CampbellReith
consulting engineers

17 Branch Hill, London, NW3 7NA

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12066-49
Revision: D1

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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 (BIA) submitted as part of the Planning Submission documentation for 17 Branch Hill, London, NW3 7NA (planning reference 2015/3377/P). The basement is considered to fall within Category B as defined by the Terms of Reference.

1.2. The Audit reviewed the BIA 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 BIA was accompanied by a ground investigations report, structural engineers report, and arboricultural report. All these reports were produced by established consultancies with experience in their respective fields, with the authors holding the appropriate qualifications.

1.4. The basement does not involve a listed building.

1.5. The proposal involves the demolition of an existing property containing a basement level, and the construction of a new property containing a basement level to a lower depth.

1.6. The documents reviewed comprise the BIA, a ground investigation report, structural engineers report, and arboricultural report. There is no evidence of a Chartered Geologist having been involved in the preparation of the documents. No formal assessment of the potential impacts of the basement has been provided therefore it cannot be confirmed that the scheme has no adverse effects on stability or the water environment.

Will get a CGEOL to sign this off

1.7. The basement will be founded within the Bagshot Beds Formation, a sand formation with clay and silt content. This overlays the Claygate Member and the London Clay.

1.8. Ground water was reported to be located and stable at 7.1m below ground level, several metres below the required excavation level and underside of the basement. The Bagshot Beds are classed as a Secondary Aquifers, however given the water table identified and the clay content of the sub soil it was concluded that ground water flows are not likely to be disrupted or affect the wider hydrology of the area. This should be confirmed in a formal impact assessment.

1.9. The slope angle at the site is shallow due to a series of retaining walls that have been introduced to remodel the original more steeply sloping ground. Care must be taken when remodelling the ground further in order to avoid any local ground instabilities that may arise during the temporary case. This should be developed in a more detailed construction and temporary works methodology.

1.10. The nearest surface water features are greater than 100m from the site and the site does not have a history of flooding. It is concluded that the risk of surface water flooding is low and this is accepted.

1.11. The basement construction is to consist partially of retained retaining walls from the original construction, and partially from new piled walls, all of which contain an inboard reinforced concrete lining wall. The walls are to be propped during the temporary and permanent stages. The use of contiguous piles where new areas are to be retained is recognised as a suitable method for formation of the basement wall while minimising ground movement.

Masonry lean-to shed.

1.12. No movement assessment has been carried out as it has been deemed unnecessary due to the property being detached. However there is a "existing garden building" on the neighbours land very close to the boundary. Further details of this structure are required and the works along the boundary in this location which appear to involve sheet piling. A formal impact assessment is required to confirm whether or not a ground movement assessment is required.

1.13. Proposed visual monitoring has been recommended to the retaining walls and the neighbouring garden building. The requirements for monitoring should be determined on the basis of a formal assessment of the potential basement impacts.

The BIA to be re-written with a separate scoping exercise

1.14. As noted above, no formal impact assessment has been produced following the scoping exercise. While impacts have partially been discussed in the scoping phase a formal impact assessment would be beneficial to further determine the impacts of the factors discussed in scoping.

As BS8002:2015

1.15. It appears that a loading of 3kN/m^2 has been adopted for the external areas which is below 10kN/m^2 that is usually adopted for surcharge pressures on retaining structures. Clarification is to be provided if 3kN/m^2 has been used for surcharge loading and if so justification for this value.

1.16. It is recommended that the BIA is revised and re-submitted with the requested additional information/clarifications.

1.17. A summary of the issues to be resolved is presented in Appendix 2. These are described in greater detail in Section 4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 07/08/2015 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 17 Branch Hill, NW3 7NA (planning reference 2015/3377/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 *"Erection of a part 2 and part 3 storey plus basement single family dwelling (following demolition of existing) with plant room, swimming pool (including air handling unit) and 5 condenser units."*

2.6. CampbellReith accessed LBC's Planning Portal on 14/09/2015 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment; Site Analytical Services Ltd, 14/22714-2, May 2014.

SAS Phase 1 Report missing from Planning.

