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20 – 21 King's Mews (2)
London, WC1N 2JB

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12466-64
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1.0 NON-TECHNICAL SUMMARY

1.1. CampbellReith was instructed by London Borough of Camden, (LBC) to carry out a re-audit of the additional Basement Impact Assessment information submitted as part of the Planning Submission documentation for 20 – 21 King's Mews, WC1N 2JB (Camden Planning reference 2016/1093/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 authors of a supplementary Ground Investigation Report (GIR) have not provided their qualifications and these are requested.

1.5. The proposal is for the demolition of a two storey existing garage and its replacement by a new three storey building over a basement to provide 6 flats.

1.6. The additional Ground Investigation has confirmed that the site consists of 3.5m of Made Ground overlying Hackney Gravel and London Clay. Groundwater monitoring has established the presence of groundwater within the Gravel.

1.7. Additional Construction Method drawings envisage that the rear boundary wall and the Party Wall with No 19 will be underpinned using traditional techniques. It is intended to install a contiguous bored pile retaining wall on the front elevation, although the GIR prefers a diaphragm wall construction. Commentary by Geosphere Environmental is requested.

1.8. The Construction Methodology also indicates a proposal to demolish and rebuild the Party Wall with Number 22 by, presumably, temporarily supporting the superstructure of Number 22 and reducing ground levels down to the Gravel to form a new party wall foundation. It is requested that Geosphere Environmental comment upon these proposals since they contradict statements within the GIR on slope stability and protection of open excavations within the Made Ground.

1.9. It is requested that an indicative temporary works solution is provided to justify the buildability of the current proposals and, where this impacts on geotechnical issues, Geosphere Environmental are to further comment on their suitability.

1.10. A Ground Movement and Damage Assessment was conducted by JMS for Numbers 20-21 with damage predictions as detailed in Section 4.11. The assessment should be confirmed once

construction methodologies are confirmed and updated to include the properties within the zone of influence of excavations under Number 22 Kings Mews, if applicable.

1.11. Heave movements due to excavation were indicated in the BIA, with suitable mitigation measures proposed.

1.12. Further information is requested to demonstrate that the stability of the neighbouring properties will be maintained following the removal of the vertical loads from the Party Walls.

1.13. An outline monitoring strategy should be provided detailing appropriate condition surveys, monitoring scheme, trigger levels and contingency actions to be adopted.

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

1.15. It is accepted that, based on the current construction methodology described, there should be no impact to the wider hydrogeological environment. Once construction methodology has been confirmed, this should be reviewed.

1.16. In line with LBC guidance, an outline drainage assessment should be presented that considers the adoption of attenuation SUDS.

1.17. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the additional information requested is provided, the BIA does not meet the criteria of CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 7 March 2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 20–21 King's Mews, WC1N 2JB (Camden Planning reference 2016/1093/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."

2.6. The Audit Instruction also confirmed 20 -21 King's Mews is a neighbour to a listed building (55 Grays Inn Road).

2.7. CampbellReith previously accessed LBC's Planning Portal on 27 April 2016 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (BIA): JMS Consulting Engineers, dated April 2016
- BIA (Groundwater): ESI Limited, dated April 2016
- Building Condition Survey and Structural Inspection Report: TCL Chartered Surveyors, undated
- Design and Access statement: Marek Wojciechowski Architects Ltd, dated February 2016
- Construction Management Plan, undated
- Planning Application Drawings consisting of

  Location Plan

  Demolition Drawings

  Proposed Elevations

  Proposed Sections
- 1 No. Planning Comment and Response

2.8. Following the initial CampbellReith audit dated May 2016, supplementary information provided between 9 and 16 June 2016 by email and the documents provided, are as follows:

- JMS drawings showing details of investigated neighbouring properties, underpinning sequence, pile layout and underpinning detail sections
- JMS letter response to initial audit queries, dated 9 June 2016
- JMS letter response to further queries, dated 16 June 2016
- JMS proposed monitoring regime, dated June 2016
- JMS Structural Inspection report, dated 8 February 2016
- Exploratory hole record

