

**Basement Impact
Assessment Audit**

9 Lyndhurst Terrace,
London NW3 5QA

For
London Borough of Camden

Project No.
14006-34

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Campbell Reith Hill LLP
15 Bermondsey Square
London
SE1 3UN

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

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Author	Sam Savery, BSc MSc CGeol FGS
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 9 Lyndhurst Terrace, London NW3 5QA (planning reference 2023/3689/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. CampbellReith previously audited a basement scheme at the site (ref 13398-40, dated November 2020) in relation to planning application reference 2020/2816/P.
- 1.4 The BIA has been carried out by individuals who possess suitable qualifications.
- 1.5 The existing property is proposed to be demolished and the new basement formed in an underpinning-style "hit and miss" sequence using reinforced concrete retaining walls.
- 1.6 The BIA confirms the proposed basement will be founded within Claygate Member soils.
- 1.7 It is accepted that the proposed development will not impact the hydrology, hydrogeology or slope stability in the area.
- 1.8 It is accepted the slopes surrounding the site are stable.
- 1.9 The removal of trees will not affect the proposed basement providing any new foundations in the zone of influence of the trees to be removed are designed in accordance with NHBC guidelines.
- 1.10 Outline loads for the retaining wall have been provided.
- 1.11 The revised Ground Movement Assessment (GMA) indicates that damage to neighbouring structures will not exceed Damage Category 1 (Very Slight) although further information is required to support the GMA and Damage Assessment conclusions.
- 1.12 Clarification of the foundation depth for No. 7 Lyndhurst Terrace is required.
- 1.13 The impact to utilities and the adjacent highway is assessed to be negligible.
- 1.14 The Planning Stage Construction Management Plan with the movement monitoring strategy should be provided.
- 1.15 Queries requiring additional clarification are presented in Appendix 2. Until the additional information is presented, the BIA does not comply with the requirements of CPG: Basements.

2.0 INTRODUCTION

2.1 CampbellReith was instructed by London Borough of Camden (LBC) on 20th September 2023 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 9 Lyndhurst Terrace, London NW3 5QA, planning reference 2023/3689/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.
- Hampstead Neighbourhood Plan
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.

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 "*Variation of condition 2 (approved plans) of planning permission ref. 2020/2816/P (dated 09/06/2021) for [Demolition of existing dwelling and replacement with a three storey (plus basement) single dwelling house with terraces to front and rear and associated landscaping works], namely to enlarge basement to front to include relocated ASHPs, enlarge rear garden terrace and amendments to landscaping and fenestration*".

2.6 The Audit Instruction confirmed 9 Lyndhurst Terrace is not involved, or was a neighbour to, listed buildings.

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

- 9 Lyndhurst Terrace - Technical Note Letter by Geotechnical and Environmental Associates (GEA), Ref J20089, Rev 1, dated 1st September 2023.

- Lyndhurst Terrace Proposed Amendments by Brinkworth Design, dated 5th September 2023.
- Construction Method Statement by Engineers HRW, Ref 2360, Rev 0, dated 5th September 2023.

2.8 CampbellReith also referred to documents submitted with the original planning application (reference 2020/2816/P) as follows:

- Site Investigation and Basement Impact Assessment Report (BIA) by GEA, Ref J20089, Rev 3, dated 28th October 2020.
- Construction Method Statement by Price & Myers, Ref 28920, Rev 1, dated November 2020.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

BIA section 3.1.1	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	
Is data required by Cl.233 of the GSD presented?	Yes	The Price & Myers CMS includes utility data and outline structural calculations for the retaining wall.
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	Included in the Lyndhurst Terrace Proposed Amendments document.
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	BIA section 3.1.2
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA section 3.1.1
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA section 3.1.3
Is a conceptual model presented?	Yes	BIA section 7.0

BIA section 3.1.1	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA section 4.0
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA section 4.0
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA section 4.0
Is factual ground investigation data provided?	Yes	BIA Appendix – Part 1
Is monitoring data presented?	Yes	BIA section 5.3
Is the ground investigation informed by a desk study?	Yes	BIA section 2.0
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Technical Note, Page 2. Confirmation of the foundation level of No. 7 is required.
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA section 8.1
Are reports on other investigations required by screening and scoping presented?	Yes	Arboricultural Impact Assessment Report
Are the baseline conditions described, based on the GSD?	Yes	

BIA section 3.1.1	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	Yes	However confirmation of the foundation depth at the adjacent No. 7 is requested.
Is an Impact Assessment provided?	Yes	BIA Part 4
Are estimates of ground movement and structural impact presented?	Yes	However, clarifications are required.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	Technical Note sections 10.0 & 11.0
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Planning Stage Construction Management Plan should be provided.
Has the need for monitoring during construction been considered?	Yes	Technical Note section 11.2. The Planning Stage Construction Management Plan which details the monitoring proposals should be provided.
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	Technical Note section 11.0. However clarification of some of the assessment results is required.
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	However the GMA may require revision pending clarification of the points raised in Section 4.

