

**20 Well Road,
London NW3 1LH**

**Basement Impact Assessment
Audit**

For
London Borough of Camden

Project Number: 12727-31

Revision: D1

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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 20 Well Road, London NW3 1LH (planning reference 2017/5998/P). The basement is considered to fall within Category C 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. An updated BIA was provided to CampbellReith on 29th January 2018.
- 1.4. The BIA has been prepared by Ground and Water Limited with supporting documents prepared by Vincent & Rymill. The authors' qualifications are in accordance with LBC guidance.
- 1.5. The property currently comprises a semi-detached property of one to two storeys. The BIA indicates that the proposed work involves the construction of a basement below the entire footprint of the ground floor, plus lightwells. The property forms a subdivided section of a once larger property called "The Logs" which is a Grade II listed building and lies within the Hampstead Conservation Area.
- 1.6. The site investigation identified ground conditions beneath the site to comprise Made Ground overlying Head Deposits and the Claygate Member of the London Clay Formation. The site investigation and BIA have been informed by a desk study broadly in accordance with LBC guidance. Appropriate interpretative geotechnical information is presented.
- 1.7. Two groundwater monitoring visits were undertaken within August 2017, both of which encountered dry conditions. The BIA states that isolated groundwater may be perched within Made Ground across the site but that it is unlikely that significant amounts of groundwater will be encountered during foundation excavation.
- 1.8. The construction methodology indicates that the south-eastern and western basement retaining walls will be constructed utilising 7.00m deep contiguous piling, with the remainder of the walls formed by underpinning. A semi-ground bearing slab incorporating heave protection has been recommended. The structural drawings and BIA are not consistent in regard to foundation depths and it has been assumed that the deeper levels indicated by the structural drawings are correct, which provides the most conservative assessment.

- 1.9. Sequencing and propping information, including retaining wall design calculations are provided for review. The basement walls will be stiffly propped in both the temporary and permanent cases. The lightwell retaining walls will be cantilevered in the permanent case.
- 1.10. A Ground Movement Assessment (GMA) is presented. A damage assessment of the Party Wall with 18 Well Road is provided, as this is stated to represent the worst case: the other neighbouring properties having existing basements. Whilst the methodology of the GMA is not fully accepted, we concur by independent assessment that well controlled underpinning of Wall H, as indicated by the temporary works information, should result in a maximum of Category 1 damage being sustained.
- 1.11. A specification for movement monitoring is presented.
- 1.12. It is accepted that the site is at very low risk of surface water flooding.
- 1.13. The proposed basement will result in an increase in the proportion of hard surface/paved areas by 12m². Outline drainage plans should be provided, including attenuation proposals, with sufficient assessment to demonstrate discharge flows will be in accordance with LBC's and Thames Water's requirements.
- 1.14. The proposed development will not impact the wider hydrogeological environment.
- 1.15. There are no slope stability impacts resulting from the proposed development.
- 1.16. Non-technical summaries should be presented with any future BIA submissions.
- 1.17. Queries and matters requiring further information or assessment are discussed in Section 4 and summarised in Appendix 2. Until the additional information requested has been presented, the BIA does not meet the criteria of CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 2 January 2018 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 20 Well Road, London NW3 1LH, Camden Reference 2017/5998/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:

- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Camden Planning Guidance (CPG) 4: Basements and Lightwells.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- The Local Plan (A5 Basements) 2017.

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; and,
- 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 Planning Portal describes the planning proposal as: *"Construction of a basement extension including lightwells to the garden area, erection of replacement single storey side extension, including increased height of boundary wall; erection of new smaller dormer windows (on east, west and north roofslopes), replacement rooflights and repositioning of entrance; installation of window and removal of French Doors."*

LBC's Planning Portal confirms that the site lies within the Hampstead Conservation Area. No.1 and 2 Cannon Lane, and 18 – 20 Well Road are subdivided sections of a once larger property called "The Logs" which is a Grade II listed building.

