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1 Wadham Gardens
London, NW3 3DN

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12985-10
Revision: D1

December 2018

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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 1 Wadham Gardens (Camden planning reference 2018/3320/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. 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 proposal involves the creation of a single storey basement under the full footprint of an existing detached multi occupancy residential property.

1.5. The ground investigation confirms that the basement will be founded within the London Clay, and that groundwater is not expected to be encountered. There will be no impact to the wider hydrogeological environment.

1.6. The presence or absence of underground infrastructure / utilities should be identified, and impacts considered, if applicable.

1.7. The basement retaining walls will be formed utilising underpinning and sheet piles. In order to support the internal walls, temporary plunge piles will be installed.

1.8. A ground movement assessment (GMA) was undertaken to demonstrate that the proposed works will not cause unacceptable damage to neighbouring properties or infrastructure. The GMA calculations indicate that the resultant damage exceeds that specified in the Camden Planning Guidance. The methodology of the GMA is also required to be confirmed and updated, as required.

1.9. Impermeable site area will not significantly increase. The final drainage scheme will need to be agreed with Thames Water and LBC. There should be no impact to the wider hydrological environment.

1.10. It is accepted that there are no slope stability concerns regarding the basement development.

1.11. Queries and requests for information are summarised in Appendix 2. Until the additional information requested is provided, the BIA does not meet the requirements of the Camden Planning Guidance.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 1 Wadham Gardens, London, NW3 3DN (Reference: 2018/3320/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 Basements. March 2018.
- 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 *"Excavation of single-storey basement level under footprint of existing building, sunken terrace to north-west of site, 4x front and side light-wells with grilles, internal alterations to flats on ground, first and second floors, new and altered window openings to rear ground floor and first floor level, demolition and rebuild of the north-west end of the building, new boundary treatment with railings and landscaping works, in association with 6 existing dwellings."*

2.6. The audit instruction also confirmed that the proposal does not involve any listed building.

2.7. CampbellReith accessed LBC's Planning Portal on 19 September 2018 and gained access to the following relevant documents for audit purposes. Additional information was provided by email from the applicant on 19 November 2018. The most updated information includes:

- Basement Impact Assessment (BIA) and Ground Appraisal Report. Geo-Environmental, Version 2.0 – November 2018
- Structural Calculations and Design Statement by Quadrant Harmon Consulting Ltd
- Construction Management Plan. HUB Architects, Issue 1 – 25 May 2018
- Arboricultural Impact Assessment Report. Landmark Trees, 5th July 2018
- HUB Architects and Designers Ltd and Quadrant Harmon Consulting Ltd Planning Application drawings:

  Proposed Block Plan (1179-00)

  Existing Plans (1179-01)

  Proposed Plans (1179-01)

  Existing Elevations (1179-02)

  Proposed Elevations (1179-02)

  Existing Sections (1179-03)

  Proposed Sections (1179-03)

  Proposed Plans Soft and Hard Landscaping (1179-10)

  Proposed Site Plan Diagram (1179-12)

  Basement Plan (1550-02-2)

  Temporary propping (1550-03-1)

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?	No	The presence of underground infrastructure / utilities is not confirmed.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	BIA and structural drawings.
Are suitable plan/maps included?	Yes	BIA, Structural drawings and architect's plans.
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	Justification has been provided for no answers. Refer to Section 2.8, 4.1.2 and Appendix G of the BIA.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Justification has been provided for no answers. Refer to Section 2.3, 4.1.1 and Appendix G of the BIA.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Is a conceptual model presented?	Yes	BIA Section 2.0 and 7.0.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	A scoping comment has been produced for each potential impact identified by screening.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	N/A	No items were brought forward from the screening assessment.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Final drainage design to be agreed with TW and LBC.
Is factual ground investigation data provided?	Yes	Section 6.0 and Appendix B of the BIA.
Is monitoring data presented?	Yes	Section 7.3 of the BIA.
Is the ground investigation informed by a desk study?	Yes	Desk study information presented in Appendix A of the BIA.
Has a site walkover been undertaken?	Yes	Reference is made to a site walkover in Section 1.3.
Is the presence/absence of adjacent or nearby basements confirmed?	No	However, it is indicated that the differential depth in foundations will increase, which assumes no neighbouring basement is present.
Is a geotechnical interpretation presented?	Yes	Section7.0 and 8.0 of the BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 8.4 of the BIA.
Are reports on other investigations required by screening and scoping presented?	No	Mapping re underground infrastructure / utilities.
Are the baseline conditions described, based on the GSD?	No	The presence of underground infrastructure / utilities is not confirmed.
Do the base line conditions consider adjacent or nearby basements?	No	The presence/absence of nearby basements has not been discussed.
Is an Impact Assessment provided?	Yes	

