CampbellReith
consulting engineers

Marine Ices
4-8A Haverstock Hill
London
NW3 2BL

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12066-51
Revision: D1

October 2015

Campbell Reith Hill LLP
Friars Bridge Court
41-45 Blackfriars Road
London
SE1 8NZ

T:+44 (0)20 7340 1700
F:+44 (0)20 7340 1777
E:london@campbellreith.com
W:www.campbellreith.com

Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	02/10/15	Comment	RMjw12066-51-021015-4-8A Haverstock Hill-D1.doc	R Morley	R Morley	A J Marlow

Document Details

Last saved	02/10/2015 16:06
Path	RMjw12066-51-021015-4-8A Haverstock Hill-D1.doc
Author	Robert Morley MEng
Project Partner	E M Brown, BSc MSc CGeol FGS
Project Number	12066-51
Project Name	4-8A Haverstock Hill, London NW3 2BL
Planning Reference	2015/0487/P

Contents

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 4-8A Haverstock Hill, NW3 2BL (planning reference 2015/0487/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 reviewed it against an agreed audit check list.

1.4. The BIA is accompanied by a structural engineer's report, a flood risk assessment, and a geotechnical and ground movement assessment. All have been prepared by well-known firms with previous experience in their respective fields and whose authors carry the required qualifications.

1.5. The proposal involves the demolition of an existing building on the site with the retention of a single masonry façade. A new structure is mixed use residential and commercial uses including a single level 10m deep basement containing a cinema.

1.6. The site is 'L shaped' fronting two highways with neighbouring properties immediately on three sides. There is a London Underground tunnel under one of the highways in close proximity to the proposed basement.

1.7. The BIA and the associated reports have been completed by well-known consultancies and authors who have the required qualifications.

1.8. The proposal is to demolish an existing building while retaining a masonry façade, and to construct a new 10m deep basement with up to four storeys of super structure.

1.9. The basement will be founded in the London Clay. It is not anticipated that the ground water table will be encountered during basement excavation.

1.10. The basement will not affect ground water flows due to the basement being above the ground water level and within the impermeable London Clay.

1.11. The surface water runoff will not be affected and a like for like development covered entirely of entire roof and hardstanding areas is proposed. The screening and scoping process has not

considered the risk of flooding. However, a Flood Risk Assessment has identified the risk to be very low.

1.12. It is accepted that the use of continuous flight auger formed contiguous piled basement walls along with top down construction techniques will mitigate disturbances and ground movement to the surrounding buildings and London Underground tunnel. However, the retaining wall calculations are illegible and it has not been demonstrated that the proposed 600m diameter retaining wall and 300mm liner wall have sufficient capacity for the proposed excavation height and permanent propping arrangement.

1.13. Heave protection due to excavation into the high heave capacity London Clay has been incorporated into the design. It is understood the piles will be designed to accommodate resultant tensile loads.

1.14. A damage assessment has been produced and has calculated that damage is Burland Category 1 (very slight) or less. However, clarification is required of a number of assumptions made as described in Section 4.

1.15. An outline of a movement monitoring regime has been provided. This will need to be developed further prior to the commencement of the works.

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

1.17. Queries and actions arising from this audit are summarised in Appendix 2 and described in more detail in Section 4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 3rd September to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 4-8 Haverstock Hill, London (2015/0487/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 buildings, with retention of façade at 45-47 Crogsland Road and construction of a part 4/part 5 storey building plus basement comprising flexible use of cinema (class D2) at basement and ground level with ancillary restaurant and bar (class A3/A4) at ground level or retail class (class A1 at basement and ground floor level and 19 residential dwellings (8x1 bed, 9x2 bed and 2x3 bed units) on upper floors with associated cycle parking, amenity space and refuse and recycling storage."*

The Audit Instruction also confirmed that neither the building proposed for development nor any of the neighbouring buildings are listed buildings.

