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22 Lawn Road, London, NW3 2XR

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 13693-49
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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 22 Lawn Road London NW3 2XR (planning reference 2021/6049/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 has been carried out by Morph Structures and Card Geotechnics Limited (CGL) and the individuals concerned in its production have suitable qualifications as per CPG: Basements.

1.5. The desk study and ground investigation has identified the presence of Made Ground overlying the London Clay Formation. No groundwater monitoring was undertaken, however perched water is present within the Made Ground.

1.6. The basement will be formed using mass concrete underpinning. Clarification is provided to the sequence of underpin construction and the maximum width of each underpin bay/section.

1.7. It is accepted that the development will not impact on the wider hydrology or hydrogeology of the area and is not in an area subject to flooding. It is accepted that the development will not impact the slope stability of the surrounding area.

1.8. A Ground Movement Assessment (GMA) was carried out and resulting building damage assessment indicate a maximum Damage Category 1 (Very Slight) on the Burland Scale.

1.9. The GMA considers the impact of local deepening of excavations, by a sensitivity analysis for the different founding stratum. The findings conclude there to be negligible difference.

1.10. Trigger values for both vertical and horizontal movements have been proposed as part of a movement monitoring strategy for neighbouring structures.

1.11. The Belsize Railway tunnel runs underneath the site and a combined sewer runs beneath the existing garage ground floor. Relevant asset owners may require further damage or ground movement assessments to satisfy their requirements and agree asset protection criteria.

1.12. Based on the revised submission provided, it can be confirmed that the BIA complies with the requirements of CPG: Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on Date to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 22 Lawn Road, NW3 2XR and Planning Reference - 2021/6049/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.

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 *"Excavation to extend existing lower ground floor garage, replacement of existing rear extension with full width, single storey rear extension with roof lights, raising of garden floor level, replacement of front, rear and side fenestration."*

2.6. The Audit Instruction confirmed 22 Lawn Road, NW3 2XR, was directly adjacent to a listed building.

2.7. CampbellReith accessed LBC's Planning Portal on 30/03/2022 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA) by Morph Structures, ref. 3197, rev P1, dated December 2021.
- Basement Impact Assessment by Card Geotechnics Limited (presented in Appendix C of the Morph BIA), ref. CG/39038, rev 0, dated December 2021.
- Architectural Drawings by Lorenzo Corti Architects, comprising existing and proposed plans and sections, and a site location plan, all dated 10 December 2021
- Design & Access Statement by Lorenzo Corti Architects, dated December 2021

2.8. CampbellReith were provided with the following documents to address the queries, in July 2022:

- Basement Impact Assessment Report (BIA) by Morph Structures, ref. 3197, rev P3, dated July 2022.
- Basement Impact Assessment by Card Geotechnics Limited (presented in Appendix C of the Morph BIA), ref. CG/39038, rev 1, dated June 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?	Yes	Underpin construction sequence is provided in the revised submission.
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 4.3 of CGL Report
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 4.2 of CGL Report
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 4.4 of CGL Report
Is a conceptual model presented?	Yes	Described in Section 7.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 5.0 of CGL Report

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	No responses taken forward to scoping.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	No responses taken forward to scoping.
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	No	No groundwater readings provided.
Is the ground investigation informed by a desk study?	Yes	Section 2 and 3 of CGL Report
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Section 7.4 of the CGL Report
Is a geotechnical interpretation presented?	Yes	Section 7.5 of the CGL Report, however parameters for the London Clay are assumed based on published data.
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	No	
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	Section 9.0 of the CGL Report

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	Section 8.0 of the CGL Report
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Monitoring is recommended and the trigger values do reflect the results of the ground movement assessment.
Has the need for monitoring during construction been considered?	Yes	Section 7.4 of Morph Structures
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?	Yes	Section 8.9 of the CGL Report.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	No significant impact to hydrological and hydrogeological environment.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Section 8.9 of the CGL Report.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by Morph Structures and Card Geotechnics Limited (CGL) and the individuals concerned in its production have suitable qualifications as per CPG: Basements.

