CampbellReith
consulting engineers

Basement Impact Assessment Audit

The Cottage, 10 Lyndhurst Road, London NW3 5PX

For
London Borough of Camden

Project No.
14006-67

Date
July 2024

Campbell Reith Hill LLP
15 Bermondsey Square
London
SE1 3UN

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

DOCUMENT HISTORY AND STATUS

Revision	Date	Purpose/ Status	File Ref	Author	Check	Review
D1	08/05/2024	For comment	MEkb14006-67-080524- The Cottage 10 Lyndhurst Road D1.docx	ME	KB	KB
F1	25/07/2024	For Planning	KBemb14006-67-250724- The Cottage 10 Lyndhurst Road F1.docx	ME/KB	EMB	EMB

Document Details

Last Saved	25/07/2024 15:57
Author	M Elias, BEng MSc GMICE Eng-OEA(LEB) / K Barker, MSci CGeol FGS
Project Partner	E M Brown, BSc MSc CGeol FGS
Project Number	14006-67
Project Name	Basement Impact Assessment Audit
Revision	F1
Planning Reference	2024/0698/P
File Ref	KBemb14006-67-250724- The Cottage 10 Lyndhurst Road F1.docx

CONTENTS

APPENDICES

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 The Cottage 10 Lyndhurst Road, Hampstead, London NW3 5PX (planning reference 2024/0698/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 authors of the BIA possess the necessary qualifications in line with the requirement of CPG Basements.

1.5 The proposed development involves demolishing the existing property and constructing a two-storey building with a single basement level. The basement will be formed using two lifts of underpinning.

1.6 Screening and scoping assessments are presented, supported by desk study information.

1.7 A site investigation has been undertaken indicating that Made Ground is underlain by the Claygate Member and the London Clay Formation. Groundwater is anticipated within the Claygate Member at the top of the London Clay Formation and possibly at shallower depths.

1.8 The BIA has confirmed that the proposed basement will be founded at the interface between the Claygate Member and the London Clay and minor groundwater management may be required during construction.

1.9 It is accepted that the development will not impact the hydrogeology of the area.

1.10 The amount of hardstanding will be increased as part of the redevelopment and the revised submission includes a drainage strategy identifying mitigation measures to control the off-site discharge to the sewer network. With the inclusion of appropriate mitigation measures it is accepted that the basement will not have a significant impact on the hydrology of the area.

1.11 It is accepted that the proposed development will not impact the land stability of the area.

1.12 The Ground Movement Assessment (GMA) and Building Damage Assessment have been updated as part of the revised submission and are accepted. The revised submissions identify that the basement development will not cause damage to neighbouring structures that exceeds Burland Category 1 (very slight). The GMA indicated that a movement monitoring scheme is to be adopted to ensure that movements generated are maintained within predicted limits.

1.13 A London Underground Tunnel is located close to the site. The asset owners may require separate assessment to satisfy their requirements.

1.14 Based on the revised submission it can be confirmed that the BIA meets the requirements of Camden Planning Guidance: Basements.

2.0 INTRODUCTION

2.1 CampbellReith was instructed by London Borough of Camden (LBC) on 9 April 2024 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for The Cottage, 10 Lyndhurst Road, Hampstead, London, NW3 5PX and Planning Reference 2024/0698/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 "Demolition of existing single dwelling house (Class C3) and redevelopment to provide a 3 bedroom dwelling (Class C3) comprising basement, ground and first floors, with associated garden room and landscaping."

2.6 The Audit Instruction confirmed The Cottage, 10 Lyndhurst Road did not involve nor was neighbour to listed buildings.

2.7 CampbellReith accessed LBC's Planning Portal on 1 May 2024 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment and Ground Investigation Report by Ground & Water Limited, Ref.: GWPR5717/BIA&GIR/January 2024 Rev V1.02, dated January 2024.
- Structural Methodology Statement by Momentum Structural Engineers, Ref.: 5737-MOM-XX-XX-SP-C-11002-P01 Rev 1, dated 31 January 2024.

