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20 Albert Terrace Mews, Primrose Hill, London NW1 7TA

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12466-63

Revision: D1

May 2017

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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 20 Albert Terrace Mews, Primrose Hill, London NW1 7TA, (planning reference 2017/0705/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 proposed development involves additions and alterations to include excavation of a single storey basement under the existing house and part of the front car port with rear lightwell and basement courtyard; erection of front entrance canopy and bin store; installation of 1 x front window, replacement of rear and side doors.

1.5. The BIA has been prepared by Card Geotechnics Limited (CGL) with supporting documents prepared by PR Structural Design Limited. The combined authors' qualifications are in accordance with LBC's requirements.

1.6. Desk study information required to inform the BIA process should be provided, including the provision of historical mapping and a site walkover, to describe conditions at and local to the site. Local residents have identified potential issues, such as historic settlement of adjacent properties, the proximity of a historic well, the position of a sewer across the site and shallow groundwater, that should be addressed, assessed and mitigated against, as required.

1.7. The site is within the Primrose Hill Local Flood Risk Zone, which has not been identified within the BIA. A site specific flood risk assessment is required.

1.8. Ground and groundwater conditions are considered based on limited investigation on site, nearby site investigations and historic bore records in the vicinity. Considering the proposed construction methodology and the reported subsidence and groundwater issues, further site investigation is required. This should include appropriate insitu and laboratory testing and groundwater monitoring.

1.9. The proposed development is to be constructed by a combination of underpinning and contiguous piled walls. These methodologies should be confirmed as appropriate following

further site investigation. Updated geotechnical design parameters and outline retaining wall calculations should also be presented.

1.10. A conceptual site model has not been provided and should be presented.

1.11. The current ground movement and damage impact assessment should be updated following further site investigation and confirmation of the construction methodology. The current assessment is not considered to be reasonably conservative (as detailed in Section 4) and should be revised, to include a defined zone of influence.

1.12. The BIA states that the proposed development will not lead to an increase in impermeable site area. Notwithstanding this, in accordance with LBC guidance, an outline drainage assessment should be presented that includes consideration of an attenuation scheme to reduce off-site discharge flows.

1.13. Queries and matters requiring further information or clarification are discussed in Section 4 and summarised in Appendix 2. Until the additional information requested has been provided the requirements of CPG4 have not been met.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 28 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 Albert Terrace Mews, Primrose Hill, London NW1, Camden Reference 2017/0705/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: "*Additions and alterations to include excavation of single storey basement under existing house and part of front car port with rear lightwell and basement courtyard; erection of front entrance canopy and bin store; installation of 1 x front window, replacement of rear and side doors.*"

2.6. CampbellReith accessed LBC's Planning Portal on 18 April 2017 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment, 20 Albert Terrace Mews, London NW1 (ref CG/18876]) dated February 2017 by Card Geotechnics Limited.
- Basement Impact Assessment Figures & Appendices, 20 Albert Terrace Mews, London NW1 (ref CG/18876]) dated February 2017 by Card Geotechnics Limited.
- Proposed and existing plans, elevations and sections numbered 15003_0100-2, 15003_0200-1, 15003_0300, 15003_2100-2, 15003_2200-2201, 15003_2300-1, 15003_1100-3, 15003_1200-1, 15003_1300-1, dated July 2016 by PR Structural Design Limited.
- Location and Block plan file name 1403-SI-001 dated January 2015, author unknown.
- Approved drawings from previous application 2015/0485/P, file name 1403-GA-100 dated January 2015.
- Planning, Design and Access Statement, 20 Albert Terrace Mews, dated February 2017, author unknown.
- Traffic Management Plan, File name 15003_SK_001-3 for 20 Albert Terrace Mews, NW1, no date, author unknown.
- Construction Management Plan, 20 Albert Terrace Mews, London, November 2016, author unknown.
- Construction Method Statement and Appendices, reference 16110, dated October 2016 by Structural engineer Paul Rogers.
- Arboriculture Report, reference 1-38-4210 dated 24 January 2017 by John Cromar's Arboricultural Company Limited.
- Comments and objections to the proposed development from local residents.

