CampbellReith
consulting engineers

176 Prince of Wales Road, London NW5 3PT

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12466-52

Revision: D1

April 2017

Campbell Reith Hill LLP
Friars Bridge Court
41-45 Blackfriars Road
London
SE1 8NZ

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	April 2017	Comment	GKemb12466-52-130417-176 Prince of Wales Road-D1.docx	GK	HS / CC	AJM

Document Details

Last saved	13/04/2017 16:28
Path	GKemb12466-52-130417-176 Prince of Wales Road- D1.docx
Author	G Kite, BSc MSc DIC FGS
Project Partner	E M Brown, BSc MSc CGeol FGS
Project Number	12466-52
Project Name	176 Prince of Wales Road
Planning Reference	2017/0001/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 176 Prince of Wales Road, London NW5 3PT (planning reference 2017/0001/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 site is occupied by a two-storey Grade II listed former Methodist chapel which is currently in use as an art gallery. The proposed development comprises extending the rear part of the existing art gallery through the construction of an additional storey and the excavation of a single level basement to a depth of 4.7m below ground level (bgl), with localised deepening to 5.7m bgl for the provision of a lift pit.

1.5. The BIA has been presented as two documents, prepared by Parmarbrook and Geotechnical & Environmental Associates (GEA). The qualifications of the authors from GEA are in accordance with CPG4 guidelines.

1.6. The BIA includes the majority of the information required from a desk study in line with LBC guidance. A conceptual site model should be presented which indicates the differential depth of foundations with surrounding structures within the zone of influence (as 1.13).

1.7. A site investigation has confirmed the underlying ground conditions to comprise Made Ground over Head Deposits overlying London Clay. Groundwater was monitored between 0.75m bgl and 3.55m bgl. The data is presented in an interpretative report broadly in accordance with LBC guidance.

1.8. Inflows of perched water may be encountered during construction. The BIA recommends that further trial excavations are undertaken to confirm the likely groundwater conditions.

1.9. It is accepted that the site is not in a Flood Risk Zone and is at low risk of flooding. The site is within a Critical Drainage Area (Group 3-0103).

1.10. The development will not increase the impermeable area across the site because the basement will be entirely beneath the footprint of the existing building. Attenuation SUDS has not been

considered. In line with LBC guidance, attenuation SUDS options should be proposed or assessment provided as to why this would be impracticable to implement.

1.11. Outline permanent and temporary works drawings have been provided. Outline retaining wall design calculations should be presented. A robust temporary works scheme is provided, including outline sequencing and propping. Temporary dewatering requirements should be discussed.

1.12. A Ground Movement Assessment (GMA) has been presented which predicts damage impacts of Category 0 to 2 (Negligible to Slight) to the building on site and surrounding structures, in accordance with the Burland Scale. It is proposed to limit all damage impacts to a maximum of Category 1 by utilising structural monitoring, phased excavations and additional propping where required. This is accepted and, due to the Listed nature of the development, should be secured by a means of a Basement Construction Plan.

1.13. Notwithstanding the comments of 1.12, the BIA does not identify in the Screening or Scoping assessments that the new development is likely to increase the differential depth of foundations with surrounding structures. The GMA has assumed foundation depths of surrounding structures, and these assumptions should be confirmed.

1.14. An outline construction programme should be presented.

1.15. Queries and matters requiring further information or clarification are discussed in Section 4 and summarised in Appendix 2. Until the additional information requested has been provided it is not possible to assess whether the requirements of CPG4 have been met.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 10 March 2017 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 176 Prince of Wales Road, London NW5 3PT, Camden Reference 2017/0001/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 planning portal describes the proposal as: "*Erection of three storey plus basement level rear extension and associated alterations following partial demolition of existing two storey rear extension (Use Class D1)*."

The planning portal also confirmed the site does not lie within a Conservation Area but the building is a Grade II listed building.

