CampbellReith
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22 Frognal Way
London NW3 6XE

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12066-37
Rev: D1

September 2015

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Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	Sept 2015	Comment	AJMjw12066-37-250915-D1.doc	A Marlow	A Marlow	E Brown

Document Details

Last saved	18/09/2015 17:39
Path	AJMjw12066-37-250915-D1.doc
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Project Number	12066-37
Project Name	22 Frognal Way, London NW3 6XE
Planning Reference	2015/3530/P

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Appendices

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 (BIA) submitted as part of the Planning Submission documentation for 22 Frognal Way (planning reference 2015/3530/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 basements 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 BIA and Construction Method Statement (CMS) have been prepared by personnel who have suitable qualifications.

1.5. The proposed development comprises the demolition of the existing building and its replacement by a new detached house consisting of roof, ground floor, lower ground floor and basement, which will be founded in either the Claygate Member or the underlying London Clay.

1.6. Additional and refined information has been requested for the following items contained within either the BIA or the CMS as follows:

- Anomalies between the text and sketches within the CSM regarding the construction methodology to provide a watertight basement.
- The lack of a movement monitoring strategy nor trigger levels within the CMS at variance with the requirements of the BIA.
- Slope stability analysis based on moderately conservative soil and groundwater parameters derived from site specific investigation.
- Confirmation that the ground movement analysis within the BIA includes for underpinning proposals, and sheet pile wall identified in the CMS but not mentioned in the BIA. Confirmation that approach is adequate for sloping site.
- The rate and direction of groundwater flow to determine any influence on the local hydrogeology.
- The lack of any basement retaining wall calculations within the CSM which recognises loading criteria within the BIA generated by the need to maintain slope stability of the surrounding ground.

- An indicative temporary works propping arrangement to confirm the practicality of the proposal considering the basement excavations adjacency to the public highway.
- Recognition within the BIA that flooding events occurred in 1975 to Frognal Gardens and Langland Gardens together with likely mitigation measures.

1.7. It is accepted that a ground movement analysis has been carried out which predicts that damage to adjoining properties, boundary party walls and pathways will vary between negligible (Burland Category 0) and slight (Burland Category 2). Confirmation is required that underpinning of the adjacent Church Walk garage block has been taken into account in this assessment. Full input and output data for the software used are required for audit.

1.8. It is accepted that the introduction of sustainable drainage proposals and attenuation of likely flows will result in no significant alteration to existing surface water drainage flows.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 06 August 2015 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 22 Frognal Way, Camden Reference 2015/3530/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 the *"Demolition of existing dwelling house and redevelopment to provide a single detached family dwelling house and all other necessary works."*

and confirmed that the basement proposals involved a listed building or neighboured listed buildings.

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

- Basement Impact Assessment (BIA)
- Basement Impact Assessment Appendix
- Construction Method Statement and Basement Impact Assessment (CMS)
- Construction Management Plan (CMP)

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	BIA and CMS Document Control.
Is data required by Cl.233 of the GSD presented?	Yes	BIA, CMP and CMS.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	BIA Section 1.0.
Are suitable plan/maps included?	Yes	BIA Section 2.0.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 3.1.2.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 3.1.1.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 3.1.3.
Is a conceptual model presented?	Yes	BIA Section 7.0.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.0.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.0.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.0.
Is factual ground investigation data provided?	Yes	BIA Appendix
Is monitoring data presented?	Yes	Standpipes monitored twice, see BIA Section 5.4.
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	No	No identification of any adjacent basements.
Is a geotechnical interpretation presented?	Yes	BIA Section 5.0.
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA Section 8.2.2.
Are reports on other investigations required by screening and scoping presented?	N/A	
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	No	No identification of any adjacent basements.
Is an Impact Assessment provided?	Yes	BIA Section 9.0.
Are estimates of ground movement and structural impact presented?	Yes	BIA Section 8.3.

