

4 The Hexagon, Fitzroy Park
London, N6 6HR

Basement Impact Assessment
Audit

For
London Borough of Camden

Project Number: 12336-85

Revision: F1

March 2020

Campbell Reith Hill LLP
15 Bermondsey Square
London
SE1 3UN

T: +44 (0)20 7340 1700
F: +44 (0)20 7340 1777
E: london@campbellreith.com
W: www.campbellreith.com

Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	August 2016	Comment	JJam 12366-85 - 090816 - 4 The Hexagon-D1.doc	J Jensen	A J Marlow	E Brown
F1	March 2020	Planning	JJam 12336-85 - 100320 - 4 The Hexagon-F1.doc	G Kite	E brown	E Brown

This document has been prepared in accordance with the scope of Campbell Reith Hill LLP's (CampbellReith) appointment with its client and is subject to the terms of the appointment. It is addressed to and for the sole use and reliance of CampbellReith's client. CampbellReith accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of Campbell Reith Hill LLP. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole. The contents of this document are not to be construed as providing legal, business or tax advice or opinion.

© Campbell Reith Hill LLP 2015

Document Details

Last saved	10/03/2020 10:20
Path	JJam 12336-85 - 100320 - 4 The Hexagon-F1.doc
Author	J Jensen, BEng (Civil), MIEAust
Project Partner	E M Brown, BSc MSc CGeol FGS
Project Number	12336-85
Project Name	4 The Hexagon
Planning Reference	2016/3252/P

Contents

1.0 Non-technical summary 1
2.0 Introduction 3
3.0 Basement Impact Assessment Audit Check List..... 6
4.0 Discussion 10
5.0 Conclusions 13

Appendix

- Appendix 1: Residents' Consultation Comments
- Appendix 2: Audit Query Tracker
- Appendix 3: Supplementary Supporting Documents

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 4 The Hexagon, Fitzroy Park, London N6 6HR (planning reference 2016/3252/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 was undertaken by LBH Wembley Geotechnical & Environmental. The reviewer's qualifications are in accordance with CPG requirements.
- 1.5. The proposal includes increasing the depth of the existing lower ground floor. The Elliot Wood Structural and Civil Engineering Planning report states that a contiguous piled wall will be formed along the north-east of the proposed building. In addition reinforced concrete underpins will be constructed at the boundaries to the south-east and the south-west of the site and be constructed in a hit and miss sequence. In the revised submissions, appropriate structural information has been provided.
- 1.6. In the revised submissions, details of the proposed bypass drainage system have been provided to mitigate hydrological impacts. However, a flood risk assessment (FRA) is required, as confirmed by correspondence with the BIA authors.
- 1.7. In the revised submission, hydrogeological assessments have been undertaken. There will be no impact on the wider hydrogeological environment.
- 1.8. In the revised submissions, geotechnical information in accordance with LBC guidance has been provided.
- 1.9. The ground movement assessment (GMA) predicts Category 0 (Negligible) damage for No 5 The Hexagon and Category 1 (Very Slight) for No 3 The Hexagon. In the revised submissions, the basis of the GMA has been provided and is accepted.
- 1.10. Work durations have been indicated in the CMP, however a detailed programme should be submitted at a later date. Details of the CMP are to be agreed with LBC.

- 1.11. An outline monitoring proposal is included. Details and trigger levels are to be agreed as part of the Party Wall award.
- 1.12. Queries and requests for further information are discussed in Section 4 and summarised in Appendix 2. Until the additional information requested is provided, 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 18th July 2016 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 4 The Hexagon, Fitzroy Park, London N6 6HR, Camden Reference 2016/3252/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.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- The 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 *"Erection of a 3 storey 3-bed dwelling following demolition of existing 3 storey dwelling, and associated works."*

The Audit Instruction also confirmed 4 The Hexagon was a neighbour to a Grade II listed building at 10 Fitzroy Park.

2.6. CampbellReith accessed LBC's Planning Portal on 8th August 2016 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA) – 9th June 2016 by LBH Wembley Geotechnical & Environmental
- Structural & Civil Engineering Planning Report – Construction Method Statement – June 2016 by Elliot Wood Partnership LLP
- Hydrogeological, Geotechnical and Ground Movement Assessment – 9th June 2016 by LBH Wembley Geotechnical & Environmental
- Planning Application Drawings consisting of
 - Location Plan – July 2015 by Soup Architects
 - Existing Plans – July 2015 by Soup Architects
 - Demolition Plans – May 2016 by Soup Architects
 - Proposed Plans – May 2016 by Soup Architects
- Planning & Heritage Statement – June 2016 by Soup Architects
- Structural Drawings – April & June 2016 by Elliot Wood Partnership LLP
- Drainage Drawings – 10th June 2016 by Elliot Wood Partnership LLP
- Arboriculture Report & Impact Assessment – 8th June 2016 by Crown Consultants
- Construction Management Plan – 26th May 2016 by Motion
- Planning Comments and Response