- BS 5837 Arboricultural Report Impact Assessment by Crown Tree Consultancy, Ref.: 11757, dated 14 February 2024.
- Architectural Drawings by Mary Duggan Architects;
  - Location Plan, Ref.: MD141-A-(00)-001, Rev P00, dated 13 February 2024.
  - Demolition Plans – Basement & Ground, Ref.: MD141-A-(12)-100, Rev P00, dated 13 February 2024.
  - Demolition Plans – First & Roof, Ref.: MD141-A-(12)-101, Rev P00, dated 13 February 2024.
  - Demolition Elevations – Front & Rear, Ref.: MD141-A-(12)-200, Rev P00, dated 13 February 2024.
  - Demolition Elevation – Side, Ref.: MD141-A-(12)-201, Rev P00, dated 13 February 2024.
  - Demolition – Existing Section AA, Ref.: MD141-A-(12)-300, Rev P00, dated 13 February 2024.
  - Demolition – Existing Section BB, Ref.: MD141-A-(12)-301, Rev P00, dated 13 February 2024.
  - Demolition – Existing Section CC, Ref.: MD141-A-(12)-302, Rev P00, dated 13 February 2024.
  - Existing Plans – Basement, Ref.: MD141-A-(00)-100, Rev P00, dated 13 February 2024.
  - Existing Plans – Ground Floor, Ref.: MD141-A-(00)-101, Rev P00, dated 13 February 2024.
  - Existing Plans – First Floor, Ref.: MD141-A-(00)-102, Rev P00, dated 13 February 2024.
  - Existing Plans – Roof, Ref.: MD141-A-(00)-103, Rev P00, dated 13 February 2024.
  - Existing Elevation – Lyndhurst Road, Ref.: MD141-A-(00)-200, Rev P00, dated 13 February 2024.
  - Existing Elevations – Front & Rear, Ref.: MD141-A-(00)-201, Rev P00, dated 13 February 2024.
  - Existing Elevation – Side, Ref.: MD141-A-(00)-202, Rev P00, dated 13 February 2024.
  - Existing Section AA, Ref.: MD141-A-(00)-300, Rev P00, dated 13 February 2024.
  - Existing Section BB, Ref.: MD141-A-(00)-301, Rev P00, dated 13 February 2024.
  - Existing Section CC, Ref.: MD141-A-(00)-302, Rev P00, dated 13 February 2024.

- Proposed Elevation – Lyndhurst Road, Ref.: MD141-A-(01)-200, Rev P00, dated 13 February 2024.
- Proposed Elevation – Front & Back, Ref.: MD141-A-(01)-201, Rev P00, dated 13 February 2024.
- Proposed Elevation – Side, Ref.: MD141-A-(01)-202, Rev P00, dated 13 February 2024.
- Proposed Elevation – Garden & Rear, Ref.: MD141-A-(01)-203, Rev P00, dated 13 February 2024.
- Proposed Plans – Basement, Ref.: MD141-A-(01)-100, Rev P00, dated 13 February 2024.
- Proposed Plans – Ground Floor, Ref.: MD141-A-(01)-101, Rev P00, dated 13 February 2024.
- Proposed Plans – First Floor, Ref.: MD141-A-(01)-102, Rev P00, dated 13 February 2024.
- Proposed Plans – Roof, Ref.: MD141-A-(01)-103, Rev P00, dated 13 February 2024.
- Proposed Plan – Front Garden, Ref.: MD141-A-(01)-110, Rev P00, dated 13 February 2024.
- Proposed Section AA, Ref.: MD141-A-(01)-300, Rev P00, dated 13 February 2024.
- Proposed Section BB, Ref.: MD141-A-(01)-301, Rev P00, dated 13 February 2024.
- Proposed Sections CC & DD, Ref.: MD141-A-(01)-302, Rev P00, dated 13 February 2024.
- Block Plan, Ref.: MD141-A-(00)-002, Rev P00, dated 13 February 2024.
- Site Plan & References, Ref.: MD141-A-(00)-010, Rev P00, dated 13 February 2024.

