CampbellReith
consulting engineers

23 Lyncroft Gardens
London, NW6 1LB

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12985-17
Revision: F1

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

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

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Author	V. Pseneac BSc MSc
Project Partner	E M Brown, BSc MSc CGeol FGS
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1.0 NON-TECHNICAL SUMMARY

1.1. CampbellReith was instructed by London Borough of Camden, (LBC) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 23 Lyncroft Gardens, NW6 1LB (planning reference 2018/3377/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 qualifications of the individuals involved in the BIA and supporting information have been confirmed to comply with CPG Basements.

1.5. The screening stage had not been fully undertaken as part of the original BIA. A revised BIA was subsequently received containing the screening, scoping and impact assessment, which is accepted.

1.6. The basement plans comprise the lowering and lateral extension of the existing basement by underpinning.

1.7. Structural drawings presenting the proposed full basement plan and depth, underpinning sequence and propping strategy had not been included in the BIA originally. Updated sketches were submitted following a request by CampbellReith, and these are accepted.

1.8. Outline structural calculations of the main retaining elements have been included in the latest BIA information and are accepted.

1.9. Insufficient site investigation was undertaken initially. Additional investigation was conducted subsequently presenting further information on the site conditions.

1.10. A below ground utility search has been undertaken and the findings should be considered during the construction works.

1.11. A ground movement and building damage assessment submitted in August 2019 confirms that damage to neighbouring properties should not exceed Burland Category 1.

1.12. An outline movement monitoring strategy, compatible with the predicted movements, has been submitted.

1.13. An outline programme has been submitted, as per request by CampbellReith.

1.14. Queries and requests for further information are summarised in Appendix 2. Additional information received since the initial audit report was issued has addressed the queries raised. It is confirmed that the BIA and supporting documentation comply with the requirements of CPG: Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 11 October 2018 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 23 Lyncroft Gardens, NW6 1LB, 2018/3377/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 *"extension and lowering of the existing basement floor below the whole footprint of the building".*

2.6. The Audit Instruction also confirmed that the development neither involved nor neighboured any listed buildings.

2.7. CampbellReith accessed LBC's Planning Portal on 25 October 2018 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA – Rev. 00) dated 18th September 2018
- Planning Application Drawings consisting of

  Location Plan

  Existing Plans (ex. 02, 03 by Architect; SK001 (rev. A) by CR8 Structures)

  Proposed Plans (P02 by Architect; SK002, SK003 (rev. A) by CR8 Structures)
- Design & Access Statement
- Planning Comments and Response

2.8. Subsequent to the issue of the initial audit report by CampbellReith, the applicant has provided a revised BIA (dated 19th February 2019 including a Ground Investigation Report by Jomas Associates Ltd (dated 16th January 2019), and a Ground Movement Assessment (version 1.1, dated 14th August 2019), also by Jomas Associates Ltd.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Authors credentials confirmed
Is data required by Cl.233 of the GSD presented?	Yes	BIA partly undertaken in line with CPG Basements. Queries relating to stability have been raised in Section 4 and Appendix 2.
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 plan/maps included?	No	Not all of the relevant maps appeared to have been consulted or presented in the BIA. However, a commentary was included in the revised BIA information.
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	BIA Section 4.2.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Sections 4.1. and 4.3
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 4.3
Is a conceptual model presented?	Yes	Refer to supplementary information – Ground Investigation Report submitted.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 5.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	N/A	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 5.5.
Is factual ground investigation data provided?	Yes	See Ground Investigation Report.
Is monitoring data presented?	Yes	As above.
Is the ground investigation informed by a desk study?	Yes	Limited desk study information presented.
Has a site walkover been undertaken?	Yes	BIA.
Is the presence/absence of adjacent or nearby basements confirmed?	No	The presence of neighbouring basements has not been confirmed.
Is a geotechnical interpretation presented?	Yes	Ground Investigation Report submitted.
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA Section. 9.1. presents assumed design parameters (see Audit paragraph 4.10).
Are reports on other investigations required by screening and scoping presented?	Yes	Ground Movement Assessment.
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	The BIA assumed existing neighbouring basements. The GMA assumes basements are absent.
Is an Impact Assessment provided?	Yes	BIA chapters 9, 10 and 11.
Are estimates of ground movement and structural impact presented?	Yes	A GMA has been presented that confirms any potential damage should not exceed Burland Category 1.