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	BIA Section 10.0.
Has the need for monitoring during construction been considered?	Yes	BIA Section 8.4.2.
Have the residual (after mitigation) impacts been clearly identified?	Yes	BIA Section 10.0.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties maintained?	Yes	
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	
Are non-technical summaries provided?	No	

4.0 DISCUSSION

4.1. The BIA has been carried out by a well established firm of consultants, Geotechnical and Environmental Associates (GEA), and the lead authors and reviewers have suitable qualifications.

4.2. The CMS has been carried out by a well known firm on structural engineers, Price & Myers (PM), and the author has suitable qualifications.

4.3. The proposed development comprises the demolition of the existing property and its replacement by a new detached house which consists of roof, ground floor, lower ground floor and basement.

4.4. The BIA has shown that the basement formation level will be either in the Claygate Member or the underlying London Clay, dependent upon the slope of the interface horizon between the two strata.

4.5. The CMS indicates that the basement foundation will be a piled suspended concrete supported on piled foundations.

4.6. The CMS provides acceptable sketches to indicate the potential construction methodology which utilises a bored pile retaining wall in conjunction with a 225mm thick reinforced concrete lining wall although the latter element is not mentioned within the accompanying text. Instead, the text describes the use of a drained cavity wall construction to intercept any groundwater passing through the basement wall but it is not shown on the sketches. It would be preferable for the anomalies between the text and the sketches in the CMS to be removed.

4.7. The BIA identifies likely vertical and horizontal ground movements caused by piling and excavation using Oasys software packages Xdisp and Pdisp. The analysis predicts that minor damage varying between Burland Category 0 (Negligible) and Burland Category 2 (Slight) will take place to adjoining properties, boundary party walls and pathways. The full Xdisp and Pdisp input and output data are required to permit a review and to comment on the validity of the predicted categories of damage. Confirmation is required that this approach is adequate for a sloping site such as 22 Frognal Way. It is not clear that movements associated with both the sheet piled wall and contiguous piled wall have been considered.

4.8. The BIA also indicates that ground heave pressures will be generated of between 75kN/m^2 and 120kN/m^2. The CMS identifies that a compressible medium will be placed beneath the slab to accommodate heave pressures. The bored pile retaining wall and individual piles will be designed to resist hydrostatic pressures equivalent to a water level or ground surface.

4.9. The BIA identifies that monitoring of ground movements will be necessary to assess whether they are in line with predictions and suggests monitored structures to include the adjoining property, No. 20 Frognal Way, and the garage block and walled pathway in Church Walk to the northwest of the site. No monitoring strategy is given, however, and no trigger levels are proposed within the CMS.

4.10. The CMS identifies that a public sewer currently runs through the site, which will require diversion around the existing boundary wall to the garage block and will require underpinning of the wall. The presence of this sewer is not mentioned within the BIA and it is not clear whether the underpinning process is included within the ground movement analysis for this specific sensitive structure. Further clarification is requested.

4.11. The BIA identifies that groundwater will be encountered between 93.93m AOD and 96.85m AOD compared to the likely basement founding level of 89.5m AOD. It is accepted that the volume of water likely to be encountered from within the Claygate Member should be suitably controlled by sump pumping. No indication was given in the BIA as to the rate and direction of groundwater flow and, until that is determined, it is not possible to agree with the BIA's statement that there will be no significant influence on the local hydrogeology. It is understood that significant pumping of nearby properties takes place to deter the ingress of water and this should also be recognised in any further assessment.

4.12. The BIA has carried out a slope stability analysis which identifies that there are "limited areas where the excavated slopes around the existing basement are shown to be marginally stable with a factor of safety of between 1.0 and 1.25." The analysis goes on to predict that no slip circles are likely to form but assumes that "the design of the proposed lower ground floor and basement retaining walls will take account of the presence of the slope above the wall and the load applied to the wall …" It is stated that the slope stability analysis has been carried out based on best estimates of soil parameters but no details are provided. It is considered that, for a level differential of this magnitude, the analysis should be based upon moderately conservative soil and groundwater parameters derived from site specific investigation. It will be necessary to review the full input and output data in a revised slope stability analysis. No basement retaining wall and pile design calculations are included in the CMS and these are requested to confirm that loading associated with this sloping site have been recognised by the designers.

