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24 Heath Drive, London, NW3 7SB

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 24 Heath Drive, London NW3 7SB (planning reference 2019/1705/P). The basement is considered to fall within Category C as defined by the Terms of Reference.

1.2. A previous audit on a Basement Impact Assessment for this site was undertaken by CampbellReith in 2018 which related to planning reference 2018/0914/P. However, due to revisions to the layout of the approved basement an updated BIA issued by Gabriel GeoConsulting Ltd dated March 2019 has been audited.

1.3. 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.

1.4. 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.

1.5. The proposed development comprises an extension to the existing basement to include excavation beneath the full footprint of the main part of the existing Grade II listed house and into the rear garden. Basement formation level varied between 2.22m and 6.62m below ground level.

1.6. The BIA has been prepared by Gabriel GeoConsulting Ltd with supporting documents provided by Form Structural Design Ltd and Studio Kyson. The authors' qualifications are in accordance with LBC guidance.

1.7. A desk study has been presented, broadly in accordance with aspects recommended by LBC guidance.

1.8. The site investigation undertaken identifies the London Clay as the bearing formation for the proposed foundations, underlying Made Ground. Interpretative geotechnical information in accordance with LBC guidance is presented.

1.9. The BIA considers the underlying geology, including proximity to the mapped Claygate Member, and proximity to the historic route of a tributary of the River Westbourne. The proposed development will not impact upon the wider hydrogeological environment.

1.10. The construction methodology indicates use of reinforced concrete underpinning for the construction of the basement together with a bored pile wall for the basement which extends to

the rear of the existing house. The BIA makes recommendation for the design of both the permanent and the temporary works.

1.11. The BIA considers the proposed development in the context of the slope across the site. The proposed development will not impact upon slope stability.

1.12. An updated ground movement assessment (GMA) has been undertaken (dated March 2019) that indicates damage to neighbouring properties will be a maximum of Category 1 (Very Slight), in accordance with the Burland Scale.

1.13. The BIA presents an outline structural monitoring methodology, including visual condition surveys, measured survey using total station and crack monitoring, if applicable. Frequency of survey, trigger levels and contingency actions are considered appropriate and should be agreed under the Party Wall Act.

1.14. The Environment Agency indicates that the risk of flooding from surface water at 24 Heath Drive is 'Very Low'. Flood resistance measures to protect the basement from local surface water flooding are discussed within the BIA in addition to mitigation measures to protect against sewer surcharging.

1.15. An attenuated drainage scheme involving permeable paving is proposed. The final drainage design should be agreed with LBC and Thames Water. There is no impact to the wider hydrological environment.

1.16. Our comments on the BIA are presented in Section 4. The BIA meets the requirements of CPG Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 17 April 2019 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 24 Heath Drive, London NW3 7SB, Camden Reference 2019/1705/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): Basements.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- The Local Plan (2017): 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; 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.

LBC's Planning Portal described the planning proposal as: *Variation of condition 3 (approved plans) of planning permission 2018/0914/P dated 11/03/2019 for "Demolition of 2 storey side garage and utility room; lowering of the ground levels of the existing basement and new basement extension; erection of single storey garage replacement; part double, part single storey side extension to north east elevation; erection of 1 x side dormer and roof lights; internal*

alterations; tree works and landscaping including wooden shed to the rear; namely, alterations to new basement layout, changes to approved garage door design and rear sash window glazing, increase width of approved side dormer and rooflights; changes to rear garden landscaping to introduce terraced levels; and various internal alterations including changes to staircase and internal partition walls."

LBC's Planning Portal confirmed that the site is a Grade II Listed building and lies within the Redington and Frognal Conservation area.

2.5. CampbellReith accessed LBC's Planning Portal on 24 April 2018 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment dated March 2018 (ref GGC17597/R2.3) by Gabriel GeoConsulting Limited including:
    - Factual report on Ground Investigation dated February 2017 (ref 17597/R1) by Gabriel GeoConsulting Limited.
- Proposed and Existing Drawings dated January 2018 by Kyson.
- Structural Engineer's Construction Method Statement dated 30 January 2018 (ref 162637) by Form Structural Design Ltd.
- Suggested Sequence of Construction dated December 2017 by Form Structural Design Ltd.
- Mechanical and Public Engineering Services Specification dated January 2018 (ref 16117) by Edward Pearce LLP.
- Planning Brochure dated January 2018 by Kyson.
- Tree Survey dated October 2017 (ref 1948 24 Heath Drive Tree Survey Report 1610-31sc.docx), Arboricultural Implication Assessment dated February 2018 (ref 1948 24 Heath Drive AIA 1802-06rc.docx) and Arboricultural Method Statement dated February 2018 (ref 1948 24 Heath Drive AMS 1802-06rc.docx) by Eight Associates.
- Addendum to BIA by Gabriel GeoConsulting Limited, reference GGL17597/R2.3/Add.1.1, dated 19 July 2018.
- Comments and objections to the proposed development from local residents.

