

34A King Henrys Road, London
NW3 3RP

Basement Impact Assessment
Audit

For
London Borough of Camden

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1.0 NON-TECHNICAL SUMMARY

- 1.1. CampbellReith was instructed by London Borough of Camden, (LBC) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 34A King Henrys Road, London, NW3 3RP (planning reference 2017/3029/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 individuals concerned in the production of the BIA and other submitted information have suitable qualifications.
- 1.5. The existing property has an existing lower ground floor located below ground level at the front of the property, and at garden level to the rear.
- 1.6. The proposal consists of extending the existing lower ground floor to the front where it is below ground, and to the rear and side where it is currently above ground level.
- 1.7. Site specific ground investigations were carried out, which were appropriate to the scale of the proposal.
- 1.8. The underlying soil consists of a layer of Made Ground overlaying London Clay.
- 1.9. The proposed structure consists of typical forms of construction for a basement to an existing building or basement extension.
- 1.10. No groundwater was observed during the ground investigations.
- 1.11. Appropriate structural calculations have been produced for the proposed basement extension walls.
- 1.12. Typical construction techniques have been proposed, which assuming good workmanship should pose low risk to the surrounding properties and infrastructure.
- 1.13. Swelling of the soil due to excavation of the ground has been considered in the design of the basement.

- 1.14. An acceptable ground movement assessment has been produced that indicates a worst case damage category of 1.
- 1.15. Appropriate drainage proposals have been proposed to limit the impact on the existing drainage system.
- 1.16. It is accepted that the property is at low risk of flooding.
- 1.17. It is accepted that the risk of slope instability is low assuming good workmanship and the following of best practise construction techniques.
- 1.18. Monitoring of the neighbouring properties has been proposed during construction.
- 1.19. An outline works programme covering key phases of work and approximate durations has been presented.
- 1.20. A schedule of queries for further information is summarised in Appendix 2 of this audit, all of which have now been closed out.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 11th October 2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 34A King Henrys Road, London, NW3 3RP, reference 2017/3029/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.
- Local Plan Policy A5 Basements.

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 *"Single storey rear and side extension and excavating at the front to enlarge the basement."*

The Audit Instruction also confirmed 34A King Henrys Road was not, or was not a neighbour to, listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 12th October 2017 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA) Parts 1 to 5, Chelmer Consult. Services, ref. BIA/7806, May 2017
- Design & Access Statement, Rev. A, SKETCH London Architects, May 2017
- Planning Comments and Response
- Existing and proposed Architectural drawings (SKETCH London Architects):
 - Location Plan – dwg. 000 rev.A
 - Site Plan - dwg 001 rev.A
 - Existing Lower Ground Floor – dwg 100 rev.A
 - Existing Roof Plan – dwg 101 rev.A
 - Existing Section AA – dwg 200 rev.A
 - Existing Front Elevation – dwg 300 rev.A
 - Existing Rear Elevation – dwg 301 rev.A
 - Existing Side Elevation – dwg. 302 rev.A
 - Proposed Lower Ground Floor – dwg. 102 rev.A
 - Proposed Roof Plan – dwg. 103 rev.A
 - Proposed Drainage Plan – dwg. 104 rev.A
 - Proposed Section AA – dwg. 201 rev.A
 - Proposed Section BB – dwg. 202 rev.A
 - Proposed Section CC – dwg. 203 rev.A
 - Proposed Rear Elevation – dwg. 304 rev.A
 - Proposed Side Elevation – dwg. 305 rev.A

2.7. The following documents were subsequently received via email following correspondence with the applicant engineer, and are included in appendix 3 of this audit;

- SUDs plan – dwg 050 rev A - SKETCH London Architects
- Structural Engineers Report Suggested method statement – 5681 12 171114 – packmanlucas
- Confirmation of monitoring during construction – email dated 23/11/17

- Clarification on structural points – email dated 02/11/17
- Clarification on GMA – email dated 02/11/17
- Geotechnical Interpretative Report – GEO/7806 Rev B – Chelmers
- Proposed Outline Programme of Works – Sketch London Architects
- Retaining wall design – packmanlucas
- Sustainable drainage design note – Sketch London Architects

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	
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	
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	A justification statement is generally provided for 'no' answers
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	A justification statement is generally provided for 'no' answers
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	A justification statement is generally provided for 'no' answers
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	A formal scoping exercise has not been carried out, however some scoping of questions is carried out within the screening.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	A formal scoping exercise has not been carried out, however some scoping of questions is carried out within the screening.

Item	Yes/No/NA	Comment
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	A formal scoping exercise has not been carried out, however some scoping of questions is carried out within the screening.
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	
Is a geotechnical interpretation presented?	Yes	An interpretive geotechnical report has subsequently been provided.
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	Yes	A ground movement assessment was produced following screening
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	No	Nearby basement are not discussed in relation to the existing ground conditions.
Is an Impact Assessment provided?	Yes	A formal impact assessment is not provided, however items identified via screening have been taken into account in the design or discussed in the conclusions.
Are estimates of ground movement and structural impact presented?	Yes	The ground movement assessment
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	A formal impact assessment is not provided, however items identified via screening have been considered within the design.