2.6. CampbellReith accessed LBC's Planning Portal on 12th March 2017 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (ref 1691) dated December 2016 by Parmarbrook.
- Desk study and Basement Impact Assessment Report (ref J162260) dated December 2016 by Geotechnical & Environmental Associates.
- Mechanical & Electrical Services Planning Report (ref 3409) dated December 2016 by E&M Tecnica LLP.
- Application Drawings – Existing, Demolition and Proposed (ref 310) dated November and December 2016 by Farshid Moussavi Architecture.
- Design and Access statement by Farshid Moussavi Architecture.
- Construction Management Plan by IDL.
- Delivery and Servicing Management Plan (ref MEPrinceofWales.1) dated December 2016 by Mayer Brown.
- Environmental Noise Survey Report and Acoustic Assessment (Ref: 360949 Rev 1) dated December 2016 by Noico Ltd.
- Comments and objections to the proposed development from local residents.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	The qualifications of the authors of the BIA prepared by GEA are in accordance with CPG4 guidelines.
Is data required by Cl.233 of the GSD presented?	No	Outline construction programme should be presented.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	
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	
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	BIA Report, part 13 (GEA report), Section 3.1.2. The screening has not identified that the proposed basement foundations will be deeper than the neighbouring property foundation depths.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Report, part 13 (GEA report), Section 3.1.1.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Report, part 13 (GEA report), Section 3.1.3. / Parmabrook report section 4.5.
Is a conceptual model presented?	No	This should indicate differential depth of foundations with structures in the zone of influence (including the subject building).

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Report, part 13 (GEA report), Section 4. However, does not discuss differential depth of foundations with neighbouring structures.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	No issues relating to subterranean flow were identified within the screening process.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Historic flooding absent in GEA report but discussed in Parmarbrook report. Conclusions accepted.
Is factual ground investigation data provided?	Yes	BIA Report, part 13 (GEA report), Section 4.
Is monitoring data presented?	Yes	BIA Report, part 13 (GEA report), Section 5.4.
Is the ground investigation informed by a desk study?	Yes	BIA Report, part 1 (Parmarbrook) and part 13 (GEA).
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	No	BIA Report, part 13 (GEA report), Section 11.1.1 – assumes surrounding structures do not have basements and are founded between 1m and 2m bgl.
Is a geotechnical interpretation presented?	Yes	BIA Report, part 13 (GEA report), Sections 5 and 8.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Geotechnical parameters for design presented. BIA Report, part 13 (GEA report), Section 8.1.1
Are reports on other investigations required by screening and scoping presented?	Yes	Thames Water Asset Search (Appendix B of Parmarbrook report). Mechanical & Electrical Services Planning Report.
Are baseline conditions described, based on the GSD?	Yes	

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	No	Assumptions made regarding founding depths of adjacent properties.
Is an Impact Assessment provided?	Yes	BIA Report, part 13 (GEA report), Section 9.
Are estimates of ground movement and structural impact presented?	Yes	BIA Report, part 13 (GEA report, sections 10, 11 and 12). Parmarbrook report, part 1.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	However, differential depth of foundations to be confirmed and assessed.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Temporary propping, monitoring and trigger levels are discussed (BIA Report, part 1 (Parmarbrook report): Sections 8 and 10).
Has the need for monitoring during construction been considered?	Yes	BIA Report, part 1 (Parmarbrook report) Sections 11 and 12.
Have the residual (after mitigation) impacts been clearly identified?	Yes	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Outline retaining wall calculations required. Differential depth of foundations to be confirmed.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	The development will not increase the impermeable area. Site drainage will be designed to maintain the existing situation. Attenuation SUDS should be considered as CPG4 3.51.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Structural calculations required, foundation depths to be assessed. It is accepted that the development will not materially change run-off from the current site arrangements, but assessment required.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	BIA Report, part 13 (GEA report) part 13. Parmarbrook report part 3.

Item	Yes/No/NA	Comment
Are non-technical summaries provided?	Yes	BIA Report, part 13 (GEA report), Section 9.

4.0 DISCUSSION

4.1. Two documents have been provided for review. The BIA prepared by Parmarbrook includes the desk study, flood risk assessment, assessment of underground infrastructure, proposed basement construction sequence, ground movement and monitoring strategy. An appendix of this document includes a further BIA prepared by Geotechnical & Environmental Associates (GEA) which includes the screening and scoping, site investigation, impact assessment and ground movement assessment. The qualifications of the authors of the BIA prepared by GEA are in accordance with CPG4 guidelines.