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	
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 plans/maps included?	No	Historical mapping to evidence desk study required. Note: neighbouring property reports a historic well on site; historic sewer connection reported from 20 Albert Park Road beneath site.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	No	As above
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	The nearest watercourse to the site is the Regents Canal, some 85m to the south. The site is not underlain by an aquifer. However, shallow groundwater and well reported by neighbours has not been considered.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	SFRA not consulted identifying Local Flood Risk Zone.
Is a conceptual model presented?	No	A conceptual site model is not presented.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	No	Residents' comments indicate a shallow water table and existing flooding at a neighbouring property. Basement construction beneath standing water level has not been considered.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	The proposed development is within the Primrose Hill Local Flood Risk Zone. EA data indicates a medium – high flood risk. A detailed Flood Risk Assessment is required. Drainage assessment in line with CPG4 3.51 required.
Is factual ground investigation data provided?	Yes	Two shallow trial pits undertaken. These do not include insitu testing, reveal the full profile to be underpinned or allow for groundwater monitoring.
Is monitoring data presented?	No	Neighbouring properties report shallow groundwater and flooding which should be investigated and assessed.
Is the ground investigation informed by a desk study?	Unknown	The SI is limited in extent.
Has a site walkover been undertaken?	Unknown	Not demonstrated.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	A basement is indicated at 21 Albert Terrace Mews.
Is a geotechnical interpretation presented?	Yes	Design parameters based on nearby SI presented. However, considering proposed underpinning and reported groundwater issues locally, investigation to at least the full depth of the basement should be undertaken.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Underpinning and contiguous piles are proposed, although secant piling is discussed in sections of the BIA which should be clarified. Retaining wall methodology in one location not identified. No

Item	Yes/No/NA	Comment
		outline retaining wall calculations provided.
Are reports on other investigations required by screening and scoping presented?	N/A	
Are baseline conditions described, based on the GSD?	Yes	Although groundwater levels have not been confirmed.
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	However, not all impacts considered.
Are estimates of ground movement and structural impact presented?	Yes	However, the GMA methodology requires revision.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	Impact assessment to consider flood risk, groundwater issues, drainage and land stability based on revised GMA.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Drainage, flood risk, temporary works based on ground / groundwater conditions and updated GMA.
Has the need for monitoring during construction been considered?	Yes	Not in sufficient detail.
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	GMA requires revision, pending confirmed ground / groundwater conditions.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	Drainage assessment required. Groundwater conditions to be confirmed.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	GMA requires revision, pending confirmed ground / groundwater conditions.

Item	Yes/No/NA	Comment
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, GMA to be revised.
Are non-technical summaries provided?	Yes	A non-technical summary is provided.

4.0 DISCUSSION

4.1. The proposed development involves additions and alterations to include excavation of a single storey basement under the existing house and part of the front car port with a rear lightwell and basement courtyard, erection of front entrance canopy and bin store, installation of 1 x front window and replacement of rear and side doors. The proposed basement is single storey and will be utilised as a residential dwelling.

4.2. The BIA has been prepared by Card Geotechnics Limited (CGL) with supporting documents prepared by PR Structural Design Limited. The combined authors' qualifications are in accordance the requirements of CPG4.

4.3. Reference desk study information provided within the BIA should be in accordance with the GSD Appendix G1. Historical map information and assessment, and a description of the site and surrounding properties from a walkover, has not been provided. Considering the many consultation responses reporting settlement of adjacent properties, the presence of a historical well at the adjacent property, the presence of a historical sewer connection running beneath the site and reported flooding to the neighbouring basement, these should be provided and assessments updated.

4.4. The BIA identified that the Regents Canal passes some 85m to the south of the site, and no other ancient or current water courses pass within 150m of the site. Given these distances and the fact that the Regents Canal is man-made, superficial deposits with their associated hydrogeological or stability impacts are not anticipated to be encountered during the development.

4.5. The screening stage identified that the site lies in an area of low to medium risk from surface water flooding. The Environment Agency indicates the site is at medium to high risk from surface water flooding. Additionally, the site is within the Primrose Hill Local Flood Risk Zone. A site specific flood risk assessment is required which should address all forms of potential flood risk and provide appropriate mitigation, if required.

