

**Basement Impact
Assessment Audit**

32 Willoughby Road, London
NW3 1RU

For
London Borough of Camden

Project No.
14006-31

Date
January 2025

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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 32 Willoughby Road, London NW3 1RU (planning reference 2023/1671/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. Updated sets of documents were subsequently provided between December 2023 and December 2024.
- 1.4 The BIA has been undertaken by individuals who possess suitable qualifications.
- 1.5 It is proposed to demolish the existing extension at the rear of the property and construct a new two-storey extension the full width of the original building, with a single storey basement below the entire extended footprint of the building. It is noted that the updated submissions remove the 'wine cellar' and the basement is now at one level.
- 1.6 The basement will be constructed using two lifts of underpinning and contiguous bored piling.
- 1.7 Screening and scoping exercises have been updated to reflect CPG Basements 2021 and are informed by desk study information.
- 1.8 The basement excavation will be c.4.00m deep and the founding stratum is identified as the London Clay.
- 1.9 It is accepted that the proposed development will not increase the amount of hardstanding draining to the sewers and will not have a significant impact on the hydrology of the area.
- 1.10 Although Claygate Member soils were encountered on one side of the site, it is accepted that limited groundwater was encountered during the site investigation and the development will not have a significant impact on the hydrogeology of the area.
- 1.11 Updated structural information has been provided, including outline temporary and permanent works.
- 1.12 A Ground Movement Assessment (GMA) has been provided. It is accepted that the range of movements predicted are within the range anticipated considering the depth and scale of the proposed basement and proposed construction techniques. Damage to neighbouring properties can be limited to Burland Category 1 (Very Slight).
- 1.13 A movement monitoring strategy is provided.
- 1.14 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 31 August 2023 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 32 Willoughby Road, London NW3 1RU.

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 two storey outrigger and replacement with an enlarged outrigger; addition of a two-storey partial extension to the rear elevation; green roof; construction of basement extension under the existing dwelling and part of rear garden with wine cellar and front lightwell; addition of side gate and fence; addition of side windows and rear roof lights and replacement sash windows."*

2.6 The Audit Instruction confirmed the property neither comprises, nor is 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:

- Basement Impact Assessment (BIA) by Key GeoSolutions Ltd, ref. 8271-001-R-02-3, rev. 3, dated 12 April 2023.
- Ground Investigation Factual Report by Key GeoSolutions Ltd, ref. 8271-001-R-01-2, rev. 2, dated 03 March 2023.

- Structural Stability Report (SSR) by BC Structural Design Ltd, ref. J209-RP-001, rev. 02, dated January 2023.
- Design Report by Joe Wright Architects, dated 29 March 2023.
- Planning Application Drawings by Joe Wright Architects, consisting of:
 - 2104-01_PL_000 Site and Block Plan, dated 14 December 2022.
 - 2104-01_PL_001 Existing Ground Floor Plan, rev E, dated 14 June 2022.
 - 2104-01_PL_002 Existing First and Second Floor Plan, rev F, dated 14 June 2022.
 - 2104-01_PL_003 Existing Loft and Roof Plan, rev E, dated 14 June 2022.
 - 2104-01_PL_004 Existing Elevations, rev D, dated 12 May 2022.
 - 2104-01_PL_005 Existing Sections A and B, rev E, dated 14 June 2022.
 - 2104-01_PL_010 Proposed Demolition Drawing, rev A, dated 20 June 2022.
 - 2104-01_PL_201 Proposed Basement and Ground Floor Plan, rev D, dated 29 March 2023.
 - 2104-01_PL_202 Proposed First and Second Floor Plan, rev C, dated 21 February 2023.
 - 2104-01_PL_203 Proposed Loft and Roof Plan, rev -, dated 21 February 2023.
 - 2104-01_PL_204 Proposed Elevations, rev C, dated 21 February 2023.
 - 2104-01_PL_205 Proposed Sections A and B, rev D, dated 29 March 2023.
- WEA Planning letter, ref. 2021_55, dated 03 July 2023.
- Arboricultural and Planning Impact Assessment Report by Wood Consulting, ref. WCEL/PEW/AIASR/0213:23, dated 13 February 2023.
- Tree Survey and Tree Protection Plan by Wood Consulting, ref WCEL/PEW/TSP1&TPP1/REV1, dated 13 February 2023.
- Planning Consultation Responses

2.8 The following documents were provided to CampbellReith in December 2023 following issue of the D1 audit, to address the queries raised in Appendix 2:

- Basement Impact Assessment (BIA) by Key GeoSolutions Ltd, ref. 8271-001-R-02-4, rev. 4, dated 28 October 2023.
- Ground Investigation Factual Report by Key GeoSolutions Ltd, ref. 8271-001-R-01-3, rev. 3, dated 25 October 2023.
- Structural Stability Report (SSR) by BC Structural Design Ltd, ref. J209-RP-001, rev. 02, dated 16 January 2023.