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

- Basement impact assessment, LBH4278bia Ver 1.2, January 2015
- Geotechnical and Ground Movement Assessment, LBH4278gma Ver 1.2, January 2015
- Flood Risk Assessment, LBH4278fra Ver 1.2, January 2015
- Structural Engineers Report, 1232, January 2015
- Architectural drawing series 177_GA, 177_GE, 177_GS by Twenty First Architecture Ltd.
- Construction Management Plan.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	The Authors of the BIA, Geotechnical and Ground Movement Assessment, and Floos risk assessment are listed on the first page and are adequate.
Is data required by Cl.233 of the GSD presented?	Yes	The various pieces of information are provided in the BIA, Structural Engineers Report, Ground Investigations Report, and construction Method Statement.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	
Are suitable plan/maps included?	Yes	BIA, Engineer's report, and 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	BIA section 3.3. A factual comment has been provided to justify all no answers.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA section 3.3. A factual comment has been provided to justify all no answers.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Screening question referring to risk of flooding not addressed. However, a Flood Risk Assessment has been provided.
Is a conceptual model presented?	Yes	Geotechnical and Ground Movement Assessment Section 4

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	A clear scoping statement is provided for each item carried through from screening.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	No items were carried through from screening.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	Risk of flooding not considered in BIA, however a Flood Risk Assessment has been provided.
Is factual ground investigation data provided?	Yes	Geotechnical and Ground Movement Assessment
Is monitoring data presented?	No	Although two standpipes have been installed in order to allow future ground water monitoring.
Is the ground investigation informed by a desk study?	Yes	BIA sections 2.4 to 2.6
Has a site walkover been undertaken?	Unclear	There is no explicit mention of a site walk over having been carried out. However discussion in the BIA would indicate that a site walk over has been carried out.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Section 5.2 of the Geotechnical and Ground Movement Assessment confirms the presence of a neighbouring basement and the adjacent underground station/tunnel.
Is a geotechnical interpretation presented?	Yes	Section 4 of the Geotechnical and Ground Movement Assessment report.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 4 of the Geotechnical and Ground Movement Assessment report provides soil engineering properties.
Are reports on other investigations required by screening and scoping presented?	Yes	Geotechnical and Ground Movement Assessment report.

Item	Yes/No/NA	Comment
Are baseline conditions described, based on the GSD?	Yes	Geotechnical and Ground Movement Assessment report.
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	BIA section 5.
Are estimates of ground movement and structural impact presented?	Yes	Section 5 in the Geotechnical and Ground Movement Assessment report.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	The points carried through from screening and scoping are discussed with reference to construction measures and techniques proposed to minimise impacts.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	The design and method of construction incorporates mitigation measures in order to minimise risks and impacts.
Has the need for monitoring during construction been considered?	Yes	Section 5.3 of the BIA recommends movement monitoring.
Have the residual (after mitigation) impacts been clearly identified?	N/A	Section 5.4 of the BIA confirms no residual impacts.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	The Ground Movement Assessment and Structural Engineer's report have to be developed further as described in Section 4.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	The BIA confirms that there will be no change to the existing surface water drainage system and no run off into the ground.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	The Ground Movement Assessment and Structural Engineer's report have to be developed further as described in Section 4.

Item	Yes/No/NA	Comment
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, GMA needs to be developed.
Are non-technical summaries provided?	No	Non-technical summaries have not been provided, however the BIA has been written in a way that is easy to understanding without the use of excessive technical terms.

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) and accompanying Geotechnical and Ground Movement Assessment, and Flood Risk Assessment have been carried out by a well-known firm of geotechnical and environmental consultants, LBH Wembley, and the individuals concerned in its production have suitable qualifications.

4.2. The Structural Engineers Report has been carried out by a well known form of engineering consultants, Heyne Tillett Steel. The qualifications of the author of this report are not provided, however the requirement for qualifications has been met by the author of the BIA.