2.9. CampbellReith accessed LBC's Planning Portal on 20 June 2016 and gained access to 1 No. consultation response.

2.10. CampbellReith issued a finalised audit, dated June 2016, which identified a number of outstanding issues, and recommended that these be provided within a Basement Construction Plan which should include:

- Confirmation of the presence/absence of a basement beneath No 22 King's Mews

- Results of investigations to determine the nature and the depth of the foundations to No 22 King's Mews
- Groundwater level determined from monitoring and control measures for groundwater ingress during underpinning
- Reconsideration of the proposed underpinning depth
- Further information to demonstrate the stability of the neighbouring properties will be maintained following the removal of the vertical loads from the party walls
- Full condition survey which includes all the party walls following possession of site
- Proposals on how further damage to the party walls already indicate to be in a poor condition is to be limited
- Detailed monitoring scheme with trigger levels to be agreed as part of the Party Wall award.

2.11. LBC contracted CampbellReith on 7 March 2017 and confirmed that the applicant had decided to make changes to the approved scheme (21 November 2016) and wished for the following documentation to be reassessed:

- Basement Impact Assessment (BIA) Revision C with mark ups; JMS Consulting Engineers dated January 2017
- Ground Investigation Report: Geosphere Environmental Ltd dated January 2017
- Foundation Construction Method: JMS Consulting Engineers, drawings nos. 600B to 604B, dated February 2017
- JMS Consulting Engineers drawings L15/284/12-507 T3 and L15/284/12-511 P3

2.12. CampbellReith were made aware that a separate planning application had been submitted for a similar basement development on the neighbouring site, No 22 King's Mews (2016/6816/P).

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	Qualifications of all individuals involved in the BIA meet requirements of CPG4 other than geotechnical qualifications of the Ground Investigation Report.
Is data required by Cl.233 of the GSD presented?	Yes	JMS BIA and supplementary information.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	Supplementary information from JMS.
Are suitable plan/maps included?	Yes	Architects Drawings and Arup GSD extracts within JMS BIA.
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	The presence of basements beneath the neighbouring properties has now been clarified.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	ESI Groundwater report.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Environment Agency (EA) website and Camden SFRA maps now referenced.
Is a conceptual model presented?	Yes	Model was based on nearby sites and it was noted this could vary greatly on site. A site specific investigation has now been undertaken.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	These issues have now been addressed in the supplementary documents.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	ESI report Section 3.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	N/A	No issues identified from screening.
Is factual ground investigation data provided?	Yes	Geosphere Ground Investigation Report.
Is monitoring data presented?	Yes	Groundwater monitored on two occasions.
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	Undertaken as part of the '*environmental desk based assessment'* for archaeology purposes.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Clarification included in the supplementary documents.
Is a geotechnical interpretation presented?	Yes	Advice on foundations is given in Section 8.4 of the JMS BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Included in BIA.
Are reports on other investigations required by screening and scoping presented?	Yes	A ground investigation has now been undertaken.
Are the baseline conditions described, based on the GSD?	Yes	Information now provided.
Do the base line conditions consider adjacent or nearby basements?	Yes	Clarification now provided.

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	Issues now addressed in supplementary documents.
Are estimates of ground movement and structural impact presented?	Yes	However there are concerns about proposed construction method. The assessment should be extended to include the properties surrounding no 22's excavation.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	No	Impact assessment not provided.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Although supplementary information has been provided, there are still concerns about the proposed construction method.
Has the need for monitoring during construction been considered?	Yes	These have now been provided with the supplementary information.
Have the residual (after mitigation) impacts been clearly identified?	No	None identified but the proposed construction method may lead to residual impacts on the neighbouring properties.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	There are still concerns about the proposed construction method.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	JMS BIA.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	Maximum Slight (Category 1) damage predicted but there are concerns about the proposed construction method and the Structural Inspection report states eastern party wall not in sound condition.