4.13. The CMS identifies that temporary lateral propping will be required to resist the lateral forces imposed on the sides of the excavation although no proposal is included. An indicative solution is requested to confirm that practicality of the proposal, at the same time ensuring that the excavation will not detrimentally affect the adjacent public highway, which is within 5.0 metres of the basement excavation.

4.14. It is accepted that the BIA has concluded that the site is not indicated as being at risk from flooding but it goes on the state that Lancaster Grove, to the southeast to the site, has previously flooded, and therefore a flood risk assessment may be required. The BIA fails to mention that the much closer Frognal Gardens, immediately to the north, and Langland Gardens, to the southwest, both flooded in 1975. The BIA should recognise these issues and identify likely mitigation measures.

4.15. It is accepted that the introduction of SUDS and an attenuation tank located beneath the existing driveway will result in no material change to surface water drainage flows.

5.0 CONCLUSIONS

5.1. The BIA and CMS have been prepared by personnel who have suitable qualifications.

5.2. The proposed development comprises the demolition of the existing building and its replacement by a new detached house consisting of roof, ground floor, lower ground floor and basements, which will be founded in either the Claygate Member or the underlying London Clay.

5.3. Additional and refined information has been requested for the following items contained within either the BIA or the CMS as follows:

- Anomalies between the text and sketches within the CSM regarding the construction methodology to provide a watertight basement.
- The lack of a movement monitoring strategy nor trigger levels within the CSM at variance with the requirements of the BIA.
- Slope stability analysis based on moderately conservative soil and groundwater parameters derived from site specific investigation.
- Confirmation that the ground movement analysis within the BIA includes for underpinning proposals and sheet pile wall identified in the CMS but not mentioned in the BIA. Confirmation of applicability of approach to sloping site.
- The rate and direction of groundwater flow to determine any influence on the local hydrogeology.
- The lack of any basement retaining wall calculations within the CMS which recognises loading criteria within the BIA generated by the need to maintain slope stability of the surrounding ground.
- An indicative temporary works propping arrangement to confirm the practicality of the proposal considering the basement excavation's adjacency to the public highway.
- Recognition within the BIA that flooding events occurred in 1975 to Frognal Gardens and Langland Gardens together with likely mitigation measures.

5.4. It is accepted that a ground movement analysis has been carried out which predicts that damage to adjoining properties, boundary party walls and pathways will vary between negligible (Burland Category 0) and slight (Burland Category 2). Confirmation is required that underpinning of the adjacent Church Walk garage block has been taken into account in this assessment. Full input and output data for the software used are required for audit.

5.5. It is accepted that the introduction of sustainable drainage proposals and attenuation of likely flows will result in no significant alteration to existing surface water drainage flows.

Appendix 1: Residents' Consultation Comments

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Residents' Consultation Comments

Surname	Address	Date	Issue Raised	Response
Church Row & Perrins Walk Neighbourhood Forum	22 Church Row	06.08.2015	Effect of construction on ground water table levels at adjacent sites.	See 4.11
Church Row Association	N/A	06.08.2015	Effect of construction on ground water table levels at adjacent sites.	See 4.11
Church Row and Perrins Walk Neighbourhood Forum	22 Church Row	06.08.2015	Effect of construction on ground water table levels at adjacent sites.	See 4.11

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Construction Methodology	Anomalies within CMS	Open	
2	Slope Stability	Full slope stability analysis based on site derived soil and ground water parameters	Open	
3	Movement Monitoring	Strategy and trigger levels requested within CMS	Open	
4	Movement Analysis	Amendment requested to include underpinning of garage block and all retaining walls. Confirmation of applicability of CIRIA C580 approach for sloping site. Full Xdisp and Pdsip input and output data to be provided.	Open	
5	Groundwater Flow	Rate and direction of flow requested to determine influence on local hydrogeology	Open	
6	Basement Retaining Wall	CMS to include calculations based upon BIA criteria, with particular regard to sloping topography.	Open	
7	Temporary Propping	Indicative proposal requested	Open	
8	Flooding	BIA to be updated to recognise local flooding events	Open	

Appendix 3: Supplementary Supporting Documents

None

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