CampbellReith
consulting engineers

1-3 Britannia Street
London, WC1X 9BN

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12466-36

Revision: F1

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	January 2017	Comment	AJMjw12466-36-110117-1-3 Britannia Street-D1.doc	AJM	GK	GK
F1	April 2017	Planning	AJMjw12466-36-110417-1-3 Britannia Street-F1.doc	AJM	GH	GK

Document Details

Last saved	11/04/2017 16:41
Path	AJMjw12466-36-110417-1-3 Britannia Street-F1.doc
Author	A J Marlow, BSc CEng MIStructE FConsE
Project Partner	E M Brown, BSc MSc CGeol FGS
Project Number	12466-36
Project Name	Camden BIA Audits
Planning Reference	2016/6356/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 1-3 Britannia Street, London WC1X 9BN (planning reference 2016/6356/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 the latest revision of submitted documentation and reviewed it against an agreed audit check list.

1.4. The BIA has been carried out by a well known firm of consultants who possess relevant qualification and experience.

1.5. The redevelopment consists of the demolition of the existing single storey double height building and its replacement by a three storey building plus a single storey basement, approximately 4.4 metres deep, within part of the proposed Ground Floor building footprint.

1.6. A soils investigation has been undertaken which identified that the new basement will be excavated through Made Ground, up to 3.9 metres deep, and founded in London Clay. Groundwater was encountered at 2.6 metres and 5.0 metres below ground, representing shallow inflows of localised perched water. Further groundwater monitoring is ongoing to establish equilibrium levels and seasonal variation, to inform the detail design.

1.7. The basement will be constructed by a mixture of underpinning of existing party walls, trench sheeting where the basement is not immediately adjacent to existing buildings and piling where the superstructure is outside the footprint of the basement.

1.8. The site is adjacent to Kings Cross Road, which has been identified as the historical route of the River Fleet and is now culverted.

1.9. It is accepted that there will be no increase in impermeable area across the ground and the surface flow regime will remain unchanged. Green roofs and associated SUDS have been specified in the Flood Risk Assessment.

1.10. The site is within a Critical Drainage Area Group and a Local Flood Risk Zone (North Swinton Street). A detailed Flood Risk Assessment was conducted and concluded the development is deemed to be at low flood risk.

1.11. A Ground Movement Analysis has been undertaken which is generally acceptable. Additional information requested was provided that addressed concerns.

1.12. An acceptable preliminary construction sequence has been undertaken identifying methodologies to be utilised and indicative temporary works required to stabilise the excavation during the basement works. A monitoring proposal has been proposed with trigger levels and outline mitigation measures are proposed for those walls that are indicated to suffer Very Slight damage (Category 1) and above.

1.13. It is accepted that there are no slope stability or hydrogeological concerns with regard to the development.

1.14. Queries and requests for further information/clarification are discussed in Section 4 and summarised in Appendix 2. Following receipt of the revised BIA and supporting supplementary documents, the criteria contained in CPG4 and DP27 have been met.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 09 December 2016 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 1 – 3 Britannia Street, WC1X 9BN Camden Reference 2016/6356/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 *"Demolition of 2 storey light industrial building (B1c use) and redevelopment of the site including the erection of a 3 storey plus basement building to provide office (B1a use) at ground, 1st and 2nd floors and flexible gallery (D1 use)/office use at basement level. The installation of sedum green roofs and*

provision of associated cycle parking waste storage plant". The Audit Instruction also confirmed the property was a neighbour to a Grade II listed building, Derby Lodge in Wicklow Street.

2.6. CampbellReith accessed LBC's Planning Portal on 21 December 2016 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment dated November 2016 by Parmarbrook and Appendices:
  - Appendix A – Proposed Structural Drawings
  - Appendix B – Thames Water Asset Search
  - Appendix C – Below Ground Drainage Drawings
  - Appendix D – Desk Study and Ground Investigation Report dated November 2016 by GEA
- Existing and Proposed Architects General Arrangement Plans and Sections dated November 2016 by Marek Wojciechowski Architects Ltd.

