CampbellReith
consulting engineers

12 Eldon Grove, London NW3 5PT

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 13693-53
Revision: F1

April 2023

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

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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 12 Eldon Grove, London NW3 5PT (planning reference 2022/0675/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 individuals involved in the BIA meet LBC qualifications.

1.5. The proposed work involves constructing a one-story basement up to a depth of 4.00m bgl beneath the entire building footprint.

1.6. The screening and scoping assessments are supported by desk study information but refer to outdated policy guidance. However, the screening questions remain unchanged, and the assessment is satisfactory.

1.7. A ground investigation was conducted and identified Made Ground to a depth of 1.40m bgl. The basement will be founded within the Claygate Member.

1.8. Groundwater was found at varying depths during monitoring and is believed to be surface water infiltration or perched water. Appropriate groundwater control measures have been provided.

1.9. Hydrogeology and hydrology screening assessments were reviewed due to increased hardstanding and a SUDS report is provided for surface water mitigation measures in the form of a storage attenuation tank.

1.10. The surrounding slopes to the development site are stable.

1.11. The basement will be constructed using a traditional reinforced concrete underpinning with a reinforced concrete raft slab.

1.12. The updated Ground Movement Assessment (GMA) is considered robust and conservative as required by LBC policy. The ground movements indicate a Category 1 damage for a two-stage underpinning construction.

1.13. A proposed movement monitoring strategy is provided with trigger values consistent with the updated GMA.

1.14. The BIA presents a damage assessment for the Network Rail tunnel, which indicates a negligible impact. Consultation with Network Rail is recommended to ensure compliance with their requirements.

1.15. Based on the additional information provided it can be confirmed that the BIA complies with the requirements of CPG: Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 22 April 2022 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 12 Eldon Grove London NW3 5PT and Planning Reference - 2022/0675/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

- Camden Local Plan 2017 - Policy A5 Basements.
- Camden Planning Guidance (CPG): Basements. January 2021.
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Hampstead Neighbourhood Plan

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 *"Excavation of basement level and front lightwell; erection of rear single storey extension at ground floor and side/rear extension at first floor; Roof extension involving erection of side dormer and installation of rear/side rooflights; fenestration alterations; Installation of side gate; front/rear landscaping alterations and installation of front cycle and bin stores."*

2.6. The Audit Instruction confirmed 12 Eldon Grove neither is, nor is a neighbour to, listed buildings.

2.7. CampbellReith accessed LBC's Planning Portal on 13 May 2022 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment by Byrne Looby, ref. 9001-BIA-001, dated January 2022, which includes:
    - In Appendix A: Preliminary Risk Assessment and Ground Investigation by Paddock Geo Engineering, ref. P18-180gi_v3, dated January 2022.
    - In Appendix B: Basement Impact Assessment by Paddock Geo Engineering, ref. P18-180bia_v2, dated January 2022.
- Planning Application Drawings by KSR Architects, all dated 03 February 2022 consisting of:

  Location Plan (ref:E-001)

  Existing Plans and Sections (ref:E-002, 003, 004, 100, 110, 130, 200, 300-303)

  Demolition Plans (ref:D-001, 100, 110, 300-303)

  Proposed Plans (ref:P-002, 003, 004, 090, 100, 110, 120, 130, 200, 201)
- Design & Access Statement by KSR Architects, dated February 2022
- Planning Consultation Responses

2.8. CampbellReith issued a D1 audit in June 2022 with request for additional information. The following updated documents were submitted by the applicant to answer CampbellReith's queries:

- Basement Impact Assessment Geo Technical Note by Byrne Looby dated 28/03/2023, Reference – J9006.
- Sustainable Urban Design Report by Byrne Looby dated 06/01/2021, Reference 9001-SUDS-001
- PDisp and XDisp inputs and outputs from Byrne Looby dated:
    - 21/10/2022
    - 18/11/2022
    - 24/01/2023
    - 14/02/2023
- E-mail correspondence regarding groundwater conditions and GMA with Paddock Geo Engineering dated 09/09/2022, presented in Appendix 3 of this audit.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Section 2.3 of BIA
Is data required by Cl.233 of the GSD presented?	Yes	A construction program plan is not included but will provided at detailed design stage in accordance with the Hampstead Neighbourhood Plan.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	SUDS report provided addresses surface water mitigation and no significant risk to groundwater flow.
Are suitable plan/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?	Yes	Section 4.2 of BIA.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 4.1 of BIA. Question 5 is addressed via a SUDS report detailing a storage attenuation tank.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 4.3 of BIA. Question 2 is addressed via a SUDS report detailing a storage attenuation tank.
Is a conceptual model presented?	Yes	Section 6.3 of BIA, further groundwater assessment is provided and discussed in Section 4.9.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 5.2 of BIA

