

1 Wadham Gardens
London, NW3 3DN

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12985-10
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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 (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. As requested in the previous version of the audit, a utilities search has been undertaken to inform the baseline conditions.
- 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 review of the XDISP model used in the GMA was requested in the previous version of the audit as the resultant damage determined was up to Category 2 (Slight) for the neighbouring properties. The analysis has been reviewed and the model adjusted to consider ground movements due to underpin installation, excavation and new structural loads. It has been demonstrated that damage to neighbouring properties will be within a maximum of Category 1 (Very Slight).
- 1.9. As requested in the previous version of the audit, the GMA considers also the impacts to the services/utilities that have been identified to be in proximity of the site. Results are available in Section 9.5 of the Ground Appraisal Report and show a maximum displacement of 3-4mm. Asset protection agreements should be entered into, as applicable.
- 1.10. Although movements generated by sheet piling are stated to be negligible in the BIA, published guidance indicates that movements can occur. Its noted, however, that sheet piling is to be

undertaken in short, localised runs away from neighbouring properties and therefore the assessment is accepted.

- 1.11. Impermeable site area will not significantly increase. However, the final drainage scheme will need to be agreed with Thames Water and LBC. There should be no impact to the wider hydrological environment.
- 1.12. It is accepted that there are no slope stability concerns regarding the basement development.
- 1.13. Queries and requests for information are summarised in Appendix 2. Considering the updated information provided, the BIA meets the requirements of CPG Basements.

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 Geotechnical and Structural Engineering by Quadrant Harmon Consulting – Rev. 2
- 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)

2.8. The following relevant revised documents were received from LBC on 20 December 2018 and from the BIA authors in January 2019, in response to the queries raised in the initial (rev. D1) BIA audit report. All the documents are available on the planning portal and have therefore not been included on Appendix 3.

- Basement Impact Assessment Geotechnical and Structural Engineering by Quadrant Harmon Consulting – Rev. 4
- Ground Appraisal Report. Geo-Environmental, Version 4.0 – January 2019
- HUB Architects and Designers Ltd and Quadrant Harmon Consulting Ltd Planning Application drawings:

Underpinning Temporary Works and Sequence (1550-01-2)

Underground Floor (1550-02-3)

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	The presence/absence of underground infrastructure / utilities has been 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	Section 7.0 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?	Yes	Ground Appraisal Report and GMA.
Are the baseline conditions described, based on the GSD?	Yes	The presence/absence of underground infrastructure / utilities has been 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?	Yes	The GMA has been updated to consider ground movements due to underpin installation, sheet pile installation, excavation and new structural loads.
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?	Yes	Residual impacts are considered to be negligible in the BIA.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	The GMA has been updated to consider ground movements due to underpin installation, sheet pile installation, excavation and new structural loads.
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?	Yes	See above.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	After the GMA update, anticipated damage to surrounding buildings will be within category 1 of the Burland Scale.
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. As requested in the previous version of the audit, a utilities search has been undertaken to inform the baseline conditions.
- 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 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.
- 4.5. 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.
- 4.6. 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.
- 4.7. 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. Clarification on the sheet piling methodology to be used was requested in the previous version of the audit. The BIA confirmed that a vibrationless press will be used to install the piles. Although movements generated by sheet piling are stated to be negligible in the BIA, published guidance indicates that movements can occur. It is noted, however, that sheet piling is to be

undertaken in short, localised runs away from neighbouring properties and therefore the assessment is accepted.

- 4.8. 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.
- 4.9. 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.
- 4.10. 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.
- 4.11. 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.
- 4.12. 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. It is noted that CIRIA guidance is intended for embedded retaining walls, but accepted that this may provide a basis for which to undertake an assessment of an underpinned construction, and ground movements are within the range typically anticipated for underpinning techniques carried out with good control of workmanship.
- 4.13. A review of the XDISP model used in the GMA was requested in the previous version of the audit as the resultant damage determined was up to Category 2 (Slight) for the neighbouring properties. The analysis has been reviewed and the model adjusted to consider ground movements due to underpin installation, excavation and new structural loads. It has been predicted that damage to neighbouring properties will be within a maximum of Category 1 (Very Slight).
- 4.14. As requested in the previous version of the audit, the GMA considers also the impacts to the services/utilities that have been identified to be in proximity of the site. Results are available in

Section 9.5 of the Ground Appraisal Report and show a maximum displacement of 3-4mm. Asset protection agreements should be entered into, as required.

- 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. As requested in the previous version of the audit, a utilities search has been undertaken to inform the baseline conditions.
- 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. The BIA confirmed that a vibrationless press will be used to install the sheet piles.
- 5.5. The revised GMA indicates that damage to neighbouring properties will be within a maximum of Category 1 (Very Slight). In regards to utilities, asset protection agreements should be entered into, as required.
- 5.6. Impermeable site area will not significantly increase. However, the final drainage scheme will need to be agreed with Thames Water and LBC. There should be no impact to the wider hydrological environment.
- 5.7. The basement will be formed within London Clay, designated unproductive strata. There will be no impact to the wider hydrogeological 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. Considering the updated information provided, the BIA meets the requirements of CPG Basements.

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.	Closed	17/01/19
2	BIA	A utility search should be undertaken to inform the baseline conditions. Impacts to be assessed, as applicable, within the GMA	Closed	17/01/19
3	Stability	Sheet piling methodology to be confirmed and impacts assessed within GMA (Query 1)	Closed	17/01/19

Appendix 3: Supplementary Supporting Documents

None

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