

20 – 21 King's Mews
London, WC1N 2JB

Basement Impact Assessment
Audit

For

London Borough of Camden

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May 2016

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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 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 the JMS report all have MICE or MIStructE qualifications. The reviewers of the Hydrogeology report are Chartered Geologists (C.Geol.).
- 1.5. The site comprises a two storey existing garage structure which is proposed to be partially demolished with a new building to provide 6 flats in 3 floors plus a basement constructed.
- 1.6. No site specific ground investigation has been undertaken to determine the sequence and depth of strata at the site and the depths to a suitable bearing stratum and the groundwater have not been established. An intrusive investigation is recommended in the Hydrogeology report.
- 1.7. Given that an extended thickness of Made Ground and soft clays may be encountered, together with possible shallow groundwater level, the proposed underpinning may not be feasible.
- 1.8. Contradictory statements are given in the BIA about the presence of basements beneath the neighbouring properties and the depth of the proposed basement. Clarification is requested.
- 1.9. A detailed description with information such as underpinning depth, type (mass concrete or reinforced) with sketches to indicate the construction sequence and temporary propping details are requested once a suitable construction method is determined.
- 1.10. Although a ground movement assessment has been provided, this will require verification once the construction methodology is confirmed. It is not possible to verify the JMS conclusion which states that the construction of the proposed development will not affect the surrounding structures or overload the near surface geology. The impact on the roadway has not been discussed and this is requested.
- 1.11. An outline monitoring proposal has not been provided and this is requested. Details and trigger levels may be agreed as part of the Party Wall awards.

- 1.12. An outline works duration has been provided in the Construction Management Plan (CMP) and it is accepted that a more detailed programme may be provided by the Contractor. Details of the CMP may be agreed with the Council.
- 1.13. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.
- 1.14. Queries and requests for further information are discussed in Section 4 and summarised in Appendix 2.

2.0 INTRODUCTION

- 2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 21 April 2016 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 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

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Qualifications of all individuals involved in the BIA meet requirements of CPG4 (see Audit paragraph 4.1).
Is data required by Cl.233 of the GSD presented?	No	Proposal not sufficiently detailed (see Audit paragraph 4.11).
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	No	Proposal not sufficiently detailed (see Audit paragraph 4.11).
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?	No	An incorrect response is given to Q6 and the response to Q13 contradicts the JMS BIA Section 9.1 (see Audit paragraphs 4.7 and 4.8).
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?	No	Environment Agency (EA) website and Camden SFRA maps not referenced, although, it does not appear that the site is in a risk area for flooding.
Is a conceptual model presented?	Yes	Model is based on nearby sites, however, this could vary greatly on site. Ground conditions given in Section 3 of the ESI report contradict those in Section 8.2 of the JMS report and the BGS boreholes referenced.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	No	Provided but considered incorrect and Q12 from the screening not carried forward despite a 'Yes' response (see Audit paragraphs 4.9 and 4.10).
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?	No	Site specific investigation not undertaken (see Audit paragraphs 4.4 to 4.6).
Is monitoring data presented?	No	Site specific investigation not undertaken (see Audit paragraphs 4.4 to 4.6).
Is the ground investigation informed by a desk study?	N/A	Desk study information within Design and Access statement and BIA but ground investigation not undertaken.
Has a site walkover been undertaken?	Yes	Undertaken as part of the ' <i>environmental desk based assessment</i> ' for archaeology purposes.
Is the presence/absence of adjacent or nearby basements confirmed?	No	Contradictory statements with respect to the presence of adjoining basements given in the response to Q13 of the Land Stability screening and the JMS BIA Section 9.1 (see Audit paragraph 4.8).
Is a geotechnical interpretation presented?	No	Some advice on foundations given in Section 8.4 of the JMS BIA, however this is not based on a site specific ground investigation.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Included but considered incomplete as stiffness parameters are not given (see Audit paragraph 4.13).

Item	Yes/No/NA	Comment
Are reports on other investigations required by screening and scoping presented?	No	A ground investigation is recommended in the Hydrogeology report but this was not undertaken.
Are the baseline conditions described, based on the GSD?	No	Sequence and depth of strata not established, no description of party wall foundations and contradictory statements with respect to the presence of neighbouring basements.
Do the base line conditions consider adjacent or nearby basements?	Yes	Considered but contradictory statements given (see Audit paragraph 4.8).
Is an Impact Assessment provided?	No	Neither of the ESI and JMS reports include an impact assessment of all the issues identified.
Are estimates of ground movement and structural impact presented?	Yes	To be reviewed when construction method confirmed.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	N/A	Impact assessment not provided.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Cannot be confirmed as not all impacts are appropriately addressed and construction method may need reconsideration.
Has the need for monitoring during construction been considered?	Yes	Considered but no outline proposals presented.
Have the residual (after mitigation) impacts been clearly identified?	No	Not possible to determine if these are needed as all the potential impacts have not been considered.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Construction method may need revision (see Audit paragraphs 4.11, 4.15 and 4.16).
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	JMS BIA.

