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59 Solent Road
London, NW6 1TY

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12066-23
Revision: F1

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Planning Reference	2016/4460/P

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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 59 Solent Road, NW6 1TY (planning reference 2016/4460/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 Authors of the BIA and the Hydrogeological assessment report hold the required qualifications.

1.5. The proposal involves the formation of a single basement level to the entire plan area of the existing terrace property and to the rear, along with a light well to the front. One neighbouring property contains an existing basement level.

1.6. Appropriate site investigations have been carried out to identify geology and existing structure.

1.7. The geology has been identified as a shallow depth of made ground overlaying London Clay.

1.8. Appropriate structural drawings and calculations have been produced, with the proposal involving typical construction techniques for a retrofit basement.

1.9. Appropriate outline temporary works and a construction sequence have been proposed.

1.10. It has been demonstrated that the proposal does not increase surface water discharge to the existing sewer system. Discharge flow rates should be agreed with Thames water and attenuated, as required.

1.11. It has been confirmed that there are no slope stability concerns related to the proposed development, this is accepted.

1.12. It has been demonstrated that the basement will not impact the wider hydrogeological environment.

1.13. A flood risk assessment has been produced that concludes a low flood risk and the appropriateness of the proposed development.

1.14. An appropriate ground movement assessment has been carried out. An appropriate movement monitoring strategy has been provided.

1.15. It has been confirmed that the basement does not impact trees within the local area.

1.16. An outline works programme has been produced.

1.17. Considering the revised BIA submissions, the BIA meets the criteria of CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 3/11/16 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 59 Solent Road, NW6 1TY, planning reference 2016/4460/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;

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 of basement level with front lightwell and erection of a single storey rear extension following the demolition of the existing rear additions to dwelling (Class C3)."

The Audit Instruction also confirmed 59 Solent Road, neither involved, nor was a neighbour to, listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 15/11/16 and gained access to the following relevant documents for audit purposes:

- Basement Impact assessment - Hardman Structural Engineers, October 2016
- Basement Structural Calculations – MMP Design, March 2016
- Structural Drawings – MMP Design
    - 01 – Structural Details Sheet 1
    - 02 – Structural Details Sheet 2
    - 03 - Structural Details Sheet 3
    - 04 – Structural Details Sheet 4
- Planning Drawings – Paul Archer Design
    - 700.000 – Site location plan
    - 700.201 – Existing ground and first floor plans
    - 700.202 – Existing sections A-A & B-B
    - 700.203 – Existing section C-C & D-D
    - 700.204 – Existing front and rear elevations
    - 700.210 – Proposed basement plan
    - 700.211 – Proposed ground floor & first floor plans
    - 700.212 – Proposed section A-A
    - 700.213 – Proposed section B-B
    - 700.214 – Proposed sections C-C & D-D
- Planning Comments and Response

2.7. Following issue of the D1 revision of this audit, the following further information was received from the applicant;

- Architectural drawings – Paul Archer Design
    - 700.201a – Existing ground and first floor plans
    - 700.210a – Proposed basement
    - 700.211a - Proposed ground and first floor plans

- 700.212a –Section A-A
- 700.213a – Proposed section B-B
- 700.214a – Proposed front and rear elevations
- 700.215a – Proposed side elevations

· Structural drawings – Hardman Structural Engineers

- 01 – 06
- 21
- 401-403
- 11-15
- 31-33
- 41
- 51
- 61
- 101-109

· Cover letter "Updates to BIA audit"

· Outline programme

· Flood risk assessment – ARK Environmental Consultancy Ltd

· Existing and proposed ground floor plan permeable area comparison – SK700.12

· Sequence Drawings – Hardman Structural Engineers

- SK04-SK11

2.8. Following the D2 issue of this report the following additional information was received from the applicant in response to the queries raised;

· Architectural drawings – Paul Archer Design

- 700.210c – Proposed basement
- 700.211d - Proposed ground and first floor plans
- 700.212c –Section A-A
- 700.213c – Proposed section B-B

- 700.214d – Proposed front and rear elevations
- 700.215c – Proposed side elevations

