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153-163 Broadhurst Gardens
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Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12727-29
Revision: D1

February 2018

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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 153-163 Broadhurst Gardens, London, NW6 3AU (planning reference 2016/3930/P). The basement is considered to fall within Category C as defined by the Terms of Reference.

1.2. The Audit reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development in accordance with LBC's policies and technical procedures.

1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and review it against an agreed audit check list.

1.4. The Basement Impact Assessment (BIA) and Desk Study have been carried out by Geotechnical and Environmental Associates (GEA). The individuals concerned in the production of the BIA have suitable qualifications.

1.5. The BIA describes the proposal as "*Demolition of the existing retail and residential building & replacement with part 3, part 4-storey building with roof accommodation above, comprising ground floor (Class A1/A3) commercial (435 sq.m) with 30 residential apartments above (13 x 1 bed, 14 x 2 bed and 3 x 3 bed) including the retention and refurbishment of No. 23 West Hampstead Mews and associated works*." No information has been provided in regards to the existing structure or proposed works at No 23 West Hampstead Mews, but it is understood that this will be retained and refurbished.

1.6. The BIA has been carried out by a well-known firm of engineering consultants who have provided information to show that their authors possess suitable qualifications and relevant experience.

1.7. The revised BIA has confirmed that the proposed basement level will be founded within London Clay, with underpinning to the shared Party Walls and piled walls to all other perimeters.

1.8. It has been confirmed that groundwater will likely be encountered during basement excavation. Further details of the method of construction beneath the water table have been requested.

1.9. An acceptable Ground Movement Analysis and Damage Assessment has been carried out which indicates a worst case damage category of (Burland Category 1).

1.10. No formal structural drawings or calculations have been submitted with only a description of the structure provided. Further structural details, construction method, and outline calculations have been requested.

1.11. Clarification is requested regarding the change in hard standing and potential impact on surface water drainage.

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

1.13. It is accepted that the basement construction is unlikely to have a cumulative impact on wider ground water flows.

1.14. Confirmation of consultation with LUL is required.

1.15. An outline works programme is required.

1.16. A number of queries for additional information have been requested in Appendix 2. At present it cannot be confirmed that the application complies with the requirements set out in CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) in December 2017 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 153-163 Broadhurst Gardens, London, NW6 3AU.

2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the Basement Impact Assessment for the 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.
- Local Plan Policy A5 Basements.

2.4. The BIA should demonstrate that schemes:

a) maintain the structural stability of the building and neighbouring properties;

b) avoid adversely affecting drainage and run off or causing other damage to the water environment;

c) avoid cumulative impacts upon structural stability or the water environment in the local area, and;

evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.

2.5. LBC's Audit Instruction described the planning proposal as *"Demolition of the existing retail and residential building & replacement with part 3, part 4-storey building with roof accommodation above, comprising ground floor (Class A1/A3) commercial (435 sq.m) with 30 residential apartments above (13 x 1 bed, 14 x 2 bed and 3 x 3 bed) including the retention and refurbishment of No. 23 West Hampstead Mews and associated works."*

2.6. CampbellReith accessed LBC's Planning Portal on 18th January 2018 and gained access to the following relevant documents for audit purposes:

- Desk Study & Basement Impact Assessment Report by Geotechnical and Environmental Associates (GEA), (Ref J13364, Issue no 1), December 2013.
- Supplementary Ground Investigation and Basement Impact Assessment Report (BIA), by Geotechnical and Environmental Associates (GEA), (Ref J13364, Issue no 2), July 2017.
- Planning Application Drawings consisting of:

  Location Plan;

  Existing Plans;

  Proposed Plans.
- Topographic Survey by Callidus Building Survey Ltd, 14 January 2014.
- Design & Access Statement by PRC, (Ref 9246, Issue 1), 23rd January 2015.
- Planning Comments and Responses.
- Flood Risk Assessment (FRA) by AAe, (Job No 133368), January 2014.
- Tree report by Arboricultural and Woodland Consultants, (Ref AR/3230L1/jq), 3rd October 2014.

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?	No	The required information is generally provided within the BIA. Works programme, construction methods, and non-technical summary not provided.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	No	Adequate details of the proposed structure and temporary works are not provided.
Are suitable plan/maps included?	Yes	BIA, architects drawings.
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	While not all no answers have been referenced, responses are sufficiently detailed.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	No answers have generally been referenced.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	While not all no answers have been referenced, responses are sufficiently detailed.
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	A appropriate scoping statement is provided for items identified from screening.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	A appropriate scoping statement is provided for items identified from screening.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	A appropriate scoping statement is provided for items identified from screening.
Is factual ground investigation data provided?	Yes	GEA BIA.
Is monitoring data presented?	Yes	Revised BIA.
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	Revised BIA.
Is the presence/absence of adjacent or nearby basements confirmed?	Unclear	Reference is made to a neighbouring property extending below the street level.
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 9 of the BIA contains piled wall design and soil engineering properties.
Are reports on other investigations required by screening and scoping presented?	Yes	Ground movement assessment, flood risk assessment, tree report.
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	N/A	The presence of neighbouring basement is not discussed.
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	Ground movement assessment – section 10 of BIA.