4.2. The GEA BIA has been generally been taken as the lead document for the purposes of this audit unless otherwise stated.

4.3. The site is occupied by a two-storey Grade II listed former Methodist chapel which is currently in use as an art gallery. The proposed development comprises extending the rear part of the existing art gallery through the construction of an additional storey and the excavation of a single level basement which will extend to a depth of 4.7m bgl, with localised deepening to 5.7m bgl for the provision of a lift pit.

4.4. The BIA includes the majority of the information required from a desk study in line with the GSD Appendix G1. However, a conceptual site model should be presented. The model should indicate the new foundation / retaining wall levels in relation to the existing development, the ground and groundwater conditions and the depth of foundations / basements of any structures within the proposed development's zone of influence. It should highlight any risks or potential impacts.

4.5. In line with paragraph 233 of the GSD, an outline construction programme should be presented.

4.6. A site investigation was undertaken by GEA in October 2016 comprising one 20m borehole, three window sampler boreholes, eight shallow trial pits and the installation of three groundwater monitoring standpipes. The ground conditions comprise Made Ground over Head Deposits overlying the London Clay. Groundwater was not encountered during drilling but on three subsequent monitoring visits was recorded between 0.75m bgl and 3.55 m bgl. The data is presented in an interpretative report broadly in accordance with the GSD Appendix G3.

4.7. The site investigation has indicated that groundwater is likely to be encountered within the basement excavation. Inflows of perched water may be encountered from within the made ground and the London Clay. The BIA recommends that further trial excavations are undertaken to confirm the likely groundwater conditions.

4.8. The Screening and Scoping assessments are generally accepted. The London Clay is identified as having a high shrink / swell potential but this has been assessed as having a negligible impact on the proposed development considering the proposed depth of foundations and proximity of trees.

4.9. The Screening and Scoping assessments have not identified that the proposed development is likely to have deeper foundations than adjacent structures and will therefore increase the differential depth of foundations. Foundation depths have been assumed for the purposes of the ground movement assessment (GMA). These should be confirmed and indicated on the conceptual site model.

4.10. The site is within a Critical Drainage Area (Group 3-0103) and the Parmabrook document identifies that Prince of Wales Road did flood in 2002. However, current Environment Agency and Camden SFRA data indicate that the site is generally at very low risk of flooding, with the exception of the western boundary which is adjacent to an alleyway identified as being at low risk of surface water flooding. The flood risk assessment indicates that the difference in site levels to that of the alleyway mitigates any flood risk, and this is accepted. However, it is recommended that the final site levels are confirmed as being suitably raised compared to the alleyway, and that raised thresholds to lightwells are considered in line with best practise.

4.11. The development will not increase the impermeable area across the site because the basement will be entirely beneath the footprint of the existing building. Drainage is proposed to continue broadly as the current situation, discharging to combined sewers. CPG4 Section 3.51 requires that attenuation SUDS is considered. An outline drainage strategy, with sufficient assessment to demonstrate discharge flows will be in accordance with LBC's and Thames Water's requirements, should be provided. Where attenuation SUDS is not practicable to implement, then this should be demonstrated.

4.12. It is proposed to form the basement retaining walls with reinforced concrete underpinning, completed by liner walls. Grade 3 waterproofing measures are proposed. Structural sketches and drawings are provided and the geotechnical parameters for retaining wall design are provided. Outline retaining wall design calculations should be provided to demonstrate stability, including soil, water and surcharge loads.

4.13. The geotechnical parameters for retaining wall design and the GMA are considered to be at the upper end of the acceptable range, and the stiffness of the Made Ground (EU) is not considered to be reasonably conservative. However, given the shallow depth of the Made Ground, it is accepted these will have very little impact on the overall design / assessments.

4.14. Temporary works sequencing and propping drawings are provided, which includes the use of plunge columns. The underpinning is typically formed to 4.8m bgl. However, it is proposed to

construct the underpins in three phases, with each phase being a maximum of 2.35m in depth. The temporary works are to be stiffly propped at all times.

