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82 Fitzjohn's Avenue
London NW3 6NP

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 82 Fitzjohn's Avenue NW3 6NP (planning reference 2021/1787/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 and Structural Strategy Report (SSR) have been prepared by individuals with the qualifications required by Camden's planning guidance.

1.5. The BIA has confirmed that the proposed basement will be founded within the Claygate Member and it is possible some groundwater will be encountered during the basement excavation. Further information with respect to the potential need for, and impact from, dewatering is requested.

1.6. The BIA and the Structural Report describe the basement construction process with new walls formed by a combination of underpinning and reinforced concrete piles.

1.7. Further detail should be provided to confirm temporary propping to piled and underpin walls and to justify the use of a contiguous piled wall in light of the BIA recommendation for a secant wall. Structural calculations for walls should be updated to reflect recommendations contained in the BIA.

1.8. Clarification is required with respect to groundwater observations to confirm the conclusion that there will be no impact to subterranean flows.

1.9. The GMA indicates that predicted damage to neighbouring properties should be no worse than class 1 to the Burland Scale. However, queries are raised with respect to some of the assumptions made in the prediction of ground movements. It is accepted there are no slope stability impacts, however, the impact of tree removal on shallow foundations should be confirmed.

1.10. Outline proposals are provided for a movement monitoring strategy during excavation and construction.

1.11. It is accepted that the development will not impact on the wider hydrogeology of the area and is not in an area subject to flooding.

1.12. It cannot be confirmed that the BIA complies with the requirements of CPG: Basements until the queries raised in Section 4 and Appendix 2 are addressed.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 06/05/2021 to carry out a Category C audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 82 Fitzjohn's Avenue NW3 6PN, Planning Reference 2021/1787/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 *"Alterations and extensions including erection of 2 storey extensions, increased ridge height, alterations to fenestration, erection of dormer windows to roof and creation of sunken terrace, removal of existing pool house and erection of new orangery involving basement excavation for new pool, and other associated works; hard and soft landscaping including replacement sheds and garage and removal of 6 x trees."*

2.6. CampbellReith accessed LBC's Planning Portal on 21/05/2021 and gained access to the following relevant documents for audit purposes:

- Ground Investigation & Basement Impact Assessment Report (BIA) – GEA Ltd, Ref J20158, Rev 2, dated April 2021
- Structural Report (SR) – Harrison Shortt, Ref 2092-BIA-C, dated April 2021
- Planning Application Drawings by Charlton Brown Architects, consisting of:

  Existing Architect's Plans

  Existing Architect's Sections

  Existing Architect's Elevations

  Proposed Architect's Plans

  Proposed Architect's Sections

  Proposed Architect's Elevations

- Tree Survey & Arboricultural Method Statement – Tree Tec, Ref 20003, dated March 2021

2.7. No planning consultation responses were listed on the LBC Planning Portal.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Details confirmed of author's and reviewer' qualifications in 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?	No	Documents referenced in section 13 of BIA but Arup GSD map extracts not presented
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	No	See note above
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	The BIA suggests that neighbouring properties contain basements or lower ground floors. That is not supported by other information provided.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1.1 of the BIA
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1.3 of the BIA
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	No	Section 4.1 of the BIA. The scoping does not acknowledge potential differential foundation depths, although it is noted that a building damage assessment has been carried out for surrounding properties.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.1 of the BIA
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.1 of the BIA. Despite the footprint of the building increasing, there is no increase in impermeable area associated with the basement
Is factual ground investigation data provided?	Yes	GI presented in Appendices of BIA
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	No	Contradictory information presented
Is a geotechnical interpretation presented?	Yes	Section 5 of the BIA
Does the geotechnical interpretation include information on retaining wall design?	Yes	Calculations in structural report not consistent with BIA recommendations
Are reports on other investigations required by screening and scoping presented?	Yes	Arboricultural Method Statement
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	No	No nearby basements identified
Is an Impact Assessment provided?	Yes	

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented	Yes	Section 9 of the BIA however justification is required for some assumptions made
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	No	Section 13 of the BIA notes the absence of any impact to groundwater due in part to the fact that the basement does not extend below the water table. This contradicts the ground model presented.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	To be confirmed
Has the need for monitoring during construction been considered?	Yes	Section 11 of BIA
Have the residual (after mitigation) impacts been clearly identified?	No	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Justification is required for some assumptions made in the building damage assessment
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?	No	To be confirmed
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Section 12 of the BIA
Are non-technical summaries provided?	Yes	Section 13 of the BIA

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by engineering consultants Geotechnical & Environmental Associates (GEA) and the individuals concerned in its production have suitable qualifications.

