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6 Nutley Terrace, London NW3 5BX

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12727-80
Revision: D1

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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 6 Nutley Terrace, London NW3 5BX (planning reference 2018/0735/P). The basement is considered to fall within Category C as defined by the Terms of Reference. The planning application consists of a 'Variation or Removal of Condition(s)' to planning application 2015/7025/P which has already obtained planning permission.

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 review it against an agreed audit check list.

1.4. It has been confirmed that the development site does not involve a listed building, nor is it in the neighbourhood of listed buildings.

1.5. The BIA and supporting documents have been carried out by several well-known or established consulting engineers, geotechnical and environmental consultants. The authors and reviewers from all of these organisations have suitable qualifications.

1.6. The proposal consists of the demolition of an existing property and the construction of two new properties each containing basement levels to approx. 4m depth, with one property also including a swimming pool at the basement level.

1.7. The proposed basement is to be formed of reinforced concrete using piling methods to construct the basement walls. The construction method proposed is recognised as industry good practise for basement construction while limiting ground movements.

1.8. A Network Rail tunnel has been identified beneath Nutley Terrace to the front of the property. The presence of this has been incorporated in the basements design in order to limit the impact on the tunnel. Network rail have confirmed they hold an interest in assessing the basement proposal.

1.9. An appropriate site specific ground investigation has been conducted including boreholes and investigations into the ground water.

1.10. It is accepted that ground water flows are unlikely to be significantly impacted by the proposal.

1.11. The BIA has demonstrated that there are no slope stability concerns in the immediate vicinity of the site.

1.12. It is accepted that the risk of surface water flooding the buildings is low. The use of a SUDs is proposed to control the flow of surface water which should mitigate the impact of surface water flows on the drainage system and on neighbouring properties.

1.13. The worst-case damage category to the neighbouring buildings has been demonstrated as Burland category 1. A proposal to monitor ground movements during construction has been presented.

1.14. Taken the above, it can be confirmed that the proposal confirms to the requirements of CPG Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 23rd May 2018 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 6 Nutley Terrace, Camden Reference 2018/0735/P. This application forms an amendment to planning application 2015/7025/P which has previously obtained planning permission.

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: 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. The original Audit Instruction described the planning proposal as the "Erection of a 4 storey building (including basement) comprising 6 flats (Class C3) (3 x 4 bed units and 3 x 2 bed units) following demolition of existing dwelling (C3) new vehicular crossover and provision of associated landscaping. This proposal was subsequently withdrawn.

2.6. According to the revised scope, it is now proposed to demolish the existing house and to construct two new three-storey houses with a single basement that will extend beneath both houses, with the current proposal being that the basement will be supported by secant piled retaining walls. The basement will extend to a maximum depth of 4.0m below existing ground level, beneath the existing building footprint and into the existing rear garden. The latest submission proposes construction of swimming pool to the basement of the No. 6A Nutley Terrace, which will be 1.4m deep below basement level, or 5.4m from existing pavement level.

2.7. The Audit Instruction also confirmed 6 Nutley Terrace neither involved, or was a neighbour to, listed buildings.

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

- 9106_Nutley Terrace_Energy and Sustainability Statement_180209 (1)
- 2140657 rep 151029 Structural Engineering Report and CMS P5
- CAAC response (Redacted)
- J11158 (GMA) Report Issue 7 (April 2016) Part1
- J11158 (GMA) Report Issue 7 (April 2016) Part2
- J11158 letter report 1 20180206 by GEA dated 6th February 2018
- Planning Application Drawings by KSR Architects consisting of
- Location Plan, dated Sept 2011
- MMA 2 APPLICATION _ COMPARISION DRAWINGS 20180322, dated March 2018
- MMA 2 APPLICATION PROPOSED DRAWINGS
- Design & Access Statement, dated Feb2018
- Planning Comments and Response

2.9. A number of documents from the original planning application (2015/7025/P) have also been considered where updated documents were not submitted as part of the amendment application.