Item	Yes/No/NA	Comment
Are non-technical summaries provided?	No	Not provided.

4.0 DISCUSSION

4.1. The main Basement Impact Assessment (BIA) has been carried out by JMS Consulting with the Hydrogeology assessment undertaken by ESI Ltd. The qualifications of the individuals concerned are in accordance with the requirements of CPG4. However, a Ground Investigation has now been carried out and the authors of this report, Geosphere Environmental Ltd, have not provided their qualifications despite requests to do so. Confirmation that geotechnical interpretation of information has been produced by individuals possessing FGS, CGeol qualifications is requested.

4.2. The proposal is for the partial demolition of a two storey existing garage structure and the construction of a new 3 storey building over a basement to provide 6 flats.

4.3. The Ground Investigation has established that the development site consists of approximately 3.5m of Made Ground overlying Hackney Gravel of thickness 1.7m to 1.9m overlying London Clay to the depth of the investigation borehole.

4.4. Groundwater was monitored on three occasions and varied between 3.71m bgl and 3.94m bgl, i.e. in the upper region of the Hackney Gravel.

4.5. The GIR recommends that "foundations will require extending beyond the maximum depth of Made Ground and at least 150mm into undisturbed natural strata", the Hackney Gravel. It further states that "it is considered unlikely ..... that a basement could be constructed in an 'open' unsupported excavation" and that "temporary cut slopes ... should ... be limited to the narrowest practicable bay widths". "Temporary slopes should be cut to as shallow a gradient as is practicable, although a shallower gradient will ... attract less risk. Temporary faces should be left open for the minimum period possible ... and specific measures ... to prevent water flowing down the face of the excavation should be adopted".

4.6. The Construction Method drawings produced by JMS Consulting Engineers envisage the rear boundary wall and the Party Wall with Number 19 King's Mews to be underpinned in narrow bays using traditional techniques. The front basement wall onto King's Mews proposes the installation of a contiguous bored pile retaining wall even though the GIR indicates the use of a diaphragm wall to be the preferred solution. The basement will be constructed as a reinforced concrete box structure on each of its three sides supported on piled foundations with a reinforced concrete basement slab designed to withstand heave and groundwater pressures generated by the excavation.

4.7. Construction Method drawing number 602 shows the revised intention to demolish the Party Wall between Numbers 21 and 22 King's Mews whilst, presumably, temporarily supporting the superstructure of Number 22 and reducing ground levels below, with open excavations

containing batters not to exceed a 1:3 slope and not to extend below the depth of existing perimeter foundations. The Party Wall between Numbers 21 and 22 will then be reconstructed on a new foundation.

4.8. It is requested that, providing Geosphere Environmental Ltd verify personnel with suitable geotechncial qualifications, they provide specific commentary on the suitability of the current construction proposals with specific slope stability criteria for the intended methodology.

4.9. It is requested that an indicative temporary works proposals is provided which ensures that damage impacts to neighbouring properties to Numbers 20-21 and No 22 and the adjacent King's Mews highway (and services contained within it) are appropriately mitigated. Should this impact on geotechnical issues, commentary is requested from Geosphere Environmental.

4.10. Although a Ground Movement and Damage Assessment has been carried out by JMS, these assessments should be extended to include the properties surrounding Number 22 if the construction methodology is confirmed as including an excavation beneath it.

4.11. The Ground Movement and Damage Assessment conducted by JMS for Numbers 20-21 was performed using Scia software with the following damage predicted:

- 19 King's Mews – Category 0 (Negligible),
- 3 Northington Street – Category 0 (Negligible),
- King's Mews (Front Elevation/Road) – Category 0 (Negligible),
- 53/55 Gray's Inn Road – Category 1 (Very slight),
- 22 King's Mews – Category 1 (Very Slight).

The Ground Movement and Damage Assessment will likely require revision once the construction methodology is confirmed.

