CampbellReith
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Basement Impact Assessment Audit

9 Lyndhurst Terrace, London NW3 5QA

For
London Borough of Camden

Project No.
14006-34

Date
February 2024

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DOCUMENT HISTORY AND STATUS

Revision	Date	Purpose/ Status	File Ref	Author	Check	Review
D1	23/10/2023	Draft	SSkb14006-34-231024-9 Lyndhurst Terrace_D1	SS	KB	KB
F1	15/02/2024	Draft	SSemb14006-34-150224-9 Lyndhurst Terrace_F1	SS	EMB	EMB

Document Details

Last Saved	15/02/2024 12:58
Author	Sam Savery, BSc MSc CGeol FGS
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Project Number	14006-34
Project Name	Basement Impact Assessment Audit
Revision	F1
Planning Reference	2023/3689/P
File Ref	SSemb14006-34-150224-9 Lyndhurst Terrace_F1.docx

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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 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. The planning application covers proposed alterations to an already consented scheme.

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 significantly impact the hydrology, hydrogeology or slope stability in the area.

1.8 It is accepted the slopes surrounding the site are stable.

1.9 It is accepted that the removal of trees will not adversely affect existing and proposed foundations providing the scheme follows NHBC guidelines.

1.10 The revised Ground Movement Assessment (GMA) indicates that damage to neighbouring structures will not exceed Damage Category 1 (Very Slight) assuming careful control is taken during construction.

1.11 The impact to utilities and the adjacent highway is assessed to be negligible.

1.12 The Planning Stage Construction Management Plan outlines provisions for the movement monitoring strategy.

1.13 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 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. The planning application includes the proposed enlarging of an approved basement scheme previously submitted under planning application reference 2020/2816/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, or is a neighbour to, listed buildings.

2.7 CampbellReith accessed LBC's Planning Portal on 28th September 2023 and gained access to the following relevant documents for audit purposes:

- 9 Lyndhurst Terrace - Technical Note 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.

2.9 Additional information submitted in response to queries raised during the initial audit was accessed on the LBC's Planning Portal, with additional documents submitted directly to CambellReith on 15th December 2023. The additional information comprises the following:

- Revised Technical Note by GEA, Ref J20089/AT/02, dated 5th December 2023.
- Construction Method Plan by Engineers HRW, Ref 2360, Rev 0, dated 24th October 2023.
- Planning Stage Construction Management Plan by Price & Myers, Ref 28920, Rev -, dated June 2020.

2.10 Following a comment on the GEA Technical Note 02, a further revised Technical Note by GEA, Ref J20089/AT/03, dated 1st February 2024 was submitted to both Camden Planning Officer and CambellReith directly.

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	The GEA Technical Note confirms the foundation level of the neighbouring No. 7 Lyndhurst Terrace.
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	
Is an Impact Assessment provided?	Yes	BIA Part 4
Are estimates of ground movement and structural impact presented?	Yes	
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	GEA Technical Note Section 3.2 Construction Management Plan
Has the need for monitoring during construction been considered?	Yes	Technical Note section 11.2.
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.
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	The revised submission clarifies the damage assessment results.

BIA section 3.1.1	Yes/No/NA	Comment
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 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 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 95.70m SD. Therefore, approximately 2m 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 does not involve a listed building nor is 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 hydrogeology conclusions from the BIA for the consented scheme remain valid, and it is accepted that the development will not significantly impact the hydrogeology of the area.

4.9 The basement amendments do not result an increase in the amount of hardstanding, therefore the hydrology conclusions from the original BIA remain valid. It is accepted there will be no significant impacts to the hydrology of the area.

4.10 The site is in an area gently sloping towards the south, with slope angles <7°. 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 superstructure 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 demolition of the existing structure, installation of the basement perimeter retaining walls 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 and clarifications sent in response to CampbellReith queries. 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. The revised submission includes input and output data for the P-Disp assessment confirming the soil parameters, model geometry and loadings 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 97.50m 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 95.78 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 structures.

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 revised submission outlines the software limitations for the ground model and considers the localised damage limit exceedances of individual building lines in the assessment. The GEA Technical Note Rev 3 states that damage to neighbouring structures is predicted to not exceed Burland Damage Category 1 (Very Slight).

4.20 In Section 9.1 of the BIA for the original scheme, the foundation for No. 7 Lyndhurst Terrace is given as 96.80m SD. The revised submission Technical Note Rev 2 by GEA confirms a foundation level of 96.695m SD, which is used in the GMA and damage assessment.

4.21 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 to utilities and the highway.

4.22 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. The revised submission includes a Planning Stage Construction Management Plan outlining provisions for monitoring movement on the surrounding buildings by a specialist surveyor.

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 groundwater 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 significantly 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.

5.7 It is accepted that the removal of trees will not affect the proposed basement or impact the neighbouring structure foundations providing the scheme follows NHBC guidelines.

5.8 The ground movement assessment indicates that damage to neighbouring structures will not exceed Damage Category 1 (Very Slight) assuming careful control is undertaken during construction. The revised submission includes additional information to support the assessment, considering individual walls during different stages of construction.

5.9 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.

5.10 The Planning Stage Construction Management Plan outlines provisions for the movement monitoring scheme.

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

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Appendix 1

Consultation Responses

None

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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.	Closed – See 4.15	5th December 2023
2	Land Stability	The results of the Ground Movement Assessment require clarification.	Closed – See 4.19	5th December 2023
3	Land Stability	Clarification of the foundation depth for No. 7 Lyndhurst Terrace, as 96.80m SD was used in the original BIA.	Closed – See 4.20	5th December 2023
4	Land Stability	Planning Stage Construction Management Plan should be provided so it contains the monitoring strategy.	Closed out – See 4.22	15th December 2023

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Appendix 3

Supplementary Supporting Documents

None

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