4.2. The LBC Instruction to proceed with the audit identified that the basement proposal is adjacent to Grade 1 listed buildings - Isokon Flats. The Design & Access Statement identified that 22 Lawn Road is located in the Parkhill Conservation Area, part of the nineteenth century London suburb of Belsize.

4.3. The proposed development comprises the extension of the lower ground rear garage space towards the existing building and demolition of a conservatory which is to be replaced by a single storey extension. The existing building has a void beneath a timber deck present at the ground floor level. The proposed basement will be formed using mass concrete underpins and the maximum excavation is given as 2.99m.

4.4. A Ground Investigation was undertaken by CGL and comprised 5 trial pits to a depth of c.1.2m bgl. A window sample to a depth of 5.00m was proposed but did not gain approval by Network Rail due to the presence of the Belize Railway tunnel beneath the site.

4.5. The Ground Investigation identified the presence of Made Ground to a depth of c. 0.80m bgl, overlying the London Clay Formation. Despite the limited amount of London Clay encountered, the descriptions provided are considered reliable and historic BGS borehole records support the presence of this stratum extending to depth. No groundwater was recorded during the investigation, but the possibility of perched water present within the Made Ground has been identified.

4.6. The screening for hydrogeology, surface flow and flooding were consistent, and no matters were taken forward to scoping. It is accepted that the development will not impact on the wider hydrology or hydrogeology of the area and is not in an area subject to flooding.

4.7. It is accepted that the proposed development will not have a significant impact on the slope stability of the area.

4.8. The screening and scoping for land stability identified the presence of the Belize tunnel approximately 8.00m below the site, need for site investigation and an increase in differential foundation depth with neighbouring properties.

4.9. The proposed basement will be formed with a suspended 250mm reinforced concrete slab with local thickenings to 500mm along the perimeter, to support loads from the new retaining walls, and in the middle to support the blockwork wall.

4.10. Due to the presence of an existing basement, the existing retaining wall at 23 Lawn Road will only require partial underpinning to a depth of 0.35m at the rear and 1.91m at the front. The party wall at 21 Lawn Road will be underpinned to a depth of 1.33m and the walls at 23 Lawn Road will be underpinned to a depth of 1.91m.

4.11. Appendix B of the CGL BIA provides a load taken down and a general construction sequence for the basement. These drawings are also provided in Appendix A of the Morph BIA. Drawings within the revised Morph BIA are updated to be consistent with the CGL BIA, and confirm the underpinning sequence to be undertaken

4.12. Geotechnical parameters for the Made Ground and London Clay are presented in Section 7.5 of the CGL Report. Parameters for the London Clay have been taken from published data and are considered to be moderately conservative.

4.13. A Ground Movement Assessment (GMA) has been undertaken and is presented in Section 8 of the CGL BIA. The GMA uses Pdisp software to calculate vertical ground movements associated with the development in the short and long term. In addition, 5mm vertical movement has been included to represent ground movements due to the construction process for the underpins.

4.14. Made Ground is not considered an appropriate founding stratum for the development. However, clarification is provided regarding the founding stratum for the underpins and basement retaining walls. Section 8.2 of the Morph BIA states the underpins will founded within the London Clay. Additionally, a sensitivity analysis is undertaken in the CGL BIA to the different formation levels of the underpins and has concluded it has a negligible effect on the predicted displacements.

4.15. An updated Building Damage Assessment is provided by CGL. A PDisp assessment is undertaken to calculate vertical ground movement in the short and long term with the input of structural loading and movements due to workmanship being considered in the assessment.

4.16. Critical sections are defined as walls perpendicular to the excavation, of which four are identified; two across 23 Lawn Road, one across 21 Lawn Road, and the rear private road.