2.6. Following the audit of the original BIA submission, CampbellReith accessed LBC's Planning Portal on 14 May 2019 and gained access to the following relevant documents for audit purposes which comprised:

- Basement Impact Assessment (ref GGC17597/R2.3/Add.2.1) dated March 2019 by Gabriel GeoConsulting Limited.
- Proposed and Existing Drawings dated January 2018 by Kyson (updated from the drawings provided above).

- Structural Engineer's Construction Method Statement dated 30 January 2019 (ref 162637) by Form Structural Design Ltd (including updated Sequence of Construction dated February 2019).

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 plans/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	BIA report (March 2018), Section 7.3.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA report (March 2018), Section 7.2.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA report (March 2018), Section 7.4.
Is a conceptual model presented?	Yes	BIA report (March 2018), Section 10.1.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA report (March 2018), Section 8.3.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA report (March 2018), Section 8.2.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA report (March 2018), Section 8.4.
Is factual ground investigation data provided?	Yes	BIA report (March 2018), Section 9 and Appendix C.
Is monitoring data presented?	Yes	Groundwater monitoring discussed in BIA report, section 9.3 and presented in Section 5.7 of Appendix C (Factual Report on Ground Investigation).
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	BIA report (March 2018), Section 10.2.
Is a geotechnical interpretation presented?	Yes	BIA report, Section 10.
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA report, Section 10.4; Structural Engineer's Construction Method Statement
Are reports on other investigations required by screening and scoping presented?	Yes	Arboricultural Impact Assessment and Damage Category assessment provided.
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	BIA report, Section 10.

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	BIA report, Section 10.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	BIA Report (March 2018), Section 10.9.
Has the need for monitoring during construction been considered?	Yes	BIA Report (March 2018), Section 10.7.
Have the residual (after mitigation) impacts been clearly identified?	Yes	None
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Structural Calculations and GMA provided.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	BIA Report GMA.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The BIA (the original (March 2018) and the current addendum (March 2019)) has been prepared by Gabriel GeoConsulting Ltd with supporting documents provided by Form Structural Design Ltd and Studio Kyson. The authors' qualifications are in accordance with CPG guidelines for all sections.

4.2. The BIA addendum (March 2019) indicates that the proposed development comprises an extension to the existing basement to include excavation for increased ceiling height and lateral expansion beneath the full footprint of the main part of the existing Grade II listed house and a small part of the rear patio/garden. The proposed development includes a swimming pool on the southwestern side (previously on the north eastern side) which will be deeper than the main part of the basement and will extend 8m beyond the main rear wall of the house beneath the rear bay window into the garden (with a walk-on rooflight proposed at the far end). Within the west corner of the basement, a plant room will be created alongside and at the same level as the adjoining swimming pool (previously in the northern corner). The proposed basement will also include a platform lift and small lobby area which will extend approximately 2m beyond the main north-east flank wall of the house, beneath the new part single-, part two-storey, extension. The basement level will be excavated to a depth of 4.45m (previously 4.30m), the pool level to 6.96m (previously 6.39m) and the plant room to a depth of 6.23m (previously 6.62m) below ground level (bgl). The site lies within the Redington and Frognal Conservation area.

4.3. The site investigation undertaken identifies the London Clay as the bearing formation for the proposed foundations, underlying Made Ground. The Made Ground was encountered within all of the exploratory holes with a maximum thickness of 2.25m in the front parking area and thicknesses of 0.25 to 0.30m recorded in the rear garden. Interpretative geotechnical information in accordance with the GSD Appendix G3 is presented.

4.4. The site investigation and BIA (March 2018) have been informed by a desk study broadly in accordance with the GSD Appendix G1.

4.5. No groundwater entries were recorded in either TP1 or TP2, but groundwater was standing at 0.36m below the level of the cellar on completion of TP3. Groundwater was monitored on 3 occasions during November and December 2016 and January 2017. The highest groundwater level recorded was 0.36m bgl in BH3 (in the rear garden).

4.6. Notwithstanding the groundwater monitoring undertaken, the BIA confirms that use of a design groundwater level at ground level is recommended for the whole basement and that the basement will need to be fully waterproofed in order to provide adequate long-term control of moisture ingress.

4.7. The BIA (March 2018) states that the construction of the proposed basement at no. 24 is not expected to create any 'unacceptable cumulative obstruction or adverse impact on groundwater seepage/flows, because the seepage/flow in any water-bearing permeable horizons intersected by the basement, is likely to be able to continue around the basement, between it and the adjacent cellars to numbers 23 and 25 Heath Drive'.