2.7. CampbellReith were provided with the following relevant documents for audit purposes between August 2016 and August 2019:

- Factual Site Investigation Data – May 2016 by Soil Consultants
- Comments on D1 Audit – 12th September 2016 by LBH Wembley Geotechnical & Environmental
- Structural & Civil Engineering Planning Report – Construction Method Statement – October 2016 by Elliot Wood Partnership LLP

- Supplementary Ground Movement Assessment Data – 10th January 2017 by LBH Wembley Geotechnical & Environmental
- Hydrogeological, Geotechnical and Ground Movement Assessment Ver1.1 – 9th June 2016 (received June 2019) by LBH Wembley Geotechnical & Environmental
- LBC Strategic Flood Risk Assessment – July 2014 by URS (received June 2019)
- Revised Planning Application Drawings – May 2016 by Soup Architects
- Proposed Below Ground Drainage Strategy – 18th November 2016 by Elliott Wood Partnership LLP
- Structural Drawings – April & June 2016 by Elliot Wood Partnership LLP
- Arboriculture Impact Assessment – 26th July 2016 by Landscape Planning Ltd
- Construction Management Plan, Technical Review – 28th July 2016 by WSP Parsons Brinckerhoff
- Report to FPRA – July 2016 by Alan Baxter
- Planning Comments and Responses (including FPRA Objections 28th July 2016)
- Telephone Discussion with LBH Wembley in regard to submission of a site specific FRA in accordance with the recommendations of the BIA (document not yet received) – 21st August 2019.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	See Audit Paragraph 4.1.
Is data required by Cl.233 of the GSD presented?	No	FRA required.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	Updated in the revised submissions.
Are suitable plan/maps included?	No	FRA required.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	No	As above.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Updated in the revised submissions.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Updated in the revised submissions.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Updated in the revised submissions.
Is a conceptual model presented?	Yes	LBH Wembley Hydrogeological, Geotechnical & Ground Movement Assessment Report Section 4.3 to 4.6.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Updated in the revised submissions.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Updated in the revised submissions.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	FRA required.
Is factual ground investigation data provided?	Yes	LBH Wembley Hydrogeological, Geotechnical & Ground Movement Assessment Report (Borehole Logs, Dynamic Probe Results and Geotechnical Test Results).
Is monitoring data presented?	Yes	Not immediately obvious from the report however the borehole logs contained within the LBH Wembley Hydrogeological, Geotechnical & Ground Movement Assessment Report indicate monitoring has occurred. Updated in the revised submissions.
Is the ground investigation informed by a desk study?	Yes	See Audit paragraph 4.12.
Has a site walkover been undertaken?	No	Not explicitly stated however it is noted a visual inspection was undertaken as part of the structural inspection of the property.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Updated in the revised submissions.
Is a geotechnical interpretation presented?	Yes	LBH Wembley Hydrogeological, Geotechnical & Ground Movement Assessment Report Section 6.0.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Updated in the revised submissions.
Are reports on other investigations required by screening and scoping presented?	No	Arboriculture report has been provided (see Audit paragraph 4.16). FRA required.
Are the baseline conditions described, based on the GSD?	Yes	Updated in the revised submissions.

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	Yes	Updated in the revised submissions.
Is an Impact Assessment provided?	Yes	BIA Section 7.0
Are estimates of ground movement and structural impact presented?	Yes	LBH Wembley Hydrogeological, Geotechnical & Ground Movement Assessment Report Section 7.0.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	No	Updated in the revised submissions. However, FRA required.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	FRA required to determine if further mitigation is required.
Has the need for monitoring during construction been considered?	Yes	BIA Section 7.8 and LBH Wembley Hydrogeological, Geotechnical & Ground Movement Assessment Report Section 9.2.
Have the residual (after mitigation) impacts been clearly identified?	N/A	None identified. FRA required to determine if further mitigation is required.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	LBH Wembley Hydrogeological, Geotechnical & Ground Movement Assessment Report Section 7. Updated in revised submissions.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	Drainage scheme has been updated. FRA required which may indicate additional mitigation measures required, including drainage provision.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	FRA required to determine if further mitigation is required.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Updated in revised submissions.

Item	Yes/No/NA	Comment
Are non-technical summaries provided?	No	No-technical summaries have not been prepared.

