

53 Fitzroy Park

London

N6 6JA

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12466-90

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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 53 Fitzroy Park London N6 6JA (planning reference 2017/3425/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 BIA and Structural Engineering Design and Method Statement (SEDMS) have been prepared by well-known engineering consultants. The identified individuals who have prepared and reviewed the reports have appropriate qualifications.
- 1.5. The BIA has confirmed that the proposed Lower Ground Floor will be founded within the London Clay and that perched water is likely to be encountered in the variable thickness of Made Ground above the clay.
- 1.6. The site is underlain by London Clay and it is accepted that the surrounding slopes to the development are stable. The proposed basement structure is unlikely to be detrimental to any groundwater flow.
- 1.7. The basement will be formed using a contiguous bored pile retaining wall with a reinforced concrete box structure with permeable materials installed between the piled and reinforced concrete walls to permit any existing groundwater flow to continue unimpeded to the Highgate Ponds to the southwest of the site. In the event of potential blockage, a land drain system is proposed. The lower ground floor construction will also incorporate void formers to overcome anticipated heave of the clay due to the removal of excavated material and a layer of permeable gravel to provide a preferential pathway for groundwater.
- 1.8. The ground movement analysis carried out requires additional information to be provided in relation to
 - Temporary propping of the piled wall during excavation.
 - Input/output for PDISP analysis.
 - The updated C760 guidance.

- 1.9. Construction sequence diagrams within the SEDMS show that the development will have no detrimental effect on the adjacent highway.
- 1.10. It is accepted that the site does not lie within any known flood zones and is not in an area of known flooding from sewer surcharge.
- 1.11. It is noted that there is a marginal reduction in rainwater volume entering the surface water drainage system and it is accepted that the new areas of external hardstanding will be constructed using permeable paving and incorporate attenuation measures to restrict drainage flows to natural (greenfield) drainage rates.
- 1.12. It is accepted that investigations undertaken has indicated that it is unlikely for there to be sufficient hydraulic connectivity between a large pond within the grounds of No. 55 Fitzroy Park and the proposed excavations to allow drainage of the pond into the excavations. Acceptable measures are proposed to prevent potential contamination of the pond during construction.
- 1.13. It is considered that the BIA has generally adequately identified the potential impacts from the proposed lower ground floor construction. There are a number of items where further information is required to enable the audit to be completed.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 28 June 2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 53 Fitzroy Park London N6 6JA, planning reference 2017/3425/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 the proposed 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;
- 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 "Erection of a three storey single family dwelling, including green roofs at first floor and roof level, solar panels at roof level and associated landscaping following the demolition of the existing part-two, part-three storey dwelling (Class C3)".

The Audit Instruction also confirmed that 53 Fitzroy Park was not itself listed nor adjacent to any listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 20th July 2017 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment, February 2017, 371263-01(04) by RSK (BIA)
- Structural Engineering Design and Construction Method Statement, February 2017, 2160751 by Elliott Wood (SEDMS)
- Planning Application Drawings by Wolff Architects consisting of
Existing Plans 1317-EX-102, 121, 122, 123, 124
Demolition Plans 1317-PL-123, 151, 161,162, 164
Proposed Plans 1317-PL-212F, 213G, 214F, 215F, 221F, 222F, 231H, 232G
- Design & Access Statement, June 2017, 1317-PL-DAS-REV I, by Wolff Architects
- Arboricultural Impact Assessment, March 2017, WFA/53FZP/AIA/01f by Landmark Trees
- Site Investigation Report, December 2010,241919-01(01) by RSK
- Construction Management Plan, by Motion
- Planning and Heritage Statement, June 2017, by Lichfields