4.6. The BIA states that the site lies on Made Ground overlying designated unproductive strata, the London Clay. The London Clay is identified as the bearing formation for the proposed foundations. The site investigation comprised two hand-dug trial pits which encountered Made Ground to 0.6m and 0.8m bgl over London Clay to 1.80m bgl, which was described as firm. There is no factual Ground Investigation report included with the BIA, engineering logs or provision of any insitu or laboratory test data. A borehole log from a site some 30m away is included, along with historic BGS borehole information, which together form the basis for the determined ground conditions and geotechnical parameters.

4.7. Given that neighbours report extensive settlement of their properties, shallow groundwater and flooding of basements, and that the proposed basement is reliant on underpinning to form some of the structure, a site specific site investigation should be undertaken. A geotechnical assessment in line with the GSD Appendix G3 should be presented.

4.8. Groundwater was not detected in the trial pits which terminated at 1.80m bgl and no standpipe installation or subsequent water monitoring was carried out. It is accepted that any water held in the London Clay is likely to be held in discrete units and not be laterally continuous. However, perched water may exist in the London Clay, and also within Made Ground, which is indicated in the nearby borehole logs presented as being variable in depth, up to 2.5m in thickness. Additional site investigation should target an area adjacent to the existing basement of 21 Albert Terrace Mews, which reports 'continual pumping to avert flooding'.

4.9. Following further site investigation and groundwater monitoring the BIA should be updated, to include any requirements for temporary dewatering during construction, permanent waterproofing requirements, and any potential impacts to neighbouring properties / basements.

4.10. The screening and scoping stage indicates that the potential for seasonal shrink swell subsidence in the London Clay at the site is unknown. However, the BIA states the proposed basement would not be affected by shrink swell movements and further that no trees will be felled as part of the proposed development. Although it is accepted that the proposed basement foundation depth is greater than the zone usually influenced by seasonal movements, subsidence is widely reported in neighbouring properties. Therefore, as 4.6 and 4.7, insitu testing to confirm geotechnical properties should be undertaken.

4.11. The scheme utilises underpinning and contiguous bored pile walls, with permanent reinforced concrete liner walls. The methodology for retaining wall construction at the front, on the side next to 19 Albert Terrace Mews, is unclear and should be confirmed. Whilst geotechnical design parameters are presented these should be confirmed following additional site investigation. Outline retaining wall design calculations should also be presented.

4.12. Temporary works and propping arrangements are detailed in the main BIA report and the Construction Method Statement (CMS). These are generally considered appropriate, pending clarification of the construction methodology as described in 4.11 and confirmation of ground conditions following further site investigation. It is noted that the BIA indicates in places that secant piling is to be used, which contradicts the rest of the BIA and CMS, and the use of contiguous piles should be confirmed. Methodologies for groundwater control should be updated, if required, noting that if permeation grouting is to be adopted then an assessment of impacts to neighbouring properties should be presented.

4.13. The BIA includes a ground movement assessment (GMA) and a corresponding damage impact assessment. The assessments consider both the installation and excavation effects of piles and underpins, deflection of the walls, and movements generated by heave in both the long term and short term condition. The maximum damage impact predicted for adjacent properties and the highway is Burland Category 1 (Very Slight).

4.14. The GMA states that it 'assumes perfect workmanship in the underpin construction' and on that basis settlement should not exceed 5mm. Considering that ground conditions have not yet been proven across the full depth of the proposed underpinning, and that neighbouring properties report settlement and groundwater issues, an assumption of 'perfect workmanship' is not considered reasonably conservative. Following further site investigation, the settlement / movements generated by underpinning should be re-assessed. If a specialist underpinning contractor is to be appointed, their review of the scheme and their confirmation of predicted ground movements would be beneficial.

4.15. Although the GMA has identified critical sections with neighbouring properties, it has not presented a contour plan in accordance with CIRIA C580, identifying the load bearing walls, the movements along them and the consequential predicted damage. This should be presented, including a zone of influence of the proposed works.