LBC's Audit Instruction stated that planning had already been granted at the subject site on 6 April 2011 for '*enlargement of existing underground garage and alterations including new garage doors, paved path with railings, steps plus landscaping to dwelling (Class C3)*'.

2.6. CampbellReith accessed LBC's Planning Portal on 18 January 2018 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment V1.01 dated October 2017 (ref GWPR2241/GIR/October 2017) by Ground and Water Limited.
- Structural Design, Construction Sequence and Temporary Works Report including Structural drawings and preliminary calculations (issue 1) dated October 2017 by Vincent & Rymill.
- Proposed and existing plans dated August 2017 by 5d Architects Ltd.
- Construction Management Plan dated September 2017 by B&G Construction.
- Tree survey, Arboricultural Impact Assessment and Tree Protection Plan (ref H23) dated 16 September 2017 by Martin Dobson Associates.
- Design and Access Statement by 5d Architects Ltd.

2.7. CampbellReith were provided with an updated BIA document for audit purposes on 29th January 2018, by email from LBC:

- Basement Impact Assessment V1.02 dated October 2017 (ref GWPR2241/GIR/October 2017) by Ground and Water Limited.

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	Information within the Desk study and BIA report is broadly in line with the information required by GSD Appendix G1.
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	Information within the Desk study and BIA report is broadly in line with the information required by GSD Appendix G1.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	As above although some maps within Appendix 1 of the BIA Report do not show the correct position of the development site.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Ground Investigation and BIA report, Section 3.1.2. The proposed development includes the removal of one tree (permission granted as part of a previous planning application). The BIA does not reference this removal.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Ground Investigation and BIA report, Section 3.1.1.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Ground Investigation and BIA report, Section 3.1.3.
Is a conceptual model presented?	Yes	Ground Investigation and BIA report – Section 3.2.1.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Ground Investigation and BIA report, Section 3.2.1.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Ground Investigation and BIA report, Section 3.2.1. The Screening process makes assumptions about the drainage design and discharge flow (Q4 and Q5) which require further assessment.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	Ground Investigation and BIA report, Section 3.2.1. There is a change in permeable / impermeable site ratio. Attenuation drainage references need further detailing to assess.
Is factual ground investigation data provided?	Yes	Ground Investigation and BIA report, Section 4.
Is monitoring data presented?	Yes	Ground Investigation and BIA report, Section 5.3 (groundwater monitoring data from 16 th and 23 rd August 2017 by Ground and Water Ltd.)
Is the ground investigation informed by a desk study?	Yes	Ground Investigation and BIA report, Section 2 and Structural Design report, Section 2.
Has a site walkover been undertaken?	Yes	Site walkover undertaken in August 2017.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	The Ground Investigation and BIA report states that 'No. 1 and 2 Cannon Lane and 19 Well Road have existing basements'. No.1 and 2 Cannon Lane, and 18 – 20 Well Road are subdivided sections of a once larger property called "The Logs".
Is a geotechnical interpretation presented?	Yes	Ground Investigation and BIA report, Section 6.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Ground Investigation and BIA report, Section 7.4 and Appendix 2 of the Structural Design report.
Are reports on other investigations required by screening and scoping	Yes	Ground movement assessment provided in Section 7.6 and

Item	Yes/No/NA	Comment
presented?		Appendix F.
Are 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	Ground Investigation and BIA report, Section 7.10.
Are estimates of ground movement and structural impact presented?	Yes	Ground movement assessment provided for 18 Well Road (report states that the other properties in a 12.00m radius already have basements (the adjacent 1 and 2 Cannon Lane and 19 Well Road)).
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	No	The proposed basement will result in a change in the proportion of hard surface/paved areas and therefore further assessment is required on the drainage design.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Drainage plans to mitigate surface water discharge flow to be provided.
Has the need for monitoring during construction been considered?	Yes	Movement monitoring is discussed in Appendix 4 of Structural Design Report.
Have the residual (after mitigation) impacts been clearly identified?	No	Drainage plans to mitigate surface water discharge flow to be provided.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	GMA methodology not fully accepted. However, considering the proposed temporary works, damage impacts should be limited to Category 1.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	The proposed scheme will increase the impermeable site area. Surface water discharge flow mitigation / drainage plan required.