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	
Are data required by Cl.233 of the GSD presented?	Yes	Data contained within BIA.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	BIA Section 3, and the Elliott Wood SEDMS..
Are suitable plan/maps included?	No	Although reference is made to the ARUP figures, none of the maps or plans are included in the BIA.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	No	See above.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 4. No maps included. Limited reference to ARUP figures.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 4.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 4.
Is a conceptual model presented?	Yes	BIA Section 2.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 5.3. Carried through to Impact.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome? (Groundwater)	Yes	BIA Section 5.1
Hydrology Scoping Provided? Is scoping consistent with screening outcome? (Surface Water)	Yes	BIA Section 5.2
Is factual ground investigation data provided?	Yes	Presented in Site Investigation report Appendix B.
Is monitoring data presented?	Yes	Presented in Site Investigation report Section 7.3.
Is the ground investigation informed by a desk study?	Yes	Presented in Site Investigation report Section 2.
Has a site walkover been undertaken?	Yes	Presented in Site Investigation report Section 2.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	BIA Figure 2.
Is a geotechnical interpretation presented?	Yes	BIA Section 2.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Presented in Site Investigation report Section 11.4.
Are reports on other investigations required by screening and scoping presented?	N/A	
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	BIA Section 7.

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	BIA Section 7. No justification for results <ul style="list-style-type: none"> - no PDISP input/output - no calcs for C580. - propping assumption not carried through to SEDWS. -
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	BIA Section 8.
Has the need for monitoring during construction been considered?	Yes	Mentioned but not detailed BIA 8.3.1.
Have the residual (after mitigation) impacts been clearly identified?	Yes	BIA Section 8.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Subject to further information.
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	
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

- 4.1. The Basement Impact Assessment (BIA) has been carried out by a well-known firm of engineering consultants, RSK Environment Limited (RSK) and the individuals concerned in its production have suitable qualifications.
- 4.2. The Structural Engineering Design and Construction Method Statement (SEDMS) has similarly been carried out by a well-known firm of engineering consultants, Elliott Wood. The author and reviewers are chartered structural engineers.
- 4.3. The proposed development consists of the demolition of an existing building on a sloping site and the construction of a replacement building, partially overlying the original footprint. The new ground floor slab level coincides with the existing site level at the front of the house and the lower ground floor slab coincides with the existing site level at the rear of the house.
- 4.4. The BIA has identified that the site is underlain by a variable thickness of Made Ground varying between 0.4 metres and 1.7 metres above the London Clay Formation, which is present to the full extent of the site investigation boreholes. It is accepted that the lower ground floor is expected to be founded wholly within the London Clay.
- 4.5. The BIA has identified that perched water is likely to be encountered within the Made Ground. It is accepted that groundwater control is likely to require sump pumping during construction works and it is noted that the potential for fine soils to be removed with the groundwater, together with preventative measures, has been identified.
- 4.6. The SEDMS details a construction methodology to excavate and construct the lower ground floor utilising a contiguous bored piled retaining wall to allow the construction of an inner reinforced concrete box to form the lower ground floor. Although the site is underlain by a non-aquifer (the London Clay), permeable materials are to be placed between the piled retaining wall and inner concrete box to allow any groundwater flow to continue unimpeded to the Highgate Ponds to the southwest of the site. The SEDMS further identifies that a system of land drains could be introduced around the building to assist groundwater flow in the event of blockage of the permeable retaining wall system. On the basis of the above, it is accepted that the development is unlikely to be detrimental to any groundwater flow.
- 4.7. The potential for ground heave to occur within the London Clay below basement formation level, caused by the removal of the excavated material, has been identified and void formers have been incorporated into the design.