4.0 DISCUSSION

- 4.1. The Basement Impact Assessment (BIA) has been carried out by LBH Wembley Geotechnical & Environmental and the reviewers has MSc, CEng, MICE, CGeol, FGS, MEnvSc and FRGS qualifications, which are in accordance with LBC guidance.
- 4.2. A Structural and Civil Engineering Planning Report has been carried out by Elliot Wood Partnership LLP. In the revised submissions the authors and reviewers are indicated to be chartered civil and structural engineers.
- 4.3. The LBC Instruction to proceed with the audit identified that the basement proposal was adjacent to a listed building, at 10 Fitzroy Park to the west; it is however considered to be outside the zone of influence of the proposals. The Planning and Heritage Statement prepared by SOUP Architects identifies that 4 The Hexagon is located in the Highgate Conservation Area.
- 4.4. The existing site comprises a three storey detached house that is stepped into the hillside, with a lower ground floor located at the rear of the site. The existing lower ground opens into a rear garden to the south and the west of the dwelling. A 3.00m drop in level is indicated from the street level to the rear garden.
- 4.5. The proposed development will comprise a three storey dwelling that will replace the existing house on roughly the same footprint. The proposed new lower ground floor will be located approximately 0.50m below the existing lower ground level. This will be 2.50m below the existing car parking area on the north of the development.
- 4.6. The proposal includes increasing the depth of the existing lower ground floor and the Elliot Wood Structural and Civil Engineering Planning report states that a contiguous piles wall will be formed along the north-east of the proposed building. In addition reinforced concrete underpins will be constructed at the boundaries to the south-east and the south-west of the site and be constructed in a hit and miss sequence. It is also mentioned that temporary propping will be required. In the revised submissions, appropriate structural information has been provided.
- 4.7. In the revised submissions, details of the proposed bypass drainage system have been provided to mitigate hydrological impacts. However, a flood risk assessment (FRA) is required, as confirmed by correspondence with the BIA authors.
- 4.8. In the original BIA submission, omissions to Screening questions were noted. In the revised submissions, those omissions have been addressed.
- 4.9. In the original BIA submission, it was noted that the relevant map extracts from the Arup GSD, Camden SFRA and the Environment Agency (EA) identifying the site location on each map were

not always referenced or included. It is accepted that the revised submissions generally address these omissions.

- 4.10. A 'No' response is given to Question 4 of the Hydrology screening which relates to whether there will be change in the profile of the inflows of surface water flows received by the neighbouring properties. Whilst this was disputed in the previous audit, in the revised submissions it has been clarified that SUDs drainage will be implemented in order to mitigate any potential impacts. As 4.7, an infiltration drainage proposal has been provided.
- 4.11. A 'No' response was given to Question 6 of the Hydrology screening which relates to whether or not the site is in an area at risk from flooding. Figure 3iii of the Camden SFRA indicates the site is in area at risk from surface water flooding. In correspondence and in the revised submissions, the BIA authors have confirmed that a FRA is required and that one would be provided, although no FRA has been received to date to address this.
- 4.12. The previous audit report requested additional desk study information to support the BIA conclusions. It is accepted that, considering the revised submissions, this has generally been provided. An FRA is still required.
- 4.13. The ground investigation revealed Made Ground to approximately 1.00m bgl below which lies over the Claygate Member to a depth of 7.00m bgl, below which lies the London Clay Formation. It is also noted that the upper 2.00m to 3.00m of the Claygate Member is subject to downwash. The LBH Wembley Hydrogeological, Geotechnical & Ground Movement Assessment Report confirmed the basement is to be founded within the Claygate Member and although groundwater was monitored at shallow depth, the water table is considered to be perched water within the permeable sections of the Made Ground. A bypass drainage system is proposed around the new structure installed at the early stages of construction to protect the basement excavation.
- 4.14. Three trial pits were undertaken to investigate the existing building foundations. The trial pits indicate that the existing foundations appear to be concrete strip footings bearing on weathered soft to firm clay of the Claygate Member at depths of between 0.60m and 0.70m below the existing lower ground level.
- 4.15. In the revised submissions it is confirmed that the surrounding properties do not include basement levels.
- 4.16. In the revised submissions, an updated arboricultural impact assessment report has been provided.
- 4.17. Whilst impermeable site area will increase, an infiltration SUDs system is proposed to mitigate against hydrological impacts (as 4.7 and 4.10).