- Basement Impact Assessment Revision A – Hardman Structural Engineers
- Hydrogeology Basement Impact Assessment (Appended to BIA) – Chelmer
- Ground Movement Assessment (Appended to BIA) – Chelmer
- CCTV survey (Appended to BIA)

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 and hydrogeological report hold the required qualifications.
Is data required by Cl.233 of the GSD presented?	Yes	An outline works program has been provided along with the other appropriate information required by clause 233.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	Appropriate drawings and explanations of the permanent and temporary works are provided.
Are suitable plan/maps included?	Partially	Site and location plans only have been provided. Other sources are referenced to support screening, although they are not provided in the BIA.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	Architectural and structural plans that have been provided in adequate detail.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	The screening incorrectly indicates that the basement is more than 5m from a highway or pedestrian right of way.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Generally data sources have been referenced.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Generally data sources have been referenced with a factual statement to justify no answers.
Is a conceptual model presented?	Yes	Basement impact assessment.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	A scoping statement has been provided for each no answer.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	N/A	No hydrogeological questions were carried forward from screening.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	N/A	No hydrological questions were carried forward from screening.
Is factual ground investigation data provided?	Yes	Factual ground investigations report by Chelmer.
Is monitoring data presented?	No	No mention of repeated visits to monitor ground water levels was discussed.
Is the ground investigation informed by a desk study?	Partially	A full desktop study has not been carried out, however some discussion of anticipated geology taken from geotechnical maps, and the history of the site, has been undertaken.
Has a site walkover been undertaken?	Yes	It is mentioned in the land stability screening that a site walkover has been undertaken.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	It is confirmed that one of the adjoining properties contains a basement level.
Is a geotechnical interpretation presented?	Yes	Bearing pressures and plasticity of clay is described in section 3.2.1 of the BIA.
Does the geotechnical interpretation include information on retaining wall design?	No	No engineering parameters have been obtained from the site investigations with relation to retaining wall design.
Are reports on other investigations required by screening and scoping presented?	Yes	A flood risk assessment has been produced.

Item	Yes/No/NA	Comment
Are the baseline conditions described, based on the GSD?	Yes	Suitable plans and discussion has been provided to provide information regarding the baseline conditions.
Do the base line conditions consider adjacent or nearby basements?	Yes	The presence of a basement to No 57 has been discussed.
Is an Impact Assessment provided?	Yes	Section 4 of the BIA.
Are estimates of ground movement and structural impact presented?	Yes	A ground movement assessment has not been carried out.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	The two items raised from scoping were adequately discussed in the impact assessment.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	The requirement for mitigation measures has not been discussed.
Has the need for monitoring during construction been considered?	Yes	An appropriate monitoring strategy has been proposed that incorporates the neighbouring properties.
Have the residual (after mitigation) impacts been clearly identified?	No	Residual impacts have not been discussed.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	A ground movement assessment has been carried out and appropriate outline temporary works details have been provided.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	It is demonstrated that the area of non-permeable area is decreasing.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	A ground movement assessment has been carried out and the hydrogeology has been interpreted correctly.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	A ground movement assessment has not been carried out and calculated a worst case damage category of 1.

Item	Yes/No/NA	Comment
Are non-technical summaries provided?	No	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by an established firm of civil and structural engineering consultants, Hardman Structural Engineers. The individuals concerned in its production have suitable qualifications for slope stability and hydrology.

4.2. A Hydrogeology impact assessment has been produced by Chelmer who hold the relevant CGeol qualification in relation to the hydrogeological aspect of the BIA.

4.3. The LBC Instruction to proceed with the audit identified that the basement proposal neither involved a listed building, nor was adjacent to listed buildings. The property is also not within a conservation area.

4.4. The proposal involves the formation of a single basement level to the entire plan area of the existing building, to the rear beneath the existing garden, and including a light well to the front. The ground floor is also being extended to the rear which will be constructed over the new basement level.

4.5. Intrusive site investigations have been carried out with a factual report produced by Chelmer, a well-known site investigations firm. Site investigations have comprised of a boreholes in both the front and rear garden, and trial pits to the front wall and the internal party wall with No 61 Solent Road. Soil testing was carried out both in situ and in the lab to determine soil properties.

