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Basement Impact Assessment Audit

61 Ornan Road, London NW3 4QD

For
London Borough of Camden

Project No.
14006-86

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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 61 Ornan Road, London NW3 4QD (planning reference 2024/2762/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 BIA has been prepared by consultants who hold the qualifications required by CPG: Basements.

1.5 The proposed basement development comprises a single level basement beneath the existing structure. Proposals are to construct mass concrete retaining walls to allow construction of the reinforced concrete basement box. Internal piles are proposed to support the new slab and structural loads.

1.6 The BIA has confirmed that the proposed basement will be founded within the London Clay Formation, and recommends an additional deep borehole is undertaken to inform pile design.

1.7 It is unlikely that the ground water table will be encountered during basement foundation excavation although limited quantities of perched water may be present and dealt with through pumping. It is accepted the development will not impact the hydrogeology of the wider area.

1.8 The BIA shows the site is in an area classified as very low risk of surface water flooding and is in a Critical Drainage Area. The development will result in an increase of impermeable surface at the site. The revised submission includes a surface water drainage strategy to mitigate the impact to the local hydrology.

1.9 The revised submission includes original house drawings showing the foundation depths, and states there are no neighbouring basements in relation to the proposed development.

1.10 The revised submission includes utility plans and states there will be no impact to the third-party assets.

1.11 A tunnel is present beneath the site. The revised submission includes evidence of liaison with the asset owner.

1.12 A Ground Movement Assessment (GMA) and Building Damage Assessment has been undertaken that suggest potential damage to neighbouring structures will be no worse than Category 1 (Very Slight) of the Burland Scale. It is recommended that monitoring is undertaken as good practice.

1.13 It is confirmed that the BIA complies with the requirements of CPG: Basements and the Principles for Audit set out in the Basement Impact Assessment (BIA) Audit Service Terms of Reference & Audit Process.

2.0 INTRODUCTION

2.1 CampbellReith was instructed by London Borough of Camden (LBC) on 16th July 2024 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 61 Ornan Road, London Borough of Camden, NW3 4QD, and planning reference 2024/2762/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.

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 a new basement floor level, including front and rear lightwells, to single dwellinghouse."

2.6 The Audit Instruction confirmed 61 Ornan Road, London Borough of Camden, NW3 4QD was not involved, nor was a neighbour to, listed buildings.

2.7 CampbellReith accessed LBC's Planning Portal on 22nd July 2024 and gained access to the following relevant documents for audit purposes:

- Ground Investigation Report and Basement Impact Assessment by Ground and Water Limited, ref. GWPR5913, rev. V1.01, dated June 2024.
- Existing Plans by Brian O'Reilly Architects, dated 11th May 2023:
  - OS map & site location plan, ref. 555-100-P, rev. -.
  - Section C-C, ref. 555-300-P, rev. -.
  - Ground, first & second floor plans, ref. 555-101-P, rev. -.

- Proposed Plans by Brian O'Reilly Architects, dated 14th February 2024:
  - Basement plan, ref. 555-102-P, rev. -.
  - Front & rear elevations, ref. 555-200-P, rev. -.
  - Section B-B, ref. 555-300-P, rev. -.
  - Ground & first floor plans, ref. 555-100-P, rev. -.

2.8 Information submitted in response to the queries raised in the D1 audit comprise the following:

- Ground Investigation Report and Basement Impact Assessment by Ground and Water Limited, ref. GWPR5913, rev. V1.02, dated November 2024.
- Proposed Section B-B by Brian O'Reilly Architects, ref. 555-300-P, rev. a – minor updates, dated 26st August 2024.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	
Is data required by Cl.233 of the GSD presented?	Yes	The revised submission includes utility plans and evidence of correspondence with the tunnel asset owner.
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 plans/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	BIA section 3.1
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA section 3.1
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA section 3.1
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA section 3.2
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA section 3.2

Item	Yes/No/NA	Comment
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA section 3.2
Is factual ground investigation data provided?	Yes	BIA appendices E, F and G
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	BIA section 2.2
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	BIA section 2.4
Is a geotechnical interpretation presented?	Yes	BIA section 7.0
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA section 7.3
Are reports on other investigations required by screening and scoping presented?	Yes	BIA appendices
Are the baseline conditions described, based on the GSD?	Yes	BIA section 7.0
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	BIA section 3.0
Are estimates of ground movement and structural impact presented?	Yes	BIA section 7.4.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	Evidence of liaison with the tunnel asset owner is provided.

Item	Yes/No/NA	Comment
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	BIA section 7.0, however further information relating to the proposed SUDs is requested.
Has the need for monitoring during construction been considered?	Yes	BIA section 7.4.4
Have the residual (after mitigation) impacts been clearly identified?	Yes	BIA section 7.0
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	GMA requires revision
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Revised submission includes FRA
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	
Are non-technical summaries provided?	Yes	BIA Executive Summary.