4.3. There is an existing building on the site that consists of several different forms of construction including load bearing masonry and concrete framing. The site is an 'L shape' which fronts onto both Haverstock Hill and Crogsland Road, wrapping around a public house, The Enterprise, that is located on the corner junction of the two roads. The existing building has no accessible basement, however it is anticipated that previous ground construction may existing from historic developments.

4.4. The BIA confirmed that the neighbouring public house has a basement, thought to be single storey. Chalk Farm London Underground station under Haverstock Hill immediately adjacent to the property.

4.5. The proposal consists of demolishing the existing building, retaining only the masonry façade to Crogsland Road. The new structure is to consist of a basement to a depth of approximately 10m to house a cinema covering the entire site area, with a ground floor level containing further cinema and restaurant space also covering the entire site. A further four floors over the front and rear of the site will provide residential units separated by a light well between.

4.6. The basement walls are to be formed by reinforced concrete contiguous piles with an inboard reinforced concrete liner wall. The basement slab and ground slab are also to be constructed of reinforced concrete creating a complete concrete box making up the basement level. From the first floor upwards the construction is to be of concrete or steel framing or a combination of the two. The retaining wall calculations in the SER are not legible and it has not been demonstrated that the proposed 600mm diameter piles and 300mm lining wall are sufficient for the proposed propping arrangement.

4.7. The piled walls are to be constructed using continuous flight auger piles. This method of piling is sympathetic to situations where low levels of deflection and vibration are required as the excavation for the piles is never entirely void.

4.8. The method of construction proposed for the basement is top down construction. Once the existing structure has been demolished, the perimeter piled walls are to be constructed from the ground level. The ground slab will then be constructed prior to the ground level being reduced and the slab constructed as to span between, and provide propping to, the head of the piled walls. The ground level will be reduced via openings in the ground floor slab with further temporary propping provided to the piled walls as the excavation proceeds. Once the final dig level has been reached the basement slab will be cast along with the reinforced concrete walls to the inside face of the piled walls. The temporary propping will then be removed to the piled walls as the box has been completed with permanent restraint provided to the top and base of the walls.

4.9. The above mentioned method of top down construction is considered good practice where movements in the surrounding ground are to be minimised. This is due to the ground slab being constructed prior to the reduction of the ground levelling, therefore the permanent lateral propping to the tops of the piles is already provided without the requirement to provide temporary propping during the construction phase of the works.

4.10. Two bore holes were carried out on site which identified 1.5m of made ground overlaying London Clay to the depth of the boreholes (30m below ground level). No groundwater was encountered in the boreholes during boring, although there has been no subsequent monitoring reported.

4.11. The BIA states that due to the basement being founded within the impermeable London Clay, there is no disruption to ground water flows. This is the accepted when considering basements situated within the London Clay due to it being an 'Unproductive Stratum', ie not an aquifer.

4.12. It is confirmed that the nearest surface water feature is the now culverted River Fleet approximately 300m away from the site. The screening and scoping process has not considered the risk of flooding, however, a Flood Risk Assessment has concluded that the risk of flooding at the site is very low.

4.13. Details of the existing surface water drainage system are currently unknown which currently consists entirely of hardstanding and roof areas, however it is assumed that all surface water flows are currently discharged into the existing sewer system. The proposal for the new site also consists entirely of hardstanding and roof areas and it is proposed for all new surface water drainage to discharge into the sewer system. Therefore there will be no effect on the surface water environment.

4.14. Heave protection measures have been taken to limit the forces exerted by heave in the clay sub soil by way of providing compressible material below the basement slab and of tension piles to

the basement slab. This is accepted as good design due to the significant depth (10m) of overburden that is to be removed from the high heave potential London Clay.