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	Heave protection..
Has the need for monitoring during construction been considered?	Yes	However outline details are not provided.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Section 16 of BIA.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Further details regarding temporary works and construction method are required.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	While it indicated that the area of hard standing is not changing it has not been demonstrated that the volume of surface water entering the sewer system is not increasing.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Further information is required with respect to temporary works and dewatering.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Ground movement assessment – Section 12 of BIA.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by a well-known firm of engineering consultants. Geotechnical and Environmental Associates (GEA), and the individuals concerned in its production hold suitable qualifications.

4.2. The LBC Instruction to proceed with the audit identified that the existing building adjoins locally listed buildings but provided no further details. The Design & Access Statement identified that the site is located within the South Hampstead Conservation Area and that the façade to the Lillian Bayliss House is locally listed.

4.3. The LBC Instruction describes the existing site to be occupied by "*Nos 153 to 163 Broadhurst Gardens & 23 West Hampstead Mews*". The site location plan indicates property No 23 at West Hampstead Mews to be part of the subject site, and it is understood that the existing structure is proposed as being retained and refurbished.

4.4. The BIA outlines that the proposal will include the demolition of the existing retail and residential buildings constituting Nos 153 to 163 Broadhurst Gardens, and their replacement with a new four-storey building with single, 3.5m deep, level basement.

4.5. A previous planning application (with the same planning reference and a BIA dated Dec 2013 by GEA) was submitted in November 2016. A Structural Strategy Report (dated Apr 2014) was produced by Fluid Engineers which contained details of the condition of the existing structures and an opinion on the feasibility of their refurbishment or replacement of Nos. 153-163 Broadhurst Gardens.

4.6. The proposed construction of the basement is to underpin the existing Party Wall to the Lylian Baylis House with mass concrete underpinning to the founding depth and construct contiguous piled walls to all other perimeters. Proposed basement slab, liner walls and ground slab are understood to be utilised to form a reinforced concrete box. No formal structural drawings have been provided with only a description of the works and an outline plan of basement walls has been provided within the BIA. Structural calculations should be also provided to indicate the feasibility of the proposal.

4.7. Further exploratory works carried out after the initial planning application submission indicated that the site geology varies across the site, consisting of Made Ground (to depths of between 0.50m to 1.45m) over London Clay to 8.45m. Possible clay head propensity was identified between 0.6m and 2.5mbgl. The foundation depth to the neighbouring Lylian Bayliss House was confirmed as 0.65m and the depth of the other surrounding properties was measured at 0.595mbgl. The response to Question 13 of the land stability screening states that Lilian Bayliss House extends beyond street level with the depth of its foundation unknown.

4.8. Based on groundwater monitoring to date, perched groundwater was encountered within the Made Ground and London Clay, at various depths between 0.76m below ground level (mbgl) and 5.70mbgl. Rising head tests were carried out in the three boreholes which identified inflow rates of 3.79E-6m/s, 1.47E-6m/s, in boreholes 101 and 103 respectively, and no inflow in borehole 102.

4.9. The BIA has provided an outline construction sequence indicating the main sequence of works, however no specific details relating to construction method are provided. A Construction Method Statement 'produced by the consulting engineer' is mentioned, however this has not been submitted. Further details including the basement structure, construction method, local dewatering, and temporary works details are required.

4.10. A Ground Movement Analysis has been carried out by GEA using geotechnical modelling software and default values within CIRIA report C760 to represent the movement arising from the proposed basement installation and predict the effect of these on the neighbouring structures. XDISP and PDISP software suits have been utilised in order to calculate ground movements behind the proposed underpinned and piled walls; during and following the basement excavation. Maximum movements arising from the combined effect of wall installation and excavation phases estimated maximum vertical and horizontal settlement generated to be about 6mm and 9mm respectively. Whilst the CIRIA approach is intended for embedded retaining walls, we accept that the predicted ground movements behind the underpinned part of the wall are within the range typically anticipated for underpinning techniques carried out with good control of workmanship.

4.11. The results of the heave analysis carried out using the software indicated that the basement floor slab will need to be suspended over a void or layer of compressible material. The latter will require designing to resist potential uplift forces generated by long term movement of up to 14mm that may occur at the centre of the proposed excavation. It was not confirmed which option is to be adopted within the structural design and thus formal structural drawings to illustrate this will be required.

4.12. A damage assessment has subsequently been carried out using the principles contained in CIRIA C760. This identified Very Slight (Burland Category 1) damage to the front, back and side elevations of Nos. 19-22 West Hampstead Mews. Elsewhere, Negligible (Burland Category 0) damage was predicted. This falls within the maximum damage category as permitted by LBC (category 1).

