CampbellReith
consulting engineers

20A Ferncroft Avenue
London
NW3 7PH

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 13398-02
Revision: D1

February 2020

Campbell Reith Hill LLP
15 Bermondsey Square
London
SE1 3UN

T: +44 (0)20 7340 1700
E: london@campbellreith.com
W: www.campbellreith.com

Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	February 2020	Comment	EMBemb-EMBemb-13398-02-190220-20A Ferncroft Avenue-D1.doc	EMB	GK	GK

Document Details

Last saved	19/02/2020 15:35
Path	EMBemb-13398-02-190220-20A Ferncroft Avenue-D1.doc
Author	E M Brown
Project Partner	E M Brown, BSc MSc CGeol FGS
Project Number	13398-02
Project Name	20A Ferncroft Avenue
Planning Reference	2019/6220/P

Contents

Appendix

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 20A Ferncroft Avenue (planning reference 2019/6220/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 authors of the BIA and supporting documents possess suitable qualifications.

1.5. The proposed basement is to be formed using underpinning techniques. Clarification is required with respect to the depth of excavation and the nature of the basement retaining walls. The calculations require revision to reflect the hydrogeological assessment.

1.6. The site is at low risk of flooding and is not in a Critical Drainage area.

1.7. The hydrogeological assessment notes that the basement will have only a local impact. The hydrogeological and hydrological assessments should be updated to consider the impact of the proposed infiltration tank.

1.8. The BIA notes that dewatering may be required and states that any such system will be designed by a specialist contractor.

1.9. The site investigation identified that the Claygate Member has a medium volume change potential. The impact of tree removal on nearby shallow foundations should be assessed.

1.10. A ground movement impact assessment has been provided. Estimations of building damage do not appear to consider the magnitude of ground movement predicted. Clarification is required.

1.11. An outline monitoring scheme is described. However, trigger levels exceed the limiting movement recommended for No 20 Ferncroft Avenue. Clarification is required.

1.12. It is accepted that the surrounding slopes to the development site are stable.

1.13. Until the queries described above and in Section 4 are addressed, it cannot be confirmed that the basement proposals comply with the requirements of the Camden Planning Guidance for basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 17 January 2020 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 20A Ferncroft Avenue, London, NW3 7PH, Camden Planning Reference 2019/6220/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 Basements. March 2018.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- Local Plan 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;

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: "*Demolition of existing rear extension and erection of new rear extension; excavation of new basement floor with front lightwell; and associated removal of 1 x Cherry Tree in rear garden.*"

The Audit Instruction confirmed that the property is not listed.

2.6. CampbellReith accessed LBC's Planning Portal on 31 January 2020 and gained access to the following relevant documents for audit purposes:

- Existing and proposed plans and sections, Trace Architects, dated December 2019
- Basement Impact Assessment, reference P18-461 - 20a Ferncroft Av – BIA, Rev 0, dated 12 December 2019 and prepared by Simpson TWS, containing
- Construction sequencing drawings and calculations
- Site Investigation report by Risk management Ltd, dated September 2019
- Ground movement assessment (GMA) by Geotechnical Consulting Group LLP (GCG), dated December 2019
- Hydrogeological impact assessment by GCG, dated December 2019
- Design & Access Statement, Trace Architects, dated November 2019
- Arboricultural Impact Assessment, Ashley Tree Surveys, dated November 2019
- Tree Protection Plan, Ashley Tree Surveys, Dated November 2019.

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 appendices
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 appendices
Are suitable plan/maps included?	Yes	BIA appendices
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	BIA appendices
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Recent sub-surface water mapping exercise for RedFrog and Hampstead area not referenced, but screening outcomes generally correct. Proposed infiltration tank in rear garden not referenced / assessed.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Proposed infiltration tank in rear garden not referenced / assessed.
Is a conceptual model presented?	No	However, relationship between ground and groundwater conditions, topography and proposed scheme clearly described.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	No	Proposed infiltration tank in rear garden not referenced / assessed.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	Proposed infiltration tank in rear garden not referenced / assessed.
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	No desk study provided, however, ground investigation is adequate for impact assessment.
Has a site walkover been undertaken?	Yes	The BIA notes that the engineer visited site on a number of occasions. A site description and numerous photographs are presented.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Partially. BIA assumes there is a basement beneath No 22 Ferncroft Avenue but not No 20.
Is a geotechnical interpretation presented?	Yes	Limited interpretation contained within Risk Management Ltd's GI report.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Contained within Risk Management Ltd's GI report.
Are reports on other investigations required by screening and scoping presented?	Yes	Ground movement, hydrogeological and arboricultural assessments, proposed construction method statement and indicative structural calculations provided.

