CampbellReith
consulting engineers

5 The Grove - Swimming Pool, London, N6 6JU

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 13693-52
Revision: F1

July 2022

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Project Name	5 The Grove Swimming Pool, London N6 6JU
Planning Reference	2021/4146/P & 2021/4990/L

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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 a swimming pool at 5 The Grove, London, N6 6JU (planning reference 2021/4146/P & 2021/4990/L). 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 carried out by individuals who possess suitable qualifications as per CPG: Basements 2021.

1.5. Desk study information and a screening assessment are presented.

1.6. It is proposed to discharge additional surface water run-off to the ground, as it currently does. Therefore, it is accepted that the development will not impact the hydrology of the area.

1.7. A site investigation confirms that the proposed swimming pool would be built within the Bagshot Formation, classified as a Secondary A Aquifer. Groundwater was encountered at 6.00m below ground level. Further groundwater monitoring is recommended to confirm design and temporary works parameters. However, it is accepted that there should be no impact to the hydrogeological environment.

1.8. The swimming pool will be built with reinforced concrete slabs, liner walls and micro piles will be utilised as part of the permanent works.

1.9. No ground movement assessment has been undertaken. Subsequent correspondence was provided, considering the impact the proposed development will have on the nearby listed garden wall. It is accepted that there will be no significant impact.

1.10. It is accepted that the development will not have a significant impact on the slope stability of the area.

1.11. 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 13th April 2022 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 5 The Grove, London N6 6JU and Planning References 2021/4146/P & 2021/4990/L.

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.
- Highgate Neighbourhood

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 *"Extension to existing outbuilding, including outdoor shower and roof terrace above; relocation of swimming pool; erection of pergola; associated landscaping."*

The Audit Instruction confirmed 5 the Grove involved, and is a neighbour to, listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 03/05/2022 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA) by GEA Ltd, Revision 1, dated 26 August 2021 (ref: J21179A).
- Structural Engineering Report (SER) by Constructure Ltd, Revision P2, dated 16 September 2021.
- Architects General Arrangement Plans & Sections existing by 31/44 Architects, dated August 2021.
    - Existing Plans. (Ref No. 44/2022/PL 0001)
    - Demolition Plans. (Ref No. 44/2022/PL 1002)
    - Proposed Plans. (Ref No. 44/2022/PL 2001)
- Rear Garden Section and Surveys by Tom Stuart-Smith Ltd, dated August 2021 (Ref No. 381-L-S-201 & 381-L-P-102)
- Rear Garden - Landscape Design Statement by Tom Stuart-Smith, Revision P01, dated August 2021, (ref: 381-L-X-901).

2.7. The following additional information was provided in response to queries raise in the D1 issue of CampbellReith's audit:

- Letter by GEA, ref J21179A/AT/1, dated 23 May 2022.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Section 1.3.2 of BIA
Is data required by Cl.233 of the GSD presented?	Yes	
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?	Yes	Section 3.1.2 of BIA.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1.1 of BIA
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1.3 of BIA.
Is a conceptual model presented?	Yes	Section 7.1 of BIA.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.1 of BIA and discussed further in Section 9.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.1 of BIA and discussed further in Section 9.
Is factual ground investigation data provided?	Yes	Section 7.0 of BIA.
Is monitoring data presented?	No	Groundwater monitoring is recommended in BIA.
Is the ground investigation informed by a desk study?	Yes	Section 2.0 of BIA.
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	No	However, no structures within 10m of proposed development.
Is a geotechnical interpretation presented?	Yes	Section 8.0 of BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 8.1.2 of BIA.
Are reports on other investigations required by screening and scoping presented?	No	
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	Section 10.0 of BIA.
Are estimates of ground movement and structural impact presented?	No	However, the impact to the listed garden is considered and assessed to not be impacted by the proposed excavation.

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	
Has the need for monitoring during construction been considered?	Yes	Continued monitoring recommended in Section 8.1.1 of the BIA.
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	Additional information provided considers the impact to listed garden wall
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?	No	However, the additional information provided it is accepted that there will be no significant impact.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by individuals who possess suitable qualifications as per CPG: Basements 2021.

