CampbellReith
consulting engineers

54 Shirlock Road
NW3 2HS

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12066-71
Revision: D2

Date: March 2016

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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 54 Shirlock Road, NW3 2HS (planning reference 2015/5351/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 two BIA documents had been prepared by firms of engineering consultants using individuals who possess suitable qualifications. Both have provided supplementary information in response to the initial audit report.

1.5. A discrepancy between the two original documents in the screening for hydrology has been resolved through Ashton Bennett's letter dated 20 January 2016 which noted that "Croft have stated that the retaining wall design has been checked by Ashton Bennett Report when they in fact mean the geological assessment of land stability, which is dealt with in the Ashton Bennett report."

1.6. It is likely that any ground water will be encountered during basement foundation excavation will be of limited volume due to unproductive aquifer status of the London Clay. However further investigation is required to confirm the source of the water encountered during the ground investigation and its implications for construction (softened bearing stratum and water ingress).

1.7. The ground investigation encountered low strength clay to the base of the exploratory holes (c 4.50m). The bearing pressure in the Croft BIA exceeds the recommended allowable bearing pressure in the Ashton Bennett BIA. It is recommended that further investigation of the below ground soils and neighbouring foundations is carried out, together with groundwater monitoring.

1.8. The original BIAs were inconsistent with respect to proposed foundations and floor slabs. This has been resolved in the information submitted in January 2016, although significant questions remain as detailed in section 4.

1.9. The ground movement and building damage assessment suggests that damage to neighbouring properties should not exceed Burland Category 1. This is accepted, provided there is good

control of workmanship and the structures are in sound condition (note it is reported that No 52 Shirlock Road has suffered movement in the past).

1.10. Final proposals for movement monitoring strategy during excavation and construction will need to be reviewed and coordinated with the contractor's final method statement. This, together with the need for condition surveys and foundation inspection pits, should be agreed with the party wall surveyor.

1.11. It is noted that SUDs is recommended to accommodate increased surface run off. Such measures should be adopted.

1.12. It is accepted that the surrounding slopes to the development site will be stable.

1.13. It is accepted that the development will not impact on the wider hydrogeology of the area and it is not in an area subject to flooding.

1.14. Queries and requests for clarification identified by this audit are summarised in Appendix 2.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 23 October 2015 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 54 Shirlock Road, NW3 2HS (reference 2015/5351/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 *"Excavation to extend existing basement. Single storey ground floor rear side infill extension, installation of bay window at first floor level and reconstruction of rear façade of closet wing."*

The Audit Instruction also confirmed 54 Shirlock Road is a neighbour to the listed building of All Hallows Church. The church is approximately 6m from the proposed basement and is therefore beyond the zone of influence.

2.6. CampbellReith accessed LBC's Planning Portal on 12 November 2015 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report – Croft Structural Engineers, July 2015
- Basement Impact Assessment Report – Ashton Bennett, June 2015
- Planning Application Drawings consisting of

  Location Plan

  OS Map

  Existing Plans

  Existing Section

  Existing Elevations

  Planning Design Statement

  Proposed Plans

  Proposed Sections

  Poposed Elevations

  Planning Design Statement
- Planning Consultation Comments.

2.7. Further to the issue of the initial audit report, supplementary and revised information was presented as listed below. This revised audit report considers that additional information.

- BIA Rev1 by Croft Engineers dated 22nd Jan 2016
- Engineering cover letter by Ashton Bennett dated 20th Jan 2016
- BIA Rev2 by Ashton Bennett
- BIA Appendix A
- BIA Appendix B & C
- BIA Appendix D

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	Works programme has been provided.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	Drawing SL10 in BIA REV1 (Croft Structural Engineers) shows piled foundations. No calculations of applied pile loads have been included. The piles are required to resist vertical and lateral loads.
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	
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?	Yes	
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Letter by Ashton Bennett dated 22 January 2016 stated that SUDS will be used.
Is a conceptual model presented?	Yes	BIA (Ashton Bennett) Section 12.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrogeology Scoping Provided?	Yes	

