CampbellReith
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7 Greenaway Gardens, London NW3 7DJ

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 13398-86

Revision: D1

May 2021

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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 7 Greenaway Gardens, London NW3 7DJ (planning reference 2021/0250/P). The basement is considered to fall within Category C 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 BIA has been prepared by Geotechnical & Environmental Associates Ltd with supporting documents by engineersHRW Ltd. The authors' qualifications are in accordance with LBC guidance.

1.5. The site is occupied by a two-storey detached property with a lower ground floor under one third of the building footprint. The proposed development extends the lower ground floor to the whole footprint of the main house, continues under parts of the garden and into the redeveloped extension structures to the rear.

1.6. The BIA includes the majority of the information required from a desk study in accordance with LBC guidance. Utilities and underground infrastructure in the vicinity of the site should be identified. An outline construction programme should be provided.

1.7. Clarification is requested on the Screening response in regard to removal of trees, with the BIA text contradicting the Arboricultural report, and assessment of any resulting impacts provided.

1.8. A site investigation indicates the ground conditions to comprise Made Ground over the Claygate Member and London Clay Formation.

1.9. Groundwater was monitored at depths of between 1.18m and 2.14m below ground level, interpreted to represent limited volumes of perched water within sandier horizons of the Claygate Member. Groundwater control measure may be required during construction. There should be no impacts to the wider hydrogeological environment.

1.10. Geotechnical interpretation and temporary works proposals, including sequencing and propping information, are provided. Clarification is requested on the use of sheet piling and groundwater control measures, and impacts to neighbouring structures should be assessed if applicable.

1.11. A Ground Movement Assessment (GMA) is presented. For the structures assessed, a maximum impact of Category 1 (Very Slight) damage in accordance with the Burland Scale has been calculated. This satisfies the requirements of the LBC guidance for basements. However, further clarification is required, as discussed in Section 4.

1.12. The site is not located within a Local Flood Risk Zone. The site is at 'very low' risk of flooding from surface water run-off. Standard flood risk mitigation measures should be adopted.

1.13. Greenaway Gardens is within a Critical Drainage Area (Group 3-010). The proposed development will not increase the impermeable area of the site and SUDs are proposed. The final drainage design should be approved by LBC and Thames Water.

1.14. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the clarifications requested are presented, the BIA does not meet the requirements of CPG Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 12th March 2021 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 7 Greenaway Gardens, London NW3 7DJ, Camden Reference 2021/0250/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): Basements. January 2021.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- The Local Plan (2017): Policy A5 (Basements).

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 proposal as: "*Remodelling of the rear elevation, expansion of the Lower Ground floor to incorporate a leisure facility and general internal refurbishment. Demolition of the pool pavilion to ground level and re-purposing of its subterranean volumes*."

The planning portal also confirmed the site lies within the Redington Frognal Conservation Area but that the building is not listed.

2.6. CampbellReith accessed LBC's Planning Portal on 18th March 2021 and gained access to the following relevant documents for audit purposes:

- Ground Investigation and Basement Impact Assessment (Ref J20269) dated January 2021 by Geotechnical and Environmental Associates Ltd including:
    - Flood Risk Assessment (ref 2628/RE/01-21/01) dated January 2021 by Evans River & Coastal Ltd.
- Proposed elevations, plans and sections dated January 2021 by Spencer Harris Hogan Ltd.
- Structural Engineer's Construction Method Statement (ref 2095) dated January 2021 by engineersHRW Ltd.
- Arboricultural Method Statement and Impact Assessment dated January 2021 by Arbtech Consulting Ltd.
- Design and Access Statement dated January 2021 by Spencer Harris Hogan Ltd.
- Energy and Sustainability Statement (ref JB/692) dated January 2021 by ME7.
- Construction/Demolition Management Plan (version 02) dated January 2021 by R L Design & Build Ltd.
- Comments and objections to the proposed development from Redington Frognal Neighbourhood Forum.

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	Utilities and underground infrastructure in the vicinity of the site should be identified. An outline construction programme should be 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	Clarification is requested on the use of sheet piling and groundwater control measures, and impacts to neighbouring structures should be assessed if applicable.
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	Maps and plans to describe the environmental setting are provided in the BIA.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Section 3.1.2 of the BIA. The screening states that no trees are to be felled but the Arboricultural Method Statement indicates that 3 individual trees and 2 groups of trees are to be removed as part of the development.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1.1 of the BIA.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1.3 of the BIA.
Is a conceptual model presented?	Yes	Section 7 of the BIA.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	No	Section 4.1 of the BIA. However, to be reviewed in regard to removal of trees.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.1 of the BIA.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.1 of the BIA.
Is factual ground investigation data provided?	Yes	Sections 4 and 5 of the BIA.
Is monitoring data presented?	Yes	Groundwater monitoring data is presented in Section 5.4 of the BIA.
Is the ground investigation informed by a desk study?	Yes	Section 2 of the BIA.
Has a site walkover been undertaken?	Yes	In conjunction with the site investigation.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Section 2.1.1 of the BIA. There is a small basement below the southwestern corner of No. 6A and a partial basement extension beneath No. 8.
Is a geotechnical interpretation presented?	Yes	Section 7 and 8 of the BIA.
Does the geotechnical interpretation include information on retaining wall design?	No	Section 8.1.2 of the BIA.
Are reports on other investigations required by screening and scoping presented?	Yes	An Arboricultural method statement, a Flood Risk Assessment and a Structural Engineer's Construction Method Statement have been provided.
Are baseline conditions described, based on the GSD?	Yes	