4.17. In order to limit damage to Category 1 (Very Slight) of the Burland Scale, the net horizontal movement is limited to 3.5mm across the length of the adjacent building, with 5mm of movement at the basement wall. A high support stiffness construction methodology is to be used and Section 7.2 of the Morph BIA provides details of the temporary support system to be used to support the basement excavation.

4.18. Section 8.10 of the CGL Report presents predicted movements the Belsize Tunnel. A combined sewer is present below the existing garage ground floor. This audit addresses the GMA for

neighbouring buildings only, Network Rail and Thames Water may require separate assessment to satisfy their requirements and agree asset protection criteria.

4.19. The need for a movement monitoring strategy during excavation and construction is identified and specified in Section 7.4 of Morph Structures report. The monitoring trigger levels are revised to reflect the vertical and horizontal movements predicted/assumed in the GMA and BDA. A 'traffic light' system of green (<3mm), amber (3-5mm) and red trigger (>5mm) values will be set for horizontal movements and green (<4mm), amber (4-7mm) and red trigger (>7mm) values for vertical movements.

5.0 CONCLUSIONS

5.1. The BIA has been carried out by Morph Structures and Card Geotechnics Limited (CGL) and the individuals concerned in its production have suitable qualifications as per CPG: Basements.

5.2. The desk study and ground investigation has identified the presence of Made Ground overlying the London Clay Formation. No groundwater monitoring was undertaken, however perched water is present within the Made Ground.

5.3. It is accepted that the development will not impact on the wider hydrology or hydrogeology of the area and is not in an area subject to flooding. It is accepted that the development will not impact the slope stability of the surrounding area.

5.4. The basement will be formed using reinforced concrete retaining walls and a suspended ground floor slab with local thickenings to withstand structural loads.

5.5. The neighbouring retaining walls are to be underpinned to a maximum depth of 1.91m bgl. Clarification is provided regarding the sequence of underpin construction and the maximum width of each underpin bay/section.

5.6. Confirmation of the underpin founding stratum is provided and a sensitivity analysis is presented within the Ground Movement Assessment (GMA) to consider the impacts of any local deepening of excavations. The findings state the predicted displacements are less than 0.1mm.

5.7. Additional information is provided to support the use of 3.5mm horizontal movement in the GMA.

5.8. The building damage assessment carried out indicates damage to be within Category 1 (Very Slight) of the Burland Scale.

5.9. Relevant infrastructure asset owners may require a detailed damage assessment to satisfy their requirements and agree asset protection criteria.

5.10. Based on the additional information provided it can be confirmed that the BIA complies with the requirements of CPG: Basements.

Appendix 1: Consultation Responses

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Pedley & Dunn	21 Lawn Road	17/03/22	Possible instability due to nearby excavations	An updated ground movement assessment and construction sequence have been submitted and the subsequent damage assessment has confirmed damage to neighbouring properties will not exceed Category 1. A high support stiffness methodology is to be used in conjunction with a temporary propping scheme, to ensure movements will not exceed those predicted.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Land Stability	Clarification of the founding strata for the mass concrete underpins and basement retaining walls is required.	Closed	27/07/2022
2	Land Stability	A construction sequence for the underpin sections is requested, along with confirmation of the maximum section length.	Closed	27/07/2022
3	Land Stability	Supporting information to justify the use of 2mm horizontal movement in the Ground Movement Assessment (GMA) should be provided or the GMA updated to consider appropriately conservative horizontal movement estimates. The GMA should include consideration of any local deepening required to reach an appropriate founding stratum.	Closed	27/07/2022
4	Land Stability	The Building Damage Assessment should be updated to reflect any changes to the GMA.	Closed	27/07/2022
5	BIA Consistency	The Morph BIA and CGL BIA should present consistent information regarding the ground movement assessment, damage category, monitoring trigger levels and basement founding stratum.	Closed	27/07/2022
6	Land Stability	The monitoring trigger levels should be updated to reflect the results of the GMA.	Closed	27/07/2022

Appendix 3: Supplementary Supporting Documents

None

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