Item	Yes/No/NA	Comment
Is scoping consistent with screening outcome?		
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Letter by Ashton Bennett dated 20 January 2016 stated that "hydrology screening in the Ashton Bennett Report takes preference."
Is factual ground investigation data provided?	Yes	BIA (Ashton Bennett).
Is monitoring data presented?	Yes	Reported in BIA (Ashton Bennett).
Is the ground investigation informed by a desk study?	Yes	BIA (Ashton Bennett).
Has a site walkover been undertaken?	Yes	Date of inspection was 12 June 2015.
Is the presence/absence of adjacent or nearby basements confirmed?	No	A cellar is present to No 50 and No 56. A basement to No 53 is unknown/not confirmed.
Is a geotechnical interpretation presented?	Yes	No information provided regarding pile design. Further ground investigation recommended in BIA (Ashton Bennett).
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	No	
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	Ground movement has been calculated and the damage has been classified as negligible (Burland category 0-1). Monitoring is required to safeguard the existing structures during underpinning and new basement construction.
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?	No	Piled foundations are proposed to underside of basement walls as stated on BIA REV1 by Croft. See further comments in section 4.
Has the need for monitoring during construction been considered?	Yes	
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?	No	Piled foundations are proposed to underside of basement walls as stated on BIA REV1 by Croft. See further comments in section 4.
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	Ground movement calculations have been revised in appendix D dated 20 January 2016 by Ashton Bennett.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. Two Basement Impact Assessments have been prepared. One, which contains the full screening process and subsequently considers (hydrology, hydrogeology and geology) has been carried out by firm of engineering consultants, Ashton Bennett. The individuals concerned in its production have suitable qualifications.

4.2. The second Basement Impact Assessment Report contains screening and scoping outcomes and is then predominantly focused on the structural design and above ground drainage. This BIA has been carried out by Croft Structural Engineers. The author and reviewer are referred to in the BIA as Chartered Structural Engineers.

4.3. The LBC Instruction to proceed with the audit identified that the basement proposal was adjacent to listed buildings. All Hallows Church is a listed property. The Design & Access Statement identified that 54 Shirlock Road is located within the Mansfield Conservation Area.

4.4. No. 54 Shirlock Road comprises four storeys and an unconverted cellar. The property is Victorian mid-terrace house with a front yard and a rear garden.

4.5. The proposed basement consists of excavation to extend an existing basement. The underside of the basement slab will be approximately 3.50m below ground level.

4.6. The BIA has identified that the existing reinforced concrete ground slab is underlain by Made Ground to a depth of 1m, with London Clay proven to a depth of 4.45m bgl. The London Clay was described as 'low strength'. It was suggested that the low strength was due to water softening. Piled foundation has been adopted to the underside of the basement walls. A ground bearing slab is adopted for the internal basement area.

4.7. The Croft BIA states that "No ground water was encountered in boreholes. However, groundwater was encountered during monitoring at depths of 2.8m bgl within the London Clay. It is expected that limited perched groundwater may be encountered within the made ground and London Clay during construction". The Ashton Bennett BIA states that "It is considered that the elevated water level may be due to leaking drains based on the unexpected high level of groundwater, the alkaline pH value and the very soft nature of the clay. A CCTV survey has confirmed leaking drains. In summary it is expected that limited perched groundwater may be encountered within the made ground and London Clay during construction, however inflows into excavations are unlikely to be significant and are expected to be dealt with by sump pumping". The Ashton Bennett BIA also recommends that the basement is designed on the assumption of the ground water level being at the groundwater surface.

4.8. Subsequent to the initial audit report, a letter by Ashton Bennett, dated 20 January 2016, states that "The level of run off may change slightly and this has been accommodated by the use of SUDS as detailed in the Croft report. Croft has stated that the garden basement may reduce the impermeable areas which is advantageous. Croft and Ashton Bennett are in agreement that the proposed basement will not result in changes to surface water being received by adjacent properties or downstream watercourses. There will be no extra run off and therefore there is no requirement to seek discussions with Thames Water." Croft has mentioned that if infrastructure fails then a pump would be required to ensure the basement does not flood.