2.8 The following additional documents were provided to address the queries raised in the D1 audit:

- Basement Impact Assessment and Ground Investigation Report by Ground & Water Limited, Ref.: GWPR5717/BIA&GIR/May 2024 Rev V2.02, dated July 2024.
- Drainage Strategy and SuDS Assessment by Momentum Structural Engineers, ref. 5737-MOM-XX-XX-RP-S-60001, rev P01, dated 05 June 2024.
- Outline retaining wall design by Momentum Engineering, ref. 5737, rev 3, dated 19 January 2024.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Cover page of the BIA report.
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	
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	All maps to support screening are included in the appendices of the BIA.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1 of the BIA.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1 of the BIA.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1 of the BIA.
Is a conceptual model presented?	Yes	Section 7.2.1 of the BIA.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 3.2 of the BIA.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 3.2 of the BIA.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 3.2 of the BIA.
Is factual ground investigation data provided?	Yes	Appendix D of the BIA.
Is monitoring data presented?	Yes	Section 5.4 of the BIA. WS1 monitored on two occasions, while WS2 only monitored on one occasion.
Is the ground investigation informed by a desk study?	Yes	Section 2.0 of the BIA.
Has a site walkover been undertaken?	Yes	Section 4.1 of the BIA.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Section 7.4.3 of the BIA. During the site walkover, there was evidence of lightwells/lower ground floors within the neighbouring properties.
Is a geotechnical interpretation presented?	Yes	Sections 6.1, 6.2 and 8.0 of the BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 8.3 of the BIA.
Are reports on other investigations required by screening and scoping presented?	Yes	Structural Methodology Statement and Arboricultural Report.
Are the baseline conditions described, based on the GSD?	Yes	

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	Yes	Section 7.4.3 of the BIA. During the site walkover, there was evidence of lightwells/ lower ground floors within the neighbouring properties.
Is an Impact Assessment provided?	Yes	Section 7.0 of the BIA.
Are estimates of ground movement and structural impact presented?	Yes	Section 8.4 of the BIA.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	Section 7.0 of the BIA.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Movement monitoring recommended.
Has the need for monitoring during construction been considered?	Yes	Section 7.5 of the BIA.
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	
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	

Item	Yes/No/NA	Comment
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Section 7.4 of the BIA.
Are non-technical summaries provided?	Yes	Executive Summary of the BIA.

4.0 DISCUSSION

4.1 The Basement Impact Assessment (BIA) has been carried out by Ground & Water Ltd and the individuals concerned in its production have suitable qualifications. It is noted the BIA refers to a superseded version of the Camden Planning Guidance: Basements (2018).

4.2 The existing property comprises a semi-detached two-storey residential dwelling on a rectangular shaped plot, located along the north-western side of Lyndhurst Road. Soft landscaped areas and hardstanding areas are present to the front and rear of the property.

4.3 The proposed development comprises the demolition of the existing property and the construction of a two-storey building with a single basement level. The basement's formation level is at 8.74m AOD (c. 2.80 to 3.20m excavation) and the basement will be formed using underpinning. An external, single-storey garden annex building will be constructed at the rear extent of the site. The garden annex does not have a basement level.

4.4 Screening and scoping assessments are presented in the BIA, informed by desk study information. Most relevant figure/maps from ARUP GSD and other guidance documents are included in the BIA to support screening questions.

4.5 A ground investigation was undertaken between 5th and 13th December 2023 and identified the site to be underlain by a moderate thickness of Made Ground to a maximum depth of 10.80m AOD. Below the Made Ground, Claygate Member was found to a depth of 7.90m AOD. London Clay encountered to the full depth of the investigation (6.10m AOD). The BIA states that formation level (8.74m AOD) for the proposed development is likely to be the interface between the Claygate Member and the London Clay Formation.

4.6 The BIA states that no groundwater strikes were noted during the site investigation. Standpipes were installed in two exploratory holes. WS1 was monitored on two occasions and groundwater was measured at 4.80m bgl on both occasions. WS2 was only monitored on one occasion, and it was found to be dry.

4.7 The BIA indicates that groundwater is anticipated within the Claygate Member, perched at the top of the London Clay Formation and is possibly present at shallower depths. Both the SMS and the BIA state that should perched groundwater be encountered, dewatering from sumps introduced into the floor of the excavation may be required.