4.13. It is noted that the site is likely to have been bombed during World War II. The Dec 2013 BIA concluded that there is a moderate potential for UXO to be present on site and a detailed UXO risk assessment should be considered by the applicant prior to commencement of construction works. A UXO risk assessment has not been submitted.

4.14. The depth of the surrounding properties foundations were measured at 0.65mbgl and 0.595mbgl. Groundwater monitoring over three monitoring visits (13/03/17, 22/03/17 and 17/05/17) showed groundwater between 0.76mbgl and 5.70mbgl. Although it has been confirmed that significant inflows into the basement excavation are not anticipated other than perched water, it is recommended that groundwater level monitoring continues until construction in order to better so as to better understand seasonal variations in ground water level and the impact this may have on construction and the site's hydrogeology. The BIA notes that sump pumping will be necessary to control any groundwater inflows.

4.15. It has been concluded that the wider hydrogeological environment will not be impacted due to any ground water identified as perched water rather than wider ground water flows. This conclusion is accepted; however it is recommended that ground water monitoring continue as discussed in paragraph 4.14.

4.16. The BIA confirms that monitoring of the adjoining properties will be undertaken throughout the works at regular intervals, however a monitoring strategy is not provided. Proposals will be made and agreed with the owners of adjacent properties during the Party Wall Act approval process.

4.17. An outline works programme for construction has not been provided and this is required.

4.18. The Hydrology and Hydrogeology screening is contradictory with the Flood Risk Assessment (FRA) report and the Architects drawings provided. It is not clear whether the hard standing area will remain as existing or not. The screening response states that the hard standing area will not change. However, section 3.14 of the FRA states that the proposed impermeable area will be reduced and the Architects lower ground level drawing indicates soft landscape areas. Clarification is requested. Should the volume/rate of surface water entering the sewer system be increasing SUDs are to be considered to reduce surface water run-off in accordance with The London Plan.

4.19. The BIA has shown that although the development is close to the River Westbourne, it will not impact on the wider hydrogeology of the area or the Hampstead Heath Pond chain catchment area.

4.20. The Jubilee LUL underground line has been identified as being located with 45m of the site. Evidence of consultation with LUL is required in order to confirm whether LUL approval is required.

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

4.22. Given the above a number of queries have been raised it cannot be confirmed that the proposal adheres to the requirements of CPG4. Outstanding queries are summarised in Appendix 2.

5.0 CONCLUSIONS

5.1. The BIA has been carried out by a well-known firm of engineering consultants who have provided information to show that their authors possess suitable qualifications and relevant experience.

5.2. The revised BIA has confirmed that the proposed basement level will be founded within London Clay, with mass concrete underpinning foundations to Party Walls and contiguous piled walls to all other perimeters.

5.3. It has been confirmed that perched groundwater will be encountered during basement excavation. Limited temporary works proposals or any details of sump pumping of groundwater during excavation have been provided which are required.

5.4. An acceptable Ground Movement Analysis and Damage Assessment has been carried out which shows Very Slight (Burland Category 1) damage to the front, back and side elevations of Nos. 19-22 West Hampstead Mews.

5.5. No formal structural drawings or calculations have been submitted, however it is described that new piled walls and underpinning will form the proposed basement. Temporary and permanent works information including an outline programme should be provided. Outline structural calculations are also required.

5.6. Acceptable options for heave mitigation measures were presented, however none has been confirmed as to be adopted.

5.7. Proposals to develop and agree the movement monitoring strategy during the Party Wall Act approval process have been deemed acceptable.

5.8. Clarification is requested whether the hard standing area will remain as existing or not and the impact this has on surface water drainage. SUDs are to be investigated should this be necessary.

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

5.10. Submitted information on below ground basement structures has shown that the development is unlikely to have a significant local or cumulative impact on the local hydrogeology.

5.11. Confirmation of consultation with LUL is required.

5.12. An outline works programme is required.

5.13. A number of queries for additional information have been requested in Appendix 2. At present it cannot be confirmed that the application complies with the requirements set out in CPG4.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Query response	Date closed out
1	Stability	Construction method statement to be provided to indicate feasibility of carrying out construction while maintaining stability to neighbouring properties. Details to consider the depth of underpinning, and outline temporary works required.	Open		
2	Stability	Outline structural calculations required to demonstrate the feasibility of the proposed basement structure.	Open		
3	Stability	Further details of structural proposal required, including heave protection measures.	Open		
4	Programme	An outline works programme indicating the main phases of construction and during is required.	Open		
5	Hydrology	Clarification is required as to any change in impermeable area, and any change in the volume or rate of surface water run off that enters the sewer system. SUDs are to be considered should an increase in the volume/rate of surface water runoff be identified.	Open		
6	Stability	Evidence of consultation with public asset owners.	Open		

Appendix 3: Supplementary Supporting Documents

None

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