Item	Yes/No/NA	Comment
Do the baseline conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	Section 13 of the BIA.
Are estimates of ground movement and structural impact presented?	Yes	Sections 10 and 11 of the BIA. However, revision required as Section 4.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	To be revised in regard to removal of trees.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Section 8, 10, 11, 13 and Section 14 of the BIA. To be revised in regards tree removal, temporary works clarifications, GMA.
Has the need for monitoring during construction been considered?	Yes	Section 11.2 of the BIA.
Have the residual (after mitigation) impacts been clearly identified?	No	To be revised in regards tree removal, temporary works clarifications, GMA.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	To be revised in regards tree removal, temporary works clarifications, GMA.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	The Energy and Sustainability Statement and FRA.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	To be revised in regards tree removal, temporary works clarifications, GMA.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	To be revised in regards tree removal, temporary works clarifications, GMA.

Item	Yes/No/NA	Comment
Are non-technical summaries provided?	Yes	Section 13.3 of the BIA.

4.0 DISCUSSION

4.1. The BIA has been prepared by Geotechnical & Environmental Associates Ltd (GEA) with supporting documents by engineersHRW Ltd. The authors' qualifications are in accordance with the requirements of CPG guidelines.

4.2. The site is occupied by a two-storey detached property with residential loft-space and a lower ground floor under approximately one third of the ground floor footprint. An existing extension to the rear houses a swimming pool and plant rooms at lower ground and ground floor levels.

4.3. The proposed development involves extending the lower ground floor to the whole footprint of the main house to a depth of approximately 4.00m below ground level (bgl), with the deeper portion of the excavation for the proposed swimming pool in the south of the main house. The existing extension will be demolished and rebuilt entirely at lower ground floor level.

4.4. 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 the presence of underground infrastructure within the development's zone of influence. These records should be obtained and presented, including an impact assessment and mitigation proposals, if required.

4.5. An outline construction programme should be provided.

4.6. A Screening assessment is presented. Clarification is requested on the Screening response in regard to removal of trees. The BIA text indicates that no trees are to be removed during the proposed development works in contradiction to the Arboricultural report, which indicates a number of trees are to be removed. If trees are to be removed, an assessment of any resulting impacts should be provided (i.e. to the stability of neighbouring foundations).

4.7. A site investigation was undertaken by GEA in November and December 2020, comprising one borehole to a depth of 20.00m bgl and four boreholes to a depth of 5.00m bgl. The ground conditions comprise shallow Made Ground over the Claygate Member to approximately 7.00m bgl, below which the London Clay was encountered.

4.8. During the drilling of the boreholes seepages of groundwater were encountered in Borehole 1 and 3 at depths of between 3.30m and 4.30m bgl. These seepages were noted to be minor inflows associated with sandy layers within the Claygate Member. The installed standpipes were monitored on two occasions over a one-month period during the winter and recorded groundwater at depths of between 1.18m and 2.14m bgl.

4.9. The Claygate Member is designated a Secondary A Aquifer. However, the BIA concludes that the clay soils beneath the site have the hydraulic characteristics similar to that of non-productive

strata, with perched groundwater present within the sand layers within the Claygate Member. It is accepted that groundwater flows are unlikely to be materially altered by the basement structure and the local hydrogeological setting will not be impacted, noting the existing lower ground floor arrangements on site.

4.10. The BIA outlines groundwater control measures such as sump pumping will be required, in order to maintain stability during excavation and construction. It should be assessed whether this will impact the stability of neighbouring structures.

4.11. Interpretative geotechnical information broadly in accordance with the GSD Appendix G3 is presented.

4.12. The excavation of the new lower ground floor will be formed within propped, underpinned retaining walls, piled retaining walls and reinforced walls constructed in a hit and miss sequence. Temporary works information, including sequencing and propping information, are provided for review within the Structural Engineer's Construction Method Statement. It is noted that 2-stage underpinning is proposed. The Method Statement also indicates that sheet piling may be utilised instead of bored piled retaining walls. Clarification should be provided on whether sheet piling will be adopted at the site, and if so, assessment of potential impacts to stability of adjacent structures should be provided. Vibrations induced by sheet piling installation should be included in the assessment.