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Movement monitoring during construction.
Has the need for monitoring during construction been considered?	Yes	An outline movement monitoring strategy not presented.
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?	Yes	A GMA has been presented which demonstrates the stability of neighbouring buildings during excavation and construction of underpins.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	
Are non-technical summaries provided?	Yes	Executive summary presented in the BIA

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by CR8 Structures. The reviewer of the report is a Chartered Structural Engineer. The Desk Study, Geotechnical Appraisal and Ground Movement Assessment have been undertaken by Jomas Associates Ltd. The authors of the BIA documentation comprise Chartered Civil Engineers and Geotechnical Engineers. This is accepted as being compliant with CPG: Basements.

4.2. The LBC Instruction to proceed with the audit identified that the basement proposal neither involved a listed building nor was adjacent to one.

4.3. Although a limited assessment of geology, hydrology and hydrogeology had been undertaken, the BIA was not originally carried out in accordance with the Camden Planning Guidance. Revised BIA information was received subsequently upon CampbellReith request. This was prepared in line with CPG: Basements, having given consideration to the screening, scoping and assessment stages as required.

4.4. The basement proposals comprise the lowering and extension of the existing basement to cover the main building footprint. The BIA confirmed that part of the existing basement slab level is to be lowered by 700mm. It is also stated that the basement is to be extended laterally, which would involve the demolition of existing structures forming the undercroft space. The depth of the excavation within the extended area of the proposed basement is indicated to be approximately 1.90m.

4.5. Preliminary sketches have been included in the BIA which indicate the extent of excavation, outline details of basement retaining elements and slab construction. The engineering proposals comprise 225-300mm thick RC underpins, constructed in a “hit and miss” sequence, which will form the basement retaining structure. The new basement RC slab is shown to vary between 200mm in thickness, at mid-span, to 500mm towards the perimeter.

4.6. Additional structural drawings, indicating the proposed basement full plan, underpinning sequence and outline propping strategy, were requested as part of the initial BIA audit. Supplementary information in form of sketches has been provided subsequently. These present an outline construction sequence of the underpinning works and a part plan of the proposed basement.

4.7. Consideration has been given to possible heave due to excavation. The BIA confirmed the adoption of clayboard under the basement slab as a heave protection measure.

4.8. Outline structural calculations demonstrating design feasibility of retaining elements has also been provided upon request by CampbellReith and these are accepted.

4.9. Limited site specific investigation (SI) was originally undertaken. The initial SI comprised three hand-dug trial pits which appear to extend to a maximum depth of 0.90m. One of the three trial pits was abandoned, whilst the remaining two indicated the presence of Made Ground approximately 0.40m bgl, underlain by stiff brown clay. The sequence and depth of strata as well as groundwater conditions, at the proposed basement depth, were not originally established.

4.10. Historic borehole data, obtained as part of site investigations at a distance away from the site, has been included in the BIA. One borehole log indicated the presence of clayey silt (Claygate "Beds" formation) below Made Ground, whilst the other two indicated soft becoming firm silty clay below a shallow layer of Made Ground. All the borehole logs confirmed the presence of London Clay formation approx. 4.50m bgl, underlying the Claygate "Beds" soil formation.

4.11. Upon request by CampbellReith, further investigation was conducted to establish the soil stratigraphy, groundwater conditions and properties of soils. This comprised two exploratory window sample boreholes to a depth of 4m. The investigation established that "brown mottled orange to grey medium becoming very high strength Clay" underlay a 650mm thick layer of Made Ground. Groundwater monitoring was undertaken and this showed that water was encountered at 1.20m and 2.26m bgl. The BIA confirmed that the groundwater encountered was likely to have been surface water infiltrated in the wells. However, the BIA noted that groundwater inflows may be encountered during basement excavation and appropriate measures to deal with these will be required.

