CampbellReith
consulting engineers

15 Lyndhurst Terrace
NW3 5QA

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12066-96
Revision: D1

February 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 15 Lyndhurst Terrace, London NW3 5QA (planning reference 2015/6278/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 BIA and SER have been carried out by well known firms of consultants who possess relevant qualifications and experience.

1.5. The proposed development comprises the demolition of the existing building and its replacement by a new detached two storey property with a basement extending under most of the new ground floor and extending full width of the site.

1.6. A ground investigation has confirmed that the basement will be founded in the Claygate Member below which is London Clay to depth. Three boreholes and a trial pit showed only very slight groundwater seepage in one borehole at below proposed basement depth, although no further groundwater monitoring to identify seasonal variations has taken place.

1.7. The proposed basement will be constructed by a mixture of conventional underpinning and piling, together with inner reinforced concrete retaining walls. Temporary works proposals and preliminary design calculations have been provided although additional information is requested to be provided to inform the Party Wall Award process.

1.8. Whilst there are some queries over the Ground Movement Assessment, it is accepted that it is correct in predicting very slight damage (Burland Category 1) occurring to the adjacent houses and slight damage (Burland Category 2) occurring to No.13's detached garage. The SER proposes strengthening and repair to the garage prior to construction commencement. The GMA assumes stiff propping in both the temporary and permanent cases and this, together with movement monitoring proposals, should be developed for the Party Wall Award process.

1.9. Further monitoring of groundwater levels is recommended in order to determine seasonal variations. Clarification is required with respect to the impact of increased paved areas.

1.10. Additional details of proposals to cater for the increase in the area of hard landscaping are requested.

1.11. It is accepted that there are no slope stability concerns and no hydrological concerns with respect to the development proposals.

1.12. Queries and matters requiring information or clarification are summarised in Appendix 2.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 23 December 2015 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 15 Lyndhurst Terrace, NW3 5QA, Camden Reference 2015/6278/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 *"Demolition of existing house to provide a new dwelling."* The Audit Instruction also confirmed the property did not include any listed buildings, nor was a neighbour to any listed buildings.

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

- Basement Impact Assessment dated November 2015 by Site Analytical Services Ltd.
- Structural Engineering Report in support of Basement Impact Assessment dated November 2015 by Heyne Tillett Steel
- Construction Management Plan dated November 2015 by Richard Mitzman Architects LLP
- Architect's General Arrangement Plans and Cross-Sections Planning Issue dated April, July and September 2015, Existing and Proposed, by Richard Mitzman.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	BIA Section 2.
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	See BIA Section 3.
Are suitable plan/maps included?	Yes	
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	Various maps and plans throughout BIA Section 3.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Table 3.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Table 3.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Table 3.
Is a conceptual model presented?	Yes	See BIA Section 6.3.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	See BIA Section 4.1.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	See BIA Section 4.1.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	See BIA Section 4.1.
Is factual ground investigation data provided?	Yes	See BIA Section 5.
Is monitoring data presented?	No	Only one set of groundwater levels undertaken.
Is the ground investigation informed by a desk study?	Yes	See BIA Section 3.3 to 3.6.
Has a site walkover been undertaken?	Unknown	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	See BIA Section 3.2.
Is a geotechnical interpretation presented?	Yes	See BIA Section 6.
Does the geotechnical interpretation include information on retaining wall design?	Yes	See BIA Section 6.7.
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?	Yes	
Is an Impact Assessment provided?	Yes	See BIA Section 7.1.
Are estimates of ground movement and structural impact presented?	Yes	See BIA Section 7.2 and Appendix C.

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	See BIA Sections 8 and 9.
Has the need for monitoring during construction been considered?	Yes	See BIA Section 7.3.
Have the residual (after mitigation) impacts been clearly identified?	Yes	See BIA Section 7.2.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be 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?	Yes	See BIA Section 3.9, 4.2, 5.6, 6.9, and 7.4.

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been produced by a well known firm of consultants, Site Analytical Services Ltd (SAS), and has been prepared by individuals who possess relevant qualifications and experience.

4.2. A Structural Engineering Report in support of (the) Basement Impact Assessment (SER) has been produced by a well known firm of Structural Engineers, Heyne Tillett Steel and has been prepared and reviewed by Chartered Engineers.

4.3. The proposed development comprises the demolition of the existing building and its replacement by a new detached two storey property with a 3 metre deep basement extension under most of the ground floor footprint of the building. The basement will extend full width of the site below boundary brick walls to nos. 13 and 17 Lyndhurst Terrace. The flank wall of No. 13 is identified as being approximately 1.3 metres away from the boundary and the BIA assumes that No.13 contains an existing basement although its depth is unknown. The south east corner of No.17 is approximately 1.0 metre from its boundary wall and the BIA has assumed it has no basement. A separate garage to No.17 abuts the boundary wall.

4.4. A Ground Investigation, carried out by SAS in November 2015, is included in the BIA as Appendix B and consisted of 3 no. boreholes and a trial pit. The investigation showed the site to be underlain by up to 1.2 metres of Made Ground, below which lies the Claygate Member to a depth of 9.2 metres, below which the London Clay was encountered to the extent of the borehole depths. The trial pit and Boreholes 2 and 3 did not encounter groundwater although Borehole 1 identified very slight seepage at 15 metres depth. Although the BIA suggests further groundwater monitoring should be undertaken, none appears to have been carried out. The BIA suggests that the chosen contractor should have a contingency plan to deal with potential perched groundwater inflows as a precautionary measure.