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 5.1 of BIA
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 5.3 of BIA
Is factual ground investigation data provided?	Yes	Appendix A of BIA (Paddock Geo Engineering GI report)
Is monitoring data presented	Yes	Section 6.3 of BIA
Is the ground investigation informed by a desk study?	Yes	Paddock Geo Engineering report
Has a site walkover been undertaken?	Yes	Appendix B of GI report
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Architectural drawings show the presence of basements, but GMA assumes that the basements are located at the surface level, which is a conservative assumption.
Is a geotechnical interpretation presented?	Yes	In the GI report
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 10.6 of Paddock Geo Engineering GI report
Are reports on other investigations required by screening and scoping presented?	Yes	SUDS Report provided to address surface water flow regime and mitigation.
Are the baseline conditions described, based on the GSD?	Yes	Presence of neighbouring basements confirmed within architectural drawings but no dimensions are given. However, GMA assumes basements are at surface level.
Do the base line conditions consider adjacent or nearby basements?	Yes	As above.
Is an Impact Assessment provided?	Yes	Section 8 of BIA.

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	Updated within BIA Geo Technical Note by Byrne Looby.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	Surface water mitigation and groundwater within Claygate Member are assessed and discussed in Sections 4.7 and 4.9.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	
Has the need for monitoring during construction been considered?	Yes	Section 7.4 and Appendix F of BIA
Have the residual (after mitigation) impacts been clearly identified?	No	Hydrogeology assessment needs further clarification.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	GMA is updated by Byrne Looby in BIA Geo Technical Note.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	A SUDS report is provided to mitigate surface water flows and groundwater regime is discussed in Section 4.9.
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	Updated Technical Note indicates movements within Category 1 of Burland Scale.
Are non-technical summaries provided?	Yes	Section 1 of BIA

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by Byrne Looby (BL) with support from Paddock Engineering (PGE). The individuals associated with the production of the report possess qualifications as required by CPG: Basements.

4.2. The site is currently occupied by a two-storey detached residential property of conventional masonry construction with a detached single storey garage. A Network Rail Tunnel runs under the application site c. 25m below ground level (bgl).

4.3. The proposed works consists of refurbishment of the existing building and construction of a one storey basement with a maximum excavation depth of 4.00m bgl beneath the entire building footprint.

4.4. Desktop study data is used to present and inform screening and scoping assessments. The BIA references the relevant figures and maps from the Arup GSD and other guidance documents to support responses to the screening questions. It is worth noting that the screening was originally performed by CPG Basements in March 2018, which has since been superseded by the latest guidance published in January 2021. The screening questions have not been modified in the most recent revision and the screening is considered to be acceptable.

4.5. Architectural drawings by KSR Architects (Drg No.: P-201) confirm the presence of neighbouring basements, but no information regarding their depth is provided. However, the GMA assumes the basement level is at surface level, which is a conservative assumption. An outline construction sequence is provided within the BIA and Technical Note. A construction program plan is not included but will be provided at detailed design stage.

4.6. It is accepted that there are no slope stability concerns regarding the proposed development, and it is not in an area prone to flooding.

4.7. Based on the information provided in the BIA, it is confirmed that there will be an increase in hardstanding as a result of the proposed works. The BIA also indicates that soakaway SUDS will not be appropriate to discharge additional surface water, which will instead be drained into the existing sewers. The SUDS report clarifies that surface water will be attenuated prior to discharge to the sewer, with a storm event run-off rate, a provision of a 6.50m^3 storage tank, and flow control device to limit flow to a maximum of 2.00l/s.

