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14F Avenue Road, London, NW8 6BP

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12066-34

Revision: D1

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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 14F Avenue Road, NW8 6BP (planning reference 2015/2397/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. The Basement Structural Method Statement by Croft and the Basement Impact Assessment by Ground and Project Consultants Ltd (which combined make up all information provided as the actual Basement Impact Assessment - BIA) and the Basement Method Statement (which is the Structural Strategy Report -SSR) have been prepared by well-known firms of engineering consultants using individuals who possess suitable qualifications.

1.4. The basement does not involve a listed building nor is it adjacent to a listed building.

1.5. The BIA reads as though it has taken sections from previous reports and discrepancies across various sections have resulted.

1.6. The basement will be founded within London Clay which underlies a veneer of Made Ground.

1.7. Basement excavation is likely to cut into a root system and a zone of likely desiccation was noted. The BIA recommends that this be taken into account during detailed design.

1.8. The slope angle at and around the site is shallow and it is accepted that risks from slope stability are negligible.

1.9. The London Clay is Unproductive Strata with respect to groundwater sources and water supply. The site is within Groundwater Protection Zone 2 (due to the Chalk at depth) and the BIA sensibly recommends minor provisions be put in place to prevent contamination of groundwater.

1.10. It is accepted that the development is unlikely to impact on the wider hydrogeology of the area, but additional monitoring suggested in the BIA should be undertaken to confirm and the proposed drainage installed.

1.11. The nearest surface water courses are greater than 100m from the site.

1.12. There are discrepancies in reports regarding whether the development will result in additional surface water discharge to sewers. Clarification is required.

1.13. The flood risk assessment concludes that flood risk is low to medium. Mitigation measures are described.

1.14. Basement construction is to comprise underpinning of perimeter walls with reinforced concrete cantilever retaining walls. Temporary and/or sacrificial support will be provided to the ground floor slab, temporary excavation faces and existing walls. Once cast and cured, the cantilever walls will provide temporary propping at head level but temporary propping will remain at toe level.

1.15. Photographs show cracks in existing Party Walls.

1.16. A prediction of likely structural damage to neighbouring properties suggests no worse than Burland Category 2, however, no assessment of anticipated vertical and horizontal ground movements has been provided nor ground parameters to allow such an assessment.

1.17. A buoyancy assessment gave a marginal factor of safety against buoyancy. This should be reviewed and a higher factor of safety achieved.

1.18. Proposed monitoring includes visual inspections, settlement (levelling equipment and targets) and crack monitoring (visual inspection and Demec studs where necessary) on Party Walls. No monitoring of vertical and lateral movements on the retaining wall seems to be allowed for although Action and Trigger Values are recommended.

1.19. It is recommended that the BIA is revised and re-submitted.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 28/07/2015 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 14F Avenue Road, NW8 6BP (planning reference 2015/2397/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.

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

2.5. LBC's Audit Instruction described the planning proposal as *"Create a basement extension including lightwell within rear garden ground floor, rear extension and partial infill at first floor rear level."*

2.6. CampbellReith accessed LBC's Planning Portal on 18/08/2015 and gained access to the following relevant documents for audit purposes:

- Basement Structural Method Statement; Croft Structural Engineers, 141005, 21/10/2014. This is forms part of the main Basement Impact Assessment Report (as well as that by Ground and Project Consultants Ltd- see below) and included.

Appendix A – Screening Figures, charts and maps

Appendix B – Structural Scheme Drawings (not included in document but assumed to be Planning Application Drawings listed below)

Appendix C – Structural Basement Calculations

Appendix D – Basement Method Statement (this is the main is the Structural Strategy report)

Appendix E – Soil Investigation Report (Ground & Groundwater Ltd December 2014)

Appendix F – Basement Monitoring (Structural Monitoring Statement).

- Basement Impact Assessment: Land Stability Report; Ground & Project Consultants Ltd (July 2015).

- Planning Application Drawings consisting of:

  Location Plan; 036900010; NEO Architects (July 2014)

  Existing Ground Floor Plan; 036998101, NEO Architects (July 2014)

  Existing 1st and 2nd Floors; 036998102, NEO Architects (July 2014

  Existing Front & Rear Elevations; 036998201, NEO Architects (July 2014)

  Existing Section A-A; 036998205, NEO Architects (July 2014)

  Site Plan; 036900001; NEO Architects (July 2014)

  Proposed Lower Ground Floor; 036900004, NEO Architects (July 2014)

  Proposed Ground Floor Plan; 036900N002, NEO Architects (July 2014)

  Proposed 1st & 2nd Floor Plan; 036900N003, NEO Architects (July 2014)

  Proposed Section A-A; 036900N119, NEO Architects (July 2014)

  Proposed Front and Side Elevations; 036900N101, NEO Architects (July 2014)

  Proposed Rear & Side Elevation; 036900102, NEO Architects (July 2014).