- 4.8. It is accepted that there are no slope stability concerns regarding the proposed development and the construction sequence diagrams show that the stability of the adjacent highway will be unaffected.
- 4.9. The BIA recognises that vertical and horizontal ground movements will occur during pile installation and during excavation to form the lower ground floor. A ground movement analysis (GMA) has been carried out using:
- Ciria C580 'Embedded Retaining Walls – Guidance for Economic Design' to assess horizontal ground movements from pile installation and excavation; and
 - PDISP, an analysis programme, to assess the vertical ground movement from heave and settlement, due to unloading and loading of the soils.
- 4.10. The calculations in section 7.1 of the BIA have assumed an excavation depth based on a previous scheme which included a basement and is therefore more onerous. The calculations also assume a high stiffness wall, propped temporarily at high level. It is noted that C580 has been updated in February 2017 and the assumptions should be checked against the latest version, C760.
- 4.11. The construction sequence noted and illustrated in the SEDMS does not indicate any temporary propping, and clarification is requested on the depth of excavation and propping regime.
- 4.12. Section 7.2 of the BIA discusses the vertical movements but no tabulated input/output data for the PDISP programme are provided to enable an assessment of the results validity to be undertaken.
- 4.13. It is accepted that the site does not lie within any known flood zones and is not in an area of known flooding from sewer surcharge. The site is not included in LBC's list of streets subject to past flood events in 1975 and 2002.
- 4.14. It is noted that there is a marginal decrease in building footprint of the proposed development in comparison with the existing and hence a slight reduction in rainwater volume entering the surface water drainage system.
- 4.15. It is accepted that the two new external hardstanding areas will be constructed using permeable paving which will be designed to incorporate attenuation of drainage flows into the underlying soils at natural (greenfield) drainage rates.
- 4.16. It is accepted that the BIA has shown that it is considered unlikely that there is sufficient hydraulic connectivity between a large pond within the grounds of the adjacent No. 55 Fitzroy Park and development excavations to facilitate drainage of the pond into any open excavations. During construction of the contiguous bored pile retaining wall, there exists the possibility that cementitious water from the pile concrete could leach into the Made Ground and contaminate

groundwater. It is usual practice for a piling rig to employ temporary steel casings at the top of each bored pile to overcome this potential hazard. More generally, the proposals identify the collection of rainwater and surface water during construction in a settlement tank prior to discharge into existing sewers, which is acceptable assuming consent is obtained from Thames Water.

5.0 CONCLUSIONS

- 5.1. The BIA and SEDMS have been carried out by well-known firms of engineering consultants using individuals who possess suitable qualifications.
- 5.2. The BIA has confirmed that the proposed lower ground floor will be founded within the London Clay Formation and that perched water is likely to be encountered in the variable thickness of Made Ground above the Clay.
- 5.3. It is accepted that the surrounding slopes to the development are stable and the proposed lower ground floor structure is unlikely to be detrimental to any groundwater flow.
- 5.4. The lower ground floor will be formed using a contiguous bored pile retaining wall as a temporary retaining wall to enable excavation with a reinforced concrete box structure incorporating permeable materials in the void between to allow any existing groundwater flow to continue unimpeded to the Highgate Ponds to the southwest of the site. In the event of potential blockage, a land drain system is also proposed. The lower ground floor slab will also incorporate void formers and granular material to overcome anticipated heave of the Clay due to the removal of excavated material and create a pathway for groundwater.
- 5.5. A GMA has been carried out which appears to demonstrate that the magnitude of ground movements would cause damage in the Burland Damage Categories of 0-1. As noted in section 4.12, further information is required to confirm that this is the case.
- 5.6. Construction sequence diagrams within the CMS show that the development will have no detrimental effect on the adjacent highway.
- 5.7. It is accepted that the site does not lie within any known flood zones and is not in an area of known flooding from sewer surcharge.
- 5.8. It is noted that there is a marginal reduction in rainwater volume entering the surface water drainage system and it is accepted that the new areas of external hardstanding will be constructed using permeable paving and incorporate attenuation measures to restrict drainage flows to natural (greenfield) drainage rates.
- 5.9. It is accepted that it is considered unlikely for there to be sufficient hydraulic connectivity between a large pond within the grounds of No. 55 Fitzroy Park and proposed basement excavations to allow drainage of the pond into the excavations. Temporary casing is required to prevent potential contamination of the pond during construction.

Appendix 1: Residents' Consultation Comments

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Ground Movement Analysis	Construction sequence in SEDMS does not indicate temporary propping as assumed in GMA. Please clarify.		
2	Ground Movement Analysis	Further information is required on derivation of ground movements and Damage categories.		
3	Ground Movement Analysis	Depth of excavation to be confirmed.		
4	Ground Movement Analysis	Review assumptions and calculations against C760.		

Appendix 3: Supplementary Supporting Documents

None

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