4.0 DISCUSSION

4.1 The Basement Impact Assessment (BIA) has been carried out by engineering consultants Ground and Water Limited (G&W) and the individuals concerned in its production have suitable qualifications.

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

4.3 Proposals include demolition of the existing building and construction a c. 3.80m deep single level basement (including a 0.40m thick slab) beneath the existing structural footprint, front and rear lightwells for the basement, and construction of a new third-storey. Maximum basement length and width is c. 14.50m and c. 10.00m respectively. The basement construction method involves constructing mass concrete retaining walls by underpinning in a hit-and-miss sequence, then forming a reinforced concrete basement box within. Internal piles are proposed to support the new slab and structural loads.

4.4 It is noted that the scale bar on the proposed section B-B drawing by Brian O'Reilly Architects suggests that the basement is c. 2.00m deep including the slab, not c. 3.80m deep. The structural engineers' scaled drawings included within Appendix C of the BIA are consistent with the BIA report, structural information, and subsequent assessments.

4.5 The BIA has been informed by a desk study and site-specific ground investigation. The BIA identified that the site is underlain by Made Ground to a depth of 1.20m bgl, below which lies the London Clay Formation to the maximum depth of investigation of 8.45m bgl. The BIA recommends an additional deep borehole to c. 20.00m bgl is undertaken to inform pile design.

4.6 No groundwater strikes were recorded during drilling although groundwater was observed during 2no. monitoring visits in WS01 and WS02 standpipes between 1.20m and 3.02m respectively.

4.7 The BIA screening confirms the site is not located directly above an aquifer; it is underlain by the London Clay which is designated as Unproductive Strata. Subterranean (groundwater) Screening notes there are no surface water features within 250m distance of site.

4.8 The Groundwater Screening assessment identifies potential for perched water to be encountered. Groundwater monitoring encountered limited quantities of perched water within the Made Ground and upper levels of the London Clay Formation. The BIA anticipates the groundwater table is below the London Clay Formation bedrock at depth and states no adverse effect on groundwater flow was anticipated. It is accepted that the development will not impact the hydrogeology of the area.

4.9 The BIA Surface Flow and Flooding Screening assessment indicates the site is at a very low risk of surface water flooding and is within Critical Drainage Area (CDA) Group3_005. The BIA reviewed Strategic Flood Risk Assessment (SFRA) by URS Infrastructure and Environment UK Ltd (2014), and records surface water fooding events nearby although there are no known flooding incidents at the site itself.

4.10 The development will result in an increase in hard surfaced areas, therefore an increase in runoff rates and surface water discharge into the ground is anticipated. The BIA notes Sustainable Urban Drainage System (SUDS) will be used to control discharge to the sewerage network connection point. The revised submission includes a Flood Risk Assessment (FRA) and outline drainage strategy.

4.11 Stability screening identifies the basement will increase the differential depth of foundations to the neighbouring properties. A Ground Movement Assessment (GMA) has been undertaken to assess potential damage to nearby buildings, roads, pavements and utilities.

4.12 The revised submission confirms the neighbouring properties adjacent to the development do not have basements and includes original house drawings showing the load bearing walls are found on strip footings at c. 0.90m depth below FFL.

4.13 The BIA states that London Clay Formation is the shallowest stratum beneath the site and classifies the cohesive soil as medium to high volume change potential based on geotechnical laboratory test results. The BIA identifies that the site can potentially be affected by seasonal shrink-swell behaviour. Section 2.2 of the BIA notes no mature trees on-site although various species of mature/semi-mature trees and bushes are locally present along Ornan Road and within neighbour's rear garden areas. The ground investigation identified fresh roots present to depths up to 1.50m bgl. The BIA confirms no trees will be felled as part of the development and states the influence of trees needs to be accounted for in the final basement design.

4.14 The BIA identifies the site is in the vicinity to two railway tunnels, known as the Belsize railway tunnels. BIA Appendix D includes email correspondence with Network Rail that states the tunnels are approximately 7.5m in diameter and the probable depth of cover above the tunnel extrados is c. 24.00m at Ornan Road. This correspondence relates to an enquiry for No.18 Ornan Road. The revised submission provides evidence of correspondence with the asset owner in relation to the development at 61 Ornan Road.

4.15 The BIA Section 7.1 identifies potential stability issues due to water ingress during basement excavation and construction. The BIA states dewatering or grouting contingency plans should be included as mitigation.

4.16 The BIA Section 7.0 provides geotechnical parameters for retaining wall and pile foundation design. These parameters have been derived from the site-specific ground investigation and published literature.