- Structural Engineer's Design Statement for Planning; EngineersHRW, June 2015.
- Report on Ground Investigation; Site Analytical Services Ltd, 14/22714, May 2014.
- Construction Management Plan, June 2015.
- Arboricultural Impact Assessment, Landmark Trees, SHH/17BRH/AIA/02a, 27/06/15
- Planning application drawings, SHHArchitects;

  Existing - Lower Ground Floor, (779)010_P03, 15/06/15

  Existing - First Floor, (779)012_P02, 15/06/15

  Existing – Section BB, (779)311_P02, 15/06/15

  Existing – Section CC, (779)312_P02, 15/06/15

  Existing – Section DD, (779)313_P02, 15/06/15

  Existing – North Elevation, (779)200_P03, 22/06/15

  Existing – East Elevation, (779)201_P03, 22/06/15

  Existing – South Elevation, (779)202_P03, 22/06/15

  Existing – West Elevation, (779)203_P03, 22/06/15

  Proposed - Lower Ground Floor, (779)020_P04, 22/06/15

  Proposed – Ground Floor / Garden Level, (779)021_P03, 22/06/15

  Proposed – First Floor, (779)023_P02, 15/06/15

  Proposed – Roof, (779)024_P02, 15/06/15

  Proposed - Section AA, (779)300_P04, 22/06/15

  Proposed - Section BB, (779)301_P03, 22/06/15

  Proposed - Section CC, (779)302_P02, 15/06/15

  Proposed - Section DD, (779)303_P03, 22/06/15

  Proposed – North Elevation, (779)204_P02, 15/06/15

  Proposed – East Elevation, (779)205_P03, 22/06/15

  Proposed – South Elevation, (779)206_P03, 22/06/15

  Proposed – West Elevation, (779)207_P03, 22/06/15

  Long Section – (779)304_P01, 15/06/15

- Structural drawings, HRWEngineers

  Lower Ground Floor Plan, 1281/GA/010, 10/06/15

  Ground Floor Plan, 1281/GA/011, 10/06/16

  First Floor Plan, 1281/GA/013, 10/06/16

  Section AA, 1281/SE/020, 10/06/16

Section BB, 1281/SE/021, 10/06/16

Temporary Works – Plan, 1281/SK008 P2, 10/06/15

Temporary Works – Section, 1281/SK009 P2, 10/06/15

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Query over geologists qualifications? Appears contrary to previous comments in para 1.4.

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	YES	The BIA lists the qualifications of those who prepared the report in section 1. The qualifications listed are suitable.
Is data required by Cl.233 of the GSD presented?	YES	The requested information is provided in the BIA and the various reports.
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 impact assessment and structural engineers report.
Are suitable plan/maps included?	PARTIALLY	Sufficient architectural and engineering plans are provided. However maps indicating geological conditions or other maps from the GSD are not provided. Will revise BIA
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	NO	Maps showing the wider area of study particularly of geological or hydrological conditions are not provided. Will revise BIA
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	NO	Data sources or maps have generally not been referenced in comments. Factual comments have been provided for each question.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	YES	Factual comments provided for each question.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	NO	Data sources or maps have not been referenced in comments. Factual comments have been provided for each question with references where relevant. Will revise BIA

Item	Yes/No/NA	Comment
Is a conceptual model presented?	YES	BIA Section 3
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	YES	BIA section 5.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	YES	BIA Section 4.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	N/A	Not required by screening. Will revise BIA
Is factual ground investigation data provided?	YES	Report on Ground Investigation.
Is monitoring data presented?	YES	Report on Ground Investigation details water monitoring method and data.
Is the ground investigation informed by a desk study?	PARTIALLY	A desk study is referenced in the report on ground investigation, however this report was not submitted for planning.
Has a site walkover been undertaken?	YES	The basement impact assessment confirms that a site walkover was carried out on 10th October 2014.
Is the presence/absence of adjacent or nearby basements confirmed?	NO	The presence of neighbouring basements has not been discussed. There are none.
Is a geotechnical interpretation presented?	YES	Report on Ground Investigation.
Does the geotechnical interpretation include information on retaining wall design?	YES	Soil properties are provided to be used in retaining wall design.