4.12. The site is underlain by a non-aquifer, therefore there are no significant flows of groundwater which may be impacted by the basement construction.

4.13. Whilst item 5.2 identified in the BIA "Scoping" states that "the excavation to basement excavation will be within 1.70m depth of suspected made ground and the lowering of existing basement will also be within 250mm of that layer", the Ground Investigation Report confirmed that the basement would be founded within London Clay. This conclusion is also supported by the exploratory boreholes information.

4.14. In-situ soil testing has been carried out using a Pocket Penetrometer and Perth Penetrometer, which are regarded to be less reliable compared to other more established soil tests. The results indicated undrained shear strengths varying between 62 and 167kPa. Based on these recordings, the BIA suggested that an allowable bearing pressure of 200kPa is used for foundation design.

4.15. The outline calculations presented in the latest BIA information suggest a maximum bearing pressure of 177kPa due to foundation loads. The GMA assumes foundation loads of 195kPa. Estimations of settlement in the GMA are based on reasonably conservative assumptions of soil strength and confirm settlements to be within generally acceptable limits.

4.16. The BIA states that any anticipated damage during construction will be no greater than Burland Category 1. Calculations relating to lateral deflection of the proposed underpins have been prepared, which indicated deflections of 1mm. Whilst it is acknowledged that post construction horizontal deflections are anticipated to be small, the settlement and horizontal ground movement during the underpinning operations has not been considered. A quantitative assessment of strains induced into the neighbouring building walls was requested to demonstrate that these were unlikely to cause damage no worse that Burland Category 1.

4.17. The GMA, which was issued subsequently, estimates vertical movements around the excavation up to 6mm and vertical movements up to 22mm. Use of specialist software to estimate building damage in accordance with CIRIA C760 indicates that damage to the surrounding properties can be limited to not worse than Burland Category 1. Although the software is intended to be used in conjunction with piled retaining walls, it is accepted that this is a reasonable estimate of ground movement and building damage.

4.18. An outline movement monitoring strategy has been provided indicating frequency of readings and trigger levels compatible with the movements obtained from the ground movement assessment.

4.19. An indicative construction works programme was not originally submitted, which is a requirement of cl. 233 of the Arup GSD. An indication of the possible duration of works has been included in the latest BIA information.

4.20. The BIA confirmed that the basement extension will be within the existing main building footprint and the present surface water discharge flow is expected to remain unchanged. The BIA makes reference to the Environment Agency (EA) maps, which indicate the risk of flooding due to rivers and seas, and confirmed that the site is located in a low risk of flooding of this type.

4.21. The BIA discusses the nearest open watercourse to be River Brent, which is stated to be located approximately 6km from the site. With reference to Drawing No 007 of the Redfrog Hydrogeological Mapping, a watercourse (Kilbourne) runs to the east of the site. Pumps and ponds are indicated to the southwest and east of the site.

4.22. With reference to the maps found in Camden's Strategic Flood Risk Assessment report, Lyncroft Gardens is indicated to have been subject to surface water flooding during the 2002 floods. Furthermore, the internal sewer flooding SFRA map (fig. 5a) indicates that at least 1 property located on Lyncroft Gardens has been subject to internal sewer flooding in the past; other maps within the same document (fig. 6 - Critical Drainage Areas/Local Flood Risk Zones) confirmed that the property is located in a local flood risk zone and within an area of increased risk of flooding due to groundwater (SFRA map fig. 4e).

4.23. Notwithstanding the above, the latest BIA information concludes that the risk of flooding from the aforementioned sources is low and a flood risk assessment is not required. The report confirmed that internal sewer flooding would be avoided by adopting a one-way valve system as part of the new drainage design.

