

35 Templewood Avenue
London, NW3 7UY

Basement Impact Assessment
Audit

For
London Borough of Camden

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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 35 Templewood Avenue (planning reference 2017/4498/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.
- 1.4. The BIA, SMS and GMA have been carried out by individuals who possess suitable qualifications in compliance with the requirements of CPG4.
- 1.5. The BIA should be revised to include all screening questions as listed in CPG4 and scoping referencing each of the questions answered 'yes/unknown'.
- 1.6. It is proposed to construct the new basement by forming reinforced concrete underpins in a hit and miss sequence, as noted in the SMS.
- 1.7. The BIA has confirmed that the proposed basement will be founded within the Bagshot Formation, a Secondary A Aquifer.
- 1.8. It is unlikely that the ground water table will be encountered during basement foundation excavation.
- 1.9. Designs have been provided for the retaining walls taking the watertable at 1.0m bgl, in line with good practice procedures.
- 1.10. It is proposed to underpin the existing perimeter walls in a hit and miss sequence, extending the foundations into the Bagshot Formation to a depth of approximately 3.7m deep.
- 1.11. The current basement proposal clashes with the root protection zone noted on the 'Tree Constraints Plan'.
- 1.12. It is accepted that there is a low shrink/swell potential in the Bagshot Formation, as noted in the BIA.

- 1.13. The GMA indicates a damage category of no worse than 1. However the GMA should be expanded to include the listed swimming pool structure, the neighbouring highways and pavements, along with clarification provided on neighbouring basements.
- 1.14. It is accepted that the proposed basement construction is unlikely to impact on the wider hydrogeology of the area. This should be confirmed by providing answers to all screening questions as listed in CPG4.
- 1.15. Clarification on surface water discharge to the existing sewer system is required.
- 1.16. Details of the south elevation lightwell are required.
- 1.17. An outline works programme is required.
- 1.18. The current steep sloping entrance to the basement carpark is identified in the screening as a slope stability concern. This and any other slope stability concerns should be addressed as part of the scoping.
- 1.19. It is accepted that the risk of flooding of the proposed development is very low.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 17 August 2017 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 35 Templewood Avenue, London NW3 7UY and 2017/4498/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.

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 new basement level; erection of 2 storey extension to south east corner of the site to join the south and east wings; erection of new lift/stairwell to the eastern elevation of the south wing up to third floor level; extension of south wing 3rd floor level; installation of car lift to east elevation; refurbishment of listed swimming pool and associated landscaping."*

The Audit Instruction also confirmed that 35 Templewood Avenue involved, or was a neighbour to, listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 22 September 2017 and gained access to the following relevant documents for audit purposes:

- Architects General Arrangement Plans & Sections Existing (December 2016) and Proposed (July 2017)
- Desk Study, Ground Investigation & Basement Impact Assessment Report (BIA) including appendices prepared by Jomas Associates 10 August 2017
- Structural Methodology Statement for Basement Development (SMS) prepared by Barrett Mahony Rev P2 11 September 2017
- Design and Access Statement (DAS)
- Ground Movement Assessment prepared by Jomas Associates 05 September 2017
- Arboricultural and Planning Integration Report prepared by GHAtrees 12 December 2016
- Tree Constraints Plan November 2016
- Planning Comments and Response

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?	No	Programme of works not provided. Indicative programme of works noting anticipated durations should be provided.
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	
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?	No	Adequate responses not provided for all questions as set out in CPG4, Figure 4. Question 4 and Question 8: Not included and no response provided. Question 6: Response not in line with 'Tree Constrains Plan'. Question 11: Wording altered to refer to garden pond only, should confirm if site is 'within 50m of Hampstead Heath ponds'.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Adequate responses not provided for all questions as set out in CPG4, Figure 3. Question 3: Wording altered to refer to garden pond only, should confirm if site is 'within catchment of the pond chains of Hampstead Heath'.