Item	Yes/No/NA	Comment
Are reports on other investigations required by screening and scoping presented?	NO	
Are baseline conditions described, based on the GSD?	YES	Section 3 in the BIA.
Do the base line conditions consider adjacent or nearby basements?	N/A	The presence of adjacent basements has not been discussed. However the property is remote from other dwellings and it is confirmed that the ground water is not affected by the proposed basement.
Is an Impact Assessment provided?	NO	No formal impact assessment has been provided. However some discussion of impacts has been carried out in the scoping stage. The BIA to be revised.
Are estimates of ground movement and structural impact presented?	NO	It is concluded that there is potential for the proposed basement to cause movement in the surrounding ground. However due to the property being detached it was concluded that a ground movement assessment is unnecessary.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	NO	Expansion on impact assessment is required, ideally separated into a formal impact assessment. The BIA to be revised.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	NO	Recommendations are made to reduce impacts, although these are generally statutory recommendations such as adhering to the party wall process and are not bespoke recommendations.
Has the need for monitoring during construction been considered?	YES	Monitoring of the existing retaining walls and adjacent garden lean to building have been suggested.
Have the residual (after mitigation) impacts been clearly identified?	NO	It is unclear whether any impacts remain. The BIA to be revised.
Has the scheme demonstrated that the structural stability of the	NO	No damage assessment has been carried out as it is claimed to be

Item	Yes/No/NA	Comment
building and neighbouring properties and infrastructure will be maintained?		unnecessary due to the property being detached. The slopes are concluded to be stable in the immediate area.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	YES	No surface water or flooding questions were carried further from screening. The BIA to be revised.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	NO	The presence of adjacent basements has not been discussed. There are none.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	NO	No damage assessment was carried out. Only nearby structure is a masonry lean-to shed.
Are non-technical summaries provided?	NO	However the BIA is written in a way that is easy to understand. Suggests report requires a more distinct summary.

4.0 DISCUSSION

4.1. The proposal is to demolish an existing three storey building (including lower ground floor level), and to construct a 3 and a half storey (including lower ground floor level and pool) property of a comparable size to the existing.

4.2. The site is graded in a way that the southern side of the site is lower than the north by approximately a storey's depth. This leaves the basement at ground level on the southern side and below ground on the northern side. The BIA and plans refer to the basement as a lower ground floor.

4.3. The existing site contains differing ground levels which are retained by existing retaining walls. The proposal includes some remodelling of the ground levels with the construction of new retaining walls.

4.4. The lower ground floor includes a swimming pool that is partly internal and partly external.

4.5. 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.

4.6. The lowest depth of the proposed basement will be approximately 2.5m deeper than the existing lower ground floor.

4.7. The Basement Impact Assessment (BIA) has been carried out by site investigation consultants, Site Analytical Services Ltd. The individual concerned in its production is not shown to have suitable qualifications. Will get a CGEOL to sign off.

4.8. The Report on a Ground Investigation is an interpretive ground investigation report also produced by Site Analytical Services Ltd.

4.9. The Structural Engineers Design Statement for Planning details the design concepts and outline method statement for construction of the basement. The report has been produced by engineersHRW, an established engineering consultancy, the individuals concerned in its production have suitable qualifications.

4.10. An Arboricultural Impact Assessment Report has been produced detailing the impact on the nearby trees and recommendations. This has been produced by Landmark Trees, an established arboricultural consultancy.

The BIA to be revised.

4.11. A formal assessment of potential basement impacts has not been carried out although some discussion of impacts is presented in the scoping stage and the conclusions sections of the

report. A formal basement impact assessment should be provided following on from the scoping stage.

4.12. A ground movement assessment has not been carried out as it has been deemed to be unnecessary due to the proposed development being detached. However the structural lower ground floor plan indicates that underpinning to the neighbouring building may be required, and show the construction of a retaining wall almost immediately adjacent to the neighbouring building, in which case a ground movement assessment is required. Underpinning to be deleted.

4.13. The formation of the lower ground floor (basement) level is to be constructed utilising a number of differing construction methods to suit the site conditions. A large portion of the perimeter basement wall is to be constructed using contiguous piles with an inboard reinforced concrete liner wall. In other areas the existing retaining wall is to be retained, with a new reinforced concrete liner wall constructed inboard.