- Planning Comments and Response

  The BIA covers an amended planning application at the site whereby the basement dimensions have been increased. A telephone conversation with Olivier Nelson on 01/09/15 confirmed that no residents' consultation comments have been received in addition to those for the original application.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	YES	Front cover of Basement Structural Method Statement (the BIA) lists all contributors.
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	Basement Structural Method Statement (the BIA) & Basement Impact Assessment (the SSR).
Are suitable plan/maps included?	YES	Appendix A of 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?	YES	Section 3 of BIA and separate Land Stability Report by Ground & Project Consultants Ltd.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	YES	Section 3 of BIA
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	YES	Section 3 of BIA
Is a conceptual model presented?	YES	Section 6 of BIA and separate Land Stability Report by Ground & Project Consultants Ltd

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	YES	Land Stability Report by Ground & Project Consultants.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	YES	Some discrepancy regarding whether in a source protection zone. Assumes the BIA text is correct.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	YES	
Is factual ground investigation data provided?	YES	Appendix E of BIA
Is monitoring data presented?	YES	Appendix E of BIA. Notably, the BIA suggests that additional groundwater monitoring should be undertaken during the winter months to obtain credible winter groundwater level.
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?	YES	BIA states that adjacent sites have not been excavated. This is assumed to mean that no basements exist. This should be confirmed for completeness.
Is a geotechnical interpretation presented?	YES	Report by Ground & Project Consultants Ltd.
Does the geotechnical interpretation include information on retaining wall design?	PARTIALLY	Provides geotechnical parameters for Ultimate Limit State (stability) but not Serviceability Limit State (stiffness parameters to determine ground movements).
Are reports on other investigations required by screening and scoping presented?	YES	Section 3 of BIA and separate Land Stability Report by Ground & Project Consultants Ltd.

Item	Yes/No/NA	Comment
Are baseline conditions described, based on the GSD?	YES	
Do the base line conditions consider adjacent or nearby basements?	YES	BIA states that adjacent sites have not been excavated. This is assumed to mean that no basements exist. This should be confirmed for completeness.
Is an Impact Assessment provided?	YES	Appendix D of BIA
Are estimates of ground movement and structural impact presented?	PARTIALLY	A potential damage assessment has been completed but potential vertical and horizontal ground movements have not been estimated. This links to stiffness parameters that would be expected in the geotechnical report.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	PARTIALLY	Some additional input recommended to clarify a few specific items, notably ground heave, discharge to sewers and monitoring.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	PARTIALLY	Potential for ground movements (e.g. heave) needs further consideration. Mitigation against flooding include: an upstand around the roof light, ceiling slab to allow water to drain into soil, dual pumping system, no sleeping accommodation in basement etc.
Has the need for monitoring during construction been considered?	PARTIALLY	Party Walls/cracks are to be monitored. Monitoring of basement structure (particularly lateral movement) during construction is not included in the Structural Monitoring Report.
Have the residual (after mitigation) impacts been clearly identified?	YES	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	PARTIALLY	See comments relating to heave, discharge and monitoring.

Item	Yes/No/NA	Comment
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	UNCLEAR	Increased impermeable surface will be created above the basement area that extends into the garden. However, the BIA states that there will be no additional discharge to sewers even though all surface water is proposed to go to the sewer. Clarification needed.
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	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) is contained in the report titled 'Basement Structural Method Statement' and has been carried out by a well-known firm of engineering consultants, Croft Structural Engineers (CSE) and Ground & Project Consultants Ltd (GOPC). The individuals concerned in its production have suitable qualifications.

4.2. The Structural Strategy Report (SSR) is contained within appendix D of the above report and is referred to as the 'Basement Method Statement'. It has also been carried out by CSE and hence the same individuals contributed to its production. Similarly, a Structural Monitoring Statement is provided in Appendix RF.

4.3. A general comment is that the report reads as though it has taken sections from previous, relevant reports. However, there are a number of discrepancies across various sections of the reports that have resulted.

4.4. The LBC instruction to proceed with the audit identified that the basement proposal does not involve a listed building nor is it adjacent to a listed building.