Item	Yes/No/NA	Comment
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	The proposed scheme will increase the impermeable site area. Surface water discharge flow mitigation / drainage plan required.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Considering the proposed temporary works, damage impacts should be limited to Category 1.
Are non-technical summaries provided?	No	These should be provided in any future revisions.

4.0 DISCUSSION

- 4.1. The BIA has been prepared by Ground and Water Limited with supporting documents prepared by Vincent & Rymill. The authors' qualifications are in accordance with the requirements of CPG4.
- 4.2. The property currently comprises a large part two and part single storey, semi-detached property. The BIA indicates that the proposed work involves the construction of a basement below the entire footprint of the ground floor including lightwells to the garden area. No. 1 and 2 Cannon Lane, and 18, 19 and 20 Well Road are subdivided sections of a once larger property called "The Logs" which is a Grade II listed building which lies within the Hampstead Conservation Area.
- 4.3. The BIA indicates the floor level of the basement is to be formed at approximately 3.20m below ground level (bgl) with the retaining wall foundation formed at 3.60m bgl. The structural drawings indicate that the basement slab level and underpinned foundations will be at approximately 4.00m bgl. For the purposes of the audit, the structural drawings have been used for assessment, which is considered the most conservative case.
- 4.4. In addition to underpinning, the scheme utilises contiguous piling to 7.00m bgl for the western and south eastern retaining walls, at lightwell locations, with permanent reinforced concrete liner walls. A semi-ground bearing slab incorporating heave protection has been recommended.
- 4.5. The site investigation undertaken in August 2017 comprised the drilling of 2 boreholes to 6.45m bgl. The ground conditions identified were Made Ground (from ground level to depths of between 1.80m and 2.60m bgl) overlying Head Deposits (encountered at depths of between 2.50m and 2.80m bgl) which are further underlain by the Claygate Member of the London Clay Formation. Interpretative geotechnical information in accordance with the GSD Appendix G3 is presented. The site investigation and BIA have been informed by a desk study broadly in accordance with the GSD Appendix G1.
- 4.6. A groundwater monitoring well was installed in one borehole to 5.00m bgl. Two groundwater monitoring visits were undertaken, both of which encountered dry conditions. The BIA states that groundwater may be perched within Made Ground at other locations across the site and that the groundwater monitoring was undertaken in August when groundwater levels are likely to be close to their annual minimum (lowest elevation). The BIA considers it unlikely that significant amounts of groundwater will be encountered during foundation excavation but recommends that the basement be suitably tanked to prevent ingress of groundwater and also surface water run-off.

- 4.7. The BIA states that if the construction works take place in the winter months then perched water could accumulate and dewatering could be required to facilitate the construction. Further groundwater monitoring should be undertaken to inform temporary works contingency planning and control measures.
- 4.8. Temporary works information, including sequencing and propping information and retaining wall design calculations are provided for review. The basement walls will be stiffly propped in both the temporary and permanent cases. The lightwell retaining walls will be cantilevered in the permanent case.
- 4.9. A Ground Movement Assessment (GMA) is presented that considers structures within a 12m radius of the proposed basement, which the BIA considers to represent the zone of influence of the works. The GMA predicts ground movements using data presented in CIRIA C760. Whilst this is intended for use with piled retaining walls, it is considered that the approach is generally conservative when applied to underpinning. However, the methodology of the GMA is not fully accepted for the following reasons:
- The GMA considers movements relating to both installation of the piled wall and excavation in front of the piled wall. When considering underpinning, the assessment does not consider any movement affects due to installation of the underpins. This makes the approach less conservative with respect to underpinning.
 - The GMA considers underpinning depths and excavation depths that are shallower than those indicated by the structural scheme.
 - The L/H ratios stated for wall H are inconsistent with the foundation length stated in the geotechnical assessment and the height of the adjacent 2 storey property.
- 4.10. A damage assessment of the Party Wall with 18 Well Road is provided, as this is stated to represent the worst case: the other neighbouring properties having existing basements. This is accepted as the worst case, as wall H has the deepest underpinning requirements.
- 4.11. The BIA and Structural Report state that strict control of the construction method together with the structural design will limit any potential damage to Category 0 or 1 (Very Slight). Whilst the methodology of the GMA is not fully accepted, we concur by independent assessment that well controlled underpinning of Wall H, as indicated by the temporary works information, should result in a maximum of Category 1 damage being sustained.