4.8. The ground investigation undertaken comprised two Window Samples to a depth of 6.00m bgl and five foundation inspections pits. The GI encountered Made Ground to a maximum depth of 1.40m bgl underlain by the Claygate Member to depth. The foundation inspection pits revealed the existing buildings foundation to be typically formed of corbelled brick on mass concrete at a

depth of c.1.30m bgl. A ground penetrating radar survey was conducted to determine the presence of a railway shaft, and the findings ruled out the possibility of a railway shaft. It is confirmed the basement will be founded within the Claygate Member.

4.9. Two subsequent monitoring visits noted the groundwater levels to be 2.29m to 2.35m depth in WS01 and 5.16m to 5.30m depth in WS02. These groundwater levels are attributed to surface water inflow in Section 5.3 of the PGE BIA, however in Section 6.0 of the PGE BIA it is attributed to perched water in the near surface soils. The near surface soils are identified as being Claygate Member, which is identified as being a Secondary A Aquifer. Borehole logs and photos provided within Appendix C of Paddock BIA indicate the Claygate Member to be predominantly cohesive in nature and the statement made in Question 1b of the hydrogeological screening is accepted.

4.10. It is proposed to construct the new basements using traditional reinforced concrete underpinning in bays not exceeding 900mm, supported by a RC raft slab of 450mm in the permanent case. Temporary propping is proposed for the existing building while underpinning progresses. Underpinning is indicated in Section 7.2b to be carried out in 2 stages. An outline load takedown and structural calculations are provided in Appendix E of the BIA.

4.11. An updated Ground Movement Assessment (GMA) is presented in the Technical Note by Byrne Looby. The GMA uses CIRIA C760 to predict ground movements resulting from underpinning and settlements are modelled on PDISP. Whilst the CIRIA approach is intended for embedded retaining walls, we accept that the predicted ground movements are within the range typically anticipated for underpinning techniques carried out with good control of workmanship. The typical range is 5mm to 10mm of horizontal and vertical movement per lift/stage of underpinning.

4.12. The following points regarding the GMA are addressed within the Technical Note:

- Clarification is provided on movements and stages of construction in the updated assessment. Movements generated by the excavation/construction of new underpins, settlement of the dry pack, bulk excavation of the basement and application of structural loads are considered to be conservative and accepted.
- A plan is presented that show the structures in relation to the application site, with walls perpendicular to the excavation proximity. The full XDISP input and outputs provided assumed building L/H ratios for the assessed walls.
- The CIRIA 760 methodology and curves used were provided, along with a full assessment comprising inputs and outputs for review. The worst-case movements were within 9-10mm vertically and 7-8mm horizontally, for two stages of underpinning.
- The building damage assessment provided within the XDISP outputs indicate a maximum of Category Damage 1, which meets the requirements of Camden basement policy.

4.13. A GMA is undertaken for the Network rail tunnel running c.25m bgl and states the impact of the basement construction is negligible. This audit addresses the impact on neighbouring buildings only. Network Rail may require a separate assessment to satisfy their requirements and agree asset protection criteria.

4.14. Proposals for a movement monitoring strategy are provided in Appendix F of the BIA. The document outlines the proposed locations of survey targets, frequency of readings, and suggested trigger levels. The trigger values align with the updated GMA and reflect the predicted movement in the GMA.

5.0 CONCLUSIONS

5.1. The qualifications of the individuals involved in the BIA are in accordance with LBC guidance.

5.2. The proposed works consists of the construction of a one storey basement with a maximum excavation depth of 4.00m bgl beneath the entire building footprint.

5.3. The presented screening and scoping assessments are supported by desk study information, referring to the outdated CPG Basements (March 2018) instead of the updated CPG Basement (January 2021). Although the screening questions have not been updated to reference the current policy, the screening questions and scoping assessment within the BIA have been carried out appropriately.

5.4. A ground investigation was undertaken and identified Made Ground to a maximum depth of 1.40m bgl and underlain by the Claygate Member to depth. It is confirmed the basement will be founded within the Claygate Member.

5.5. The Claygate Member has been identified as a Secondary A aquifer, and varying depths of groundwater were observed during monitoring. The stratum was found to be cohesive based on photos and logs. The water recorded in the wells is believed to be surface water infiltration or perched water. As a result, no further monitoring is necessary, and appropriate groundwater control measures provided.