4.15. A full movement monitoring plan has not yet been produced, however it is proposed that the neighbouring properties be monitored for both horizontal and vertical movement. The plan provided suggests that readings be taken at the beginning and end of every shift during the basement excavation phase, with pre agreed trigger levels and courses of action being adhered to. This outline for a movement monitoring plan is considered good practice and should be implemented.

4.16. A ground movement assessment and damage assessment was carried out due to the ground stability potential impacts raised by the screening and scoping exercise. This comprised of a ground model being developed and analysed based on the ground investigations and the guidance given in CIRIA Report C580. Contour plots were provided detailing contours of horizontal and vertical movement in the areas around the site. The Burland category of damage based on strains predicted from these movements was found to be Burland category 1 (very slight) for all the surrounding properties which is within the limiting threshold of Burland Category 2.

4.17. Whilst contour plots for vertical and horizontal movement are provided associated with excavation, pile installation and yielding of the wall, the discussion of ground movements within the text ignores likely horizontal movements. In the building damage assessment it is not clear what differential movements have been assumed over the width of the affected buildings and what assumptions have been made for the building dimensions. It is also noted that some of the predicted ground movements are less than would be predicted from CIRIA C580 and it is questioned whether the suggested undrained shear strength for the London Clay represents a moderately conservative assessment.

4.18. Whilst the GMA predicts negligible damage to the adjacent tunnel, final approval will be required from London Underground. It is noted in the geotechnical and ground movement assessment report that discussions are underway with London Underground Ltd to gain approval for the scheme. It is also mentioned in the Structural Engineer's report that the Party Wall process needs to be followed during the next stage of the project. These are two statutory requirements must be concluded prior to the works starting on site.

4.19. The BIA confirms that the area is generally flat and that the wider area contains a gentle slope, ground stability due to unstable ground is therefore concluded as not an issue with this proposal. This is accepted.

5.0 CONCLUSIONS

5.1. The BIA and the associated reports have been completed by well-known consultancies and authors who have the required qualifications.

5.2. The proposal is to demolish an existing building while retaining a masonry façade, and to construct a new 10m deep basement with up to four storeys of super structure.

5.3. The basement will be founded in the London Clay. It is not anticipated that the ground water table will be encountered during basement excavation.

5.4. The basement will not affect ground water flows due to the basement being above the ground water level and within the impermeable London Clay.

5.5. The surface water runoff will not be affected and a like for like development covered entirely of entire roof and hardstanding areas is proposed. The screening and scoping process has not considered the risk of flooding. However, a Flood Risk Assessment has identified the risk to be very low.

5.6. It is accepted that the use of continuous flight auger formed contiguous piled basement walls along with top down construction techniques will mitigate disturbances and ground movement to the surrounding buildings and London Underground tunnel. However, the retaining wall calculations are illegible and it has not been demonstrated that the proposed 600m diameter retaining wall and 300mm liner wall have sufficient capacity for the proposed excavation height and permanent propping arrangement.

5.7. Heave protection due to excavation into the high heave capacity London Clay has been incorporated into the design. It is understood the piles will be designed to accommodate resultant tensile loads.

5.8. A damage assessment has been produced and has calculated that damage is Burland Category 1 (very slight) or less. However, clarification is required of a number of assumptions made as described in Section 4.

5.9. An outline of a movement monitoring regime has been provided. This will need to be developed further prior to the commencement of the works.

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

Appendix 1: Resident's Consultation Comments

None pertinent to BIA

Appendix 2: Audit Query Tracker

CampbellReith
consulting engineers

Audit Query Tracker
No queries

Query No	Subject	Query	Status	Date closed out
1	Stability	Retaining wall calculations are illegible and do not confirm that proposed arrangement is adequate for proposed Scheme	To be provided in legible format with justification for proposed pile diameter	
2	Stability	Clarification required of some assumptions made in Ground Movement Assessment	To be provided	
3	Stability	It is noted that LUL approval will be required separately. Proposals for monitoring should the further developed	-	N/A

Appendix 3: Supplementary Supporting Documents

None