Item	Yes/No/NA	Comment
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	See Audit paragraphs 4.11, 4.15 and 4.16.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	Maximum Slight (Category 1) damage predicted but construction method may need reconsideration.
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.
- 4.2. The damage and ground movement assessment was undertaken by an individual with MIStructE qualifications.
- 4.3. The proposal is for the partial demolition of two storey existing garage structure and the construction of a new building to provide 6 flats in 3 above ground floors plus a basement.
- 4.4. Limit ground investigation in the form of foundation inspection pits has been carried out. The location plan indicates four trial pits (TH1 to TH4), however, only logs for TH2, undertaken against No 3 Northington Street, and TH4, undertaken against No 22 King's Mews, are provided. There is no discussion on what the pits revealed, however, the logs indicate TH2 recorded Made Ground to 3m bgl over soft clay to 3.70m bgl over sand and gravel. It appears the base of the foundation was not proven as it is noted on the log at 3.70m bgl that this is the '*suspected bottom of the foundation*'. TH4 was undertaken to 3.20m bgl where an obstruction was encountered and the pit revealed Made Ground to the base.
- 4.5. The sequence of strata presented has been established from nearby British Geological Survey (BGS) boreholes and in the main BIA it is stated that the Made Ground extends to 3 to 4m depth over Lynch Hill Gravel to approximately 6m bgl over the London Clay. The borehole logs referenced and included as an appendix to the Hydrogeology report indicate Made Ground to up to 5.10m bgl over soft to firm clay to 6.65m bgl in one of the boreholes.
- 4.6. It is noted Section 8.2 of the BIA states that '*investigations at the site have been limited due to ongoing use of the footprint of the building*'. However, the investigation to date does not appear to have identified a competent bearing strength nor the depth to the groundwater. An intrusive investigation is recommended in the Hydrogeology report.
- 4.7. The response to Question 5 of the Land Stability screening is incorrect as it states the London Clay is the shallowest stratum, however, it is stated on Section 3.1 that Superficial Deposits are present overlying the Gravels. This is further indicated by the historic borehole records.
- 4.8. The response to Question 9 of the Land Stability screening states that '*the proposed basement does not abut cellars*', however, Section 9.1 notes that Nos 3 & 5 Northington Street and 18 to 19 King's Mews, the neighbouring properties to the north, both have 'dry' basements. Clarification is requested.

- 4.9. A 'Yes' response is given to Question 12 of the Land Stability screening which relates to whether or not the site is within 5m of a highway, however, this was not carried forward to scoping.
- 4.10. It is stated in the Land Stability scoping that the nearby boreholes suggest that the water table is lower than the basement and its associated works. This has not been established as a site specific ground investigation with a programme of groundwater monitoring has not been undertaken. The Hydrogeology scoping states that one of the nearby boreholes referenced recorded groundwater at 3.30m bgl which is within the basement depth of 3.50m bgl and further states the presence of groundwater at the site is probable pending confirmation from a site investigation.
- 4.11. It is proposed to underpin the party walls, however, the proposal is not sufficiently detailed in the text. It is stated in Section 9.1 that the '*rear*' and '*right hand side*' elevations will be underpinned to basement depth to allow construction of the basement wall. Given the ground conditions indicated by the nearby boreholes, this is likely to be in the Made Ground or soft clays which are not competent strata. From the sketches of the foundation inspection pits provided, it does not appear the depth of party wall foundations which are proposed to be underpinned, has been established.
- 4.12. Sections indicating the sequence of works have been provided, however, it is noted in '*Stage 2*' that the width and depth of the new foundation under the party wall is "to be determined". The depth of the basement is not indicated in the BIA and a note on Stage 4 (final stage) of the construction sequence drawings indicates 2.50m which contradicts the 3.50m bgl indicated in the Hydrogeology report. Clarification is requested.
- 4.13. In light of the possible depth to a suitable bearing stratum and the groundwater table, the construction methodology may need to be reconsidered. It would be helpful to refer to the party walls in relation to the building numbers of the neighbouring properties rather than '*rear*' or '*right hand side*' as this is subjective. It is noted that No 55 Gray's Inn Road, one of the neighbouring properties, is listed.
- 4.14. A piled solution is proposed to support the new building. Retaining wall parameters are included in Section 8.4, however, stiffness parameters have not been included and this is requested.
- 4.15. Heave movements due to excavation are indicated to be approximately 12mm at the centre and reducing to 5mm at the edges. It is not stated how these were derived. Mitigation measures in the form of heave forces being transmitted to the walls, on to tension piles within the basement or a void layer or layer of compressible material beneath the slab are proposed. Further clarification is requested.