4.17 Structural Calculations, included as Appendix C of the BIA, outline the temporary support methods and the basement construction sequence. The construction sequence includes an initial excavation to basement formation level with 45° batter around the excavation edges before any underpinning of the party walls is undertaken. It is noted that this does not reflect a traditional underpinning scheme and will be subject to the use of appropriate temporary works.

4.18 Appendix C includes outline structural loads for the ground floor slab, retaining walls and basement shell using suitable geotechnical parameters.

4.19 A Ground Movement Assessment (GMA) was undertaken for the basement using PDisp software to predict vertical (heave and settlement) ground movements in three stages of construction:

1. Mass excavation of the basement (short term conditions)
2. Mass excavation loads and structural loads (short term conditions)
3. Stage 2 loads (long term/drained conditions)

4.20 Ground movements predicted by the PDisp assessment have been imported into XDisp software to assess the horizontal and vertical ground movements around the development and their associated damage category for neighbouring structures. Whilst the CIRIA approach utilised in the XDisp software is intended for embedded retaining walls, it is accepted that this method can predict ground movements within the range typically anticipated for a single lift of underpinning carried out with good control of workmanship.

4.21 In addition to importing PDisp movements, user generated ground movement curves have been included in the XDisp assessment and are stated to be based on experience of basement construction within similar ground conditions. The curves have been designed such that a maximum of 5mm horizontal and vertical displacement occur at the basement wall. The movement curves applied in the revised submission are considered cautious or moderately conservative, as is required by CPG Basements.

4.22 The BIA estimates soil displacement values between 1mm and 9mm and notes the highest risk of movement will likely occur during basement construction and later through long-term heave of the constructed basement.

4.23 The building damage assessment results predict damage to neighbouring structures will not exceed Burland Damage Category 1 (Very Slight).

4.24 The revised submission states utilities within the footprint of the proposed basement are to be removed/replaced and the utilities immediately offsite, along Ornan Road will be unaffected by the basement considering the anticipated soil displacement estimations. Monitoring the utilities during the development is recommended as good practice.

4.25 The GMA includes consideration of the potential impact to the Belsize Tunnel underlying the site and states that it was not possible to discount the risk from piling to the tunnel and further specialist tunnel analysis should be undertaken. Additional assessment requirements should be confirmed as part of the liaison with Network Rail as part of the asset protection agreement.

4.26 The BIA states the ground movement predictions should be checked by monitoring the adjacent properties and structures to ensure no excessive movements occur that would lead to damage.

5.0 CONCLUSIONS

5.1 The BIA has been carried out by individuals who hold the qualifications required by CPG: Basements.

5.2 The BIA has been informed by a desk study and site-specific ground investigation.

5.3 The BIA has confirmed that the proposed basement will be founded within London Clay Formation using an underpinning construction method, piled raft and reinforced concrete basement box.

5.4 The groundwater table is unlikely to be encountered during basement excavation. It is accepted that the development will not impact the hydrogeology of the area.

5.5 The BIA Surface Flow and Flooding Screening assessment indicates the site is at a very low risk of surface water flooding and is in a Critical Drainage Area.

5.6 The basement will result in an increase of impermeable area at the site. The revised submission incorporates a Flood Risk Assessment including an outline drainage strategy and proposals for Sustainable Urban Drainage Systems (SUDS).

5.7 The revised submission states there are no neighbouring basements in relation to the proposed development.

5.8 An underground tunnel is present beneath the site. Evidence of ongoing liaison with National Rail has been provided in regard to asset protection.

5.9 A Ground Movement Assessment (GMA) has been undertaken. The BIA indicates damage to neighbouring buildings will not exceed Burland Category 1 (Very Slight).

5.10 It is confirmed that the BIA complies with the requirements of CPG: Basements and the Principles for Audit set out in the Basement Impact Assessment (BIA) Audit Service Terms of Reference & Audit Process.

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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	BIA	The architect's drawing scales do not appear correct.	Note – Paragraph 4.4	
2	Hydrology	Further information relating to the proposed SuDS mitigation measures is requested.	Closed – Paragraph 4.10	November 2024
3	Land Stability	Drawings showing the neighbouring structures and foundations relative to the basement should be provided.	Open – Paragraph 4.12	November 2024
4	BIA	Utility Plans should be provided.	Open – Paragraph 4.24	November 2024
5	BIA	Evidence of liaison with Network Rail in relation to the proposed development at No. 61 should be provided.	Open – Paragraph 4.14 and 4.25	November 2024
6	GMA	PDisp input data is requested.	Open – Paragraph 4.20	November 2024
7	GMA	The vertical ground movement curves used in the damage category assessment should be revised to provide a cautious or moderately conservative assessment.	Open – Paragraph 4.21	November 2024

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Appendix 3

Supplementary Supporting Documents

None

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