Item	Yes/No/NA	Comment
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Adequate responses not provided for all questions as set out in CPG4, Figure 5. Question 1: Wording altered to refer to garden pond only, should confirm if site is 'within catchment of the pond chains of Hampstead Heath'. Question 3: Not included and no response provided.
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	No	Scoping should clearly identify mitigation measures for each of the screening questions answered 'Yes/Unknown'.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	No	Scoping should clearly identify mitigation measures for each of the screening questions answered 'Yes/Unknown'.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	Scoping should clearly identify mitigation measures for each of the screening questions answered 'Yes/Unknown'.
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	

Item	Yes/No/NA	Comment
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	The GMA indicates the presence of neighbouring basements, however clarification on the extent of any existing basement to Schrieber House is required.
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	Yes	
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	
Are estimates of ground movement and structural impact presented?	Yes	Estimated heave movements from the excavation and vertical & horizontal movements from excavation and underpinning/pile installation have been included for the neighbouring properties 33 Templewood Avenue and the Schreiber House. However the GMA should also include the surrounding roadways within 5m and the existing Grade II listed swimming pool on site.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate	Yes	

Item	Yes/No/NA	Comment
mitigation methods incorporated in the scheme?		
Has the need for monitoring during construction been considered?	Yes	However additional movement monitoring proposal should be put in place for neighbouring infrastructure, as well as for the Grade II listed swimming pool building.
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?	No	Some clarification is required regarding the GMA, along with explain the GMA to cover the listed swimming pool and adjacent highways.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Unclear	The area of basement is increasing, clarification is required as to the amount of surface water drainage entering the sewer system.
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?	No	However clarification is required regarding parameters taken in the GMA, along with expanding the GMA to the swimming pool and highways.
Are non-technical summaries provided?	No	

4.0 DISCUSSION

- 4.1. The Basement Impact Assessment (BIA) has been prepared by Jomas Associates (JA). The BIA includes a Ground Investigation (GI) and a desk study prepared by Groundsure. A Structural Methodology Statement for Basement Development (SMS) has been prepared by Barrett Mahony Consulting Engineers. The qualifications of the author of the BIA and the associated reports are in compliance with the requirements of CPG4.
- 4.2. The BIA includes screening, site investigations and impact assessment stages as defined and required in the LBC Planning Guidance document 'Basements and Lightwells (CPG4)', dated July 2015. However not all screening questions have been answered, as noted in Section 3.0. This should be rectified and the screening and scoping revised accordingly. Scoping is referred to in Section 7.2 of the BIA, however it is not clear in the report where the questions identified for further scoping have been expanded on and the proposed mitigation measures for each question. This should be rectified.
- 4.3. 35 Templewood Avenue is an existing L-shaped building on plan, with the height of the building varying between two and four stories. It is located to the west of Hampstead Heath. There is an independent swimming pool structure with a glass domed roof to the rear of the L-shaped building. The swimming pool originally formed part of the neighbouring Grade II listed Schreiber building, which was constructed in 1968. The swimming pool and part of the garden where separated from the main Schreiber building following a change of ownership in the early 1990s and now form part of the 35 Templewood Avenue plot. The L-shaped dwelling was constructed on this plot adjacent to the existing Grade II listed swimming pool building.
- 4.4. The LBC Instruction to proceed with the audit identified that the basement proposal either involved a listed building or was adjacent to listed buildings but gave no details. The Design & Access Statement identified that 35 Templewood Avenue is located in the Redington and Frogna Conservation Area. It also confirmed that the neighbouring Schreiber building and the swimming pool at 35 Templewood Avenue are Grade II listed buildings.
- 4.5. The proposed works include the excavation of a new single story basement beneath the full footprint of the existing building, extending beyond the existing footprint at the rear adjacent to the swimming pool and to the front entrance to the basement garage. The depth of the proposed basement is approximately 3.7m below the existing lower ground floor. It is proposed to construct the new basement by forming reinforced concrete underpins in a hit and miss sequence beneath the existing property. It is proposed to construct the basement car park entrance to the front using a contiguous piled wall.
- 4.6. There are some discrepancies between the BIA and the SMS regarding the proposals for the existing listed swimming pool building. The BIA states that the proposal is to rebuild the

existing buried swimming pool at a different location on the site however the SMS noted the swimming pool remaining as existing. The DAS confirms that the current proposal is to keep the listed swimming pool building in its current position.