4.2. The Structural Strategy Report (SSR) has similarly been carried out by a firm of engineering consultants, Harrison Shortt Structural Engineers Ltd. The author is confirmed as a chartered structural engineer.

4.3. The LBC Instruction to proceed with the audit indicated that neither the site nor neighbouring properties have listed status.

4.4. The proposed works consists of partial demolition of the existing structure to accommodate a single storey basement beneath the north eastern corner of the property with a lowered swimming pool area. Due to a change in ground levels, the basement slab level (c92.50m) is nearly 7m below ground level at the northern site boundary (c99.50m), but only around 3m below ground level at its southern edge. The basement is to be formed within a contiguous piled wall, with piles installed from around 95.50m. The upper portion of the northern basement retaining wall will be formed by reinforced concrete underpinning.

4.5. The construction sequence is highlighted as

- Demolition of existing above ground structure
- Underpinning of northern boundary wall
- Excavation to first lower level
- Construction of piled raft foundations and contiguous piled walls to lower pool basement level
- Construction of superstructure

4.6. It is noted that the BIA assumes the underpins and contiguous piled wall will be propped in the temporary case whilst the structural report suggests that the piled wall will act as a cantilever in the temporary cases.

4.7. A site investigation was carried out by GEA in 2020 and the BIA has indicated the ground conditions as Claygate Member beneath a nominal thickness of Made Ground. The Claygate Member was proven to a maximum depth of 15m bgl.

4.8. Groundwater was encountered as a seepage in the borehole at depths of 3m (c 93m) and 10m. A round of monitoring in October 2020 recorded ground water levels at 1.45 and 2.65m bgl (c 95 and 94.55m). The BIA suggests that the standpipes have collected water following heavy

rainfall. Noting the standpipe installation details, this suggests that the rainfall has resulted in groundwater flowing into the standpipes through the Claygate Member.

4.9. The BIA notes that groundwater should be expected to be encountered during excavation and recommends further monitoring. The construction sequence does not include an allowance for dewatering. The need, or otherwise, for dewatering should be confirmed and any impacts assessed. It should be noted that Section 10 of the BIA notes the potential for groundwater flow into the basement with a consequent loss of fines between the piles. For this reason it recommends a secant piled wall, although earlier sections suggest that sump pumping will be adequate.

4.10. Retaining wall calculations in the Structural Report assume a ground water level as 2m below ground. This contradicts section 8 of the BIA which recommends a groundwater level of 1m bgl is adopted. It is also noted that the structural engineering calculations do not adopt the recommended 'Effective Friction Angle' of 25 degrees.

4.11. The Subterranean (groundwater) screening exercise in section 3 the BIA raised three impacts to be taken forward to the screening stage:

- The Claygate Member is considered to be an aquifer.
- It is considered possible the basement excavation will extend beneath the water table.
- The site is within 100m of a water course.

4.12. The BIA concludes that there is no impact to subterranean flows as the basement does not extend below the water table (section 13). However, the underside of the basement slab is anticipated to be at c 92.50 and Section 8.1 of the BIA notes that groundwater was encountered at 93.07m. As noted above, the BIA also states that groundwater flows into the basement excavation, with possible loss of fines, should be expected. Further justification is required to demonstrate that recorded water levels do not constitute the groundwater level beneath the site. The nature of flows anticipated into the excavation, with appropriate mitigation should be clarified.

4.13. The surface flow and flood screening indicated no potential impacts to be carried forward for assessment. This is accepted.

4.14. The slope stability screening contained in the BIA raised four potential impacts to be carried forward to the scoping stage.

- History of seasonal shrink – swell subsidence in local area.
- Existing trees on the site to be felled as part of the development
- The site is within 100m of a watercourse or potential spring
- The site is located within an aquifer.

4.15. Whilst the screening exercise indicates that surrounding buildings have basements and lower ground floors, avoiding increased differential in founding depths, this is not supported by other information in the BIA. Section 13.1 of the BIA correctly identifies this impact exists and requires assessment. The assessment of foundations and other slope stability impacts are further considered in section 13.