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	Structural Engineering report and BIA.
Are suitable plan/maps included?	Yes	BIA and drawings.
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 Section 3.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Groundwater Impact Assessment Section 4 BIA Section 3.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Groundwater Impact Assessment Section 4.
Is a conceptual model presented?	Yes	Ground model in Site investigation report Section 7
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Groundwater Impact Assessment Section 5.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Groundwater Impact Assessment Section 5.
Is factual ground investigation data provided?	Yes	Site investigation report Section 4.
Is monitoring data presented?	Yes	Groundwater monitoring in the Site investigation report.
Is the ground investigation informed by a desk study?	Yes	Site investigation report Section 2.
Has a site walkover been undertaken?	Yes	Site investigation report Section 1.3.
Is the presence/absence of adjacent or nearby basements confirmed?	No	Assumptions made in GMA but no justification provided. Same as per BIA Section 2.1.1.
Is a geotechnical interpretation presented?	Yes	Site investigation report Section 7.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Site investigation report Section 8.1.1.
Are reports on other investigations required by screening and scoping presented?	Yes	Network Rail Belsize tunnel solution proposed.
Are the baseline conditions described, based on the GSD?	Yes	Assumptions made in GMA but no justification provided.
Do the base line conditions consider adjacent or nearby basements?	Yes	No discussion on other basements being present or not.
Is an Impact Assessment provided?	Yes	Ground Movement Assessment and J11158 letter report 1 20180206
Are estimates of ground movement and structural impact presented?	Yes	Ground Movement Assessment and J11158 letter report 1 20180206

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Top down construction, secant piled wall with localised grouting or sealing if seepage occurs SUDS / attenuation tank Monitoring of nearby structures
Has the need for monitoring during construction been considered?	Yes	Structural Engineering report Sections 5 and 9.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Degree of damage to neighbouring buildings is considered and indicated.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Ground movement assessment indicates up to Burland Category 1 damage.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	With attenuation tank / SUDS.
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	Predicted in revised GMA to be Burland Category 1 or less.
Are non-technical summaries provided?	Yes	BIA Section 9.1 Structural Engineering report.

4.0 DISCUSSION

4.1. The BIA has been carried out by an established firm of structural engineers, ElliottWood, who have employed the services of GEA to supplement the work needed to form the BIA. Chord Environmental Ltd have produced a Groundwater Impact assessment. The authors and reviewers from all of these organisations have suitable qualifications.

4.2. The proposal consists of the demolition of an existing property and the formation of two detached residential properties of three above ground stories, plus a basement level to c. 4m below ground level. The basements are to extend outside of the plan area of the houses to the front and side, along with to the rear into the rear gardens which are partially dropped to the basement level. One of the properties is proposed to contain a swimming pool at basement to the rear, creating a deeper excavation in this area.

4.3. The structural proposal consists of a secant piled wall with RC lined wall to form the basement wall, with a piled basement raft slab and suspended ground slab at the head of the basement wall, creating a propped RC box structure. Some portions of the retaining wall to the rear is proposed as being formed of an RC cantilever wall without a piled wall, along with the swimming pool structure. The super structures are to consist of a load bearing masonry structures.

4.4. The basement is proposed as being constructed in a top down sequence, with piling first carried out from ground level and the ground slab constructed to provide a permanent prop to the head of the piled wall, before excavating the basement level beneath the ground slab. Where RC retaining walls are proposed these are indicated as being formed in bays in a sequential sequence. Adequate construction methodology is provided to demonstrate the feasibility of constructing the proposal, and it is accepted that the proposed method represents good practise construction techniques to minimise ground movements.

4.5. A Network Rail tunnel, The Belsize Tunnel, has been identified beneath Nutley Terrace to the front of the property, some 23m below ground level. The piling towards the front of the basement is proposed as resisting lateral loads only, with vertical loads at the front of the basement supported via cantilevering basement structure.

4.6. Evidence of consultation with Network Rail has been provided, with confirmation from Network Rail that they hold an interest in the proposal.

4.7. The BIA does not confirm the presence of other nearby basements, although it is assumed none are present based on a search on the Camden Planning Portal. The design case modelled in the Ground Movement Assessment Report is specific to the adjacent garage / pool extension to No. 4 Nutley Terrace.

4.8. A site investigation was carried out in 2011 as presented in the Desktop Study and Ground Investigation Report. Three boreholes were carried out to depths of 20m, along with 5 shallower window sample borehole. Ground water monitoring was carried out for a single return visit at the time of writing the report.

4.9. It is acknowledged that the basement is founded within the Head Deposits underlain by London Clay. Ground water was identified at 1.24m bgl and 6.14m bgl during monitoring, indicating the ground water had not stabilised at this time.