4.16. For the purposes of the damage impact assessment, the combined effects of settlement and heave have been considered. The effects of long term heave will take many years to be realised and therefore their inclusion in the assessment is not considered to be a 'worst case scenario' for the assessment of damage during the construction and in the period immediately thereafter. The combined effects of settlement and short term heave, especially for the sections to be underpinned, would be considered a reasonable approach. Further comment on the effects of long term heave should be considered separately.

4.17. The BIA indicates there will be no change in impermeable site area due to the proposed development and proposes utilising the existing site drainage system. In accordance with CPG4, section 3.51, a drainage assessment considering the implementation of attenuation SUDS should be presented. It is noted that the site is within a Critical Drainage Are (Group3_003).

4.18. A conceptual site model which collectively identifies ground and groundwater conditions, extent and form of the proposed basement, proximity of sensitive buildings and infrastructure, and annotated identifying potential risks, impacts and mitigation measures should be presented.

5.0 CONCLUSIONS

5.1. The proposed development involves additions and alterations to include excavation of a single storey basement under the existing house.

5.2. The BIA has been prepared by Card Geotechnics Limited (CGL) with supporting documents prepared by PR Structural Design Limited. The combined authors' qualifications are in accordance the requirements of CPG4.

5.3. Desk study information, including historical mapping and a site walkover to assess conditions at and local to the site, should be provided.

5.4. The site is within the Primrose Hill Local Flood Risk Zone. A site specific flood risk assessment is required.

5.5. Insufficient site investigation has been undertaken. Further site investigation should be provided, including appropriate insitu and laboratory testing and monitoring of groundwater levels.

5.6. The construction methodology, including temporary and permanent works, geotechnical design parameters and outline retaining wall calculations should be provided, following additional site investigation.

5.7. The ground movement assessment and damage impact assessment should be revised following further site investigation and confirmation of construction methodology. Any revision should identify a zone of influence, assess defined structural walls, assess the short and long term heave effects separately and take a 'reasonably conservative' approach.

5.8. A drainage assessment considering the implementation of attenuation SUDS, in accordance with LBC guidance, should be presented.

5.9. A conceptual site model which collectively identifies ground and groundwater conditions, extent and form of the proposed basement, proximity of sensitive buildings and infrastructure, and annotated identifying potential risks, impacts and mitigation measures should be presented.

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

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Walker	Flat 9, 39 Regents Park Road	18 March 2017	Concerned that further excavation in the local area will cause ground movement and settlement at their property. Outline concerns regarding the impact on drainage and groundwater flow to their property which is at the lowest point.	4.5, 4.13-4.16, 4.17
Goodden & Thomas	Flat 6, 47 Regents Park Road	07 March 2017	Concerned about ground vibrations and impact on the road during the construction phase.	4.13 - 4.16
McCririck	9/10 Albert Terrace Mews	13 March 2017	Concerned that existing subsidence at no.s 19, 20 & 21 is not being taken into consideration, including subsidence of the road outside these properties and opposite, no. 10 already having suffered subsidence and required underpinning. Concerned that flooding exists in the basement of no. 21 (pump utilised 24hrs a day) will be compounded by this development. Anecdotal evidence that a well was discovered at no. 19.	4.3, 4.5, 4.13-4.16
Powell	18 Albert Terrace Mews	05 March 2017	Concerned about short and long term ground movement and clay heave, sites examples of remedial structural repairs required at nearby properties as a result of basement excavation at no.s 11 and 21. Concerned about impact on surface and underground water flows to both buildings and the road.	4.5, 4.13-4.16, 4.17
Stillit	7 Albert Terrace Mews	23 March 2017	Concerned about subsidence, owners property already underpinned due to effects of subsidence. Concerned about subsidence in the road. Concerned about flooding, siting the example no. 21 being subject to heavy flooding during/following a basement construction.	4.5, 4.13-4.16, 4.17
Chappell	77 Newman Street	30 March 2017	Concerned that 20 Albert Terrace Mews is in a 'High' flood risk area from surface water and this is not being taken into account. Concerned about subsidence and the need for underpinning at nearby properties.	4.5, 4.13-4.16
Pattison	Flat 1, 20 Prince Albert Road	22 March 2017	Concerned at suggestions that his flat is underlain by a basement. Concerned that information on drainage in the vicinity may have been overlooked, suggests that a sewer from 20 Prince Albert Road passes beneath 20 Albert Terrace Mews. Concerned about long-term impacts of the development on subsidence and hydrology.	4.3, 4.5, 4.13-4.16

