

**53 Fitzroy Park
London N6 6JA
Basement Impact Assessment
Audit**

For
London Borough of Camden

Project Number: 12066-19
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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 (planning reference 2015/0441/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 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 CMS have been prepared by well-known firms of engineering consultants using individuals who possess suitable qualifications, although the authors of the CMS did not provide evidence of geotechnical engineering expertise.
- 1.5. The BIA has confirmed that the proposed basement 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 and 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 sandwiching permeable materials 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 proposed. The basement floor will also incorporate void formers to overcome anticipated heave of the clay due to the removal of excavated material.
- 1.8. An acceptable ground movement analysis has been carried out which shows that five adjacent properties should experience a Burland Damage Category of less than 1 – "very slight". Proposals to monitor movements during construction are provided in the BIA but without identifying acceptable limits of movement at this stage.
- 1.9. Construction sequence diagrams within the CMS 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 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. Acceptable measures are proposed to prevent potential contamination of the pond during construction.
- 1.13. It is considered that the BIA has adequately identified the potential impacts from the proposed basement construction and includes appropriate mitigation measures.

2.0 INTRODUCTION

- 2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 29 June 2015 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 53 Fitzroy Park, Camden Reference 2015/0441/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 "*Erection of a three storey single family dwelling including basement level, green roofs at first floor and roof level, solar panels at roof level associated landscaping following the demolition of the existing part-two, part-three storey dwelling.*"

The Audit Instruction also confirmed 53 Fitzroy Park did not involve any listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 28 July 2015 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (BIA)
- Geotechnical, Hydrogeological and Geoenvironmental Site Investigation Report (SIR)
- Structural Engineering Design and Construction Method Statement (CMS)
- Architect's Drawings

1317-EX-101 rev -	Existing Location Plan
1317-EX-102 rev -	Existing Site Plan
1317-PL-211 rev E	Proposed Basement Plan
1317-PL-212 rev E	Proposed Lower Ground Floor Plan
1317-PL-213 rev F	Proposed Ground Floor Plan
1317-PL-231 rev G	Proposed Section A-A & B-B
1317-PL-232 rev F	Proposed Sections C-C & F-F

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	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.
Are suitable plan/maps included?	Yes	BIA Figures.
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	BIA Section 4.
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.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 5.1.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 5.2.
Is factual ground investigation data provided?	Yes	S.I.R. Appendix B.
Is monitoring data presented?	Yes	S.I.R. Section 7.3.
Is the ground investigation informed by a desk study?	Yes	S.I.R. Section 2.
Has a site walkover been undertaken?	Yes	S.I.R. 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	BIA Section 11.4.
Are reports on other investigations required by screening and scoping presented?	N/A	
Are 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 8.
Are estimates of ground movement and structural impact presented?	Yes	BIA Section 7.

Item	Yes/No/NA	Comment
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	
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	
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 (CMS) has similarly been carried out by a well-known firm of engineering consultants, Elliott Wood. The author and reviewers are all chartered structural engineers but no proof of expertise in engineering geology has been provided as required by CPG4.
- 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 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. A basement is proposed below the lower ground floor approximately 5.0 metres deep, to house a swimming pool and ancillary plantrooms, etc.
- 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 extent of investigation boreholes. It is accepted that the proposed basement is expected to be founded wholly within the London Clay and is unlikely to be detrimental to any groundwater flow.
- 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 CMS details a construction methodology to excavate and construct the basement utilising a contiguous bored piled retaining wall to allow the construction of an inner reinforced concrete box to form the basement and 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 CMS further identifies that a system of land drains will be introduced around the basement to assist groundwater flow in the event of blockage of the permeable retaining wall system.
- 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. A ground movement analysis has been carried out based upon the empirical assessment method contained within CIRIA 580 "Embedded retaining Walls – Guidance for Economic Design" and has shown that the five nearest properties should experience a Burland Damage Category of less than 1 – "very slight". Proposals to monitor movements during construction are provided although the BIA does not identify limits of lateral and vertical displacement at present.
- 4.10. 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. The site is not included in LBC's list of streets subjected to past flood events in 1975 and 2002.
- 4.11. 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.
- 4.12. 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.
- 4.13. 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 basement excavations to allow drainage of the pond into the open excavation. 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 CMS have been carried out by well-known firms of engineering consultants using individuals who possess suitable qualifications, other than the authors of the CMS not identifying expertise in engineering geology.
- 5.2. The BIA has confirmed that the proposed basement 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 basement structure is unlikely to be detrimental to any groundwater flow.
- 5.4. The basement will be formed using a contiguous bored pile retaining wall with a reinforced concrete box structure sandwiching permeable materials 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 basement floor will also incorporate void formers to overcome anticipated heave of the Clay due to the removal of excavated material.
- 5.5. An acceptable ground movement analysis has been carried out which shows that five adjacent properties should experience a Burland Damage Category of less than 1 – “very slight”. Proposals to monitor movements during construction are provided in the BIA but without identifying acceptable limits of movement at this stage.
- 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: Resident's Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Carnell	1 The Hexagon, Fitzroy Park	01/07/2015	Groundwater flows Perched water table Risk of subsidence	See 4.4 to 4.6 See 4.5 and 4.13 See 4.8 and 4.9
Fitzroy Park Residents Association	Dancers End, Fitzroy Park	19/03/2015	Pond contamination Groundwater flow Surface water drainage	See 4.13 See 4.4 to 4.6 See 4.12
Rowe Barber Kennedy	1 Fitzroy Close Sunbury, Fitzroy Park Ashridge, Fitzroy Park	03/03/2015	Depth of basement Reference to Residents Association Report above	See 4.3

Appendix 2: Audit Query Tracker

None

Appendix 3: Supplementary Supporting Documents

None