2.7. Additional information was provided with regards to further information requested, comprising:

- Basement Impact Report – dated March 2017 by Parmarbrook
- Flood Risk Assessment and Surface Water Strategy – dated March 2017 by Parmarbrook
- Design and Access Statement – dated March 2017 by Marek Wojciechowski Architects Ltd
- Existing and Proposed Architects General Arrangement Plans and Sections – dated March 2017 by Marek Wojciechowski Architects Ltd
- Energy and Sustainability Statement – dated March 2017 by Cundall
- Transport Statement – dated March 2017 by Motion

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	BIA Appendix D.
Is data required by Cl.233 of the GSD presented?	Yes	
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	See BIA Sections 2 to 5.
Are suitable plan/maps included?	Yes	See BIA Sections 2 to 5.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	Extracts from Camden GHHS, EA and Strategic Flood Risk Assessment identifying site location have been provided.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Appendix D, Section 3.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Appendix D, Section 3.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Appendix D, Section 3.
Is a conceptual model presented?	Yes	See BIA Appendix D, Section 7.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes Yes	See BIA Appendix D, Section 4.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes Yes	See BIA Appendix D, Section 4.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes Yes	See BIA Appendix D, Section 4. FRA presented.
Is factual ground investigation data provided?	Yes	See BIA Appendix D, Section 5.
Is monitoring data presented?	Yes	See BIA Appendix D, Section 5.3.
Is the ground investigation informed by a desk study?	Yes	See BIA Appendix D, Section 1.3.
Has a site walkover been undertaken?	Yes	See BIA Appendix D, Section 2.1.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	See BIA Section 3.3 and Appendix D, Section 5.5.
Is a geotechnical interpretation presented?	Yes	See BIA Appendix D, Section 8.
Does the geotechnical interpretation include information on retaining wall design?	Yes	See BIA Appendix D, Section 8.1.1.
Are reports on other investigations required by screening and scoping presented?	Yes	See BIA Appendix C "Thames Water Asset Search" and BIA Section 5 "Underground Rail Assets".
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	See BIA Appendix D, Section 9.
Is an Impact Assessment provided?	Yes	See BIA Appendix D, Section 10.
Are estimates of ground movement and structural impact presented?	Yes	See BIA Appendix D Section 9 and BIA Section 10.

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	See BIA Appendix D, Section 9 and BIA Section 16. However, an FRA should be presented to address potential hydrological impacts / risks.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	See BIA Appendix D, Section 9.3.1 and BIA Section 16.
Has the need for monitoring during construction been considered?	Yes	See BIA Section 11.
Have the residual (after mitigation) impacts been clearly identified?	Yes	See BIA Appendix D, Section 11 and BIA Section 16.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	GMA and BIA Sections 6 and 8.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	See BIA Section 16. FRA presented to address potential hydrological impacts / risks.
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	BIA Appendix D, Sections 9.1 to 9.3 and BIA Section 9.
Are non-technical summaries provided?	Yes	BIA Appendix D, Section 10.2.

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been produced, as a base document, by a well known firm of consultants, Geotechnical and Environmental Associates (GEA) and has been produced by individuals who possess relevant qualifications and experience. The GEA document is included, along with a Ground Investigation Report, as Appendix D of a document entitled Basement Impact Assessment by Parmarbrook, who have summarised GEA's findings and included additional structural basement construction information and details in their document.

4.2. The proposal identifies that the existing single storey double height building will be demolished and replaced with a three storey basement, approximately 4.4 metres deep, within part of the proposed Ground Floor building footprint.

4.3. A ground investigation has been carried out by GEA in August and September 2016 through the installation of two no. boreholes and the investigation of surrounding party wall foundations by 14 no. trial pits. These have revealed the site stratigraphy to consist of 1.9m to 3.9m of Made Ground underlain by London Clay to depths exceeding 15m.

4.4. The trial pits identified that the existing party wall foundations investigated were formed from corbelled brickwork founded in the Made Ground. It is proposed to underpin three separate lengths of party wall to the rear walls of 159-163 Kings Cross Road, the rear of 3 Britannia Street, the side wall of 5 Britannia Street and a small length of Derby Lodge's Boiler House, all of which are immediately adjacent to the proposed basement construction. The remainder of the basement walls will have trench sheeting installed, and temporary propping introduced, to allow reinforced concrete retaining walls to be constructed followed by a 400mm thick basement raft to support internal loadbearing columns. Areas of the proposed building behind 155 and 157 Kings Cross Road and 5 Britannia Street do not have a basement and their ground floor and superstructure are supported on continuous flight auger piles installed from existing ground level.