4.6. The geology was identified as being made ground to a depth of 0.7m, underlain by London Clay proved to a depth of 8m.

4.7. The BIA is appended by a set of structural drawings by Hardman that detail an outline structural scheme, along with demolition and sequence drawings. A separate set of detailed structural drawings have been produced by MMP Design. These two sets of drawings are broadly in agreement with regards to the basement permanent works.

4.8. The proposed basement walls are to be reinforced concrete underpinning where beneath existing walls, and reinforced concrete retaining walls to the front lightwell and rear basement wall beneath the garden. Underpinning is to incorporate a toe to transfer loads to the ground, with a portion of compressible material beneath the internal areas of the basement slab to protect again ground heave.

4.9. Demolition and sequence drawings have been appended to the BIA. These indicate an outline method of construction showing indicative temporary works required at each stage. The sequence drawings indicate the demolition of the existing ground floor structure with the excavation of the basement area being carried out internally.

4.10. It has been stated that discharge of surface water into both the sewer system and run off to the ground will not increase. A drainage survey has been carried out that concludes that the existing surface water drainage does not enter the foul water drainage system and is likely discharging to soakaways within the garden, although the surface water drains were not able to be surveyed. Due to the underlying ground conditions, and presence of impermeable London Clay at shallow depths, this is considered unlikely. It is recommended that surface water discharge flows to drainage are calculated and assumed to drain to combined sewers. The flow rate should be agreed with Thames Water, to be attenuated to meet their requirements.

4.11. It has been confirmed that the basement will not extend below the ground water level, and that the site is not above an aquifer. Therefore no further discussion has been carried out with regards to the impact on ground water flows or hydrogeology. It is accepted that individual or cumulative impact on strategic groundwater flows is negligible. However, care should be taken during construction as local ground water flows within the Made Ground may still be present.

4.12. It has been confirmed that there are no slope stability concerns related to the proposed development, this is accepted.

4.13. While the surface water flow screening did not identify the site as being at risk of flooding, it did identify that adjacent roads were and therefore recommended that a flood risk assessment be carried out. A flood risk assessment has been produced that concludes that the proposed use of the basement is acceptable given the low flood risk identified.

4.14. The slope stability screening indicates that the basement is not within 5m of a highway or pedestrian right of way. However, by inspection, it appears that the front wall of the basement, or the front lightwell, is within 5m of the pavement and possibly the highway. The screening, scoping, and impact assessment should be updated to reflect this.

4.15. It has been identified that the differential foundation depth with neighbouring property will be increased and a ground movement assessment has been produced. The ground movement assessment makes the statement “extensive past experience has shown that the bulk movement of the ground alongside underpins for a single storey basement should not exceed 5mm horizontally”. This 5mm value has then been reduced to 3.9mm to pro rata for the fact that the basement is 2.7m which the author considers less than a full height single storey basement. The vertical movement has been calculated as a combination of settlements predicted by PDISP and vertical movements calculated in accordance with CIRIA 580. These vertical and horizontal movements are then used to calculate the damage category in accordance with the method set out in CIRIA 580, which is calculated as a worst case of 1. It is generally accepted that total horizontal movements for an unpropped L shaped underpinning wall which is supporting an axial load from the existing building is unlikely to experience horizontal deflections greater than 0.2% of the excavation depth, assuming good workmanship.

This is approximately in agreement with the horizontal deflection values taken in the ground movement assessment.

4.16. Structural calculations have been provided for the basement walls, and internal steel framing. The structural calculations do not appear to have relied upon the site investigations that were carried out in order to obtain soil engineering properties, and have instead used generic values for design purposes. These generic values appear to be reasonable and are within conservative estimates for London Clay.

4.17. A movement monitoring strategy has been proposed, with details of fixing targets to the rear and front elevations of No 59 Solent Road, the neighbouring properties, and the property to the rear in the parallel road. Generic trigger values of 3mm for the first warning, and 5mm for ceasing work have been proposed. These values should be reviewed once the ground movement assessment has been carried out to assess their suitability.

4.18. It has been stated that the proposed basement does not fall within the root protection area of any trees. Root protection areas have been calculation and indicated on plans to show that the rear wall of the basement commences approximately 2m outside of the root protection areas.