BIA section 3.1.1	Yes/No/NA	Comment
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	However further consideration and assessment may be required.
Are non-technical summaries provided?	Yes	Technical Note introduction and BIA Executive Summary

4.0 DISCUSSION

- 4.1 The original Basement Impact Assessment (BIA) and recent Technical Note have been carried out by engineering consultants Geotechnical & Environmental Associates (GEA) and the individuals concerned in its production have suitable qualifications.
- 4.2 CampbellReith previously audited a basement scheme for 9 Lyndhurst Terrace (ref 13398-40, November 2020) in relation to planning application reference 2020/2816/P. The new proposed scheme includes a larger basement footprint, but is considered to broadly reflect the previously audited scheme.
- 4.3 It is proposed to demolish the existing 2-storey, split level building at the site and construct a new detached dwelling with 3 above ground storeys and a single basement level. The proposed basement amendment extends approximately 2m further to both the front and rear of the new building footprint and has been made slightly deeper. The Proposed Amendment document includes the most recent structural drawings, dated August 2023
- 4.4 Existing garden level is approximately 97.50m SD (Site Datum) with basement excavation extending to 96.00m SD. Therefore, approximately 1.50m thickness of material will be excavated and removed from site for most of the site, increasing to 3.75m in the northeast corner. The basement will be formed with concrete retaining walls on three sides, with the western side opening to the rear garden. The basement slab will comprise a reinforced concrete raft foundation.
- 4.5 The LBC Instruction to proceed with the audit identified that the basement proposal is not involved with a listed building nor was adjacent to listed buildings.
- 4.6 The BIA has been informed by a desk study and site-specific ground investigation. This site is within the Hamstead Neighbourhood Plan area.
- 4.7 The BIA indicates the site is underlain by Made Ground to depths of between 0.70m to 1.00m below ground level (bgl), below which lies the Claygate Member extending to the maximum depth of investigation of 6.50m bgl. The Claygate Member is described as interbedded horizons of clay and sand but is predominantly cohesive in nature.
- 4.8 No groundwater was encountered during the site investigation. Two groundwater monitoring standpipes were installed during the site investigation. Two subsequent groundwater monitoring visits recorded both pipes to be dry. The BIA hydrogeology conclusions remain valid, and it is accepted that the development will not impact the hydrogeology of the area.
- 4.9 The basement amendments do not result an increase in the amount of hardstanding, therefore the hydrology conclusion remains valid. It is accepted there will be no impacts to the hydrology of the area.
- 4.10 The site is in an area gently sloping towards the south, with slope angles $<7^\circ$. The screening exercise for slope stability identifies that all the trees within the rear garden are to be removed as part of the development. The BIA indicates that the removal of trees will not affect the proposed basement if new foundations in the zone of influence of trees to be removed are design in accordance with NHBC guidelines.

- 4.11 The characteristic geotechnical soil parameters for the ground conditions encountered comprise separate parameters for the sand- and clay-principal soil types of the Claygate Member. The allowable bearing pressure of 140kPa accounts for the soil types encountered.
- 4.12 The Construction Method Statement (CMS) by Engineers HRW, outlines the construction methods for the new basement and an alternative super structure comprising a steel frame with composite metal deck and concrete slab instead of the initial timber frame proposal. The CMS states the extension to the basement at the front has been sited sufficiently far from the road not to require an Approval in Principle (AIP).
- 4.13 The CMS indicates after the existing structure demolition, installation of the basement perimeter retaining wall will follow an underpinning-style 'hit and miss' sequence using temporary propping to support the excavation. The CMS includes construction sequence drawings indicating a maximum excavation/ pin length of 1.20m. On completion of the retaining wall, each bay will be backfilled to a 'bulk dig level' to 1.50m above the basement slab formation level. No additional temporary support of the retaining wall is indicated once backfilling to this reduced level has occurred.
- 4.14 The Technical Note states that, following completion of underpinning, the basement slab will be constructed in strips spanning the full width of the basement, excavated and cast in a similar 'hit and miss' sequence from the reduced level. The basement slab will form a permanent prop at formation level and will be constructed prior to the remainder of the new structure.
- 4.15 The Technical Note includes a revised Ground Movement Assessment (GMA) for the proposed basement amendments. The GMA was undertaken using X-Disp and P-Disp software to assess the ground movements within and surrounding the basement excavation. This includes heave / settlement (vertical movement) and lateral movement behind the retaining walls (horizontal). The GMA considers the 4 construction stages: Demolition of the existing structure and retaining wall construction, bulk excavation, construction short term and total (long term) movement / complete construction. Input and output data for the P-Disp assessment are requested to confirm the soil parameters, model geometry and loading used in the assessments.
- 4.16 The ground movements predicted by the P-Disp assessment have been imported into X-Disp software to assess the horizontal and vertical ground movements around the development and their associated damage category for neighbouring structures. The Technical Note provides the full input and output data for the X-Disp analyses, indicating ground movement curves from CIRIA C760 have been used. The assessment considers ground movement for a ground level of 97.5m SD at the rear of the property and 99.75m SD at the front (northeast) of the property. The base of excavation depth is taken as 96.00m SD.
- 4.17 It is noted that the diagram in Section 11 of the Technical Note shows the original scheme, however the assessment in the appendix shows the new scheme in relation to neighbouring walls.