2.9 The following documents were provided to CampbellReith between October and December 2024 to address the queries raised in Appendix 2 of the D1 audit:

- Basement Impact Assessment (BIA) by Key GeoSolutions Ltd, ref. 8271-001-R-02-5, rev. 5, dated 14 March 2024.
- Structural Stability Report (SSR) by BC Structural Design Ltd, ref. J209-RP-001, rev. 03, dated 15 September 2023.
- Ground Movement Assessment Model Outputs, Key Geosolutions.
- Design of embedded retaining walls and cofferdams, Bored pile analysis, ref 8271, dated 21 October 2024.
- Design Report – Basement by Joe Wright Architects dated 4 November 2024.
- Proposed basement plans by Joe Wright Architects dated 9 September 2024.
- Construction Method Statement by BC Structural Design Ltd, ref. J806-S-RP-001, rev. 00, dated 23 October 2024.
- Planning, Design and Access Statement (Update) by WEA Planning, ref: 2021_55, dated November 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	Updated submissions.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	Updated submissions.
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	Screening has been updated to reflect CPG Basements (2021).
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Screening has been updated to reflect CPG Basements (2021).
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Screening has been updated to reflect CPG Basements (2021).
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	

Item	Yes/No/NA	Comment
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	Yes	A Ground Investigation Report is presented in Appendix 1 of the BIA.
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	Undertaken during the ground investigation.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Section 6.3 of the BIA.
Is a geotechnical interpretation presented?	Yes	Table 6.1-1 of the BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	Yes	Arboricultural Impact Assessment is provided.
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	Updated submissions.
Are estimates of ground movement and structural impact presented?	Yes	Updated submissions.

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	Screening has been updated in line with CPG Basement January 2021.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Structural monitoring recommended.
Has the need for monitoring during construction been considered?	Yes	
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	Updated submissions.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Updated submissions.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Updated submissions.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Updated submissions.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

- 4.1 The Basement Impact Assessment (BIA) has been carried out by Key GeoSolutions Ltd (KGS) and the individuals concerned in its production are reported to have suitable qualifications. The revised BIA submission includes signatures to confirm their involvement.
- 4.2 The LBC instruction to proceed with the audit identified that the basement proposals neither involves, nor is a neighbour to, listed buildings. The Planning Design and Access Statement identifies the property to lie within the Hampstead Conservation Area.
- 4.3 The site comprises a three-storey building with a two-storey outrigger extension constructed to the rear of the original building. The outrigger is approximately half the width of the original building.
- 4.4 It is proposed to demolish the existing out-rigger extension at the rear of the property and construct a new two-storey extension the full width of the original building, with a single storey basement below the entire extended footprint of the building. The basement will also extend to the front to form a lightwell. It is proposed to form the new basement using a combination of underpinning the existing building walls using two lifts, and piling the areas of the extension that are outside the building footprint (to the front, rear and side) after the outrigger has been demolished.
- 4.5 It is noted that the updated submissions remove the 'wine cellar' and the basement is now at one level.
- 4.6 The revised BIA has been updated to refer to the most recent policy document: Camden Planning Guidance Basements, dated January 2021.
- 4.7 Screening and scoping exercises have been undertaken, generally informed by a desk study and reference to the Arup GSD document. The screening and scoping sections have been updated to reflect CPG Basements (2021).
- 4.8 The proposed development will include a green roof to the new extension. It will not result in an increase in hardstanding area, as the current external areas are paved and drain to the local sewers. It is accepted that the development will not impact the hydrology of the area.
- 4.9 A ground investigation has been undertaken, which includes one window sample hole at the front of the property and one window sample hole at the rear of the property. Generally, the site is underlain by Made Ground over London Clay; however, the exploratory location at the front of the property also encountered soils interpreted to be Claygate Member to a depth of c.2.00m. The revised BIA submission includes a cross-section as Figure 5.5-1, which shows the ground conditions in relation to the proposed basement.