4.19. An outline works programme has been provided.

5.0 CONCLUSIONS

5.1. The authors of the BIA, Hardman Engineers, hold the relevant qualifications for slope stability and hydrology. A Hydrogeological impact assessment has also been produced by Chelmer who hold the required qualification for hydrogeology.

5.2. The proposal involves the formation of a single basement level to the entire plan area of the existing building and to the rear, along with a light well to the front.

5.3. Appropriate site investigations have been carried out comprising of boreholes and trial pits to identify soil conditions and depths of existing foundations.

5.4. The geology has been identified as a shallow depth of made ground overlaying London Clay.

5.5. Appropriate structural drawings and calculations have been produced, with the basement being designed as reinforced concrete unpropped L-shaped retaining walls. Heave protection measures have been incorporated below the basement slab by use of compressible void formers.

5.6. Outline temporary works and sequence details have been provided, which indicate the basement being formed by underpinning in a hit and miss sequence from the ground floor level down.

5.7. It has been stated that surface water flows into the sewer system and the ground will not increase. It has been demonstrated that the overall impermeable area is decreasing. Reference should be made to the requirements outlined in CPG4 section 3.51. Discharge flow rates should be agreed with Thames water and attenuated, as required.

5.8. It has been confirmed that there are no slope stability concerns related to the proposed development, this is accepted.

5.9. It has been confirmed that the basement will not extend below the ground water level, and is therefore implied that ground water flows will not be disrupted.

5.10. A flood risk assessment has been produced that confirms the suitability of the basement and its use for the low flood risk identified.

5.11. It has been identified by screening that the differential depth of foundations is increasing. An appropriate ground movement assessment has been produced that calculates a worst case damage category of 1.

5.12. A movement monitoring strategy has been proposed that includes generic trigger values. These values should be reviewed once the ground movement assessment has been carried out to assess their suitability.

5.13. Details of local trees and their root protection areas have been provided and indicate that the basement falls outside of these zones.

5.14. An outline works programme has been provided.

5.15. Based on the revised submissions, the BIA meets the criteria of CPG4.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Simpson	14 Sumatra Road	23/10/16	Disruption to the local water course	The applicant has demonstrated that the basement will be founded in impermeable soils.
Doran	16 Sumatra Road	2/10/16	Proximity of foundations to No 16 Sumatra Road	An appropriate ground movement assessment has been provided by the applicant that indicates an acceptable level of ground movements.
Doran	16 Sumatra Road	2/10/16	Disruption to ground water flows/flooding	The applicant has demonstrated that the basement will be founded in impermeable soils.
Doran	16 Sumatra Road	2/10/16	Root damage to trees in the garden of No 16 Sumatra Road	It has been confirmed that the proposed development falls outside of the root protection area for the surrounding trees.
Rees and Davies	61 Solent Road	26/09/16	Impact of basement excavation on foundations to No 57 Solent Road.	An appropriate ground movement assessment has been provided by the applicant that indicates an acceptable level of ground movements.

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Flooding	A flood risk assessment has been identified by screening as being required, however this has not been produced. A flood risk assessment is required, or screening is to be revised to provide a consistent conclusion.	Closed	10/01/16
2	Stability	Screening has identified that the differential foundation level with the neighbouring properties is increasing. An accurate ground movement assessment is therefore required for affected properties, including the public highway if within the influence zone.	Closed	28/03/17
3	Surface water	Details of existing and proposed surface water drainage is required to support the screening conclusion that surface water flows to the sewer and run off will not increase, including calculations if appropriate. The requirements of CPG4 3.51 should be noted.	Open – discharge to be attenuated, if required.	N/A – off-site discharge flow rate to be agreed with Thames Water
4	Trees	Details of trees in the rear garden to No 16 Sumatra Road, and any other local trees, along with root protection areas is required, in order to assess impact of the proposed basement on retained trees.	Closed	28/03/17
5	Construction	An outline works programme is required.	Closed	10/01/16
6	Accreditation	A Chartered Geologist (CGeol) is required to author/review the hydrogeology aspects of the BIA.	Closed	28/03/17

Appendix 3: Supplementary Supporting Documents

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