4.5. The existing property comprises generally 3 storeys but also has a single storey lounge area at the rear and a garage at the front. It is built into a relatively gentle slope. Internal floor levels within the property and in the rear garden are at around 39.66m. The garage at the front of the property is positioned on the downslope section and has a floor level coincident with the front access road, approximately 3.5m below internal floor/garden level.

4.6. The proposed basement consists of a single storey construction formed by creating basement areas beneath the existing kitchen/lounge area and beneath a section of the rear garden. Excavations will be approximately 3.1-3.6m deep such that basement floor levels are either at, or approximately 0.6m below, the existing garage floor at the front of the property.

4.7. The BIA has identified that the site is underlain by Made Ground to a depth of around 0.6 – 1.5m (base of Made Ground not proven in the latter) below which lies the London Clay Formation to the maximum depth of investigation (6m). The London Clay is likely to extend to some depth beneath the site.

4.8. Groundwater was not encountered during the site investigation works but a single monitoring visit recorded groundwater at 0.68m depth. Page 52 of the BIA states that investigations show that 'no groundwater is present' at the site. Elsewhere, additional monitoring is recommended in the BIA during the winter months to identify a 'winter' groundwater level. There is some discrepancy and it should be ensured that appropriate groundwater levels are used in the final design.

4.9. The BIA states that excavation is likely to cut into the root system of a tree within 3m of the basement. In addition, the ground investigation identified a zone of likely desiccation (WS1 1.5-2.5m) and the presence of roots top 2.5m in BH1.

4.10. Whilst there is some discrepancy across the reports with respect to the slope angle at and around the site, it is accepted that risks from slope stability are negligible.

4.11. The BIA states that the London Clay is Unproductive Strata i.e. low permeability and negligible significance for water supply or river base flows. There are discrepancies between the ground investigation report by Ground & Water (G&W) and the main text of the BIA with respect to Source Protection Zones (SPZ). The G&W report states that the site is not within an SPZ whilst the BIA states that it is within Groundwater Protection Zone 2 (likely associated with the Chalk at depth). This is unlikely to have a significant influence on development, particularly as the BIA recommends that minor provisions are put in place to prevent contamination of groundwater.

4.12. The BIA suggests that consideration be given to provision of groundwater drainage pathways around the structure to prevent backing up of groundwater around the structure. Unless it can be proven that groundwater flow does not occur, this is a sensible measure. This is particularly relevant since BIA shows a lost river to the west of the site.

4.13. The BIA states that nearest surface water courses are greater than 100m from the site.

4.14. The BIA states that the development will not result in a material change of surface water discharge to sewers. However, it also states that there will be an increased impermeable surface at the site due to the extension of the basement into the garden area and that all surface water will discharge to the sewer. Presumably, the sewer will therefore take some additional flow. Clarification is required.

4.15. The flood risk assessment concludes that flood risk is low to medium. Mitigation measures are described.

4.16. The Basement Method Statement (which is the SSR) discusses in depth the proposed method of construction. It comprises underpinning of perimeter walls with reinforced concrete cantilever retaining walls that extend to the London Clay. Underpins will therefore be approximately 3.m deep and are described as being a maximum of 1m wide.

4.17. Existing foundations were exposed during the ground investigation and were shown to extend to variable depths (<1.5m in one location).

4.18. The SSR describes how temporary and/or sacrificial support will be provided to the rear face of underpins and the overlying ground floor slab and brickwork walls. Temporary propping will be from soil left insitu in the middle of the basement.

4.19. Once the cantilever retaining underpins are cast, sufficiently cured, packing and ground floor support are complete, upper props are to be removed such that temporary support at underpin head level is from the reinforced concrete cantilever only. Propping will remain at toe level.

4.20. After continuing with the proposed construction sequence, the final reinforced concrete floor slab (which provides permanent propping at cantilever toe level) will be cast in 3 bays. The central insitu soil will be removed locally down to floor slab formation level and the floor slab cast insitu. It is not clear whether any temporary propping is proposed at toe level of each bay when that area of floor slab is being constructed. Clarification should be sought.

4.21. Point 1 of the Basement Method Statement (the SSR) appears to have been copied from a previous report with no explanation as to why underpins 1 & 2 are completed first to fit the conveyor. The basement underpin sequence does not match the one provided in the Appendix.

4.22. From cracks in walls shown in Figures 6, 7 & 8 of the BIA there may be existing settlement issues within the property and therefore potentially in adjacent properties.

4.23. For the design of underpins as reinforced cantilever retaining walls, Croft has conservatively assumed ground water at ground level and have applied a 10kN/m^2 surcharge. This is believed to be acceptable since it represents a conservative approach.

