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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 10 & 10A Eldon Grove (planning reference 2015/7022/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. Two main technical reports have been produced both of which authored by well known engineering consultancies and by individuals who possess suitable qualifications.

1.5. The proposal is to demolish an existing 2 storey side annex, and construct a new side annex of three stories, including a basement level.

1.6. It is unlikely that the water table will be encountered during the excavation, or that wider groundwater flows will be disrupted. However, perched water is anticipated and outline measures for the exclusion of water from the basement excavation are requested.

1.7. The basement walls are to be formed using techniques that rely on good workmanship and temporary works in order to prevent movements. Appropriate outline temporary works have been suggested. The scheme presented in the BIA allows for propping in the permanent and temporary cases.

1.8. The design of the basement walls has omitted a recommendation from the ground interpretation with respect to hydrostatic pressures. The basement walls should be redesigned or alternative suggested mitigation measures detailed

1.9. An assessment has been produced that concludes that damage to neighbouring properties will be no worse than Burland category 1 (very slight). It should be confirmed that the assumptions made in the ground movement assessment with respect to propping are valid.

1.10. A monitoring strategy has been proposed, however the values within should relate to the ground movement assessment that has been produced.

1.11. It is accepted that the area is not prone to flooding, nor in the immediate area of slope stability concerns.

1.12. Surface water runoff is not expected to be effected by the proposal.

1.13. A summary of queries where further information is required has been included in appendix 2 of this report.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 14th January 2016 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 10 & 10A Eldon Grove, planning reference 2015/7022/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 two storey side extension and replacement with two storey side extension including basement floor level beneath footprint; associated installation of rear dormer at main roof level; relocation of side window; new Juliette balconies to rear first floor windows; replacement of rear ground floor door and window with new doors and amalgamation of units 10 and 10a."*

The Audit Instruction also confirmed 10 & 10A Eldon Grove is not, nor is a neighbour to, listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 1st February 2016 and gained access to the following relevant documents for audit purposes:

- Arboricultural Impact Assessment, Arbol EuroConsulting
- As Existing Architectural Plans, Stiff + Trevillion
- As Proposed Architectural Plans, Stiff + Trevillion
- Basement Impact Assessment (BIA), Heyne Tillett Steel
- Site Location Plan, Stiff + Trevillion
- Desk Study & Basement Impact Assessment Report, GEA
- Construction Traffic Management Plan (CTMP), TPHS

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Between the BIA and the Desk Study Report the authors hold the required qualifications.
Is data required by Cl.233 of the GSD presented?	Yes	The required information is provided between the BIA, Desktop Study Report, CTMP, and drawings.
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	Architects drawings and appended plans/maps to desk study report.
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	Suitable screening has been provided. Generally justification has been provided for no answers where appropriate.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Suitable screening has been provided. Generally justification has been provided for no answers where appropriate.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Suitable screening has been provided. Justification has been provided for no answers where appropriate.
Is a conceptual model presented?	Yes	Section 7 of the desktop study report.
Land Stability Scoping Provided?	Yes	A scoping statement has been provided for each potential impact

Item	Yes/No/NA	Comment
Is scoping consistent with screening outcome?		identified from screening.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	A scoping statement has been provided for each potential impact identified from screening.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	N/A	Screening did not identify any potential hydrological impacts.
Is factual ground investigation data provided?	Yes	Borehole logs and trial pit investigations have been carried out with logs provided.
Is monitoring data presented?	Yes	Desktop Study Report section 5.4.
Is the ground investigation informed by a desk study?	Yes	Desktop Study Report.
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	It has been indicated that neighbouring basements are not present.
Is a geotechnical interpretation presented?	Yes	Desktop Study Report.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Desktop Study Report section 8.1.1.
Are reports on other investigations required by screening and scoping presented?	Yes	Arboricultural impact assessment.
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	N/A	Adjacent basements are not thought to be present.

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	Section 9 of the Desk Study Report.
Are estimates of ground movement and structural impact presented?	Yes	Section 12 of the Desk Study Report.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	Appropriate discussion has been carried out for each item carried forward from screening and scoping.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Movement monitoring and general considerations to minimise movements during construction have been discussed.
Has the need for monitoring during construction been considered?	Yes	An outline monitoring strategy has been described.
Have the residual (after mitigation) impacts been clearly identified?	No	It is claimed that all impacts are negligible or have been mitigated.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	A ground movement assessment, temporary works details, construction sequence, and scheme design have been produced.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	The area of hardstanding is not increasing.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	No existing basement are present. While the basement will be situated within the Claygate member it has been concluded that flows are not likely to be strategic and will be low.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	The worst case Burland damage category was found to be Category 1 (very slight).
Are non-technical summaries provided?	Partially	A non-technical summary has been provided for the basement impact assessment. The rest of the report is written in a manner that is easy to understand without the use of excessive technical terms.

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by a well-known firm of engineering consultants, Heyne Tillett Steel, and the individuals concerned in its production have suitable qualifications. The Heyne Tillet Steel BIA is a summary of the basement impact assessment provided in the report described below, with the inclusion of details of temporary works and construction sequence, and other structural engineering information.