Item	Yes/No/NA	Comment
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	
Has the need for monitoring during construction been considered?	Yes	It has been confirmed via email that movement monitoring is to be provided
Have the residual (after mitigation) impacts been clearly identified?	No	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Construction method, GMA, and monitoring proposal
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Appropriate SUDs proposed
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 1?	Yes	
Are non-technical summaries provided?	No	

4.0 DISCUSSION

- 4.1. The Basement Impact Assessment (BIA) has been carried out by a well-known firm of Geotechnical consultants, Chelmer Consultancy Services, and the individuals concerned in its production have suitable qualifications.
- 4.2. Consulting Structural engineers, packmanlucas, have produced supplementary information to support the structural design and construction of the basement proposal.
- 4.3. The existing property has a lower ground floor founded at 2.5m below ground at the front of the property, with the lower ground level exiting to garden level at the rear due to a sloping ground level. A front lightwell is located at the front of the property with steps up to the front garden and pavement level.
- 4.4. The proposed development involves extending the existing lower ground floor beneath the front garden, and to the side and rear where the structure generally level with the ground level. The existing lower ground level is proposed to be lowered by 0.4m to 0.6m. Two small lightwells are to be formed at the front of the property between the extended lower ground floor and the existing lower ground floor space.
- 4.5. A site specific ground investigation was conducted, comprising two trial pits (to investigate existing foundations) and one borehole to a depth of 8.1mbgl.
- 4.6. The ground model consists of a layer of Made Ground to 2mbgl, overlaying London Clay (stiff fissured brown silty clay) to depth.
- 4.7. The proposed structure consists of mass concrete underpinning to the party wall, and L shaped retaining walls to the front to create lower ground floor level below ground to the front. The side and rear extension are to be formed of load bearing masonry construction on strip foundations and are not retaining on these elevations. A new lower ground floor is to be constructed at a lower level from suspended beam and block generally and of a reinforced concrete slab between the toes of the retaining wall. The existing timber floor at 1st floor level is to be retained, with a new concrete on metal deck floor beneath the front garden level.
- 4.8. No groundwater was observed during the drilling process but in two following monitoring visits, water was recorded at 6.29m and 5.16m bgl. As the ground water was recorded at levels below the proposed basement foundations, it is accepted that the basement will have little to no impact on the ground water levels; however it is recommended that ground water monitoring continue until construction in order to better understand the seasonal variation of ground water.
- 4.9. An interpretive geotechnical report has been produced that provides geotechnical design parameters for shallow foundations, retaining walls, and piled foundations based on the site specific site investigations. A recommendation is made that retaining walls are designed for

groundwater pressures in accordance with good design practise and the site specific hydrogeological conditions, however a specific design water level is not provided.

- 4.10. Structural calculations have been produced for the retaining wall design, which exerts a maximum bearing pressure of 71kPa onto the London Clay, and concrete strip foundations to internal structure have been designed for a bearing pressure of 87kPa. This is in line with the geotechnical interpretive report which provides a safe bearing capacity of 98kPa at a depth of 3m below ground level.
- 4.11. The retaining walls have been designed as unpropped cantilevers. A hydrostatic pressure has not been taken for the retaining wall design which is recommended by the interpretive geotechnical report. While it is generally recommended to take a hydrostatic pressure when forming a basement within clay in order to allow for pressures from perched or trapped water, it is accepted that ground water was not recorded during the drilling and was identified during monitoring several meters below the underside of the proposed basement.
- 4.12. A Construction method statement has been produced that indicates the retaining walls are to be formed in a sequential sequence of maximum width 1.2m. The soil faces are described as being propped until the wall is constructed. Details of temporary works are also provided for the support of the existing super structure that is to be supported on steel frames and strip foundations.
- 4.13. It has been identified that as the London clay will experience unloading due to the excavation there is the potential for heave. The basement slab has been designed as suspended between the retaining wall toes with a 150mm void beneath to allow for the expansion of clay. Generally this is accepted as an appropriate method to deal with heave pressures, however in the detailed design it should be ensured that the heave pressures can be resisted by the bearing pressure beneath the toes of the retaining walls.
- 4.14. The retaining walls to the front lightwell are indicated as having a heel to them which would require cutting beneath the retained side. These have been indicated as being constructed as under-reams, although no further detail of construction methodology provided, nor is the impact that this would have on ground movement discussed. However it is accepted that given the under-ream would be excavated within London clay given good workmanship this is likely to have small impact on ground movements.
- 4.15. A ground movement assessment has been produced to calculate a damage category for the neighbouring properties, 32 and 36 King Henry's Road. This has been produced combining settlement as calculated following the method described in CIRIA C580, along with calculated heave values. It is not clear if this has considered the existing lower ground floors to the neighbouring buildings, which if taken into account would reduce the calculated damage category further. The worst case damage category has been confirmed as being Burland category 1 (very slight). No damage category is calculated for the public highway or footpath, however it is accepted that the maximum horizontal movement values calculated for the neighbouring properties are unlikely to significantly impact the highway the highway.