- 4.18 Technical Note section 10.2.3 states a “plume of larger movement of up to 21mm” is present in the northeast corner of the site, due to the presence of a re-entrant corner within the excavation. It is stated that this is caused by the P-Disp software ‘doubling up’ movements from the walls forming the re-entrant corner and no data manipulation has been carried out to reduce this effect.
- 4.19 The table presented in Section 10.3.1 of the Technical Note suggests that in the short and long term some areas of the underpinning will experience 3mm heave. It is a requirement of LBC policy that the BIA presents a cautious or moderately conservative assessment. 3mm of heave is not considered a realistic value for underpinning, as movements are typically expected to be a minimum of 5mm to 10mm horizontal movement and vertical settlement per lift of underpinning. Clarification of the results of the GMA is requested. The results should be reviewed to ensure heave is not used to off-set vertical settlement associated with the underpinning, as this approach is not considered to meet the LBC requirement for a cautious or moderately conservative assessment.
- 4.20 The GMA indicates damage to neighbouring structures generally does not exceed Burland Damage Category 1 (Very Slight). Category 2 damage was calculated for 2 walls of No. 7 Lyndhurst Terrace. The BIA presents additional analysis of the two walls identified as Category 2, based on the existing foundation depth of these walls, which is identified as 96.40m SD. The additional assessment indicates damage to these walls will be within LBC limits.
- 4.21 In Section 9.1 of the BIA for the original scheme, the foundation for No. 7 Lyndhurst Terrace is given as 96.80m SD. Clarification is requested and the GMA and damage assessment should be updated as needed.
- 4.22 The impact of the basement development on the adjacent highway, utilities and National Rail assets is considered in the GMA. The Network Rail tunnel is indicated in the BIA to be c. 10m north of the property at 37m bgl and has been modelled as such in the GMA. The GMA results indicate a negligible impact.
- 4.23 Section 11.2 of the Technical Note states that predicted ground movements should be checked by the monitoring of the adjacent properties. The technical Note states monitoring will be carried out as outlined in a Planning Stage Construction Management Plan prepared by Engineers HRW, however, this document has not been provided. The monitoring strategy is requested.

5.0 CONCLUSIONS

- 5.1 The BIA has been carried out by individuals who possess suitable qualifications.
- 5.2 The BIA has confirmed that the proposed basement will be founded within the Claygate Member.
- 5.3 It is unlikely that the ground water table will be encountered during basement foundation excavation.
- 5.4 It is accepted that the surrounding slopes to the development site are stable.
- 5.5 It is accepted that the development will not impact on the wider hydrogeology of the area and is not in an area subject to flooding.
- 5.6 The Construction Method Statement outlines the basement construction proposals following the existing structure demolition. The perimeter retaining wall will be undertaken in 1.2m spacing 'hit and miss' sections with suitable temporary propping arrangements. The basement slab will form a permanent prop at formation level and will be constructed prior to the remainder of the new structure.
- 5.7 It is accepted that the removal of trees will not affect the proposed basement as long as new foundations in the zone of influence of the trees to be removed are designed in accordance with NHBC guidelines.
- 5.8 The ground movement assessment indicates that damage to neighbouring structures will not exceed Damage Category 1 (Very Slight). Additional information to support the assessment, and further clarifications are requested, as per Section 4.
- 5.9 The Planning Stage Construction Management Plan should be provided to confirm the movement monitoring scheme identified therein.
- 5.10 Utility data is provided in the revised submission and the revised BIA includes consideration of the impact on utilities, the adjacent highway and London Overground tunnel, which is indicated to be negligible.
- 5.11 Queries requiring additional clarification are presented in Appendix 2. Until the additional information is presented, the BIA does not comply with the requirements of CPG: Basements.

Appendix 1

Consultation Responses

None

Basement Impact Assessment Audit
9 Lyndhurst Terrace, London NW3 5QA

CampbellReith
consulting engineers

Appendix 2

Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Land Stability	P-Disp input and output data are requested to confirm soil parameters, model geometry and loadings applied.	Open – See 4.15	
2	Land Stability	The results of the Ground Movements Assessment require clarification.	Open – See 4.19	
3	Land Stability	Clarification of the foundation depth for No. 7 Lyndhurst Terrace, as 96.80m SD was used in the original BIA.	Open – See 4.21	
4	Land Stability	Planning Stage Construction Management Plan should be provided so it contains the monitoring strategy.	Open – See 4.23	

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

Campbell Reith Hill LLP. Registered in England & Wales. Limited Liability Partnership No OC300082
A list of Members is available at our Registered Office at: 15 Bermondsey Square, London, SE1 3UN
VAT No 974 8892 43