4.24. A below ground utility search was requested to confirm that the lowering and extension of the existing basement will not impact on any existing below ground services and/or infrastructure. This has been now undertaken and the BIA confirmed that the proposals would not impact on any buried services.

5.0 CONCLUSIONS

5.1. It can be confirmed that BIA authors' credentials satisfy CPG Basement requirements.

5.2. The original BIA did not give consideration to the procedure required by CPG Basements, particularly relating to the main stages of the BIA (i.e. screening, scoping and impact assessment). However, this has now been addressed and accepted.

5.3. Sketches have been provided presenting the proposed part basement plan, underpinning sequence and possible propping strategy.

5.4. Outline structural calculations of the main retaining elements had not been submitted originally. These were subsequently provided and are accepted.

5.5. Insufficient site investigation had been undertaken originally. Further site specific investigation was requested by CampbellReith, which was undertaken. The results confirmed the founding stratum, soil properties, groundwater conditions and depth of party wall foundations.

5.6. Confirmation has been submitted that the settlements due to the calculated bearing pressures at basement level will be acceptable.

5.7. A below ground utility search has been carried and the findings should be considered prior to and during construction.

5.8. A GMA has been submitted which estimates likely vertical and horizontal ground movements. The damage assessment predicts damage to neighbouring properties will not exceed Burland Category 1.

5.9. An outline movement monitoring strategy, compatible with the predicted movements, has been presented.

5.10. An outline construction programme was not originally submitted. However, this has been included in the latest BIA information following a request by CampbellReith.

5.11. Queries and requests for further information are summarised in Appendix 2. The additional information received since the initial audit report has addressed the queries raised and it is confirmed that the BIA and supporting documentation comply with the requirements of CPG: Basements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Unknown	1/3/25 Lyncroft Gardens	22.10.2018	1. Concerns have been raised in relation to damage to neighbouring properties 2. Concerns have been raised in relation to flooding and cumulative impact of proposals.	Updated documents reviewed - see Section 4
Taylor/Mukherjee	21 Lyncroft Gardens	Unknown	1. Concerns have been raised regarding flooding and the running of an underground stream in proximity to site 2. The residents stated that the existing condition of their properties has not been inspected by engineers.	Updated documents reviewed - see Section 4
Bull/Foster	27 Lyncroft Gardens	28.10.2018	1. The neighbours raised concerns regarding ground water levels, indicating these are quite high in the area. 2. Concerns have been raised with regards to the possible structural damage to their properties due to redevelopment plans.	Updated documents reviewed - see Section 4

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA format	Qualifications of BIA authors/reviewers require confirmation.	Closed	27.02.2019
2	BIA format	BIA not undertaken in accordance with planning guidance.	Closed	27.02.2019
3	BIA format	Construction programme will be required.	Closed	27.02.2019
4	Baseline conditions/Stability	Additional investigation will be required to confirm the basement founding stratum, soil properties, allowable bearing capacity and groundwater conditions.	Closed	27.02.2019
5	Stability	Party wall foundations requiring underpinning not investigated;	Closed	27.02.2019
6	Stability	Structural drawings/sketches will be required to show further information relating to basement construction. Full basement plans showing the underpinning sequence and depth will be required.	Closed	08.04.2019
7	Stability	Outline calculations of the main basement structural elements will be required.	Closed	27.02.2019
8	Stability	A GMA showing likely strains in neighbouring structures due to excavation for and installation of underpins will be required to demonstrate that the likely damage is no worse than Burland Category 1.	Closed	22.08.2019
9	Stability	Outline movement monitoring strategy will be need to be presented.	Closed	22.08.2019
10	Stability	Confirmation of retaining wall design parameters will be required.	Closed	27.02.2019
11	Hydrology/Hydrogeology	Additional assessment will be required to confirm risk of flooding from various sources.	Closed	27.02.2019

Appendix 3: Supplementary Supporting Documents

Revised BIA documentation has not been appended to this report as this will be available on LB Camden Online Planning Portal.

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