- 4.7. The Arboricultural Report provided notes that the scheme requires the removal of a small number of relatively insignificant trees and that retained trees are at a satisfactory distance from the proposed new structures and highly unlikely to give rise to any issues. However this information is contradicted by the 'Tree Constraints Plan', which shows the root protection zones of two significant trees overlapping with the proposed basement construction. This should be clarified.
- 4.8. It is accepted that there is a low shrink/swell potential in the Bagshot Formation, as noted in the BIA. The SMS notes that Cellcore heave board will be provided beneath the basement slab to mitigate the impact of heave.
- 4.9. A GI has been undertaken at the site by Jomas, June 2017. 2No. window sample boreholes to a depth of 6m and 1No. foundation trial pit were carried out. The investigations identified Made Ground up to 1m deep, underlain by sandy clay, Bagshot Formation, to the base of the bore holes.
- 4.10. The BIA confirms that no groundwater strikes were recorded during the ground investigations. Groundwater monitoring has been carried out, however, only over a very short period of time over the summer months. Allowance should be made for seasonal variations to the watertable and possible mitigation measures. However it is accepted that the proposed basement construction is unlikely to extend below the groundwater level. The basement retaining wall designs assume the ground water level at 1.0m bgl, in line with good practice procedures. Preliminary designs have been provided for the retaining walls. A ground bearing capacity of 150kN/m² has been adopted for the design, as recommended in the GI.
- 4.11. The proposed construction sequence is to remove the existing ground floor and extend the internal and external load bearing walls down to form the basement walls using traditional underpinning techniques, extending the foundations into the Bagshot Formation to a depth of approximately 3.7m bgl. The perimeter wall and underpins are to be laterally propped in the temporary condition, allowing the reinforced concrete basement slabs and walls to be constructed. It is proposed to cut back the face of the concrete ground beam/trench fill foundations flush with the face of the underpin wall to allow the underpins to be constructed. Following completion of the underpinning, it is then proposed to install the steel plunge columns within 450mm diameter piles and the proposed contiguous piles to the carpark entrance. The reduced level dig well then be undertaken, installing temporary propping as the level reduces to the proposed basement slab formation level. The basement slab, walls and ground floor slab will then be constructed to complete the basement construction.

- 4.12. The GMA indicates that 33 Templewood avenue contains an existing basement level to the entire building footprint, with it possibly indicated that Schrieber House contains a partial basement level however this is unclear. Clarification should be provided on any existing basement level to Schrieber House and its extent.
- 4.13. Temporary works propping and sequencing proposals are provided. Assuming that the works are carefully controlled and monitored, the detail of temporary works and construction method can be considered in accordance with CPG4.
- 4.14. A movement monitoring proposal has been provided as part of the SMS. This should be extended to provide proposed monitoring points to the listed swimming pool building.
- 4.15. The GMA indicates the potential damage to neighbouring properties as no higher than Category 1 on the Burland scale, 'Slight Damage'. The GMA makes reference to carrying out the assessment to determine horizontal and vertical movement in accordance with CIRIA 580 which is considered a conservative approach to calculating ground movements beneath an underpinned building. No parameters are provided with regards to the foundation levels of the neighbouring Schrieber House, which should be provided along with confirmation of its existing basement extent.
- 4.16. The GMA should also assess the potential damage to the neighbouring infrastructure, including the road within 5m of the development. A potential damage assessment should also be carried out for the listed swimming pool building.
- 4.17. A lightwell to the south elevation is indicated on the architectural ground floor plan, however this is not indicated on the structural drawings. The form of construction of this lightwell should be confirmed.
- 4.18. While it is indicated that the area of hardstanding is not increasing, it is not clear if this equates to no increase in surface water discharge to the existing sewer system. Confirmation of the existing hardstanding drainage, and proposed basement drainage, should be provided in order to compare the impact on surface water discharge to the sewer system. SUDs should be considered in order to mitigate an increased surface water discharge if appropriate.
- 4.19. Considering that the proposed basement is to be underlain by a Secondary A aquifer, it is accepted that the proposed basement is unlikely to extend into the groundwater and is unlikely to impact on the wider hydrogeology of the area. Proximity to the Hampstead Heath ponds and catchment area should be considered as part of the screening stage.
- 4.20. The current steep sloping entrance to the basement carpark is identified in the screening as a slope stability concern. This and any other slope stability concerns should be addressed as part of the scoping.