4.5. Monitoring of boreholes encountered groundwater at depths of 2.6m and 5.0m in the north and centre of the site. It is confirmed that additional groundwater monitoring is being undertaken to confirm the equilibrium water levels to be incorporated into the detailed design of the structure. It is accepted that inflows of localised perched groundwater should be controlled by sump pumping but care should be taken to ensure fine aggregates are not removed during the process.

4.6. The screening and scoping exercise has identified that the historical route of the River Fleet ran through Kings Cross Road and onto Farringdon Road along its route to the River Thames. It is accepted that the Fleet is now entirely covered and culverted which is now indicated as a major sewer under Kings Cross Road on drawings supplied in Appendix B of the BIA.

4.7. The proposals in Appendix C of the BIA to limit flows to 5 litres/sec into the combined Thames Water sewer in Britannia Street, through the introduction of an attenuation tank, is noted although its installation could impact on adjacent existing foundations. This attenuation tank has now been omitted in the revised proposal.

Green roofs and associated SUDS have been specified in the revised proposal, detailed in the Flood Risk Assessment conducted by Parmarbrook. It is confirmed that all proposed drainage networks will be designed to Adoptable Standards in accordance with Thames Water Requirements.

4.8. It is accepted that there will be no increase in impermeable area across the ground surface above the basement and the surface water flow regime will be unchanged.

4.9. It is accepted that the development will not affect the hydrogeological setting as no known ponds, springlines or wells are in close vicinity to the site and the site is outside the Hampstead pond chain catchment area.

4.10. It is accepted that there are no slope stability concerns regarding the basement development.

4.11. The site is located within a Critical Drainage Area Group 3-003 as defined by LBC's Surface Waste Management Plan and is in a Local Flood Risk Zone (North Swinton Street). Appendix D of the BIA, Section 10.1 identifies that "the proposed basement is set back behind the buildings that front onto Britannia Street and Kings Cross Road, such that the basement is likely to be at a sufficient distance from any such surface water flooding". Parmabrook have carried out an "Assessment of Flood Risk" in Section 16 of their BIA stating that any flood water will be contained within the kerb upstands of the highways. However, topographical evidence is required to validate this statement. Environment Agency mapping suggests that flooding could exceed 300mm depth in the vicinity of the site. Further to this, following LBC guidance, sites within a Local Flood Risk Zone require a detailed flood risk assessment to be undertaken, which should be presented, including mitigation actions if required.

A Flood Risk Assessment has been conducted by Parmarbrook. The report concludes (Chapter 8) that the development is deemed to be at low flood risk, considering fluvial/tidal sources, surface water and groundwater.

4.12. Parmabrook have undertaken a preliminary construction sequence identifying methodologies to be utilised and indicative temporary works required to stabilise the excavation during the basement works, which is generally acceptable. It is noted that GEA have assumed that stiff propping will be provided by the contractor.

4.13. Specific care should be taken during the underpinning process which is envisaged under all party walls other than the southern retaining wall section, which will be constructed by trench

sheeting, to ensure adequate support during the hit and miss construction sequence. The BIA notes that the proposed methodology envisages mass concrete underpins to be excavated in 4.4m deep section. This should be considered further during the Party Wall process, as the anticipated ground conditions have revealed the thickness of the made ground strata to range between 1.9 and 3.9m. Details should be provided during the Party Wall process to ensure that the stability of the underpins is achieved through suitable temporary works.

4.14. A Ground Movement Assessment has been carried out by GEA to determine the effect of the underpinning and excavation on the adjoining/adjacent properties. Generally the assumptions and the output of the assessment are in agreement with the industry practice. Notwithstanding, the following observations are made:

- The BIA notes that the proposed basement walls will be constructed by a combination of traditional underpinning and trench sheeting. The revised BIA and GMA considers the effect of the trench sheeting installation.
- The predicted movements due to the basement excavation have been evaluated using X-Disp adopting the ground movement curves for 'excavations in front of a stiff wall in stiff clay'. An adequate propping system should be proposed during the Party Wall process to confirm the assumptions made in the GMA as it has a significant impact on ground movement.
- All building foundation depths that have not been proved by means of trial pitting are assumed to be 0.5m deep. This is considered acceptable.

4.15. The BIA had identified the potential for heave of the underlying clay soils to occur and suitable mitigation is proposed. Pdisp inputs were be provided and accepted.