4.15. The BIA states that the underpinning will be formed in stiff London Clay. Whilst it is accepted that the underpins will be founded within stiff London Clay, they will be excavated and constructed through Made Ground, firm Head Deposits and firm to stiff London Clay. They are also likely to encounter groundwater. The temporary works strategy should outline proposed dewatering methods to ensure underpinning works remain stable.

4.16. The GMA predicts damage impacts of between Category 0 to 2 (Negligible to Slight) to the existing building on site and surrounding structures, in accordance with the Burland Scale. The assessment is broadly accepted as predicting movements within the expected range for the scale of the development. The BIA acknowledges that control of construction and workmanship will influence ground movements. In that regard it proposes a structural monitoring regime with appropriate trigger values and contingency actions. It is considered that the monitoring strategy, linked to the phased excavation approach, will provide suitable control of construction to mitigate ground movements and potential damage impacts.

4.17. Using the approach described in 4.16, the BIA proposes that damage can be limited to a maximum of Category 1 (Very Slight). This is accepted and, due to the Listed nature of the development, should be secured by a Basement Construction Plan (BCP). The BCP should consider the actual depth to potentially affected foundations, the final construction methodology and temporary works detail and should describe all assumptions made with respect to ground, groundwater and structural loads.

4.18. Notwithstanding the comments of 4.17, the BIA does not identify in the Screening or Scoping assessments that the new development is likely to increase the differential depth of foundations with surrounding structures. The GMA has assumed foundation depths of surrounding structures, and these assumptions should be confirmed and the assessment updated, as required.

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

5.0 CONCLUSIONS

5.1. The qualifications of the authors are in accordance with CPG4 guidelines.

5.2. The proposed development includes the excavation of a single level basement which will extend to a depth of 4.7m with localised deepening to 5.7m for the provision of a lift pit.

5.3. An outline construction programme should be provided.

5.4. A conceptual site model should be provided.

5.5. Basement / foundation depths of structures within the zone of influence should be confirmed and assessments revised, as required.

5.6. A site investigation has confirmed the underlying ground conditions to comprise Made Ground over Head Deposits overlying London Clay. Groundwater was monitored between 0.75m bgl and 3.55m bgl. Further groundwater monitoring is recommended.

5.7. Inflows of perched water may be encountered from within the made ground and the London Clay. Temporary dewatering proposals should be presented to confirm the stability of temporary works.

5.8. It is accepted that the site is at low risk of flooding.

5.9. An attenuation SUDS proposal should be provided.

5.10. Outline retaining wall design calculations and verification of adequate bearing capacity should be provided.

5.11. The phased temporary works proposals in conjunction with structural monitoring are accepted as suitable for controlling construction and limiting ground movements and damage impacts. A maximum of Category 1 damage is predicted, and this should be secured by a Basement Construction Plan.

5.12. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the additional information requested has been provided it is not possible to assess whether the requirements of CPG4 have been met.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA	Conceptual Site Model to be provided.	Open – to be provided as 4.4	
2	BIA	Outline construction programme.	Open – to be provided as 4.5	
3	Land Stability	Confirm depth of foundations with surrounding structures.	Open – to be provided as 4.4	
4	Land Stability	Outline retaining wall calculations.	Open – to be provided as 4.12	
5	Land Stability	Provide outline temporary dewatering proposals.	Open – to be provided as 4.15	
6	Land Stability	GMA and damage impact assessment.	Open – assessments to be confirmed pending foundation depth assessment as 4.4, 4.18	
7	Land Stability	Damage impacts to surrounding structures.	Structural monitoring and mitigation proposals accepted	N/A – a maximum damage impact of Category 1 to be secured by Basement Construction Plan
8	Groundwater	In accordance with the BIA's own recommendations, further groundwater monitoring should be undertaken.	Open – to be provided as 4.7	N/A – ongoing
9	Surface Water Flow	Attenuation SUDS to be considered as CPG4 3.51 or confirmed as not practicable to implement.	Open – to be provided as 4.11	

Appendix 3: Supplementary Supporting Documents

None

London

Friars Bridge Court
41- 45 Blackfriars Road
London, SE1 8NZ

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

UAE

Office 705, Warsan Building
Hessa Street (East)
PO Box 28064, Dubai, UAE

T: +971 4 453 4735
E: uae@campbellreith.com