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10-11 Kings Mews
London WC1N 2ES
Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12066-18

Revision: D1

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Contents

Appendix

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 10-11 Kings Mews (planning reference 2015/2393/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.

1.4. The BIA and Structural Strategy Report (SSR) have been prepared by well-known firms of engineering consultants using individuals who possess suitable qualifications, although the authors of the SSR did not provide evidence of suitable engineering geology expertise.

1.5. The BIA has confirmed that the proposed basement will be founded within Made Ground and its foundations will need to be deepened to encounter the Lynch Hill Gravel below.

1.6. It is likely that the ground water table will be encountered during basement foundation excavation.

1.7. The SSR discusses two alternative basement construction proposals, underpinning and piled perimeter retaining walls, both with suitable temporary propping arrangements. Underpinning is the preferred solution but concern is expressed regarding the suitability of the underlying materials and potential groundwater ingress into excavations.

1.8. It is recommended that further investigation of the below ground soils and neighbouring foundations is carried out, together with groundwater monitoring to allow a decision to be taken on construction methodology.

1.9. No analysis has been undertaken of horizontal and vertical ground movements and this should be carried out once a decision on methodology has been taken and the above investigations have been completed.

1.10. The further soils investigation should be tailored to allow further consideration of any potential heave movements below the basement slab and likelihood of groundwater flow and direction affecting the local hydrogeology.

1.11. No proposals are provided for a movement monitoring strategy during excavation and construction.

1.12. Further investigation should be undertaken to identify which surface water drainage system (Kings Mews or John Street) the existing rear building roof discharges to, prior to demolition. If it currently flows to John Street, an attenuation system should be proposed to limit additional flows to Kings Mews.

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

1.14. 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.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 26 June 2015 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 10-11 Kings Mews, Camden Reference 2015/2393/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; 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 Audit Instruction described the planning proposal as *"Demolish two storey building and erection of 2 x 3 bedroom, four storey dwellings including a new basement floor."*

The Audit Instruction also confirmed 10-11 Kings Mews involved, or was a neighbour to, listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 21 July 2015 and gained access to the following relevant documents for audit purposes:

- Design Study & Basement Impact Assessment Report (BIA)
- Structural Strategy Report (SSR)
- Planning Application Drawings consisting of

  Location Plan

  Existing Plans

  Demolition Plans

  Proposed Plans
- Design & Access Statement
- 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?	Yes	BIA and SSR.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	BIA Section 1.
Are suitable plan/maps included?	Yes	BIA Section 2.
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	BIA Section 3.1.3.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 3.1.2.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 3.1.1.
Is a conceptual model presented?	Yes	BIA Section 7.0
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.1.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.1.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No Yes	Not required, consistent with screening outcome.
Is factual ground investigation data provided?	Yes	BIA Section 4.2.
Is monitoring data presented?	Yes	BIA Section 4.2.
Is the ground investigation informed by a desk study?	Yes	BIA Section 1.3.
Has a site walkover been undertaken?	Yes	BIA Section 1.3.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	BIA Section 2.1.
Is a geotechnical interpretation presented?	Yes	BIA Section 5.0.
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA Section 8.1.
Are reports on other investigations required by screening and scoping presented?	No	BIA & SSR suggest further testing and monitoring is required.
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	BIA Section 2.1.
Is an Impact Assessment provided?	Yes	BIA Section 9.0.
Are estimates of ground movement and structural impact presented?	No	

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	BIA Section 10.0.
Has the need for monitoring during construction been considered?	No	
Have the residual (after mitigation) impacts been clearly identified?	Yes	BIA Section 10.0.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes / No	SSR alternative construction proposals.
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 / No	SSR alternative construction proposals.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	No	
Are non-technical summaries provided?	No	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by a well-known firm of 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 well-known firm of engineering consultants, Fluid Structures. The author and reviewer are both chartered structural engineers but no proof of expertise in engineering geology has been provided as required by CPG4.

4.3. 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 10-11 Kings Mews is located in the Bloomsbury Conservation Area and that John Street, to its rear, contains a majority of Grade II listed properties.

4.4. The proposed basement consists of a single storey construction formed by lowering an existing lower ground floor area at the rear of the development site by just over 2.0 metres and excavating the front portion of the site to the same level by the excavation of 3.0 metres of soil below an existing surface level car park. An existing extension to no. 6 John Street, also in the ownership of the Kings Mews owner, will be demolished on the rear section of the site to facilitate the development of 10-11 Kings Mews.

4.5. The BIA has identified that the reinforced concrete ground slab is underlain by Made Ground to a depth of 4.80 metres below which lies Lynch Hill Gravel, thickness 1.30 metres, below which lies the London Clay Formation.

4.6. It is clear that the BIA was written in October 2012 whilst the SSR was completed in April 2015. The BIA refers to basement depths of construction of 3.0 and 4.5 metres while the scheme developed in the SSR has reduced depths of basement of 2.0 and 3.0 metres. During this audit, an assumption has been made that the later SSR proposal is correct as this also agrees with an Architect's proposed section A-A drawing, no. 1008/211 dated 17 April 2015.

4.7. The SSR discusses in depth two alternative proposals to construct the basement. The preferred option is to underpin the perimeter walls, extending down into the gravel, requiring approximately 5.0 metre deep underpins, and encountering groundwater at a level of approximately 3.5 metres below existing ground level. The SSR indicates that surrounding walls to the site are typically supported on strip foundations which *"may well terminate in the existing Made Ground,"* although none of the three trial pits excavated proved this conclusively. The perimeter walls and underpins would be laterally propped, allowing basement excavation and reinforced concrete basement slab and walls to be constructed.