4.9. Croft provided a revised BIA (REV1) dated 22 January 2016 which proposes piled foundations to the underside of the basement walls. It is requested that Croft clarifies whether all the vertical and lateral loads which act onto basement walls will be transferred to ground via piles. It is not clear whether the foundation design statement by that "Reinforced concrete…….These will also transfer the vertical loads to the ground via reinforced concrete base….." means that the loads will be transferred to the ground via the piles. Ground bearing slabs with Cellcore under are proposed to internal basement slabs. Additional queries regarding discrepancies between the foundation design statement by Ashton Bennett and the Croft report are described in the audit query tracker. See below for comments on basement design based on Croft BIA report Rev1 dated 22 January 2016:

a) It is not clear that how the loads which act on to the walls have been derived. The walls are designed for flexure due to the lateral load only. This should be covered by calculations/statement to confirm if this is appropriate. There is no calculation showing the applied lateral deflection and the allowable limit.

b) The cantilever walls supporting party walls will be supported by piled foundations. Calculations of applied pile loads due to combinations of vertical and lateral loads will need to be considered. Consideration should be given to the type of piles that can be adopted in order not to cause excessive vibration, noise and damage to the adjacent buildings.

c) The uplift calculations have considered heave only and the heave is resisted by heave protection measure using Cellcore. It should be clarified how hydrostatic pressure will be resisted, noting Ashton Bennett's recommendation that groundwater is assumed to be a ground level.

d) The retaining wall calculations assumed a surcharge from roads outside the building of $10kN/m^2$ which is accepted as appropriate. The report discusses the potential for skips material to be located in the carriageway which could potentially exceed this surcharge value. Further consideration should be given to this.

4.10. Croft BIA REV1 contains a construction sequence and method statement. As a general overview, the sequence of works is not clear. A number of comments on this are provided below. Numeric references are taken from the BIA (note numbering is not consecutive in BIA). We would suggest that the method statement is revisited and sequencing drawings provided to clarify how the proposed works will be carried out safely and whilst maintaining stability to the surrounding buildings.

a) 1.3 - An alternative methodology would also potentially require resubmission of the BIA.

b) 1.5 - More details on access to install piles are required.

c) 1.6 - Propping will be required as assumed in assessment of ground movement.

d) 2.4 - The foundations to the existing surrounding walls should be established at the design stage and included in BIA, or conservative assumptions clearly stated.

e) 3.3 & 3.4 - Pins 1 & 2 are in the corner. What is being needled and propped?

f) 3.11.2 - This is likely to be a complex operation. Further detail of this needs to be provided to ensure stability is maintained at all time.

g) 4.5.1 - We would suggest that trench sheets would not be removed in excavations through made ground as noted earlier.

4.11. A revised ground movement and building damage assessment prepared by Ashton Bennett is based on an underpinning scheme and indicates that damage to the neighbouring structures should not exceed Burland Category 1. This is accepted provided there is good control of workmanship and the affected structures are in sound condition.

4.12. A slab uplift calculation has been provided which is unclear. If a ground bearing slab is proposed this requires clarification.

4.13. Proposals for a movement monitoring strategy during excavation and construction have been provided. The BIA states that "Before the works begin a detailed monitoring report is required to confirm the implementation of the Monitoring and should cover Risk Assessment to determine level of Monitoring, Scope of Works, Applicable standards, Specification for Instrumentation, Monitoring of Existing cracks and Monitoring of movement". Further investigation of the foundations to the surrounding properties and their current condition is recommended. These actions should be agreed with the Party Wall Surveyor.

4.14. The Croft Basement Impact Assessment Report states that "Where garden basements are present then a soil band of a minimum of 1m should be provided. Where 1m of soil is not present then SUDs is required." A SUDs assessment has been carried out and it is

recommended that a system similar to Skeletank is used to reduce the run-off flow from the site.

4.15. It is accepted that there are no slope stability concerns associated with the proposed development and it is not in an area prone to flooding (subject to confirmation from Thames Water with respect to the relief sewer). In the absence of significant subterranean groundwater flows, it is accepted there are no potential impacts from the proposed construction to the groundwater.

4.16. It is reported that No 52 Shirlock Road has suffered movement in the past. This could have a significant impact on the predicted damage category and should be investigated.

5.0 CONCLUSIONS

5.1. The two BIA documents have been prepared by firms of engineering consultants using individuals who possess suitable qualifications. A discrepancy between the two documents in the screening for hydrology has been resolved through Ashton Bennett's letter dated 20 January 2016 which noted that "Croft have stated that the retaining wall design has been checked by Ashton Bennett Report when they in fact mean the geological assessment of land stability, which is dealt with in the Ashton Bennett report."

5.2. It is likely that any ground water will be encountered during basement foundation excavation will be of limited volume due to unproductive aquifer status of the London Clay. However further investigation is required to confirm the source of the water encountered during the ground investigation and its implications for construction (softened bearing stratum and water ingress).