4.14. The method of construction in the structural engineers report details that the upper floors of the existing structure are to be demolished initially with the lower ground floor slab and laterally supporting elements retained. The contiguous piled walls are then to be installed with lateral propping provided prior to the remaining ground structure being removed. This method provides an outline method of construction that follows a logical best practice path. However a more detailed method statement and sequence of works will be required prior to construction. By contractor.

4.15. Along the Eastern boundary a sheet piled wall is shown along the boundary on the structural lower ground floor plan. It is also shown on the temporary works plan and indicated as being an item of temporary structure. This wall is situated very close to the edge of a neighbouring garden structure of unknown construction. It would not normally be acceptable to construct a driven sheet piled wall immediately close to a rigid structure. Further details are required. The drawings will be revised to show trench sheeting.

4.16. The temporary works drawing indicates temporary propping to the proposed piled and existing retaining walls during construction. The Structural Engineer's report confirms that permanent propping will be provided by the ground floor slab once this has been constructed. This is good construction practice to minimise deflections and ground movement during the construction and permanent cases.

4.17. The site investigation report indicates that the basement will be located within the Bagshot Beds formation. The Bagshot Beds formation is a clayey sand that and it is concluded that this stratum has the capacity to carry ground water flows, although any such flows are likely to be limited due to the clay content. The cumulative effect is not considered in relation to potential nearby basements (which are neither confirmed or otherwise).

4.18. The groundwater level was monitored and found to stabilise at approximately 7m below ground level, this is below the underside of the proposed basement level.

4.19. Surface water flows have been concluded as not being disrupted. None of the surface water questions were taken beyond the screening stage and justification was provided for each answer. The area of hardstanding is not expected to change and existing surface water drainage routes are to be maintained.

4.20. The site is reported to be not within the catchment area of Hampstead ponds, nor is it within a flood risk area.

4.21. The BIA indicates that the site contains slopes of 3-5 degrees which are considered to be stable. However a risk of "running sand" and local ground instability has been identified. Measures have been recommended to batter back slopes or to provide lateral support. This is accepted although no further details of how this would be implemented during the construction of the retaining walls are provided within the Structural Engineer's report. Retaining walls adopted generally.

4.22. The arboricultural impact assessment in the arboricultural report concludes that of the trees that are proposed to be retained the impact on each from the basement will be low or very low in practice. Adjusted root protection areas have been calculated to account for how existing subterranean structure has impacted root growth.

4.23. Due to the new lower ground floor being constructed to a significantly lower depth than the existing (2.5m approx) an allowance for heave of the sub soil has been included. The lower ground floor slab is to be situated on compressible material to allow for ground heave to occur, while piles support the perimeter walls and point loads.

4.24. The structural engineers report indicates that the design has been carried out with an external areas loading of 3.0kN/m^2. This is below the 10.0kN/m^2 surcharge loading that is called for by BS8002. Clarification should be provided as to if 3.0kN/m^2 has been taken for the surcharge loading of retaining structures and if so justification for this value.

Latest edition of BS8002 suggests 2.5kN/m2. Will amend to 10kN/m2 for construction load case.

5.0 CONCLUSIONS

5.1. The documents reviewed comprise the BIA, a ground investigation report, structural engineers report, and arboricultural report. There is no evidence of a Chartered Geologist having been involved in the preparation of the documents. No formal assessment of the potential impacts of the basement has been provided therefore it cannot be confirmed that the scheme has no adverse effects on stability or the water environment. The BIA to be revised.

5.2. The basement will be founded within the Bagshot Beds Formation, a sand formation with clay and silt content. This overlays the Claygate Member and the London Clay.

5.3. Ground water was reported to be located and stable at 7.1m below ground level, several metres below the required excavation level and underside of the basement. The Bagshot Beds are classed as a Secondary Aquifers, however given the water table identified and the clay content of the sub soil it was concluded that ground water flows are not likely to be disrupted or affect the wider hydrology of the area. This should be confirmed in a formal impact assessment. The BIA to be revised.