Item	Yes/No/NA	Comment
Are the baseline conditions described, based on the GSD?	Yes	Although assumptions made with respect to surrounding basements.
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	Some queries are raised on the ground movement assessment and structural calculations (see Section 4).
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	Although some queries are raised on the ground movement assessment (see Section 4).
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Mitigation to be confirmed once queries resolved.
Has the need for monitoring during construction been considered?	Yes	However, recommendations to be reviewed to ensure compliance with GMA assumptions.
Have the residual (after mitigation) impacts been clearly identified?	No	Residual impacts to be confirmed once queries resolved.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Acceptability of residual impacts to be confirmed once queries resolved.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	Proposed infiltration tank in rear garden not assessed.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	However, acceptability of residual structural impacts to be confirmed once queries resolved.

Item	Yes/No/NA	Comment
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	However, residual impacts to be confirmed once queries on GMA resolved.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been prepared by engineering consultants Simpson TWS. The structural appraisal, construction sequencing and outline structural calculations have been prepared by Simpson TWS and some of the impact assessments undertaken by GCG and Ashley Tree Surveys. The individuals concerned in the production of the BIA and supporting documents have suitable qualifications.

4.2. The LBC Instruction to proceed with the audit identified that the basement proposal does not involve a listed building. The Design & Access Statement identified that the property lies within the Redington Frognal Conservation Area.

4.3. The proposed basement consists of a single storey construction formed by excavating below and beyond the existing property. To the front is a small lightwell, while to the rear, the basement lies below an extension to the host property. It is intended to form the basement walls using underpinning techniques. The working area to each underpin is to be backfilled and the ground floor slab is to be cast before bulk excavation.

4.4. Drawings indicate excavations depths between approximately 3.00m and 3.70m below ground level (bgl), while the description of the proposals within the BIA refer to 2.90m to 3.40m bgl. The BIA also refers to mass concrete underpinning, whilst the structural calculations refer to reinforced concrete retaining walls. These items should be clarified.

4.5. The BIA has identified that the site is underlain by the Claygate Member of the London Clay Formation. The site investigation comprised two exploratory holes although the BIA also references historic site investigation data from 20 Ferncroft Avenue and further afield. Limited geotechnical interpretation is presented. However, the assumptions made are reasonably conservative and have been adopted in the structural appraisal and subsequent assessments.

4.6. The site investigation has identified that the Claygate Member has a medium volume change potential. The BIA notes that a tree is to be removed to facilitate the basement construction. The impact of tree removal on foundations to the host structure and No 20 Ferncroft Avenue has not been assessed.

4.7. The Claygate Member is classified as an aquifer. The BIA states that the basement will extend below the water table. However, the hydrogeological assessment identifies two separate water bodies; a deeper water table in the aquifer at around 5.00m bgl and shallow perched water at circa 2.00 to 3.00m bgl. The assessment concludes that the shallow perched water is impersistent and that, whilst there may be a small, localised rise in water levels at the rear of the basement, there is unlikely to be any adverse impact on local or wider subterranean flows.

This interpretation is accepted, however, the hydrogeological assessment should consider the impact of the proposed surface water infiltration tank.

4.8. The hydrogeological assessment notes that some local dewatering may be required to remove perched water from excavations and the BIA notes the intention to install two dewatering wells in the rear garden, with the dewatering scheme designed by a specialist contractor. The hydrogeological assessment notes that retaining walls are to be designed for water pressure higher than that recorded in the ground investigation. This is not reflected in the calculations and should be clarified.

4.9. The BIA has identified that Ferncroft Avenue flooded in 1975 but that otherwise the site is at low risk of flooding and does not lie within a Critical Drainage Area. The impermeable area is decreasing nominally, a partial brown roof is being provided and surface water is to be drained via an infiltration tank in the rear garden. It is accepted that surface water flows off site to the network will not be increased. However, the suitability of infiltration into the Claygate Member has not been demonstrated. The impacts to the local hydrological and hydrogeological environments from the infiltration tank should be assessed, as 4.7.

4.10. A ground movement impact assessment has been undertaken using proprietary software and empirical data. The GMA assumes an excavation depth of 3.00m to 3.50m bgl, which is broadly consistent with the depths indicated in the BIA text and drawings. For clarity, as 4.4, the depth of excavations should be confirmed. With respect to No 22 Ferncroft Avenue, the GMA notes that the main structure is approximately 3.00m from the proposed excavation, and itself has a basement. The GMA assumes that the garage to No 22 and the property at No 20 have shallow foundations.