- 4.10 Groundwater was not recorded in the boreholes during the ground investigation. Two monitoring standpipes were installed and the revised submission includes the results of two subsequent groundwater monitoring visits. Water was encountered in one of the trial pits, which was considered to represent perched water held in the Made Ground. The revised submission provides additional consideration of the groundwater regime at the site and identifies that any groundwater encountered during construction is likely to be low volume and can be dealt with by sump pumping. It is accepted that the proposed basement will not have a significant impact on the hydrogeology of the area.
- 4.11 The BIA identifies a leaning boundary wall to be evidence of shrink/swell movement of the ground, as the London Clay was found to have a high volume change potential. The BIA indicates that the basement will be founded significantly lower than the depth of ground likely to be impacted by shrink/swell behaviour.
- 4.12 The arboricultural report indicates no trees are to be removed as part of the development and shows that the root zones of the nearest trees do not extend into the area of the proposed basement. Tree root protection measures have been recommended in the arboricultural report.
- 4.13 A Structural Stability Report (SSR) and Construction Method Statement (CMS) has been produced for the proposed basement. Temporary and permanent works information is provided in sufficient detail to inform the BIA.
- 4.14 Outline retaining wall have been provided in the updated submissions.
- 4.15 A Ground Movement Assessment (GMA) has been carried out for the development and uses CIRIA C760 to estimate horizontal and vertical movements that may be generated by the underpinning and piling works proposed. While CIRIA C760 is intended for embedded retaining walls, it can give reasonable estimates of ground movement resulting from underpinning.
- 4.16 The proposed construction sequence indicates two lifts of underpinning will be used as well as contiguous piling. It is accepted that the range of movements predicted are within the range anticipated considering the depth and scale of the proposed basement and proposed construction techniques. The assessment predicts a maximum damage category of Burland Category 1 (Very Slight) to neighbouring structures.
- 4.17 The BIA recommends the monitoring of adjacent properties and the public highway using tell tales and levelling targets.
- 4.18 A number of responses have been submitted by the public during the planning consultation period. Many of these relate to concerns of structural instability caused by the construction of the basement. The updated information provided demonstrates that the basement can be constructed in compliance with CPG: Basements.
- 4.19 The adjoining neighbouring property at No. 30 is identified as having been underpinned due to ongoing issues with subsidence. It is noted there is a large willow tree adjacent to the far front corner of No. 30 which could be the main contributor to cracking and subsidence experienced by No. 30.

5.0 CONCLUSIONS

- 5.1 The BIA has been undertaken by individuals who possess suitable qualifications.
- 5.2 It is noted that the updated submissions remove the 'wine cellar' and the basement is now at one level.
- 5.3 Screening and scoping exercises have been undertaken, generally informed by a desk study and reference to the Arup GSD document.
- 5.4 The basement excavation will be c.4.00m deep and the founding stratum is identified as London Clay.
- 5.5 It is accepted that the proposed development will not increase the amount of hardstanding draining to the sewers and will not have a significant impact on the hydrology of the area.
- 5.6 It is accepted that the development will not have a significant impact on the hydrogeology of the area.
- 5.7 Updated structural information has been provided, including outline temporary and permanent works.
- 5.8 A Ground Movement Assessment (GMA) has been provided. It is accepted that the range of movements predicted are within the range anticipated considering the depth and scale of the proposed basement and proposed construction techniques. Damage to neighbouring properties can be limited to Burland Category 1 (Very Slight).
- 5.9 A movement monitoring strategy is provided.
- 5.10 Based on the additional information provided it can be confirmed that the BIA complies with the requirements of CPG: Basements.

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CampbellReith
consulting engineers

Appendix 1

Consultation Responses

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
SM Planning, Clark, Kolabi, Shuttleworth	30 and 34 Willoughby Road	31/05/2023	Structural stability Damage from trees	The ground movement assessment has been reviewed in this audit. The arboricultural report shows that the root zone of the nearby trees doesn't extend into the excavation area for the proposed basement at No. 32.
LBHGeo	-	30/05/2023	Numerous – Discussed in section 4	The LBHGeo review highlights a number of inaccuracies and inconsistencies in the BIA submission, which have also been identified through the CampbellReith audit process.

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Appendix 2

Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA Format	Signatures from the qualified BIA authors are required to confirm their involvement.	Closed	March 2024
2	BIA format	Update screening and scoping in line with CPG Basements January 2021. Further consideration should be given to the figures in the Arup CGHHS report.	Closed	March 2024
3	Hydrology/ Hydrogeology	Further consideration of the impact that the presence of Claygate Member soils may have on basement construction and hydrogeological environment is required.	Closed	March 2024
4	Hydrogeology	Groundwater monitoring data should be provided to confirm the groundwater regime and should be considered in the assessment of the impact to hydrogeology.	Closed	March 2024
5	Land stability	The proposed layout of the basement presented in Image 2 of the Structural Report requires clarification.	Closed	March 2024
6	Land stability	The construction method statement should include the proposed piling to the front, side and rear of the property.	Closed	January 2025
7	Land Stability	Outline retaining wall calculations should be provided for both construction methods.	Closed	January 2025
8	Land stability	The ground movement assessment (GMA) should be revised to take into account the two proposed lifts of underpinning, the impact from the proposed piling and the cumulative impact these two activities will have on neighbouring structures, highways and utilities. Consideration should also be given to the impacts associated with the additional excavation required to form the buried wine cellar.	Closed	January 2025
9	Land stability	Further evidence is required to show how the results of the ground movement assessment have been used to derive the predicted damage category.	Closed	January 2025
10	Land Stability	Movement monitoring trigger levels may require to be updated to reflect the updated GMA	Closed	January 2025

Appendix 3

Supplementary Supporting Documents

None

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