4.16. Parmabrook have identified that monitoring of the building movements should be undertaken on the adjoining buildings both before and during construction on a regular basis and have identified a minimum of 10 no. locations. They have also identified an acceptable set of movement trigger levels. However, they also accept that those walls that are classified as Burland Damage Category 1 (Very Slight) and above should receive appropriate mitigation measures to be agreed with the contractor when appointed. Mitigation measures are identified by Parmabrook that satisfy current concerns. They should be subsequently agreed with the appointed contractor.

5.0 CONCLUSIONS

5.1. The BIA has been carried out by a well known firm of consultants who possess relevant qualification and experience.

5.2. The redevelopment consists of the demolition of the existing single storey double height building and its replacement by a three storey building plus a single storey basement, approximately 4.4 metres deep, within part of the proposed Ground Floor building footprint.

5.3. A soils investigation has been undertaken which identified that the new basement will be excavated through Made Ground, up to 3.9 metres deep, and founded in London Clay. Groundwater was encountered at 2.6 metres and 5.0 metres below ground, representing shallow inflows of localised perched water. Further groundwater monitoring is ongoing to establish equilibrium levels and seasonal variation, to inform the detail design.

5.4. The basement will be constructed by a mixture of underpinning of existing party walls, trench sheeting where the basement is not immediately adjacent to existing buildings and piling where the superstructure is outside the footprint of the basement.

5.5. The site is adjacent to Kings Cross Road, which has been identified as the historical route of the River Fleet which is now culverted.

5.6. It is accepted that there will be no increase in impermeable area across the ground and the surface flow regime will remain unchanged. Green roofs and associated SUDS have been specified in the Flood Risk Assessment.

5.7. The site is within a Critical Drainage Area Group and a Local Flood Risk Zone (North Swinton Street). A detailed Flood Risk Assessment has concluded the development is at low flood risk.

5.8. A Ground Movement Analysis has been undertaken which is generally acceptable. Additional information requested was provided that addressed concerns.

5.9. An acceptable preliminary construction sequence has been undertaken identifying methodologies to be utilised and indicative temporary works. A monitoring proposal has been proposed with suitable trigger levels.

5.10. It is accepted that there are no slope stability or hydrogeological concerns with regard to the development.

5.11. Queries and requests for further information/clarification are summarised in Appendix 2. Following receipt of the revised BIA and supporting supplementary documents, the criteria contained in CPG4 and DP27 have been met.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue Raised	Response
Musgrave	Flat 13, Derby Lodge	19.12.16	Not seen BIA. Stability of existing walls.	See audit paragraphs 4.4, 4.12 to 4.16
Dealey	88 Derby Lodge	19.12.16	Basement excavation and noise and effect on existing foundations.	See audit paragraphs 4.4, 4.12 to 4.16
Krotoski	82 Derby Lodge	14.12.16	Integrity of residence.	See audit paragraphs 4.4, 4.12 to 4.16
Todd	51 Derby Lodge	19.12.16	Ground disturbance and flooding.	See audit paragraphs 4.4 to 4.6, 4.11 to 4.16
Derby Lodge TRA	94 Derby Lodge	21.12.16	Existence of small river below Derby Lodge and courtyard.	See audit paragraphs 4.6 and 4.11

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	Hydrogeology	Further monitoring of groundwater levels.	Closed – Ongoing monitoring to inform detailed design confirmed.	March 2017
2	Hydrology	Provision of a detailed Flood Risk Assessment.	Closed – FRA provided by Parmarbrook.	March 2017
3	Stability	Details of attenuation tank on adjacent foundations.	Closed – Provided in FRA Section 5.	March 2017
4	Stability	Mitigation measures for walls with Category 1 and above damage classification.	Closed – Revised BIA Sections 10.2 and 12.	March 2017
5	Stability	Temporary works to ensure stability of underpins.	To be provided as part of Party Wall process.	N/A
6	Stability	GMA additional information as items 4.14 and 4.15.	Closed – Addressed in Revised GMA.	March 2017

Appendix 3: Supplementary Supporting Documents

Basement Impact Report dated March 2017 by Parmarbrook

Flood Risk Assessment and Surface Water Strategy dated March 2017 by Parmarbrook

Design and Access Statement dated March 2017 by Marek Wojciechowski Architects Ltd

Existing and Proposed Architects General Arrangement Plans and Sections dated March 2017 by Marek Wojciechowski Architects Ltd

Energy and Sustainability Statement dated March 2017 by Cundall

Transport Statement dated March 2017 by Motion

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