- 4.16. It is stated in Section 9.2 that movements in the range of 2 to 5mm are anticipated provided the works are carried out by a reputable contractor. It is not stated if these are horizontal or vertical movements. It is further stated that the *'estimated movements are considered to represent a worst case scenario particularly as movements resulting from a basement excavation will be minimised due to the control of propping in the temporary works and a regime of monitoring'*. Category 0 (Negligible) damage is predicted for the nearby and adjoining structures with limited areas of Category 1 (Very Slight) damage to the *'front right hand corner of the building/party wall'*. As stated above, it is unclear which party wall this refers to. It is stated in the conclusion in Section 11 that *'we can therefore conclude that the construction of the proposed development generally, and the subterranean basement in particular, will not affect the integrity of the surrounding building stock or overload the near surface geology'*. Without a site specific investigation to determine the sequence of strata and groundwater level and hence the depth of underpinning, the above statement cannot be accepted.
- 4.17. Movement resulting from underpinning is almost entirely due to workmanship and it may be possible to limit damage to Category 1 provided the works are properly controlled and the affected structures are in sound condition. However, in this case given that the sequence and depth of strata and the groundwater level have not been established, the ground movement assessment may require reconsideration due to the depth of underpinning which may be required as a result of the soils encountered. The impact to the roadway and any utilities running beneath it also needs to be considered.
- 4.18. The need for monitoring has been considered, however, no details are provided. The BIA recommends condition surveys. Outline proposals are requested with details and trigger levels to be agreed as part of the Party Wall awards.
- 4.19. An outline works duration is provided in the Construction Management Plan (CMP) and it is accepted that a more detailed programme may be submitted at a later date.
- 4.20. 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 authors of the JMS report all have MICE or MIStructE qualifications. The reviewers of the Hydrogeology report are Chartered Geologists (C.Geol.).
- 5.2. The site comprises a two storey existing garage structure which is proposed to be partially demolished with a new building to provide 6 flats over 3 floors plus a basement constructed.
- 5.3. No site specific ground investigation has been undertaken to determine the sequence and depth of strata at the and the groundwater level. There is no justification for the assumption that the proposed basement is unlikely to reach groundwater as stated in the BIA by JMS. An intrusive investigation is recommended in the Hydrogeology report.
- 5.4. Given that an extended thickness of Made Ground and soft clays may be encountered, together with possible shallow groundwater level, the proposed underpinning may need to be reconsidered.
- 5.5. Contradictory statements are given in the BIA and supporting documents about the presence of basements beneath the neighbouring properties and the depth of the basement. Clarification is requested.
- 5.6. Further ground investigation is required, together with groundwater monitoring, to allow the feasibility of the proposed construction methodology to be confirmed. A detailed description with information such as underpinning depth, type (mass concrete or reinforced) with sketches to indicate the construction sequence and temporary propping details are requested once a suitable construction method is determined.
- 5.7. Although a ground movement assessment has been provided, this requires confirmation once the construction methodology has been determined. It is not possible to verify the JMS Conclusion which states that the construction of the proposed development will not affect the surrounding structures or overload the near surface geology. The impact on the roadway has not been discussed and this is requested.
- 5.8. An outline monitoring proposal has not been provided and this is requested. Details and trigger levels may be agreed as part of the Party Wall awards.
- 5.9. An outline works duration has been provided in the Construction Management Plan (CMP) and it is accepted that a more detailed programme may be provided by the Contractor. Details of the CMP may be agreed with the Council.
- 5.10. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.

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	April 2016	Incorrect statement on the absence of a basement beneath the neighbouring properties	See Audit paragraph 4.8

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA format/ Stability	No site specific ground investigation to confirm sequence and depth of strata	Open – site specific ground investigation to be undertaken.	
2	Hydrogeology	Groundwater level not established	Open – to be established as part of the recommended ground investigation	
3	Stability	Retaining wall parameters incomplete as stiffness parameters not given	Open – to be provided	
4	Stability	Contradictory statements on the presence of basements in the neighbouring properties and neighbouring property foundations not determined	Open – Clarification requested on the presence of basements. Foundations to be investigated or maximum differential depth assumed.	
5	Stability	Proposed construction method not sufficiently detailed in the text and may need reconsideration. Depth of the basement is to be confirmed.	Open – Construction method to be reconsidered following ground investigation and construction sequence drawings together with any temporary works proposal to be provided after appropriate methodology is confirmed.	
6	Stability	Ground movement assessment to be revised following ground investigation and reconsideration of construction methodology. No consideration of impact on roadway and any possible utilities	Open – Anticipated movements for all the neighbouring properties within zone of influence to be provided once construction methodology is established. Impact on roadway and any utilities running beneath to be considered.	
7	Stability	Movement monitoring proposal not provided	Open - Outline proposal to be provided. Details and trigger levels to be agreed as part of Party Wall awards.	N/A

Appendix 3: Supplementary Supporting Documents

None

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