4.11. The GMA variously estimates 5mm to 10mm vertical movement due to underpinning, with nominal additional immediate settlement due to structural loads, and negligible horizontal movement. These estimates are based on good workmanship, the construction taking place 'in the dry' and shoring of the rear excavation face. Due to the presence of shallow groundwater and the need for pumping, it concludes that ground movements of up to 10mm are assumed in the impact assessment. It is not clear if this is both vertical and horizontal movement.

4.12. Vertical and horizontal movements due to excavation are also subsequently considered, with additional settlement of 2mm to 3mm and horizontal movements of 4mm to 5mm estimated. Finally, potential long term settlement of underpinned walls of up to 5mm to 6mm is estimated.

4.13. The impact assessment predicts no worse than Burland Category 1 damage for No 20 Ferncroft Avenue. However, it is stated that this is on the basis that settlement does not exceed 5mm. Burland Category 1 (very slight) damage is predicted for the garage to No 22 Ferncroft Avenue,

with negligible (Category 0) damage to the house. No limiting settlement is noted for this assessment.

4.14. Clarification is required with respect to estimated ground movements and the magnitude of movements assumed in the subsequent impact assessment to structures. It is accepted that impacts to the highway and infrastructure will be negligible.

4.15. The BIA recommends that the observation method is adopted with monitoring employed to control ground movement and building damage. An outline monitoring strategy is described in the BIA. Trigger levels for monitoring are recommended in the GMA and BIA. The amber trigger level is set at 7mm to 10mm and the red, at >10mm. It should be confirmed that damage to adjacent properties can be limited to Burland Category 1, should these movements be allowed to occur.

4.16. It is accepted that there are no slope stability concerns regarding the proposed development.

5.0 CONCLUSIONS

5.1. The BIA and supporting documents have been prepared by individuals who possess suitable qualifications.

5.2. The BIA has confirmed that the proposed basement will be founded within the Claygate Member.

5.3. The basement will be formed using underpinning techniques. Clarification is required with respect to the depth of excavation and the nature of the basement retaining walls. The calculations require revision to ensure that they comply with the recommendations of the hydrogeological assessment.

5.4. The impermeable area is staying broadly unchanged and the scheme introduces a brown roof and surface water infiltration tank. The hydrogeological and hydrological assessments should be updated to consider the proposed impact of the infiltration tank.

5.5. The BIA notes that dewatering may be required and states that any such system will be designed by a specialist contractor.

5.6. The site investigation identified that the Claygate Member has a medium volume change potential and that a tree is to be removed. The impact of tree removal on nearby shallow foundations should be assessed.

5.7. A ground movement impact assessment has been provided. However, the estimations of building damage do not appear to consider the full magnitude of ground movement predicted and clarification is required.

5.8. An outline monitoring scheme is described. However, trigger levels exceed the limiting movement recommended for No 20 Ferncroft Avenue. Clarification is required.

5.9. It is accepted that the surrounding slopes to the development site are stable.

5.10. Until the queries described above and in Section 4 are addressed, it cannot be confirmed that the basement proposals comply with the requirements of the Camden Planning Guidance for basements.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Stability	Clarification required with respect to excavation depth and nature of basement retaining walls.	Open	
2	Stability	Retaining wall calculations to be revised to reflect recommendations in hydrogeological assessment.	Open	
3	Stability	Building damage assessment to be reviewed to ensure consistent with anticipated ground movements.	Open	
4	Stability	Consideration to be given to impact of tree removal.	Open	
5	Hydrogeology / Hydrology	Impact of infiltration tank to be considered.	Open	

Appendix 3: Supplementary Supporting Documents

None

London

15 Bermondsey Square
London
SE1 3UN

T: +44 (0)20 7340 1700
E: london@campbellreith.com

Birmingham

Chantry House
High Street, Coleshill
Birmingham B46 3BP

T: +44 (0)1675 467 484
E: birmingham@campbellreith.com

Surrey

Raven House
29 Linkfield Lane, Redhill
Surrey RH1 1SS

T: +44 (0)1737 784 500
E: surrey@campbellreith.com

Manchester

No. 1 Marsden Street
Manchester
M2 1HW

T: +44 (0)161 819 3060
E: manchester@campbellreith.com

Bristol

Wessex House
Pixash Lane, Keynsham
Bristol BS31 1TP

T: +44 (0)117 916 1066
E: bristol@campbellreith.com