5.6. Due to the increase in hardstanding, screening assessments for hydrogeology and hydrology are reviewed, and clarification provided for surface water mitigation measures in the form of a SUDS report.

5.7. The basement is to be constructed using a traditional reinforced concrete underpinning in bays not exceeding 900mm wide, with the incorporation of a RC raft slab of 450mm thick. Two stages of underpinning are proposed.

5.8. The Ground Movement Assessment (GMA) is updated and damage assessment indicate the Category 1 damage on the Burland Scale.

5.9. A proposed movement monitoring strategy is provided in the BIA, with trigger values consistent with the updated GMA.

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

5.11. The BIA presents a damage assessment made on the Network Rail tunnel, with a negligible impact identified. Consultation with Network Rail is recommended to satisfy their requirements.

5.12. It can be confirmed that the BIA complies with the requirements of CPG: Basements.

Appendix 1: Consultation Responses

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Malcolm & Maroulla Roberts	11 Eldon Grove	05/04/22	Impacts of proposed basement on flow of groundwater pertaining to the Secondary A aquifer.	Groundwater clarification provided. Logs indicate strata to be predominantly cohesive in nature and will not hold significant volumes of water. The BIA includes appropriate mitigation measures for groundwater management during construction

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA	BIA should refer to current guidance CPG Basements (January 2021)	Closed – See 4.4	
2	BIA	The presence of neighbouring basements should be confirmed. An outline construction programme and outline construction sequence are to be provided.	Closed – See 4.5 Note Only – See 4.5	
3	Hydrology	Clarification of surface water attenuation is required.	Closed – See 4.7	
4	Hydrogeology	Further consideration of the hydrogeology is required and the proposed additional groundwater monitoring should be undertaken.	Closed – See 4.9	
5	Land Stability	GMA to be reviewed and updated.	Closed – See 4.11	
6	Land Stability	Monitoring trigger values to be updated in line with the results of the revised GMA	Closed – See 4.14	

Appendix 3: Supplementary Supporting Documents

Paddock Geo Engineering E-mail correspondence

From: Matt Paddock <matt@paddockgeoengineering.co.uk>
Sent: Friday 9 September 2022 16:43
To: Derek Crous <DCrous@ByrneLooby.com>
Cc: Richard Thiemann <RThiemann@ByrneLooby.com>; jspyvee@brynelooby.com
Subject: RE: Eldon Grove

Derek,

Further to the below email and our telephone call, we have the following comments

Query 4) The water encountered in the wells is not considered to be representative of a water table, but a non-continuous perched water body or surface water inflow into the wells and therefore, the proposed basement would not extend below a water table. As stated by the Hydrogeologist employed (Chord Environmental – John Evans) for their specialist advise for the screening:
"In the absence of continuous sand strata, the Claygate Member is cohesive and as such cannot transmit significant groundwater flow under normal hydraulic gradients. It therefore cannot support a continuous water table as would occur in a permeable and porous medium. Monitored water levels represent either isolated pockets of groundwater (perched water), usually within Made Ground, or undrained collected surface water."

Query 5) Input data for the ground movement analysis are detailed in Section 5.7.3 of the report. Attached is the .pdd files for pdisp on the no 12 basement footprint if CRH need the input parameters for pdisp.

Please feel free to contact me with any further queries.

Kind regards

Matt

Matt Paddock MSc FGS
(he/him)
Principal Geo-Environmental Engineer
Director

Paddock Geo Engineering Limited
Milton Keynes: The Log Cabin, Manor Farm, Whaddon Road, Newton Longville, MK17 0AU
Swindon/Oxford: 21 Tyrell Close, Stanford in the Vale, Oxon, SN7 8EY

T: 44 (0) 1908 764032 | M: 44 (0) 7377 422528 | E: matt@paddockgeoengineering.co.uk | W: www.paddockgeoengineering.co.uk

PADDOCK GEO ENGINEERING
GEO-ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS

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

Bristol

Unit 5.03,
HERE,
470 Bath Road,
Bristol BS4 3AP

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

Manchester

No. 1 Marsden Street
Manchester
M2 1HW

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