4.8 The BIA indicates that the amount of hardstanding will be increased as part of the redevelopment. A drainage strategy and SUDS assessment has been provided as part of the revised submission and includes details of a proposed attenuation storage system to include as part of the development. It is noted that the report incorrectly identifies the bedrock geology to be the London Clay, despite the geology map in Appendix B clearly stating Claygate Member. The drainage proposals will require approval from the LLFA and Thames Water.

4.9 The BIA has identified the site to have a very low risk to low risk of surface water flooding. As the site is underlain by a secondary A Aquifer and unproductive strata, there was considered to be a risk of groundwater flooding; however the risk is considered to be low as a result of the cohesive nature of the soils and their low permeability.

4.10 The SMS outlines the construction methods of the proposed basement in Section 2.4. Excavation for the underpins will be conducted sequentially with propping of the retaining structure during excavation until the ground floor slab is cast. Underpinning of the existing load bearing walls will proceed sequentially in 1m sections, with the RC basement box cast similarly in 1m sections adjacent to the existing neighbouring walls. The revised BIA identifies that the underpinning will be carried out in two lifts and piling will not be undertaken.

4.11 Geotechnical parameters, including those for retaining walls, bearing capacity and settlement calculation, are presented in the BIA. The basement will be founded close to the interface between the Claygate Member and the London Clay. Section 8 of the revised BIA provides additional clarification relating to the soil parameters used.

4.12 A Ground Movement Assessment (GMA) and a Damage Assessment are provided in the BIA to demonstrate that ground movements and consequential damage to neighbouring properties will comply with LBC's policy requirements. PDisp was used to model vertical ground movements using Mindlin analysis method, and XDisp was used to estimate movements due to underpinning and an associated damage category.

4.13 Section 8.2.2 of the revised BIA submission provides additional clarification of the loads used in the PDisp modelling and summarises the values in a table. The loads are considered appropriate for the scheme.

4.14 The BIA states that the retaining wall loads were not finalised by the structural engineers at the time of writing but were to be limited to a maximum load of 100kPa. Throughout the construction of the basement, the PDisp models assumed a load of 30kPa initially, increasing to 100kPa when fully constructed. Should there be any changes in the retaining wall loads, the assessment will need to be updated accordingly.

4.15 The BIA states that five stages of construction, regarding changes in vertical load, were modelled using PDisp. The movements associated with PDisp Model 4 were then imported into XDisp, where the underpinning movements were modelled assuming 5mm of movement per lift of underpinning at the back of the wall in both the horizontal and vertical directions. The input and output from the modelling has been provided to confirm the geometry, ground model and loading used.

4.16 Section 7.4.4 of the BIA suggests that road deflections are not expected to cause damage based on their assessment of road lengths. However, the BIA recommends monitoring be undertaken as good practice.

4.17 The revised BIA submission includes an updated Ground Movement Assessment (GMA),which predicts damage to neighbouring buildings will not exceed Burland Category 1 (Very Slight).

4.18 The revised BIA presents utility data and an assessment of the impact of the development on nearby utilities in Figures 31 and 32.

4.19 It is noted that a London Underground Tunnel is located at c. 10m north of the northern site boundary. The BIA states that no ground movement is expected at the location of the tunnel as it falls outside the zone of influence of the works at the proposed basement development. The owners of the infrastructure assets may require separate assessment to satisfy their requirements.

4.20 The BIA states that ground movement monitoring should be undertaken to ensure the movements remain within acceptable limits and to enable mitigation to be effectively implemented in the event of trigger values for movement being exceeded. The detailed monitoring strategy will be developed at a later stage and will be subject to discussions and party wall agreements.

4.21 The Arboricultural Impact Assessment indicates that trees will be felled during the redevelopment. The BIA recognises the potential for soils with shrink-swell potential near the surface and provides additional assessment of the impact of removing trees in Section 7 of the revised BIA. The assessment concludes that only one tree will be removed and provides a recommended foundation depth for the annex building, to mitigate the impact of shrink swell movement on the building. The BIA concludes there will be no impact to neighbouring properties of the basement.

5.0 CONCLUSIONS

5.1 The authors of the BIA possess the necessary qualifications.

5.2 The proposed development involves demolishing the existing property and constructing a two-storey building with a single basement level. The basement will be formed using underpinning.