4.2. The Structural Engineering Report (SER) has been carried out by Constructure Ltd.

4.3. The LBC Instruction to proceed with the audit identified that the main house at No. 5 The Grove is listed, as is the garden wall adjacent to the existing outbuilding. The Design & Access Statement identified that 5 The Grove is located in the Highgate Conservation Area.

4.4. The proposed works consist of excavating a new swimming pool in the existing rear garden, with a surrounding pool terrace, a woodland walk in the west and alterations to the existing single storey pool house in the east. The swimming pool is indicated to extend to a depth of approximately 3m below ground level.

4.5. Desk study information and a screening assessment are presented.

4.6. A site investigation confirms that the ground conditions comprise of Made Ground to c.2.00m below ground level (bgl), underlain by 14.20m of Bagshot Formation and followed by the Claygate Member to depth. It is confirmed the swimming pool will be founded within the Bagshot formation.

4.7. Groundwater was encountered during the investigation within the Bagshot Formation at depths of 6.00m bgl at the rear of the site and 12.00m bgl at the front garden. No subsequent groundwater monitoring has been carried out, and the BIA recommends that ongoing groundwater monitoring should be undertaken to establish equilibrium groundwater levels and seasonal fluctuations.

4.8. The screening assessment for hydrogeology identifies the Bagshot Formation as a Secondary A Aquifer. Given the depth of groundwater encountered during the investigation, and the referenced depth of groundwater from nearby investigations, the BIA suggests that the swimming pool is unlikely to impact the hydrogeological environment, as groundwater will follow a flow pathway around and below the pool. However, the BIA recommends a trial excavation of the full swimming pool excavation depth, as well as groundwater monitoring, to be carried out to confirm the depth of groundwater and inform the temporary works design, which should be implemented.

4.9. The screening assessment for hydrology identifies there will be an increase in hardstanding. This is taken forward to scoping where it is indicated that the additional surface water run-off generated will be attenuated by allowing the full volume of surface water to enter the ground. Surface water currently discharges to the ground, therefore no material change is envisaged.

4.10. The SER includes proposed construction methodology and the sequence of construction. The proposed swimming pool will be constructed in an open excavation with the sides battered back. It should be noted that the Bagshot Formation is a Secondary A Aquifer. Layers of sand with interbedded clays can give rise to groundwater levels and changes in pore water pressures, which can lead to instability. This should be considered in the temporary works design by a qualified temporary works engineer.

4.11. The permanent works for the swimming pool will include a reinforced concrete slab, liner walls and tension piles to limit heave and hydrostatic pressures at the base of the pool.

4.12. A ground movement assessment was not provided in the original BIA. Subsequent correspondence was provided by GEA as a letter, which discusses the pool excavation in relation to the listed garden wall. The letter states that, based on the ground conditions encountered, ground movements around the excavation will reduce to zero at a distance of two times the excavation depth. As the pool excavation is 3m deep, the zone of influence will be 6m, and the garden wall lies beyond this zone. Additionally, the letter indicates that loads from the pool will not interact with loads imposed on the ground by the garden wall foundation. Based on this additional information, it is accepted that there will be no significant impact to the listed garden wall.

5.0 CONCLUSIONS

5.1. The BIA has been carried out by individuals who possess suitable qualifications.

5.2. The proposal includes the construction of a new swimming pool and alterations to the pool house, with associated landscaping.

5.3. A Desk Study is provided.

5.4. The swimming pool will extend to a depth of 3.00m bgl and be founded within the Bagshot Formation.

5.5. Groundwater monitoring has not been undertaken and is recommended in the BIA, in order to confirm design parameters, construction techniques and temporary works requirements. The BIA suggests a trial excavation be carried out to the proposed maximum excavation depth, and that additional groundwater monitoring is undertaken.

5.6. The above notwithstanding, it is accepted that the swimming pool excavation will not impact the hydrogeology of the area, as flow paths around and below the excavation will remain available.

5.7. It is accepted that the development will not impact the slope stability of the surrounding area.

5.8. The development will increase the amount of hardstanding at the site. It is proposed that surface water run-off be attenuated and discharge to the ground, as it does at present. it is therefore accepted that the hydrology of the area will not be significantly impacted.

5.9. It is proposed to construct the pool in open cut. The detailed temporary works design will need to consider the excavation instability within the Bagshot Formation.

