the Made Ground to the full depth investigated. The relative elevations of ground level / strata are unclear in the context of the existing and proposed development, highway level and adjacent structures.

4.5. The site investigation identified soft clay at the front of the site, extending to 4.0m below ground level (bgl). The BIA recommends that the proposed basement formation is deepened to avoid founding within the soft clay. The final founding levels should be confirmed.

4.6. Groundwater was not encountered in BH1 during drilling but was encountered at a depth of 1.0m in BH2. Groundwater has subsequently been measured at a shallowest depth of 0.65m at the rear of the house (BH2) and rising head tests indicate a "fast" inflow of water could be expected into excavations. The data is presented in an interpretative report broadly in accordance with the GSD Appendix G3.

4.7. The BIA recommends that further trial excavations are undertaken once the existing building has been demolished to confirm the likely groundwater conditions. These would also confirm the lateral extent and depth of the soft clay identified. These should be undertaken to inform temporary works designs, including any dewatering requirements.

4.8. It is accepted that the development will not impact upon the wider hydrogeological environment. However, potential stability impacts should be considered and mitigated against in any temporary dewatering strategy.

4.9. The Screening and Scoping assessments are generally accepted. However, potential impacts to the western boundary garden walls should be considered, which appear to retain the higher ground to the west. The north-western elevation of the existing house also appears to be retaining the adjacent private rear gardens which are approximately 1.5m below the top of the brick wall in the rear courtyard.

4.10. The current Environment Agency and Camden SFRA data indicates that the site is at "low" risk of flooding (between 0.1% and 1%). There are no records of flooding at the site although Belsize Park Gardens to the north of the site did flood in 1975. It is understood that a positive pumped device will be installed in the basement in order to further protect the site from sewer flooding. Standard flood risk mitigation measures, such as elevated thresholds and suitable drainage, should be adopted within the final design.

4.11. The site is within a Critical Drainage Area (Group 3-005) but not within a Local Flood Risk Zone. The development will not increase the impermeable site area.

4.12. Retaining wall design has been referred to in the BIA but construction method is not confirmed. Retaining wall options presented include forming reinforced concrete walls in an "underpinning" sequence or bored pile walls. Construction method should be confirmed and outline permanent and temporary works proposals should be provided including final formation level, sequencing and propping arrangements. The requirement for groundwater control should be considered, including any potential stability impacts

4.13. An outline construction programme should be presented.

4.14. Outline retaining wall calculations should be provided, plus any requirements to mitigate the effects of heave.

4.15. The Ground Movement Assessment (GMA) identifies some of the potentially sensitive structures within the zone of impact of the proposed development, which includes neighbouring buildings but does not include the boundary retaining walls. For the structures assessed, Category 0 to 1 (Negligible to Very Slight) damage is predicted in accordance with the Burland Scale.

4.16. The site investigation identifies the foundation depth of the adjacent 50 Belsize Park, but it is unclear if this is the level used within GMA calculations.

4.17. Once a final founding level has been established, the results of the GMA and damage assessment should be confirmed. These should also consider the confirmed construction method, foundation levels of adjacent structures and the effects of dewatering.

4.18. A structural monitoring strategy should be presented, including proposed trigger values and contingency actions.

4.19. A conceptual site model should be presented which indicates the potential risks and impacts due to the proposed development in the context of the surrounding ground and groundwater conditions and adjacent structures, clearly indicating existing and proposed foundation levels, ground levels across the site, foundation levels of adjacent structures and retaining walls.

4.20. Queries and matters requiring further information or clarification are summarised in Appendix 2.

5.0 CONCLUSIONS

5.1. The qualifications of the authors are in accordance with CPG4 guidelines.

5.2. Underground infrastructure should be identified and any potential impacts assessed, if applicable. A private sewer is noted on / adjacent to the site.

5.3. A site investigation has confirmed the underlying ground conditions to comprise Made Ground overlying London Clay. Soft clay has been identified to 4.0m bgl at the front of the site. Groundwater is likely to be encountered during basement construction works. The BIA recommends additional investigation prior to construction.

5.4. The formation level is stated as being 3.5m bgl. However, the BIA recommends deepening formation level below the soft clay identified. A final formation level should be confirmed.

5.5. Construction method should be confirmed and outline permanent and temporary works proposals should be provided. The requirement for groundwater control should be considered, including any potential stability impacts

5.6. Outline retaining wall calculations should be provided, plus any requirements to mitigate the effects of heave.

5.7. An outline construction programme should be provided.

5.8. It is accepted that the site is at low risk of flooding. Standard flood risk mitigation measures should be adopted.

5.9. The development will not increase the impermeable site area. It is accepted that the development will not impact the wider hydrogeological and hydrological environments.

5.10. The results of the GMA and damage assessment should be confirmed, considering a confirmed construction methodology, temporary works, formation level and foundation levels of adjacent structures. Impacts to retaining structures, the highway and utilities should be assessed.

5.11. A structural monitoring strategy should be presented, including proposed trigger values and contingency actions.

5.12. A conceptual site model should be provided.

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

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Prior and Warman	10 Belsize Park	16th July 2017	Concerns about western boundary of site which backs onto their garden.	Chapter 4
Lynch	Flat 2, 50 Belsize Square	17th July 2017	Concerns about potential structural problems.	Chapter 4
Moore and Davies	Flat 5, 50 Belsize Square	28th July 2017	Concerns about potential structural problems	Chapter 4
Levy	Flat 1, 50 Belsize Square	28th July 2017	Highlighting absence of Flood Risk Assessment and draft Construction Management Plan	Chapter 4
Santangelo	Flat 2, 50 Belsize Square	28th July 2017	Highlighting absence of Flood Risk Assessment and draft Construction Management Plan	Chapter 4
French	Flat 4, 50 Belsize Square	2nd August 2017	Concerns about drainage and the garden retaining wall	Chapter 4

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	Desk Study	Identify underground infrastructure within proposed development's zone of influence. Assess impacts, if applicable.	Open	
2	Desk Study	Outline Construction programme to be provided.	Open	
3	Land Stability	Further trial excavations and monitoring to be undertaken once the existing building has been demolished to confirm the ground / groundwater conditions.	Note Only – to confirm design assumptions	N/A - to be undertaken in advance of construction
4	Land Stability	Formation level to be confirmed	Open	
5	Land Stability	Construction methodology to be confirmed. Permanent and temporary works information, including loads, retaining wall design calculations, foundations assessment, dewatering, etc, to be clarified.	Open	
6	Land Stability	GMA and damage impact assessment – to be confirmed once formation level, methodology, temporary works etc considered. Retaining structures, highway, utilities to be considered. Differences in levels, foundation elevations etc to be confirmed.	Open	
7	Land stability	Structural monitoring scheme to be outlined, including trigger values and methodologies	Open	
8	BIA	Conceptual site model – providing context of the development and highlighting potential risks and impacts; clarify existing and proposed elevations, as well as neighbouring structures" foundation elevations, ground and groundwater conditions, etc.	Open	

Appendix 3: Supplementary Supporting Documents

None

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