4.2. The Desk Study & Basement Impact Assessment Report has similarly been carried out by a well-known firm of engineering consultants, GEA, and the individuals concerned in its production have suitable qualifications. This report contains the main screening, scoping, and impact assessment stages as required by Camden CPG4, along with details of the site investigations and geotechnical interpretation.

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.

4.4. The existing building property consists of a mid-19th century semi-detached four storey property (including lower ground floor level), with a more recent two storey attached side annex. The proposal involves the demolition of the two storey side annex and its reconstruction as a three storey extension incorporating a basement level. The side annex is currently listed as a separate property, 10A Eldon Grove, whereas the original property is number 10 Eldon Grove.

4.5. It has been stated that neither of the neighbouring properties contains basement levels, while number 11 Eldon Grove contains a lower ground floor of identical construction to 10 Eldon Grove.

4.6. Site investigations have included two boreholes, trial pits to both the original building and the side annex, and water level monitoring via standpipes over a period of time.

4.7. The site is underlain by a circa 3m thick band Claygate member, overlaying the London Clay. The formation level of the proposed basement has been stated as likely being "within the Claygate member, or underlying London Clay". It has been concluded that either stratum will offer a suitable bearing medium.

4.8. The Claygate member is classified as a Secondary 'A' Aquifer, due to sand and other permeable deposits within the clay. However the basement impact assessment states that the Claygate member in this location will likely have similar non-productive characteristics as the London Clay due to an absence of significant sand horizons within the strata. It has therefore been concluded that there is unlikely to be a significant influence on the surrounding hydrogeological

environment caused by the basements construction. It is thought that this conclusion is reasonable and can be accepted.

4.9. Although ground water was found within the three standpipes that were monitored, it has been concluded that this represents perched water or local flows, and is not part of a wider water table. This is accepted, however care should be taken during excavation with an anticipation of inflows of perched water.

4.10. The proposal is to initially demolish the existing side annex, then to form the new basement in its place, with the two above ground storeys constructed from on top of this basement. The approach allows for the basement walls to be constructed as retaining walls without the need to underpin an existing foundation on three sides of the basement. Along the fourth side, the basement wall is to be formed as reinforced concrete underpinning to the existing foundation. A second depth of basement wall is to be formed by underpinning the previously formed underpinning and retaining walls, to bring the basement depth to the final formation level. Both the first and second stage are to be formed in an underpinning type sequence as is the industry standard for this type of construction. A ground bearing basement slab is then to be cast to provide a permanent prop to the base of the underpinning. The lower ground floor slab can then be cast to provide a permanent prop to the head of the underpinning.

4.11. A sequence of works and outline details of temporary works has been provided in the BIA which detail how the first stage of underpinning to the existing property will be constructed with temporary toes to spread the load during the first stage of underpinning. These are to be cut away once the second stage has been completed when the load will be transferred into the lower level of underpinning and into their permanent ground bearing toes. An outline for propping of the underpinning has been provided, with this to be designed by the contractor. Cross basement propping has been detailed as laterally restraining the top and bottom of the underpinning, which is to be removed sequentially as the basement and lower ground floor slabs are constructed. These temporary works appear to be appropriate and well thought out for the proposal, however a detailed propping method along with calculations will need to be produced to support the final construction method.

4.12. The BIA contains scheme calculations for the retaining walls to prove the viability of the proposal. The retaining walls have been designed as propped cantilevers, therefore utilising the lower ground floor slab as a permanent prop in the permanent case, and requiring temporary propping during the construction case. The walls have been designed to resist a surcharge loading from the neighbouring foundations, while derivation of this loading has not been provided it appears to be of the anticipated magnitude.

4.13. Hydrostatic pressure has not been taken in the design. This is in conflict with the report by GEA where a water head of ¾ of the height of the retaining wall is recommended, unless a land

drainage system is provided on the retained side of the walls. The retaining walls should be redesigned to resist a hydrostatic pressure as described in the report by GEA, or details of a land drainage system should be submitted.

4.14. In the retaining wall calculations it is noted that the calculation fails the span to depth ratio check, where the basic limiting ratio of 20 has been used which is applicable to a simply supported member. However because the retaining walls are propped cantilevers it can be considered that a comparative basic allowable span to depth ratio would fall somewhere between that of a continuous member and a simply supported member, increasing it from the allowable ratio in the calculation. Therefore this failed check is likely not of significant concern.

4.15. The area of hardstanding is not changing from the existing, therefore run off has been concluded to be unaffected. This conclusion is accepted.

4.16. A ground movement assessment has been produced using the P-DISP and X-DISP analysis software, the horizontal and vertical values of movement from which have been used to calculate a worst case damage Burland category of 1 for No 10b, and category 0 for 11 Eldon Grove. The estimated ground movement assume sufficient propping in the temporary and permanent cases to allow the retaining walls to be considered a "stiff" system. This should be confirmed by the Engineer.