5.10. Reinforced concrete slabs, liner walls and micro piles will be utilised as part of the permanent works.

5.11. No ground movement assessment has been undertaken. Subsequent correspondence was provided, considering the impact the proposed development will have on the nearby listed garden wall. Based on the depth of the excavation and the distance of the proposed pool from the garden wall, it is accepted that there will be no significant impact.

5.12. Based on the additional information provided, it can be confirmed that the BIA complies with the requirements of CPG Basements.

Appendix 1: Consultation Responses

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Land Stability	Consideration of the impact to the nearby listed garden wall is required.	Closed	05/07/2022

Appendix 3: Supplementary Supporting Documents

GEA letter, ref. J21179A/AT/1, dated 23 May 2022

23th May 2022

Your ref:
Our ref: J21179A/AT/1

GEA

Widbury Barn
Widbury Hill
Ware SG12 7QE

01727 824666
mail@gea-ltd.co.uk
www.gea-ltd.co.uk

Dave Oberoi-Morris
Constructure
Unit 18
New Concordia Wharf
London
SE1 2BB

Dear Dave

Re: 5 THE GROVE, LONDON N6 6JU – PROPOSED SWIMMING POOL CONSTRUCTION – GROUND MOVEMENTS

Further to your request and in response to comments raised by Campbell Reith as part of the London Borough of Camden's review of the planning documents submitted for the proposed development, we have reviewed the proposals and our previous report and provide the following further clarification with respect to the requirement to have a ground movement assessment completed for the proposed swimming pool excavation.

Our previous report (reference J21179 Rev 1, dated 26th August, 2021) states the following;

"It is understood that it is currently proposed to carry out the swimming pool excavation as an open cut. This should be feasible but it should be noted that slopes within Bagshot Formation can be problematic due to the inconsistent nature of the soil, which often contains lenses or layers of sand interbedded with clays which can give rise to inconsistent groundwater tables and changes in pore water pressures, which can lead to various stability problems. In addition at this site the made ground extends to depths of between 1.30 m and 2.00 m. Whilst it is possible that a slope angle of about 60 degrees could be adopted for the clay of Bagshot Formation, in view of the presence of a significant thickness of made ground over the soil and the variability of the Bagshot Formation an angle of about 30 degrees may be more appropriate, unless the slope face is strutted. Precautions should be taken to protect the slopes during periods of rainfall to minimise instability. A check has been carried out which has indicated that a line at an angle of 45° from the base of the footings of the surrounding structures does not intersect the proposed slope and therefore the excavation of the open cut excavation should not impact the stability of the surrounding structures. A ground movement assessment is, therefore, not considered to be required."

Provided that the slope angle during construction is consistent with the figures provided above, the excavation should remain stable and will not extend up to the listed retaining walls. Additionally, the loads of the swimming pool will not have an impact on the foundations or loading of the listed retaining walls as a line drawn at 45 degrees from the base of the swimming pool excavation does not intersect any of the existing walls or foundations. Additionally, a line drawn at 45 degrees from the base of the footings for each of the retaining walls does not intersect the slope of the excavation and therefore any movements within the excavation will not have an effect on the retaining walls and the loads of the walls will not contribute to movement within the slopes of the excavation.

Published information[i] on observations made of excavations in a sand or firm to stiff clay, have indicated that the movement around an excavation reduces to zero at a distance equal to twice the depth of the excavation. In this case, where the excavation is to extend to a depth of 3.00 m, movements are expected to reduce to zero at a distance of 6.00 m from the edge of the excavation. None of the retaining walls fall within this area.

As a result of the above, it has been concluded that the swimming pool excavation will not have a significant impact on the nearby listed retaining walls and no other sensitive structures are present within the vicinity that require consideration. Therefore a ground movement assessment is not considered to be required to determine the extent of movements occurring as a result of the development.

We trust that we have provided sufficient information but will of course be pleased to assist further if required.

Yours sincerely
GEOTECHNICAL & ENVIROMENTAL ASSOCIATES

Alex Taylor

Encs

[i] Peck, R B (1969) *Deep excavations and tunnelling in soft ground*. State-of-the-Art Report. Proc 7th Int Conf SMFE, Mexico 225-290

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