4.24. A buoyancy check has been carried out. However, this only achieves a FOS of 1.04 i.e. only marginally above a condition where buoyancy would occur. Further assessment is recommended.

4.25. There are several descriptions used in the reports with respect to structural damage. They are described as negligible (page 61), very slight (in SSR Appendix) and slight (page 63). This should be clarified, although it is acknowledged that the BIA predicts cracking to be no more than Burland Category 2. No assessment of vertical and horizontal ground movements has been provided to allow this to be validated.

4.26. Output from bearing capacity checks are provided in the SSR but no moment determinations. A calculation for the reinforcement design of the cantilever underpins therefore was not included. This will need to be included as the detailed design progresses.

4.27. A separate monitoring report is provided in Appendix F. It gives recommendations for the proposed monitoring regime which includes visual inspections, settlement (levelling equipment and targets) and crack monitoring (visual inspection and Demec studs where necessary) on

Party Walls. No monitoring of vertical and lateral movements on the retaining wall seems to be allowed for even though Action and Trigger Values for lateral displacement (5mm and 6mm respectively) are described in the BIA.

5.0 CONCLUSIONS

5.1. 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 14F Avenue Road, NW8 6BP (planning reference 2015/2397/P). The basement is considered to fall within Category B as defined by the Terms of Reference.

5.2. 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.

5.3. The BIA and Structural Strategy Report (SSR) have been prepared by well-known firms of engineering consultants using individuals who possess suitable qualifications.

5.4. The basement does not involve a listed building nor is it adjacent to a listed building.

5.5. The BIA reads as though it has taken sections from previous reports and discrepancies across various sections have resulted.

5.6. The basement will be founded within London Clay with underlies a veneer of Made Ground.

5.7. Basement excavation is likely to cut into the root system of a tree within 3m of the basement and the ground investigation identified a zone of likely desiccation. The BIA recommends that this be taken into account during detailed design.

5.8. The slope angle at and around the site is shallow and it is accepted that risks from slope stability are negligible.

5.9. The London Clay is Unproductive Strata i.e. low permeability and negligible significance for water supply or river base flows. The site is within Groundwater Protection Zone 2 and the BIA sensibly recommends minor provisions be put in place to prevent contamination of groundwater.

5.10. It is accepted that the development is unlikely to impact on the wider hydrogeology of the area, but the additional monitoring suggested should be undertaken to confirm and the proposed basement drainage installed.

5.11. The nearest surface water courses are greater than 100m from the site.

5.12. There are discrepancies in reports regarding whether the development will result in additional surface water discharge to sewers. Clarification is required.

5.13. The flood risk assessment concludes that flood risk is low to medium. Mitigation measures are described.

5.14. Basement construction is to comprise underpinning of perimeter walls with reinforced concrete cantilever retaining walls. Temporary and/or sacrificial support will be provided to the ground floor slab, temporary excavation faces and existing walls. Once cast and cured, the cantilever walls will provide temporary propping at head level but temporary propping will remain at toe level.

5.15. Photographs show cracks in existing Party Walls.

5.16. A prediction of likely structural damage to neighbouring properties suggests no worse than Burland Category 2. However, no assessment of anticipated vertical and horizontal ground movements has been provided nor ground parameters to allow such an assessment.

5.17. A buoyancy assessment gave a marginal factor of safety against buoyancy. This should be reviewed and a higher factor of safety achieved.

5.18. Proposed monitoring includes visual inspections, settlement (levelling equipment and targets) and crack monitoring (visual inspection and Demec studs where necessary) on Party Walls. No monitoring of vertical and lateral movements on the retaining wall seems to be allowed for although Action and Trigger Values are recommended.

5.19. It is recommended that the BIA is revised and re-submitted.

Appendix 1: Resident's Consultation Comments

None

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Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Stability	No assessment provided (heave, settlement and lateral movements)	To be included in revised BIA with updated building damage assessment	
2	Groundwater	BIA states that additional monitoring is proposed.	Undertake monitoring and ensure appropriate groundwater level used in design	N/A
3	Surface water	Discrepancies as to whether additional surface water will discharge to sewers.	To be clarified in revised BIA	
4	Stability	Unclear whether monitoring of lateral and vertical displacements of the retaining wall during construction will take place. Trigger and Action levels are given.	Clarify and include in revised BIA	
5	Stability	Current buoyancy assessment gives FOS=1.04. Higher FOS required.	To be included in revised BIA	

Appendix 3: Supplementary Supporting Documents

None