- 4.12. A specification for movement monitoring is presented as Appendix 4 to the Structural Report. This includes trigger levels and contingency actions to ensure construction is controlled and impacts are limited to those predicted.
- 4.13. Well Road is within Critical Drainage Area (Group 3-010), although this was not identified within the BIA screening or scoping process. The site did not flood in either 2002 or 1975. It is accepted that the site is at very low risk of surface water flooding but assumptions have been made about the drainage design, including the attenuation of discharge flow.
- 4.14. The proposed basement will result in an increase in the proportion of hard surface/paved areas by 12m². A drainage assessment, and proposed mitigation if required, in accordance with CPG4 Section 3.51 should be presented. Outline drainage plans should be provided, including attenuation proposals, with sufficient assessment to demonstrate discharge flows will be in accordance with LBC's and Thames Water's requirements.
- 4.15. The proposed development will not impact the wider hydrogeological environment.
- 4.16. There are no slope stability impacts resulting from the proposed development.
- 4.17. Non-technical summaries should be presented with any future BIA submissions.
- 4.18. Queries and matters requiring further information or clarification are summarised in Appendix 2.

5.0 CONCLUSIONS

- 5.1. The authors' qualifications are in accordance with the requirements of CPG4.
- 5.2. The proposed development includes the construction of a basement below the entire footprint of the ground floor including lightwells to the garden area. The subject site forms a section of a once larger property and is a Grade II listed building.
- 5.3. A site investigation has confirmed the underlying ground conditions to comprise a Made Ground overlying Head Deposits which are underlain by the Claygate Member of the London Clay Formation.
- 5.4. No groundwater was encountered during the investigation or in further groundwater monitoring visits in August 2017. The proposed development will not impact the wider hydrogeological environment.
- 5.5. Longer term groundwater monitoring is recommended to inform temporary works contingency planning and control measures.
- 5.6. Suitable temporary and permanent structural information has been provided for review.
- 5.7. Whilst the methodology of the GMA is not fully accepted, we concur by independent assessment that well controlled underpinning of Wall H, as indicated by the temporary works information, should result in a maximum of Category 1 damage being sustained.
- 5.8. It is accepted that the site is at very low risk of flooding.
- 5.9. The proposed development will result in an increase in the proportion of hard surface/paved areas. A drainage assessment, and proposed mitigation if required, in accordance with CPG4 Section 3.51 should be presented.
- 5.10. There are no slope stability impacts resulting from the proposed development.
- 5.11. Non-technical summaries should be presented with any future BIA submissions.
- 5.12. Queries and matters requiring further information or assessment summarised in Appendix 2. Until the additional information requested has been presented, the BIA does not meet the criteria of CPG4.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	Groundwater	BIA recommends further groundwater monitoring.	Contractor to confirm groundwater levels in advance of construction.	N/A
2	Surface Water Flow	There is an increase in impermeable site area. Assessment and mitigation, if required should be presented.	A drainage assessment in accordance with CPG4 Section 3.51 should be presented.	
3	BIA Format	Non-technical summaries are not provided	Future revisions should include non-technical summaries.	

Appendix 3: Supplementary Supporting Documents

None

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