5.4. The slope angle at the site is shallow due to a series of retaining walls that have been introduced to remodel the original more steeply sloping ground. Care must be taken when remodelling the ground further in order to avoid any local ground instabilities that may arise during the temporary case. This should be developed in a more detailed construction and temporary works methodology.

5.5. The nearest surface water features are greater than 100m from the site and the site does not have a history of flooding. It is concluded that the risk of surface water flooding is low and this is accepted.

5.6. The basement construction is to consist partially of retained retaining walls from the original construction, and partially from new piled walls, all of which contain an inboard reinforced concrete lining wall. The walls are to be propped during the temporary and permanent stages. The use of contiguous piles where new areas are to be retained is recognised as a suitable method for formation of the basement wall while minimising ground movement.

5.7. No movement assessment has been carried out as it has been deemed unnecessary due to the property being detached. However there is a "existing garden building" on the neighbours land very close to the boundary. Further details of this structure are required and the works along the boundary in this location which appear to involve sheet piling. A formal impact assessment is required to confirm whether or not a ground movement assessment is required.

The BIA to be revised.

5.8. Proposed visual monitoring has been recommended to the retaining walls and the neighbouring garden building. The requirements for monitoring should be determined on the basis of a formal assessment of the potential basement impacts.

5.9. As noted above, no formal impact assessment has been produced following the scoping exercise. While impacts have partially been discussed in the scoping phase a formal impact assessment would be beneficial to further determine the impacts of the factors discussed in scoping. The BIA to be revised.

5.10. It appears that a loading of 3kN/m^2 has been adopted for the external areas which is below 10kN/m^2 that is usually adopted for surcharge pressures on retaining structures. Clarification is to be provided if 3kN/m^2 has been used for surcharge loading and if so justification for this value. Latest edition of BS8002 suggests 2.5kN/m2. Will amend to 10kN/m2 for construction load case.

5.11. It is recommended that the BIA is revised and re-submitted with the requested additional information/clarifications.

Appendix 1: Resident's Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Farnworth	2c Lindfield Gardens	7/08/2015	The basement and swimming pools can cause long term damage to neighbouring properties and environment, especially the subterranean water flow.	The BIA required a formal impact assessment to demonstrate that the groundwater flow and the wider hydrological environment will not be affected.
Lombardo	6 Firecrest Drive	7/08/2015	Basement excavation often causes damage to neighbouring properties, and typically these problems appear a few years after the works.	Further information has been requested from the applicant regarding ground movement and the potential for damage to neighbouring buildings.
Lombardo	6 Firecrest Drive	7/08/2015	The presented BIA doesn't appear to be supported by a good quality, site-specific ground investigation accompanied by long-term monitoring of water levels.	The report entitled "Report on a Ground Investigation" ref 14/22714 provides site specific ground investigation data and interpretation including groundwater monitoring. A formal impact assessment has been requested.

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Stability	The construction of the neighbouring "existing garden building" should be confirmed and the need for a ground movement assessment determined on the basis of the revised BIA a ground movement assessment is required.	To be included in revised BIA	The garden building is a single storey masonry structure. Appears to be a shed. Not a residential use shown on planning applications. Adjacent excavation approx. 1m.
2	Stability	Confirming if 3.0kN/m^2 has been taken as surcharge loading for retaining structures and if so justification for this value provided.	To be included in revised BIA	Current BS8002 suggests 2.5kN/m2. Will amend to 10kN/m2 for construction load case.
3	Stability	Further details of the temporary sheet piling along the boundary and an inclusion of this in the method statement.	To be included in revised BIA	Trench sheeting not piling and underpinning deleted.
4	Stability/Groundwater	The BIA is now complete. A formal impact section by appropriately qualified personnel should be included in the BIA taking the points forward from the scoping stage. The references consulted in the screening process should be identified.	To be included in revised BIA	The BIA to be revised.
5	Stability	The site is sloping and the method statement should describe the sequence of construction to deal with this and the potential identified risk of 'running sand'.	To be included in revised BIA	See section 7.0 of Structural Engineers Design statement. All retaining walls to be constructed behind pile walls or trench sheeting.

Appendix 3: Supplementary Supporting Documents

None

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