- 4.16. Whilst the CIRIA approach that has been used to calculate ground movements is intended for embedded retaining walls, we accept that the predicted ground movements are within the range typically anticipated for underpinning techniques carried out with good control of workmanship.'
- 4.17. The drained surface water catchment will be increasing by approximately 10% due to the construction of the basement and side/rear extensions, with the existing front hardstanding area, that is to be underlain by the proposed basement extension, draining to the combined sewer system as existing. The proposed new roof to the rear is to be covered in a sedum blanket, which will provide some flow attenuation, along with providing a 1m³ attenuation tank, and flow restrictor of 0.1l/s. This would reduce run off rate to well below the requirement stipulated in the London Plan, and is agreed to provide a suitable SUDs provision.
- 4.18. The property is located in an area of low risk of flooding from surface water and ground water, however consideration should be given to the risk of sewer flooding in the detailed design stage and appropriate mitigation measures provided.
- 4.19. The site steps down with the rear garden being approximately 2.4m lower than street level, which is indicated as possibly related to historic cuttings for the railway line rather than natural ground slopes. While previously profiling of the ground is apparent, with this being contained and incorporated by the existing properties structure, care should be taken when excavating the front garden area due to the differing levels between the front of the property and the side/rear of the property.
- 4.20. Monitoring of the neighbouring properties has been proposed during the basement deepening/extension works. While a specific strategy has not been proposed it has been confirmed that monitoring will be carried out in accordance with best practise principles. This is accepted however a bespoke monitoring strategy will need to be developed prior to construction.
- 4.21. An outline works programme covering key phases of work and approximate durations has been presented.
- 4.22. A schedule of queries for further information is summarised in Appendix 2 of this audit, all of which have now been closed out.

5.0 CONCLUSIONS

- 5.1. The Basement Impact Assessment (BIA) has been carried out by a well-known firm of Geotechnical consultants, with a firm of consulting Structural Engineers producing supplementary information. The individuals concerned in the production of the documents have suitable qualifications.
- 5.2. The existing property has an existing lower ground floor located below ground level at the front of the property, and at garden level to the rear.
- 5.3. The proposal consists of extending the existing lower ground floor to the front where it is below ground, and to the rear and side where it is currently above ground level.
- 5.4. A site specific ground investigation was conducted, comprising two trial pits and one borehole, along with a geotechnical interpretive report.
- 5.5. The ground model consists of a layer of Made Ground of moderate thickness overlaying London Clay.
- 5.6. The proposed structure consists of mass concrete underpinning to the existing structure, and L-shaped retaining walls to create the front basement extension.
- 5.7. No groundwater was observed during the ground investigations.
- 5.8. Appropriate structural calculations were produced that indicate foundation bearing pressures are within those recommended by the interpretative geotechnical report. The retaining walls have been designed as unpropped cantilevers, with no hydrostatic pressure being taken which is considered acceptable although does not following conservative design practise.
- 5.9. An underpinning like sequence is proposed for the retaining wall and mass concrete underpinning construction, with acceptable outline construction methodology provided.
- 5.10. Heave has been considered with a suspended lower ground floor slab over a void proposed. This is accepted however further consideration should be given in the detailed design stage.
- 5.11. An acceptable ground movement assessment has been produced that indicates a worst case damage category of 1. No indication of the damage to the highway is provided or discussed, however it is accepted that the risk to the highway is low.
- 5.12. While the surface water drainage area is increasing, appropriate SUDs by use of green roofs, and an attenuation tank are proposed.
- 5.13. It is accepted that the property is at low risk of surface and ground water flooding. However sewer flooding should be considered further during the detailed design.

- 5.14. While the site is considerably stepped, it is accepted that this is likely man made, and assuming the following of best practise construction techniques the risk to the neighbouring properties is low.
- 5.15. The intention to carry out monitoring of the neighbouring properties during construction has been confirmed by the applicant.
- 5.16. An outline works programme covering key phases of work and approximate durations has been presented.
- 5.17. A schedule of queries for further information is summarised in Appendix 2 of this audit, all of which have now been closed out.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Where similar quires have been raised more than once they have only been listed once

Surname	Address	Date	Issue raised	Response
G. Moss	32 King Henry's Rd	7.07.2017	Long term structural issues on number 34 and surrounding houses	An appropriate ground movement assessment has been provided, which indicates a worst case damage category of 1. An appropriate method statement has also been produced for the retaining wall construction.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Hydrology	Outline details of SUDs strategy required due to potential increase in surface water area	Closed	09/11/17
2	Stability	Construction method statement is not provided	Closed	09/11/17
3	Stability	RC Retaining Wall design bearing pressure at base and a stem design calculations should be provided and assumptions regarding wall design should be confirmed	Closed	09/11/17
4	Stability	Evidence of heave protection measures/design as recommended by BIA	Closed	09/11/17
5	Construction	A works programme is not provided	Closed	23/11/17