4.13. A Ground Movement Assessment (GMA) is presented and considers the movements relating to the proposed basement construction and the effect on the neighbouring properties at 6/6A Greenaway Gardens and No. 8 Greenaway Gardens. For the structures assessed, a maximum impact of Category 1 (Very Slight) damage in accordance with the Burland Scale has been calculated. The following clarifications are required:

- How has the GMA accounted for the proposed 2-stage underpinning? Existing calculations indicate a range of 3mm to 8mm vertical movements and 6mm to 12mm horizontal movements. Underpinning is generally anticipated to generate approximately 5mm to 10mm of vertical and horizontal movements per stage. Conditions at the site include saturated sandy layers within the Claygate Member, which have the potential to generate movements / instability, and therefore the GMA is expected to present reasonably conservative predictions for the proposed construction methodologies to be adopted.
- If sheet piling is proposed (as 4.12), assessment of potential impacts should be provided.
- The review of the GMA should include consideration of any utilities or underground infrastructure that may be affected, with provision for protecting those assets in consultation with the asset owner.
- If trees are to be removed, an assessment of any resulting impacts should be provided (i.e. to the stability of neighbouring foundations, see 4.6.).

4.14. Greenaway Gardens is within a Critical Drainage Area (Group 3-010), although this was not identified within the BIA screening or scoping process but was identified in the Flood Risk Assessment report. The BIA indicates that the impermeable site area will not increase as a result of the proposed development. Where the basement continues beneath the garden, a minimum of 1.00m of soil will be placed above to allow infiltration of rain water and a medium for mature vegetation to develop. Where 1.00m of soil cannot be placed, attenuation SUDS is proposed. The final drainage design should be approved by LBC and Thames Water.

4.15. The site is not located within a Local Flood Risk Zone. The site is at 'very low' risk of flooding from surface water run-off and is not at risk from flooding from reservoirs. The FRA recommends that standard flood risk mitigation measures should be adopted, such as non-return valves, and that finished ground floor levels should be raised above the external levels to provide safe overland flood routes for excess surface water run-off should exceedance of the drainage infrastructure occur.

4.16. There will be no impacts to the wider hydrological environment.

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

5.0 CONCLUSIONS

5.1. The authors' qualifications are in accordance with the requirements of CPG guidelines.

5.2. Utilities and underground infrastructure in the vicinity of the site should be identified. An outline construction programme should be provided.

5.3. Clarification is requested on the Screening response in regard to removal of trees, with the BIA text contradicting the Arboricultural report, and assessment of any resulting impacts provided.

5.4. A site investigation indicates the ground conditions to comprise Made Ground over the Claygate Member and London Clay Formation.

5.5. Perched groundwater was encountered within the Claygate Member. Groundwater control measure may be required during construction. There should be no impacts to the wider hydrogeological environment.

5.6. Geotechnical interpretation and temporary works proposals, including sequencing and propping information, are provided. Clarification is requested on the use of sheet piling and groundwater control measures, and impacts to neighbouring structures should be assessed if applicable.

5.7. A Ground Movement Assessment (GMA) is presented. For the structures assessed, a maximum impact of Category 1 (Very Slight) damage in accordance with the Burland Scale has been calculated. Further clarification is required, as discussed in Section 4.

5.8. The site is not located within a Local Flood Risk Zone. The site is at 'very low' risk of flooding from surface water run-off. Standard flood risk mitigation measures should be adopted.

5.9. Greenaway Gardens is within a Critical Drainage Area (Group 3-010) The proposed development will not increase the impermeable area of the site and SUDs are proposed. The final drainage design should be approved by LBC and Thames Water.

5.10. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the clarifications requested are presented, the BIA does not meet the requirements of CPG Basements.

Appendix 1: Residents' Consultation Comments

Consultation Comments

Surname	Address	Date	Issue raised	Response
Redington Frognal Neighbourhood Forum		12/03/21	The felling of three individual trees (yew, bay and cypress) and two groups of trees / hedges (acer, laburnum, yew, magnolia and cotoneaster and a beech hedge) to facilitate development.	Section 4
Ciallie	Bracknell Gardens	28/03/21	Concern re stability impacts to properties within Bracknell Gardens to the rear of the site.	Section 4 – General comments on GMA Properties on Bracknell Road are considered to be outside of the zone of influence of the works.

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	Desk Study	Underground utility and infrastructure information should be provided.	Open – to be provided as 4.4	
2	BIA Format	An outline construction programme should be provided.	Open – to be provided as 4.5	
3	Land Stability	Clarification is requested on the Screening response in regard to removal of trees, with the BIA text contradicting the Arboricultural report, and assessment of any resulting impacts provided.	Open – to be provided as 4.6	
4	Land Stability	Clarification is requested on the use of sheet piling and groundwater control measures, and impacts to neighbouring structures should be assessed if applicable.	Open – to be provided as 4.10 and 4.12	
5	Land Stability	The GMA to be further clarified.	Open – to be provided as 4.13	

Appendix 3: Supplementary Supporting Documents

None

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