- 4.18. In the revised submissions, the geotechnical parameters presented are broadly in accordance those required by LBC guidance.
- 4.19. A ground movement analysis has been undertaken based on maximum excavation depth of 2.50m and a contiguous piled wall along the northeast boundary with an embedment depth of 1.50 x the excavation depth. The calculations are based on CIRIA C580 with high support stiffness assumed. Heave movements due to demolition and excavation and settlement due to the new building loads have been calculated using the SAPPER programme. In the revised submissions, further details of the calculations undertaken are provided.
- 4.20. Damage assessments have been undertaken for No 3 and No 5 The Hexagon based on the movements discussed above. Category 0 (Negligible) damage for No 5 with Category 1 (Very Slight) damage for No 3 is predicted. Although a damage assessment for No 6 has not been undertaken, it is acknowledged the depth of excavation is reduced in this area and the property is outside of the zone of influence.
- 4.21. It is stated in the BIA submissions that mitigation measures are required where predicted damage is Category 1 or higher. The measures proposed include designing the piled wall to be as stiff as possible (e.g. by increasing the pile diameter) and the use of additional propping.
- 4.22. A works duration is indicated in the Construction Management Plan (CMP); however, a detailed programme should be submitted by the appointed contractor at a later date. Details of the CMP should be agreed with LBC.
- 4.23. An outline monitoring proposal is included in the Structural and Civil Engineering Planning Report, with trigger levels included. Details and trigger levels should be agreed as part of the Party Wall award.

5.0 CONCLUSIONS

- 5.1. The BIA was undertaken by LBH Wembley Geotechnical & Environmental. The reviewer's qualifications are in accordance with CPG4 requirements.
- 5.2. The proposal includes increasing the depth of the existing lower ground floor. In the revised submissions, appropriate structural information has been provided.
- 5.3. In the revised submissions, details of the proposed bypass drainage system have been provided to mitigate hydrological impacts. However, a flood risk assessment (FRA) is required.
- 5.4. In the revised submission, hydrogeological assessments have been undertaken. There will be no impact on the wider hydrogeological environment.
- 5.5. In the revised submissions, geotechnical information in accordance with LBC guidance has been provided.
- 5.6. The ground movement assessment (GMA) predicts Category 0 (Negligible) damage for No 5 The Hexagon and Category 1 (Very Slight) for No 3 The Hexagon. In the revised submissions, the basis of the GMA has been provided and is accepted.
- 5.7. Work durations have been indicated in the CMP, however a detailed programme should be submitted at a later date. Details of the CMP are to be agreed with LBC.
- 5.8. An outline monitoring proposal is included. Details and trigger levels are to be agreed as part of the Party Wall award.
- 5.9. Queries and requests for further information are summarised in Appendix 2. Until the additional information requested is provided, the BIA does not meet the requirements of CPG: Basements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Man & Edwards	3 The Hexagon Fitzroy Park London N6 6HR	26/07/16	Ground water Stability/Damage to neighbouring building	See Audit Paragraph 4.7, 4.10 & 4.17 See Audit Paragraph 4.19, 4.20, 4.21 & 4.23
Apcar (on behalf of residents 10 Fitzroy Park)	Kinetic House Theobald St Borehamwood Hertfordshire WD6 4PJ	26/7/16	Stability of Grade II building Groundwater	See Audit Paragraph 4.3, 4.19, 4.20, 4.21 & 4.23 See Audit Paragraph 4.7, 4.10 & 4.17
Carnell	1 The Hexagon Fitzroy Park London N6 6HR	28/7/16	Stability of neighbouring buildings Groundwater flow	See Audit Paragraph 4.19, 4.20, 4.21 & 4.23 See Audit Paragraph 4.7, 4.10 & 4.17
Clements (on behalf of Highgate Society)	10A South Grove Highgate London N6 6BS	29/7/16	Increased Runoff (SuDS)	See Audit Paragraph 4.10 & 4.17

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA format	BIA not undertaken in accordance with ARUP GSD and CPG4 requirements	Closed	June 2019
2	BIA format	Works programme and CMP	Works duration provided in outline CMP. Detailed programme to be provided by appointed Contractor at a later date. Details of CMP to be agreed with Council.	N/A
3	BIA format/stability	Stiffness parameters not given for retaining wall design	Closed	June 2019
4	Hydrogeology	Impact of increased hard standing area and discharge to groundwater	Closed	June 2019
5	Hydrogeology	Bypass Drainage System	Closed	June 2019
6	Hydrology	Impact of increase hard standing area and discharge to groundwater	Closed	June 2019
7	Hydrology	Screening did not identify that the site is located in an area at risk from surface water flooding.	Open – FRA required. Responses in June / October 2019 indicated a FRA would be submitted but not yet received.	
8	Stability	Presence or absence of basement beneath neighbouring properties not discussed in BIA and foundations depths not determined.	Closed	June 2019
9	Stability	No construction sequence sketches and no temporary works proposal.	Closed	June 2019
10	Stability	Full input and output from the SAPPER programme not included	Closed	June 2019

11	Stability	Monitoring proposals	Outline proposal provided. Details and trigger levels to be agreed as part of Party Wall award.	N/A
----	-----------	----------------------	---	-----

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

Campbell Reith Hill LLP. Registered in England & Wales. Limited Liability Partnership No OC300082
A list of Members is available at our Registered Office at: 15 Bermondsey Square, London, SE1 3UN
VAT No 974 8892 43