4.5. The SER has identified that the two boundary side walls of the proposed basement will be formed by conventional underpinning techniques using narrow "hit and miss" bays together with the construction of retaining walls and "L-shaped" bases. The reinforced concrete front wall and partial rear wall will be formed by contiguous bored piles with a reinforced concrete liner wall cast inside the piled wall. An acceptable indicative temporary works scheme is included within the SER, which also contains preliminary design calculations for the retaining walls. The depth of the adjacent basement to No.13 has been assumed so that it does not surcharge the boundary retaining wall to No. 15 and the actual depth should be verified prior to construction commencement. Similarly, the foundation to No.17 imparts a surcharge to the new boundary retaining wall to No. 15 which has been assumed to be 10kN/m^2 in the design calculations. Loadings from the adjacent property should be identified in detail and verified prior

to construction commencement. These matters should be dealt with during the Party Wall process.

4.6. A Ground Movement Assessment (GMA) has been undertaken by Applied Geotechnical Engineering and is included in the BIA as Appendix C. It has evaluated vertical and horizontal movements due to the piling installation, underpinning process, propping removal and subsequent excavation.

4.7. The GMA provides an evaluation of the ground conditions including an estimate of soil stiffness. Whilst this is reported to be supported by case study data, the case study is a multi-propped deep excavation. The selected values are significantly higher than typically adopted values and are not considered appropriate for this site without sophisticated sampling and laboratory testing. The GMA refers to a PDisp analysis which utilises soil stiffness although it is not clear how this has been used in the assessment which is based on empirical evidence contained within CIRIA C580. The CIRIA C580 approach is largely independent of soil stiffness and it is accepted that ground movements should be small providing that there is high level stiff propping in both the temporary and permanent cases, as assumed in the GMA. The control of ground movement and the building damage assessment also rely on good workmanship and the surrounding structures being in sound condition.

4.8. The GMA has determined that the potential level of damage to the houses at Nos.13 and 17 is predicted to be Burland Category 1 'very slight' and the detached garage to No.17 to be Burland Category 2 'slight'. The SER has identified that the garage walls will be strengthened and repaired before and after construction, with the permission of the adjacent owner, to mitigate the impact of the basement construction.

4.9. A movement monitoring proposal is discussed in principle in the SER which should be developed further during the Party Wall Award process.

4.10. Although the groundwater level has been shown to be just below the level of the proposed basement, groundwater monitoring should be carried out to determine seasonal variations of the minor aquifer, to ensure the development will not impact significantly on this level. It is accepted that the proposed basement is unlikely to result in a significant change to the groundwater flow regime.

4.11. The BIA had identified an increase in hard landscaping of 47m^2. The scoping section 4.1 identifies that this "*could potentially reduce rates of recharge reducing groundwater flow to a nearby watercourse".* Alternatively the BIA states in section 7.1 that this area increase *"equates to an increase in the rate of runoff from the site"* but includes new grassed areas which can incorporate formal SUDs areas such as French drains and cellular storage. These comments are

considered to be in conflict with one another and contradictory and further details are requested.

4.12. The BIA has identified the adjacency of Network Rail infrastructure and has provided documentation to show that it will be unaffected by the development.

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

4.14. It is accepted that no known ponds, spring lines or wells are in close vicinity to the site and that the site is outside the Hampstead pond chain catchment area.

4.15. It is accepted that the site is not in a Flood Risk Zone based upon Camden Flood Risk Management Strategy maps and is not identified as a street that flooding in either 1975 or 2002.

5.0 CONCLUSIONS

5.1. The BIA and SER have been carried out by well known firms of consultants who possess relevant qualifications and experience.

5.2. The proposed development comprises the demolition of the existing building and its replacement by a new detached two storey property with a basement extending under most of the new ground floor and extending full width of the site.

5.3. A ground investigation has confirmed that the basement will be founded in the Claygate Member below which is London Clay to depth. Three boreholes and a trial pit showed only very slight groundwater seepage in one borehole at below proposed basement depth, although no further groundwater monitoring to identify seasonal variations has taken place.

5.4. The proposed basement will be constructed by a mixture of conventional underpinning and piling, together with inner reinforced concrete retaining walls. Temporary works proposals and preliminary design calculations have been provided although additional information is requested to be provided to inform the Party Wall Award process.

5.5. Whilst there are some queries over the Ground Movement Assessment, it is accepted that it is correct in predicting very slight damage (Burland Category 1) occurring to the adjacent houses and slight damage (Burland Category 2) occurring to No.13's detached garage. The SER proposes strengthening and repair to the garage prior to construction commencement. The GMA assumes stiff propping in both the temporary and permanent cases and this, together with movement monitoring proposals, should be developed for the Party Wall Award process.

5.6. Further monitoring of groundwater levels is recommended prior to construction in order to determine seasonal variations. Conflicting statements with respect to the impact on surface water flows into the ground should be clarified.

5.7. Additional details of proposals to cater for the increase in the area of hard landscaping are requested.

5.8. It is accepted that there are no slope stability concerns and no hydrological concerns with respect to the development proposals.

5.9. Queries and matters requiring information or clarification are summarised in Appendix 2.

Appendix 1: Residents' Consultation Comments

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Residents' Consultation Comments

Surname	Address	Date	Issue Raised	Response
Cardenas	13 Lyndhurst Terrace	22.12.15	Size of basement and potential associated water problems.	Section 4.9

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	Stability	Depth to basement of No.13 to be verified	To be produced for Party Wall process	N/A
2	Stability	Foundation loading from No. 17 to be verified	To be produced for Party Wall process	N/A
3	Stability	Temporary works and Movement monitoring proposal to be provided with specific details	To be produced for Party Wall process	N/A
4	Hydrogeology	Further monitoring of groundwater levels	Open	
5	Hydrology/Hydrogeology	Additional details to cater for increase in area of hard landscaping and impact on ground water and surface water flows	Open	

Appendix 3: Supplementary Supporting Documents

None

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