4.16. The existing trees are not considered to enhance the stability of the retained ground, and the BIA recommends that new foundations are designed in accordance with NHBC guidelines assuming high shrinkability. The BIA also recommends that foundations to the adjacent neighbouring properties are checked for any affect from future shrinking or swelling of soil as a result of removal of the trees. It is considered that this assessment should form part of the BIA.

4.17. As noted above, the new basement foundations will increase the difference in level of the neighbouring foundations. Neighbouring buildings within the zone of influence of the basement comprise Fitzjohn's Primary School and a Royal Mail delivery office. The school is located upslope of 82 Fitzjohn's Avenue and, for the purposes of the ground movement assessment, is assumed to have shallow foundations at 0.50m depth (c 99m). The sorting office lies downslope of the subject site and its foundations are also assumed to be at around 0.50m depth (94.25m).

4.18. Movements due to deflections from underpinning and piling are estimated using a variety of sources of information including the structural engineer's calculations, published case study data and specialist modelling software. The assessment predicts that damage to the two nearby structures can be limited to Burland Category 1 (very slight).

4.19. However, the predictions of ground movement are not considered to be moderately conservative as a number of reductions to published values have been applied, including a 50% reduction to movement resulting from excavation in front of the underpin sections and a 50% reduction to movements related to pile installation. Whilst this approach is accepted for some sites, it is more usually accepted on sites underlain by London Clay where there is little or no risk of seepages and soil loss, and on larger construction sites where a high level of control of workmanship can be assured. Additionally, it should be confirmed how the predicted heave and settlement outside the basement excavation have been considered in the damage assessment.

4.20. The GMA assumed the walls are propped in the temporary case. As noted above, this needs to be confirmed by the structural engineer's report.

4.21. The BIA recommends a movement monitoring strategy during excavation and construction. Proposals are presented in the structural engineer's report which may be refined during the party wall award negotiations.

4.22. It is accepted that there are no slope stability concerns regarding the proposed development.

5.0 CONCLUSIONS

5.1. The BIA and Structural Report have been carried out by firms of engineering consultants using individuals who possess suitable qualifications.

5.2. The BIA has confirmed that the proposed basement will be founded within the Claygate Member and it is possible some groundwater will be encountered during the basement excavation. The construction sequence should consider the need for dewatering and any potential impacts should be assessed.

5.3. The BIA and the Structural Report describe the basement construction process with new walls formed by a combination of underpinning and reinforced concrete piles. Further detail should be provided to confirm temporary propping to piled and underpin walls in accordance with the recommendations within the GMA. Furthermore, the use of a contiguous piled wall requires justification in the of the BIA recommendation for a secant piled wall.

5.4. Structural calculations for walls should be updated to reflect water table and angle of friction recommendations contained in the BIA.

5.5. The GMA indicates that predicted damage to neighbouring properties should be no worse than class 1 to the Burland Scale. However, the assessment uses a number of assumptions about predicted ground movements which are not considered moderately conservative.

5.6. The BIA notes that the impact of tree removal on nearby shallow foundations should be assessed. This should form part of the BIA.

5.7. A programme and an outline movement monitoring strategy during excavation and construction are provided.

5.8. It is accepted that the surrounding slopes to the development site are stable.

5.9. The discussion of groundwater requires further clarification to justify the conclusion that the basement will have no impact on subterranean flows to confirm what mitigation measures may be required.

5.10. It is accepted that the development will not impact on the hydrology of the area and is not in an area subject to flooding.

5.11. It cannot be confirmed that the BIA complies with the requirements of CPG: Basements until the queries raised in Section 4 and Appendix 2 are addressed.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments [Request 'relevant comments' from the Case Officer]

Surname	Address	Date	Issue raised	Response

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Stability	Confirmation of temporary propping to walls during construction to be provided.	Open	
2	Stability	Need for dewatering to be confirmed and any impacts assessed	Open	
3	Stability	Construction sequence and structural engineering calculations do not accord with BIA in respect of: Recommendation for secant wall Assumed groundwater level and soil parameters for design	Open	
4	Stability	Justification required for application of reductions to predicted ground movement. Clarification required with respect to impact of predicted heave and settlement around basement.	Open	
5	Stability	Impact of tree removal on nearby shallow foundations to be confirmed	Open	
6	Subterranean flows	BIA is contradictory with respect to relative levels of basement and groundwater, and nature of groundwater flows into the basement excavation	Open	

Appendix 3: Supplementary Supporting Documents

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