- 4.21. It is accepted that the risk of flooding of the proposed development is very low.
- 4.22. Given a number of queries raised about it is recommended that the BIA or supporting documents be revised and resubmitted. A summary of open queries can be found in appendix 2.

5.0 CONCLUSIONS

- 5.1. The Basement Impact Assessment (BIA), Structural Methodology Statement (SMS) and Ground Movement Assessment (GMA) have been carried out using individuals who possess suitable qualifications in compliance with the requirements of CPG4.
- 5.2. Screening and scoping should be revised to include all questions as set on in CPG4. Reference should be made to each question requiring scoping within the BIA and the mitigation measures proposed.
- 5.3. Generally it is proposed to construct the new basement by forming reinforced concrete underpins in a hit and miss sequence, as noted in the SMS.
- 5.4. The BIA has confirmed that the proposed basement will be founded with the Bagshot Formation. Groundwater monitoring has confirmed that the proposed basement is unlikely to extend below the water table.
- 5.5. The current basement proposal clashes with the root protection zone noted on the 'Tree Constraints Plan', this should be confirmed.
- 5.6. It is accepted that there is a low shrink/swell potential in the Bagshot Formation, as noted in the BIA.
- 5.7. Designs have been provided for the retaining walls taking the watertable at 1.0m bgl, in line with good practice procedures.
- 5.8. It is proposed to underpin the existing perimeter walls in a hit and miss sequence, extending the foundations into the Bagshot Formation to a depth of approximately 3.7m deep. The walls are to be laterally propped in the temporary condition, allowing the reinforced concrete basement slab and walls to be constructed.
- 5.9. The GMA indicates the potential damage to neighbouring properties as no higher than Category 1 on the Burland scale, 'Very Slight Damage'. The GMA should be updated to include the neighbouring infrastructure and Grade II listed swimming pool building, and highways and pavements within 5m of the development. Clarification is also required on neighbouring basements.
- 5.10. The movement monitoring proposal should be expanded to include the neighbouring infrastructure and Grade II listed swimming pool building, and should be secured via planning condition planning condition.

- 5.11. The surface water drainage from the developed areas should be clarified to assess the impact on surface water drainage.
- 5.12. The construction of the lightwell to the south elevation should be clarified.
- 5.13. It is accepted that the proposed basement construction is unlikely to impact on the wider hydrogeology of the area. This should be confirmed with the by revising the BIA to include all screening questions as listed in CPG4.
- 5.14. The current steep sloping entrance to the basement carpark is identified in the screening as a slope stability concern. This and any other slope stability concerns should be addressed as part of the scoping.
- 5.15. An outline works programme is required.
- 5.16. It is accepted that the risk of flooding of the proposed development is very low.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Kirsch	9 West Heath Road, NW3 7UX	11/09/17	Impact on existing structure with in 5m of property. Impact on groundwater.	Refer to Section 4.0 of the audit for comments on groundwater, ground movement assessment and predicted damage categories. Further information has been requested as per Appendix 2.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA General	Indicative programme of works noting anticipated works and duration periods should be provided.	Open	
2	Stability, Hydrogeology, Hydrology	Responses to be provided for all screening questions as set out in CPG4, Figure 3, 4 and 5.	Open	
3	Stability, Hydrogeology, Hydrology	Scoping should clearly identify mitigation measures for each of the screening questions answered 'Yes/Unknown'.	Open	
4	Stability	GMA should also include the surrounding roadways within 5m, the existing Grade II listed swimming pool on site, and clarification of parameters taken for the analysis of Grade II listed Schrieber House.	Open	
5	Hydrology	Clarification on surface water discharge to the existing sewer system required, with details of SUDS provided if required.	Open	
6	Stability	Details of construction of south lightwell as indicated on proposed ground floor plan	Open	

Appendix 3: Supplementary Supporting Documents

None

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