5.3 Screening and scoping assessments are presented, supported by desk study information.

5.4 A site investigation has been undertaken indicating that Made Ground is underlain by the Claygate Member and the London Clay Formation. Groundwater is anticipated within the Claygate Member at the top of the London Clay Formation and possibly at shallower depths.

5.5 The BIA has confirmed that the proposed basement will be founded at the interface between the Claygate Member and the London Clay and minor groundwater management may be required during construction.

5.6 It is accepted that the development will not impact the hydrogeology of the area.

5.7 The amount of hardstanding will be increased as part of the redevelopment and the revised submission includes a drainage strategy identifying mitigation measures to control the off-site discharge to the sewer network. With the inclusion of appropriate mitigation it is accepted that the basement will not have a significant impact on the hydrology of the area.

5.8 The revised submission provides clarification of the soil parameters, outline retaining wall calculations and confirms the basement will be constructed using two lifts of underpinning.

5.9 It is accepted that the proposed development will not impact the land stability of the area.

5.10 The Ground Movement Assessment (GMA) and Building Damage Assessment have been updated as part of the revised submission and are accepted. The revised submissions identify that the basement development will not cause damage to neighbouring structures that exceeds Burland Category 1 (very slight).

5.11 The GMA indicated that a movement monitoring scheme is to be adopted to ensure that movements generated are maintained within predicted limits.

5.12 A London Underground Tunnel is located close to the site. The owners of the assets may require separate assessment to satisfy their requirements.

5.13 Based on the revised submission it can be confirmed that the BIA meets the requirements of Camden Planning Guidance: Basements.

CampbellReith
consulting engineers

Appendix 1

Consultation Responses

None

CampbellReith
consulting engineers

Appendix 2

Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA Format	The BIA refers to a superseded version of the CPG for basements. Confirmation that the correct version has been used for the assessment is required. Some reviewer signatures are missing and should be included.	Closed	May 2024
2	Hydrogeology & Land Stability	If piling is included in the construction of the basement, additional assessment of the impact of this construction method will be required.	Closed	May 2024
3	Hydrology	Hardstanding will be increased. No mitigation measures to limit the impact on the hydrology of the surrounding area is provided and it is requested.	Closed	May 2024
4	Land Stability	Clarification is requested regarding the number of lifts of underpinning and underpinning construction sequence.	Closed	May 2024
5	Land Stability	Outline retaining wall calculations are requested	Closed	May 2024
6	Land Stability	Clarification requested regarding missing SPT data and design Cu lines.	Closed	May 2024
7	Land Stability	Clarification regarding the overburden pressure release of demolition is requested.	Closed	May 2024
8	Land Stability	The input and output data for both PDisp and XDisp are not provided and are requested.	Closed	July 2024
9	Land Stability	Settlement plots for the roads are not provided and are requested.	Closed	July 2024
10	Land Stability	Excerpt from the Building Damage Assessment of the XDisp model suggests that damage to neighbouring properties will fall under Burland Category 2 (Slight). Further consideration is needed to ensure damage to neighbouring structures remains within Category 1 (Very Slight).	Closed	July 2024

Query No	Subject	Query	Status	Date closed out
		The SMS incorrectly states that all walls were assessed as having Category 0 (Negligible) damage. The results of the analysis should be presented consistently.	Closed	July 2024
11	Hydrogeology & Land Stability	Utility data are not presented, and an assessment of the impact on utilities has not been undertaken and is requested.	Closed	May 2024
12	Land Stability	Confirmation of whether neighbouring foundation will be impacted by tree removal should be presented with impact assessment and mitigation provided if necessary.	Closed	May 2024
13	Land Stability	The retaining wall loads were not finalised by the structural engineers at the time of writing but were to be limited to a maximum load of 100kPa. Throughout the construction of the basement, the PDisp models assumed a load of 30kPa initially, increasing to 100kPa when fully constructed. Should there be any changes in the retaining wall loads, the assessment will need to be updated accordingly.	Note only	

CampbellReith
consulting engineers

Appendix 3

Supplementary Supporting Documents

None

London

15 Bermondsey Square
London
SE1 3UN

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

Birmingham

Chantry House
High Street, Coleshill
Birmingham B46 3BP

T: +44 (0)1675 467 484
E: birmingham@campbellreith.com

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