4.17. A ground heave assessment has been produced in the GEA report that predicts both short term and long term heave. The GIA report recommends that the forces from these heaves be either transferred into the basement walls via the ground slab, be resisted via tension piles, or a compressible material is provided beneath the slab. The BIA states that the slab will be designed to act as a two way spanning slab between the basement walls to resist uplift forces. This solution is compatible with the recommendation in the GEA report.

4.18. It is stated in the GEA report that monitoring is to be carried out to the nearby buildings, along with the number 10 Eldon Grove itself. The appended 'monitoring specification and points' to the BIA provides monitoring trigger values and a specification for carrying out the readings. The trigger values are arranged as a coloured system of increasing severity, appropriate actions are described as the magnitude of the movement increases. However trigger values are not related to the predicted vertical or horizontal ground movements from the ground movement assessment, with even the lowest trigger value being less than than the predicted horizontal movements, and being greater than the predicted vertical settlement. The movement monitoring strategy should therefore be reproduced to relate the predicted movement values to the trigger values.

4.19. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.

5.0 CONCLUSIONS

5.1. Both the BIA and the Desk Study Report have been carried out by well-known firms of engineering consultants using individuals who possess suitable qualifications.

5.2. The proposal is to demolish an existing 2 storey side annex, and construct a new side annex of three stories, including a basement level.

5.3. The site is underlain by the Claygate member circa 3m thick, which is in turn underlain by London Clay to a considerable depth. The proposed basement would be founded close to the junction between the Claygate Member and the London Clay.

5.4. It is unlikely that the water table will be encountered during the excavation, however perched water and local water flows may be encountered due to the possible permeable strata within the Claygate member. Outline proposals for the temporary and permanent exclusion of perched water from the basement excavation should be provided.

5.5. The wider hydrological environment is not anticipated to be affected due to the limited ground water flows anticipated through the subsoil, and any flows that do exist are not likely to be strategic to the wider area.

5.6. The basement walls as proposed to be formed utilising a two stage process, where the top 2m are formed using traditional underpinning and retaining wall construction techniques, with the second stage involving the underpinning of the previously formed underpinning. This technique is suitable for the creation of the basement walls, however it relies on good workmanship and extensive temporary works. The scheme presented in the BIA includes for propping in the temporary and permanent cases.

5.7. A ground movement assessment and subsequent damage assessment has been produced that concludes that damage to neighbouring properties will be no worse than Burland category 1 (very slight). This is considered an acceptable level of damage in accordance with CPG4. It should be confirmed that the assumptions made in the ground movement assessment with respect to propping are valid.

5.8. Scheme calculations have been produced for the design of the basement walls. However they have not been designed to resist a hydrostatic pressure, nor has a land drainage system been specified to alleviate any build-up of hydrostatic pressure. This is in conflict with the recommendations from the Desktop study report which recommends either designing to a hydrostatic pressure or specification of a land drainage system. Further details of this should be provided.

5.9. A monitoring strategy has been proposed, however the trigger values provided do not relate to the predicted ground movement in the ground movement assessment. The monitoring trigger values should be revised.

5.10. It is accepted that the area is not prone to flooding, nor in the immediate area of slope stability concerns.

5.11. The area of hardstanding is not changing from the existing, and it is accepted that surface water runoff will not be affected by the proposal.

5.12. A summary of queries where further information is required has been included in appendix 2 of this report.

Appendix 1: Residents' Consultation Comments

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Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Brown	6a Eldon Grove	21/01/2016	Potential structural damage to neighbouring houses.	A ground movement assessment has been produced that calculates that the damage will be within the limits stipulated by Camden.
McNair	10d Eldon Grove	25/01/2016	Potentially unsound construction method	A satisfactory scheme design and construction method and sequence has been produced, bar 1 outstanding query listed in appendix 2.
McNair	10d Eldon Grove	25/01/2016	The stability of a deep excavation	See query 1 in appendix 2
McNair	10d Eldon Grove	25/01/2016	Lack of use of contiguous piled walling	The applicant as demonstrated the feasibility of their proposed structural retention system. With 1 outstanding query in appendix 2.
McNair	10d Eldon Grove	25/01/2016	Cumulative effects on structural and hydrogeological environment should other nearby basements be constructed	No basements are planned within the immediate vicinity that could pose a cumulative effect.
Roberts	11 Eldon Grove	25/01/2016	Changes to hydrological environment causing foundation movements.	A hydrogeological scoping, screening, and impact assessment has been carried out in accordance with CPG4. The impact assessment has concluded that the effect on the local ground water regime is likely to be negligible due to low ground water flows.

Note – Repeat issues raised by more than one resident have only been listed once.

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Stability	Design retaining walls to resist hydrostatic head in accordance with report by GEA, or provide details of land drainage system.	Open	
2	Stability	The movement monitoring specification should relate the trigger values to the calculated movement from the ground movement assessment.	Open	
3	Stability	Outline measures for excluding perched water required.	Open	
4	Stability	Confirm that the assumptions in the GMA regarding propping and a "stiff" retaining wall are valid.	Open	

Appendix 3: Supplementary Supporting Documents

None

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