4.10. It is stated that despite the basement potentially extending beneath the groundwater level significant ground water flows are not anticipated to be present due to the impermeably of the clay soil. This assessment appear to have been written for the previous scheme before the deeper swimming pool portion was proposed, however it is accepted that this conclusion would be largely unchanged given the impermeability of the clay increasing with depth.

4.11. A proposal for localised grouting or sealing between piles should seepage of ground water occur during excavation during construction. It is accepted that this, in combination with the proposed use of a secant piled wall, demonstrates suitable methodology for excluding any ground water during the construction phase.

4.12. The BIA has demonstrated that there are no slope stability concerns in the immediate vicinity of the site.

4.13. The BIA indicates that the new foundations will be deeper than any neighbouring foundations, although the presence of neighbouring basements is largely unknown.

4.14. There will be an increase in the area of surface water run-off unless the proposed mitigation measures such as an attenuation tank or similar are adopted. On the basis that suitable mitigation is provided it is accepted that this will not significantly alter the existing surface water drainage conditions.

4.15. The risk of surface water flooding is accepted as being low.

4.16. A ground movement assessment has been carried out using X-Disp software, which has concluded a worst case damage Burland category of 1 for the surrounding properties. The GMA was carried out for the previous proposal which did not include a swimming pool, with a letter report subsequently produced that provides an updated analysis with the swimming pool included, with the worst case damage category still being identified as 1.

4.17. An outline movement monitoring strategy has been provided and it is stated as being carried out to all adjacent buildings and infrastructure. Generic trigger values are given along with appropriate actions should these be reached. Given the construction method proposed it is

accepted that the risk of excessive ground movement is low, the outline monitoring strategy adequately demonstrates that the stability of the neighbouring properties can be appropriately monitored during construction.

4.18. To minimise any impact that the proposed building may have on the Belsize Tunnel, an exclusion zone of 10m from the tunnel extrados will be formed whereby vertically-loaded piles will not encroach. Piles outside of the exclusion zone will take vertical and lateral loads. Piles that lie within the exclusion zone will only take lateral loads to reduce the required depth of pile and minimise any impact this may have on the tunnel.

4.19. Taken the above, it can be confirmed that the proposal confirms to the requirements of CPG Basements.

5.0 CONCLUSIONS

5.1. The BIA and supporting documents have been carried out by several well-known or established consulting engineers, geotechnical and environmental consultants. The authors and reviewers from all of these organisations have suitable qualifications.

5.2. The proposal consists of the demolition of an existing property and the construction of two new properties each containing basement levels to approx. 4m depth, with one property also including a swimming pool at the basement level.

5.3. A secant piled wall is proposed for the basement structure, with RC slabs at basement and ground level permanent propping out the basement wall to form an RC box. The basement slab is to be piled.

5.4. The construction methodology is proposed as top down construction, with an adequately detailed construction sequence provided to demonstrate feasibility of the construction of the basement.

5.5. A Network Rail tunnel has been identified beneath Nutley Terrace to the front of the property, which has been incorporated in the basement design by reducing vertical foundation loads at the front of the basement.

5.6. Network Rail have indicated that they hold an interest in assessing the proposal.

5.7. An appropriate site specific ground investigation has been conducted which included a sample of boreholes across the site along with ground water monitoring.

5.8. The proposed basement will be founded in the Head Deposits underlain by London Clay. Ground water was identified at varying levels between 1.24m bgl and 6.14m bgl as well as one standpipe remaining dry.

5.9. It is stated that significant ground water flows are not anticipated to be present due to the impermeably of the clay soil.

5.10. The secant piled wall is proposed as being utilised to exclude water during construction.

5.11. The BIA has demonstrated that there are no slope stability concerns in the immediate vicinity of the site.

5.12. It is accepted that the risk of surface water flooding the buildings is low. The use of an attenuation tank is proposed to control the flow of surface water which should mitigate the impact of surface water flows on the drainage system and on neighbouring properties.

5.13. A formal ground movement assessment calculation has been carried out in accordance with CIRIA C580. It has been demonstrated that the worst case damage category to the surrounding buildings will be 1.

5.14. An appropriate outline movement monitoring strategy has been provided.

5.15. Taken the above, it can be confirmed that the proposal confirms to the requirements of CPG Basements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

None

Appendix 3: Supplementary Supporting Documents

None

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