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	Section 9.0 of the BIA.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	No	The GMA does not consider ground movements due to underpin installation, sheet pile installation, excavation and new structural loads or impacts to highways / underground infrastructure.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Temporary propping are proposed to mitigate ground movements.
Has the need for monitoring during construction been considered?	Yes	See Section 9.5 of the BIA.
Have the residual (after mitigation) impacts been clearly identified?	No	Residual impacts are not clearly identified in the BIA.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	GMA should be revised considering ground movements due to underpin installation, sheet pile installation, excavation and new structural loads, and consider impacts to highways / underground infrastructure.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Final drainage design to be agreed with TW and LBC.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	GMA to be updated.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	No	Damage up to Category 2 indicated in the model calculations. However, the GMA should be revised.
Are non-technical summaries provided?	Yes	QH BIA November 2018.

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) was undertaken by Geo-Environmental Services Limited and Quadrant Harmon Consulting Ltd and the individuals concerned in its production hold suitable qualifications, as required by the CPG Basement 2018.

4.2. The LBC Instruction to proceed with the audit identified that the basement proposal neither involved, nor was neighbouring to, a listed building.

4.3. The site comprises an approximately rectangular shaped parcel of land occupied by a one to two storey detached property, with a multi occupancy residential use. The building is of traditional load bearing masonry construction and some alterations and extension have been carried out historically, noticeably a single storey extension with roof terrace to the north.

4.4. The presence or absence of underground infrastructure / utilities should be identified, and impacts considered, if applicable.

4.5. The proposal is to demolish the northern extension and to reconstruct it in a different configuration, to create a single storey basement under the full plan of the property, along with a basement level terrace to the north-west, two lightwells to the south and two lightwells to the east. The maximum excavation depth is anticipated to be approximately 4.00m bgl.

4.6. A ground investigation undertaken by Geo-environmental Services Ltd in September 2015 identified Made Ground to a maximum depth of 0.60m bgl underlain by the London Clay Formation which was proven to 4.60m bgl. Although groundwater was not encountered during the ground investigation, two standpipes were installed and groundwater was monitored during four visits, between 2.12 and 3.16m bgl, above the proposed basement level. The BIA concluded those levels represent an accumulation of perched water in the standpipes rather than a continuous groundwater body. However, the BIA considered the potential for groundwater ingress during the excavation and indicated adequate mitigation measures. The London Clay is designated unproductive strata. There will be no impact to the wider hydrogeological environment.

4.7. The majority of the basement perimeter walls will be positioned directly beneath the existing masonry walls. The proposal is to form these walls of reinforced concrete, by construction in individual bays in an underpinning type sequence.

4.8. From the structural drawings it is understood that the four lightwell walls are to be constructed of reinforced concrete walls cast against sheet piles that are to be hydraulically driven. However, it is not clear if this refers to hydraulically hammer driven piles that could cause significant vibration, or hydraulically pressed in piles where vibrations would be minimal. Given the location

of the proposed sheeting piling being some distance from the neighbouring properties, it is thought that should they be hammer driven the greatest potential for building damage caused by vibration would be to the applicant' s property only. However, whichever the installation method, the ground movements should be considered and impacts assessed.

4.9. The basement slab is to be a ground bearing reinforced concrete slab tied into the toes of the L shaped underpinning, and will provide a permanent base prop to the underpins. The ground floor construction is to be replaced with a suspended reinforced concrete slab that will span between the underpinning walls and internal reinforced concrete columns.