4.8. However the SSR states that *"the ground conditions are not considered ideal for the above approach given the depth of the gravels and the relatively shallow groundwater"* and proposes an alternative solution utilising contiguous or secant piled walls installed inside the site boundary walls, dependent upon the potential degree of groundwater inflow during excavation and construction. Again, an extensive system of temporary lateral props is proposed prior to excavation and basement construction.

4.9. The conclusions reached within both the BIA and, more particularly, the SSR appear undermined by the need for further investigation of the depth of Made Ground and monitoring of groundwater levels. Both documents agree that further investigation is required and, in particular, the SSR states *"The ground conditions are not considered ideal for the above approach given the depth of the gravels and the relatively shall groundwater. It is therefore recommended that measures be undertaken in advance to confirm the viability of the above construction method. These will include further groundwater monitoring, additional window sampling, and trial underpinning. In the event that these measures show underpinning not to be a suitable approach, an alternative basement construction method will be employed, utilising contiguous piled walls installed inside the site boundary walls"*.

4.10. The BIA warns that " *…. due to the thickness of Made Ground present on site, it is recommended that trial excavations are carried out in order to check the stability of the fill material and the depth of the natural soil. It is possible that this method may result in loss of ground from below existing foundations. This should not be an issue provided that the existing foundations are sufficiently able to bridge across any loose materials"*. These concerns will be exacerbated if groundwater flows are high and *"whether or not any groundwater inflows can be suitably controlled"*.

4.11. Irrespective of the adoption of either proposal, no assessment of vertical and horizontal ground movements has been produced, so no indication of potential damage to adjoining properties can be reviewed.

4.12. It is recommended that measures be undertaken, as indicated in 4.9, to allow confirmation of which construction methodology is viable and a Ground Movement Analysis be carried out in conjunction with the chosen solution. Further investigation of the foundations to the surrounding properties is also recommended. An assessment should also be provided of likely heave movements and measures to overcome these movements dependent upon the chosen system.

4.13. Further groundwater monitoring should also identify the direction of flow of groundwater and, together with a review of the proposed basement and other adjacent basements, allow an assessment to be made within the BIA of their impact on the local hydrogeology. The BIA states that *"Although the proposed basement is likely to encounter the groundwater table, the*

majority of the surrounding upstream buildings in this area already contain basement structures". No information is provided to verify this statement and it is not possible, at this time, to agree with the BIA Statement that *"the basement structure will have no adverse affect on the local hydrogeology"*.

4.14. No proposals are provided for a movement monitoring strategy during excavation and construction.

4.15. It is accepted that the site currently is overlain with a concrete ground slab which appears to be in good condition. The area of new roof development on this front portion of the site does not impact on current rainwater discharges to the below ground surface water drainage system. The BIA should re-assess whether the existing roof area on the rear portion of the site currently discharges to no. 6 John Street, and its below ground surface water drainage system, in which case attenuation should be provided for this roof area and the rear lightwell.

4.16. The BIA has shown that although the development is close to a tributary of the "lost" River Fleet, it will not impact on the wider hydrogeology of the area, any other watercourses, springs or the Hampstead Heath Pond chain catchment area.

4.17. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.

5.0 CONCLUSIONS

5.1. The BIA and SSR have been carried out by well-known firms of engineering consultants using individuals who possess suitable qualifications, other than the authors of the SSR not identifying suitable expertise in engineering geology.

5.2. The BIA has confirmed that the proposed basement will be founded within Made Ground and its foundations will need to be deepened to encounter the Lynch Hill Gravel below.

5.3. It is likely that the ground water table will be encountered during basement foundation excavation.

5.4. The SSR discusses two alternative basement construction proposals, underpinning and piled perimeter retaining walls both with suitable temporary propping arrangements. Underpinning is the preferred solution but concern is expressed regarding the suitability of the underlying materials and potential groundwater ingress into excavations.

5.5. It is recommended that further investigation of the below ground soils and neighbouring foundations is carried out, together with groundwater monitoring to allow a decision to be taken on construction methodology.

5.6. No analysis has been undertaken of horizontal and vertical ground movements and this should be carried out once a decision on methodology has been taken and the above investigations have been completed.

5.7. The further soils investigation should be tailored to allow further consideration of any potential heave movements below the basement slab and likelihood of groundwater flow and direction affecting the local hydrogeology.

5.8. No proposals are provided for a movement monitoring strategy during excavation and construction.

5.9. Further investigation should be undertaken to identify which surface water drainage system (Kings Mews or John Street) the present rear existing building roof discharges to, prior to demolition. If it currently flows to John Street, an attenuation system should be proposed to limit additional flows to Kings Mews.

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

5.11. 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.

Appendix 1: Resident's Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	SSR Author CV	Required to show suitable expertise of engineering geology.	To be undertaken.	
2	Additional soils, foundation and groundwater investigation	Required to inform decision on basement construction solution.	To be undertaken.	
3	Ground movement analysis	Required to determine potential damage to neighbouring properties.	To be undertaken.	
4	Heave analysis	Required to determine effect on basement floor slab.	To be undertaken.	
5	Groundwater flow	Required to determine effect on local hydrogeology	To be undertaken.	
6	Rear building roof drainage investigation	Required to determine potential need for attenuation.	To be undertaken.	

Appendix 3: Supplementary Supporting Documents

None

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