4.8. The BIA (March 2018) considers the underlying geology, including proximity to the mapped Claygate Member, and proximity to the historic route of a tributary of the River Westbourne. Considering the existing foundation and cellar depths on site and in the adjacent properties, the proposed development into low permeability London Clay does not increase the likelihood of intercepting any shallow groundwater flow (if present). The proposed development will not impact upon the wider hydrogeological environment.

4.9. The construction methodology indicates use of reinforced concrete underpinning for the construction of the basement together with secant bored pile wall for the section of the swimming pool which extends to the rear of the existing house. Updated tructural calculations and retaining wall design are provided in the Structural Engineer's Construction Method Statement. A construction sequence including proposed propping arrangements is presented.

4.10. The overall slope angle from the rear wall of the house to the rear site boundary is up to 9.1° and slope angles of up to 19° are present locally. The BIA therefore recommends that: for the rear wall of the basement, the design of both the permanent retaining structure and the temporary support for the underpin excavations should be based on effective residual shear strength parameters for the Weathered London Clay; and that the underpin pits to be excavated in the rear wall of the basement should be inspected by an engineering geologist who is experienced in logging soliflucted clay textures. These measures are considered to be prudent and reasonably conservative.

4.11. The BIA (March 2018) considers the proposed development in the context of the slope across the site. The proposed development will not impact upon slope stability.

4.12. An updated ground movement assessment (GMA) has been undertaken that indicates damage to neighbouring properties will be a maximum of Category 1 (Very Slight), in accordance with the Burland Scale. The GMA is considered to take a reasonably conservative approach, taking account of short and long term movement, two stages of underpinning and secant piling. Each element of the proposed works is assessed in regard to the relevant neighbouring structures within the zone of influence.

4.13. The original BIA (March 2018) presents an outline structural monitoring methodology, including visual condition surveys, measured survey using total station and crack monitoring, if applicable.

Frequency of survey, trigger levels and contingency actions are considered appropriate and should be agreed under the Party Wall Act.

4.14. A former course of one of the tributaries of the River Westbourne once flowed in the base of the valley which is now Heath Drive. The stream flowed from north-east to south-west in this area. The 1870 Ordnance Survey map shows this stream flowing just to the north-west of the site along with two tributaries (one to the northwest merging with the main stream downslope of the site and another a short distance to the northeast of the site). None of the streams are shown on the 1894 Ordnance Survey map and therefore it is assumed that they have been culverted or diverted into the sewer system.

4.15. Heath Road is within Critical Drainage Area (Group 3-010) but is not located within a Local Flood Risk Zone. The Environment Agency indicates that the risk of flooding from surface water at 24 Heath Drive is 'Very Low'. Heath Drive was not subject to surface water flooding during 1975 or 2002 events. Within the Heath Drive carriageway an area at 'Low' risk of flooding from surface water is shown extending the full length of the road, becoming 'Medium' risk further downslope. Flood resistance measures to protect the basement from local surface water flooding are discussed within the BIA (section 10.8) in addition to mitigation measures to protect against sewer surcharging.

4.16. The proposed scheme will increase the proportion of hardstanding at the site by approximately 150m^2 (as in the previous scheme dated March 2018). The SuDS assessment recommends the replacement of paving and asphalt with resin-bound gravel to create permeable paving, resulting in a net increase in permeable site area, linked to an attenuated drainage system. The final drainage design should be agreed with LBC and Thames Water. There is no impact to the wider hydrological environment.

5.0 CONCLUSIONS

5.1. The qualifications of the authors are in accordance with LBC requirements.

5.2. Desk Study information within the BIA is broadly in line with aspects recommended in the GSD Appendix G1.

5.3. A site investigation has confirmed the underlying ground conditions to comprise Made Ground over the London Clay. The data is presented in an interpretative report in accordance with GSD Appendix G3. The proposed development will not impact the wider hydrogeological environment.

5.4. The construction methodology, structural scheme and temporary works proposed are presented, including sequencing and propping arrangements.

5.5. The BIA considers the proposed development in the context of the slope across the site. The proposed development will not impact upon slope stability.

5.6. A ground movement assessment (GMA) has been undertaken that indicates damage to neighbouring properties will be a maximum of Category 1 (Very Slight), in accordance with the Burland Scale.

5.7. The BIA (March 2018) presents an outline structural monitoring methodology, including visual condition surveys, measured survey using total station and crack monitoring, if applicable. Frequency of survey, trigger levels and contingency actions are considered appropriate and should be agreed under the Party Wall Act.

5.8. The risk of flooding from surface water at 24 Heath Drive is 'Very Low'. Flood resistance measures to protect the basement from local surface water flooding are discussed within the BIA in addition to mitigation measures to protect against sewer surcharging.

5.9. An attenuated drainage scheme involving permeable paving is proposed. The final drainage design should be agreed with LBC and Thames Water. There is no impact to the wider hydrological environment.

5.10. Discussion is presented in Section 4. The BIA meets the requirements of CPG Basements.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

None

Appendix 3: Supplementary Supporting Documents

None

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