4.12. Heave movements due to excavation were indicated to be approximately 12mm at the centre and reducing to 5mm at the edges. It is stated in a letter from JMS that the heave movements were derived using '*empirical methods of observation and experience.*' Details of these 'observations' or outline calculations should be provided. In order to mitigate the effects of heave on the new building, it is proposed to transmit heave forces into the walls or onto tension piles within the basement, or a void or layer of compressible material could be introduced beneath the slab designed to resist the potential uplift forces generated by the ground movements.

4.13. It should be noted that vertical and horizontal movements would arise as a result of the underpinning and excavation although movements from underpinning is almost entirely due to workmanship. Damage to neighbouring properties may be limited to Category 1 provided the works are properly controlled and the buildings are in sound condition.

4.14. Further information is requested to demonstrate that the stability of the neighbouring properties will be maintained following the removal of the vertical loads from the Party Walls.

4.15. An outline monitoring strategy should be provided detailing appropriate condition surveys, monitoring scheme, trigger levels and contingency actions to be adopted.

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

4.17. It is accepted that, based on the current construction methodology described, there should be no impact to the wider hydrogeological environment. Once construction methodology has been confirmed, this should be reviewed.

4.18. In line with CPG4 Section 3.51, an outline drainage assessment should be presented that considers the adoption of attenuation SUDS.

5.0 CONCLUSIONS

5.1. The authors of a supplementary Ground Investigation Report (GIR) have not provided their qualifications and these are requested.

5.2. The additional Ground Investigation has confirmed that the site consists of 3.5m of Made Ground overlying Hackney Gravel and London Clay. Groundwater monitoring has established the presence of groundwater within the Gravel.

5.3. Construction methodology presented within the BIA is contradictory between documents and should be confirmed. An outline temporary works scheme should be provided, with further geotechnical commentary provided to support this, as required.

5.4. Although a Ground Movement and Damage Assessment has been carried out, this should be reviewed once construction methodology is confirmed and extended to include all structures within the zone of influence, notably if excavations extend beneath Number 22.

5.5. Further information is requested to demonstrate that the stability of the neighbouring properties will be maintained following the removal of the vertical loads from the Party Walls.

5.6. An outline monitoring strategy should be provided detailing appropriate condition surveys, monitoring scheme, trigger levels and contingency actions to be adopted.

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

5.8. It is accepted that, based on the current construction methodology described, there should be no impact to the wider hydrogeological environment. Once construction methodology has been confirmed, this should be reviewed.

5.9. In line with LBC guidance, an outline drainage assessment should be presented that considers the adoption of attenuation SUDS.

5.10. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the additional information requested is provided, the BIA does not meet the criteria of CPG4.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Pollard (Owner of 5 Northington Street/18-19 Kings Mews)	55 Colebrook Row London N1 8AF	Undated	Previous objections withdrawn subject to specific conditions.	No comment.
Moore (Owner of 55 Gray's Inn Road)	51 First Avenue Claremont Western Australia	June 2016	Unstable ground conditions and uncontrollable water inflows affecting structural stability of party wall.	See 4.3 to 4.15.
Temple Bright (on behalf of Mr Moore)	N/A	August 2016	Potential listed Party Wall and ownership issues.	No comment.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA Format	Qualifications of GIR author / reviewer.	Open, see 4.1.	
2	Stability	Confirm construction methodologies, temporary works scheme and provide geotechnical basis for proposals	Open, see 4.6, 4.7, 4.9	
3	Stability	Concern regarding slope stability and open faces of excavation below No 22.	Open, see 4.5, 4.7 – 4.8.	
4	Stability	GMA and Damage Assessment to be confirmed as applicable to construction methodologies adopted and extended to all structures within zone of influence, notably if excavations extend under Number 22.	Open, see 4.10.	
5	Stability	Stability of Party Walls to be confirmed	Open, see 4.14	
6	Stability	Monitoring strategy to be provided.	Open, see 4.15	
7	Hydrology	Outline drainage assessment in line with CPG4 3.51	Open, see 4.18	

Appendix 3: Supplementary Supporting Documents

None

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