4.10. The proposed temporary works required during the underpinning indicates two levels of horizontal temporary props to be installed before casting the ground floor slab, which will act as a prop in the permanent case.

4.11. In order to support the internal walls temporary plunge piles will be installed. The plunge piles in the final condition will be cut to basement level and used to limit ground heave. Preliminary calculations have been produced in order to estimate heave forces per pile and pile capacity. These indicate the feasibility of a tension pile solution to resist heave forces in the long term.

4.12. A ground movement assessment (GMA) has been produced and is contained in the Ground Appraisal Report. Maximum vertical movements due to heave of the London Clay induced by the excavation in the short and the long term have been calculated using a PDISP model and are 9 and 12mm respectively. The use of plunge piles has not been accounted for in the calculated movements and the BIA comments that these movements are theoretical and unlikely to occur.

4.13. An XDISP model has been produced to estimate ground movements due to underpinning construction and basement excavation following CIRIA C580 guidance (which is now superseded by C760), with the underpinned sections being treated as bored piles. While this guidance is intended for embedded retaining walls, it is considered to provide a reasonable approximation of movements generated by underpinning, when used with caution.

4.14. Only the XDISP output for ground movements due to excavation has been provided in the appendix and the resultant damage determined is up to Category 2 (Slight) for the neighbouring properties, although stated in the reports as category 0 top Category 1. This is not policy compliant and therefore not accepted and the GMA should be reviewed with the structural proposals to demonstrate that damage to neighbouring properties will be within a maximum of Category 1 (Very Slight). The inputs and output for each model and calculation should be provided. The GMA should consider ground movements due to underpin installation, sheet pile installation, excavation and new structural loads, and consider impacts to highways / underground infrastructure.

4.15. A construction management plan has been produced that describes in adequate detail how the project can be undertaken while minimising disturbance to the local neighbourhood. Mitigation measures have been suggested where disturbance is inevitable. A works program with project duration has also been provided.

4.16. Impermeable site area will not significantly increase as a result of the proposed development. The BIA indicates that drainage will be constructed to match the existing arrangements. The final drainage scheme will need to be agreed with Thames Water and LBC. There should be no impact to the wider hydrological environment

4.17. It is accepted that there are no slope stability concerns regarding the proposed development.

5.0 CONCLUSIONS

5.1. The qualifications of the individuals involved in the BIA meet Camden Planning Guidance requirements.

5.2. The proposal involves the creation of a single storey basement under the full plan of an existing detached multi occupancy residential property.

5.3. The presence or absence of underground infrastructure / utilities should be identified, and impacts considered, if applicable.

5.4. The basement retaining walls will be formed utilising underpinning and sheet piles. In order to support the internal walls, temporary plunge piles will be installed.

5.5. The basement will be formed within London Clay, designated unproductive strata. There will be no impact to the wider hydrogeological environment.

5.6. Whilst the report text indicates that damage to neighbours due to ground movements will be between Category 0 and 1, the model outputs indicate up to Category 2 damage will be sustained, which is not accepted. The GMA should be revised considering ground movements due to underpin installation, sheet pile installation, excavation and new structural loads, and consider impacts to highways / underground infrastructure.

5.7. Impermeable site area will not significantly increase. The final drainage scheme will need to be agreed with Thames Water and LBC. There should be no impact to the wider hydrological environment.

5.8. It is accepted that there are no slope stability concerns regarding the basement development.

5.9. Queries and requests for information are summarised in Appendix 2. Until the additional information requested is provided, the BIA does not meet the requirements of the Camden Planning Guidance.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker*

Query No	Subject	Query	Status	Date closed out
1	Stability	The GMA should be reviewed to demonstrate damage to neighbouring properties will be within Category 1. The GMA should consider ground movements due to underpin installation, sheet pile installation, excavation and new structural loads, and consider impacts to neighbouring structures and highways / underground infrastructure.	Open	
2	BIA	A utility search should be undertaken to inform the baseline conditions. Impacts to be assessed, as applicable, within the GMA	Open	
3	Stability	Sheet piling methodology to be confirmed and impacts assessed within GMA (Query 1)	Open	

Appendix 3: Supplementary Supporting Documents

None

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