Robinson	2 Albert Terrace Mews	23 March 2017	Concerned about increased subsidence in the road.	4.13 – 4.16
Chappell	20 Prince Albert Road	22 March 2017	Structural and hydrological concerns relating to the impact of the proposal, in particular flooding and subsidence.	4.5, 4.13-4.16
Gordon	19 Prince Albert Road	12 March 2017	Concerned about the increased risk of subsidence and flooding and potential changes to the soil and water table, particularly in relation to his own property which is partially underpinned.	4.5, 4.7-4.9, 4.13-4.16
16-22 Prince Albert Road Residents Association	19 Prince Albert Road	12 March 2017	Concerned about the risk of subsidence, and states that the area has already suffered from subsidence. Concerned that the development will affect the water table and cause flooding.	4.5, 4.7-4.9, 4.13-4.16
Sacks	19 Prince Albert Road	12 March 2017	Concerned about the development causing subsidence. Outlines that the area has a history of ground movement. Concerned that the development will increase the risk of flooding.	4.5, 4.13-4.16
Woodcock	47 Regents Park Road	10 March 2017	Concerned about potential for increased flooding, states that since building works along Albert Terrace Mews started around 2003 his basement flat floods frequently, whereas it didn't flood prior to this (1974-2003).	4.5
Arditti	Flat L, 37 Regents Park Road	09 March 2017	Concerned that the construction works will cause subsidence and additional damage (cracking) to his property	4.13-4.16
Groenvold	19 Albert Terrace Mews	08 March 2017	Concerned that the flooding at no. 21 Albert Terrace Mews has not been taken into account in the hydrology and hydrogeology assessments of the BIA.	4.5, 4.7-4.9
unknown	unknown	unknown	Concerned that the determined ground conditions are based on historic borehole data and not site specific information. Concerned that the proposed development will increase the risk of subsidence and hence building damage in the vicinity. Concerned that subsidence in the road will increase. Concerned that underground infrastructure (a sewer) exists beneath the property.	4.3, 4.5 – 4.9, 4.13-4.16
Marks	1 Albert Terrace Mews	7 March 2017	Concerned that there is a flood risk in the area of no. 21, and that settlement associated with the proposed development would exacerbate the subsidence risks and cause further damage to surrounding properties,	4.3, 4.5, 4.13-4.16

			including those that are already underpinned. Also concerned about subsidence and flooding of the road.	
Hoffmann-Howard	2nd Floor Flat, 41 Regents Park Road	3 March 2017	Concerned about structural damage to neighbouring properties especially subsidence related damage to the older surrounding properties.	4.13 – 4.16

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA	Desk Study information and assessment – historical mapping and site walkover	Open – to be provided as 4.3.	
2	Hydrology	Flood Risk Assessment – the site is within a Local Flood Risk Zone	Open – to be provided as 4.5.	
3	Stability / Hydrogeology	Site specific investigation required – including insitu testing and groundwater monitoring	Open – to be provided as 4.6, 4.7, 4.8, 4.10	
4	Hydrogeology	Temporary dewatering, waterproofing, impacts to neighbouring basements	Open – to be provided as 4.9	
5	Stability	Geotechnical parameters and outline retaining wall design calculations	Open – to be provided as 4.11	
6	Stability	Temporary works methodologies to be confirmed and updated, if required, following additional site investigation to include further mitigation	Open – to be provided as 4.12	
7	Stability	Ground movement and damage impact assessments – to be revised	Open – to be provided as 4.13, 4.14, 4.15, 4.16	
8	Hydrology	Attenuation SUDS Assessment in accordance with CPG4 3.51	Open – to be provided as 4.17	
9	BIA	Conceptual Site Model	Open – to be provided as 4.18	

Appendix 3: Supplementary Supporting Documents

None

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