5.3. The ground investigation encountered low strength clay to the base of the exploratory holes (c 4.50m). The bearing pressure in the Croft BIA exceeds the recommended allowable bearing pressure in the Ashton Bennett BIA. It is recommended that further investigation of the below ground soils and neighbouring foundations is carried out, together with groundwater monitoring.

5.4. The original BIAs were inconsistent with respect to proposed foundations and floor slabs. This has been resolved in the information submitted in January 2016, although significant questions remain as detailed in section 4.

5.5. The ground movement and building damage assessment suggests that damage to neighbouring properties should not exceed Burland Category 1. This is accepted, provided there is good control of workmanship and the structures are in sound condition (note it is reported that No 52 Shirlock Road has suffered movement in the past).

5.6. Final proposals for movement monitoring strategy during excavation and construction will need to be reviewed and coordinated with the contractor's final method statement. This, together with the need for condition surveys and foundation inspection pits, should be agreed with the party wall surveyor.

5.7. It is noted that SUDs is recommended to accommodate increased surface run off. Such measures should be adopted.

5.8. It is accepted that the surrounding slopes to the development site will be stable.

5.9. It is accepted that the development will not impact on the wider hydrogeology of the area and it is not in an area subject to flooding.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Stephen Connelly	52 Shirlock Road	08/11/2015	Basement will cause harm to the land stability, hydrology and ground water.	Refer to audit report sections 4.9 – 4.17
Sharon Sullivan	50 Shirlock Road	09/11/2015	The owner is worried about damage to the property and possible flood to coal cellar.	Refer to audit report section 4.9 – 4.17
Mrs D Meere	56 Shirlock Road	08/11/2015	There is contradiction for construction basement method (between hand tools and piling).	Refer to audit report section 4.10 – 4.17
Steven Adams	6 Rona Road, NW3 2VA	N/A	There is a potential for damage to neighbouring properties.	Refer to audit report sections 4.10 – 4.12

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA - General	There are numerous discrepancies to be resolved before the BIA (and supporting documents) can be approved. These relate to the form of construction and inconsistency of screening response between BIA (structure design) and BIA (Hydrology & geology). A supplementary report is missing.	Closed	22.03.2016
2	Surface Water	It is reported that the site benefits from a relief sewer: this should be confirmed.	Closed - Letter by Ashton Bennett dated 20th Jan2016 stated that "There will be no extra run off and therefore there is no requirement to seek discussions with Thames Water."	22-03-2016
3	Hydrogeology	The groundwater monitoring shows ground water encountered at 2.8m bgl. Evidence of CCTV showing this water came from leaking pipe need to be provided. Further investigation may be required and repairs carried out.	Not for BIA	N/A
4	Stability	The GI interpretation does not cover piled foundations. There is lack of clarity over proposed foundations and floor slab. It is shown on the drawings as piled foundation but the installation of piles has not been mentioned in the method statement.	Open – queries remain with respect to foundations. Refer to Section 4 for comments.	
5	Stability	Confirmation of appropriate pile types required to ensure no excessive vibration or damage to neighbouring properties.	Open	

6	Stability	The impacts to the surrounding buildings are to be clarified and calculations clearly presented. There is no confirmation of neighbouring basements being present at some properties. It is reported that a neighbouring building has suffered movement historically and this needs to be considered.	Open	
7	Stability	The ground movement and building damage assessment are to be revised to accord with the stated reference and the proposed construction methodology.	Closed – assessments by Ashton Bennett indicate damage no greater than Burland Cateogry 1.	22.03.2016
8	Stability	The proposed bearing pressure exceeds that recommended by Ashton Bennett. The Ashton Bennett BIA recommends further ground investigation.	Open	
9	Stability	The final monitoring regime and requirements for condition surveys are to be agreed with the party wall surveyor.	-	N/A
10	Stability design	There is discrepancy between foundation design statement by Ashton Bennett and Croft report. Croft Engineers is to clarify if all the vertical and lateral loads which act onto basement walls will be transferred to ground via piles. Ashton Bennett state that " Foundations should be placed below the shrink and swell zone of the London Clay and in unweathered strata." Letter by Ashton Bennet states that "Croft Drawing SL10 show piled foundations beneath the underpins. The piles are to prevent uplift and aid stability".		

		However, this is not mentioned in the BIA report Rev 1 by Croft Engineers.		

Appendix 3: Supplementary Supporting Documents

None

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