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Wallace House, Fitzroy Park, London N6 6HT

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12727-02

Revision: F1

April 2018

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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 Wallace House, Fitzroy Park, London N6 6HT, (planning reference 2017/4301/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. The proposed development involves creation of a new 2 storey structure with a basement in place of the existing single storey garage, a lower ground floor rear/side extension to the north of the pool house and various external alterations. This report is concerned with stability, hydrological and hydrogeological impacts arising from the basement development only.

1.5. The BIA has been prepared by Geotechnical and Environmental Associates Limited (GEA) and forms part of an overall Planning Report prepared by Elliott Wood Partnership Ltd, which has supporting documents and drawings prepared by Soup Architects.

1.6. The combined authors' qualifications are in accordance with LBC's requirements for comment on surface flow and flooding, subterranean flow and land stability.

1.7. Desk study information required to inform the BIA process is provided, including the provision of historical mapping, a preliminary UXO risk assessment, Arboriculture Survey and details of a site walkover, which enable conditions at and local to the site to be described according to LBC guidance.

1.8. Underground infrastructure / service plans and an outline construction programme were provided as part of the supplementary information supplied in response to the original Audit.

1.9. The BIA identifies the site to be within an area of very low flood risk. A site-specific flood risk assessment is not required.

1.10. Ground and groundwater conditions are based on information gained from desktop research and an on-site intrusive investigation, indicating that the site is underlain by Made Ground overlying Head Deposits and London Clay. Perched groundwater has been identified.

1.11. An Arboricultural Report by Crown Consultants has been submitted within the supplementary information provided, in response to the original Audit. It's noted that an objection has been raised by Elliott Consultancy Ltd (Arboricultural Consultants), which disputes the conclusion of the Crown report. It is recommended that the issues are reviewed by LBC's Tree Protection Officer. Tree protection is beyond the scope of this Audit.

1.12. The proposed basement is to be constructed within a battered excavation by formation of a reinforced concrete box founded on new piles, and is to be tied to the adjacent existing structure using dowels. The existing garage will be removed and the old piled foundations broken down. Protection is proposed to mitigate the effects of heave.

1.13. A Ground Movement Assessment (GMA) is presented which calculates damage will be limited to Category 0 (Negligible) for all structures within the zone of influence. The original proposed batter angle was reviewed and amended to 45 degrees in the supplementary submission, and a slope stability analysis presented. This revised batter angle, in conjunction with the proposed propping and temporary works, is considered to mitigate stability issues.

1.14. The structural monitoring proposed is linked to the GMA. Trigger values and contingency actions are described and is considered appropriate to control stability impacts to within predicted range.

1.15. The BIA states that the proposed basement development will not lead to an increase in impermeable site area (other extension proposals have not been considered). Temporary surface water flow will be dealt with via gravity drainage and temporary pumping from sumps. In the permanent case a French drain will allow free passage of surface water around and beneath the slab, connected to the existing landscaped pond in the garden as per the Surface Water Management Scheme implemented at the time of building the house, circa 1999.

1.16. Discussion is presented in Section 4 and responses to the previous Audit are summarised in Appendix 2. The BIA meets the criteria of CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 31 August 2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Wallace House, Fitzroy Park, London N6, Camden Reference 2017/4301/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.
- The Local Plan (A5 Basements) 2017.

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: "*Creation of additional storey at first floor level; front basement extension; lower ground floor rear/side extension; and various external alterations.*"

2.6. CampbellReith accessed LBC's Planning Portal on 25 September 2017 and gained access to the following relevant documents for audit purposes:

- Structural and Civil Engineering Planning Report dated August 2017 by Elliott Wood Partnership Limited.
- Site Investigation and Basement Impact Assessment, Wallace House (ref J17111) dated August 2017 by Geotechnical & Environmental Associates (GEA).
- Site Location Plan file name 01.299_Figure 01 dated June 2017, unknown author.
- Existing plans and sections by Soup Architects numbered 299_110_S00, 299_111_S00, 299_100_S00, 299_101_S00, 299_120_S00, 299_050_S00, 299_300_S00, 299_310_S00, 299_320_S00, 299_200_S00, 299_220_S00, 299_002_S00, 299_003_S00, 299_004_S00, 299_315_S00 and 299_210_S00 dated June 2014.
- Proposed plans and sections by Soup Architects numbered 299_110_PL00, 299_111_PL00, 299_100_PL00, 299_101_PL01, 299_130_PL00, 299_120_PL01, 299_050_PL00, 299_300_PL01, 299_330_PL00, 299_200_PL00, 299_220_PL01, 299_007_DS00, 299_008_DS00, 299_315_PL01, 299_310_PL01, 299_320_PL01, 299_325_PL00, 299_325_PL01, 299_210_PL00, 299_001_VS00, 299_002_VS00, 299_003_VS00 and 299_004_VS00 dated May 2017.
- Design Statement Contents, Existing and Proposed Site Context Analysis, Proposed Section Analysis and Area Schedule, The Wallace House, dated May 2017 by Soup Architects.
- Swept Path Analysis Figures 10-16, dated June 2017, author unknown.
- Construction Management Plan Rev B (AMENDED) version B, dated September 2017 by Soup Architects.
- One comment / objection to the proposed basement development from local residents was available for review at the time of writing.

2.7. CampbellReith again accessed LBC's Planning Portal on 06 March 2018 and gained access to the following supplementary information for audit purposes:

- Structural and Civil Engineering Planning Report revision P2, reference 2170310, by Elliot Wood Partnership Limited, dated February 2018.
- Appendix 1 – Assumed Sequence of Construction by Elliot Wood Partnership Limited, dated February 2018.

- Appendix 2 – Structural Drawings numbered SK001-004 by Elliot Wood Partnership Limited, dated February 2018.
- Appendix 3 – Site Investigation and Basement Impact Assessment Report – Parts 1, 2 & 3, reference J17111, by Geotechnical and Environmental Associates Limited, dated February 2018.
- Appendix 4 – Arboricultural Report reference 09417 by Crown Consultants, dated 25 November 2018.
- Comments and Objections (WSP and Elliott Consultancy Ltd).

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	Underground infrastructure / utilities plans presented in updated submission, along with an outline construction programme.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	The BIA report and associated appendices considers both temporary and permanent cases.
Are suitable plans/maps included?	Yes	Envirocheck maps are supplied.
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	Slope in the area and across the site indicated to be <7°.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	The nearest watercourse to the site is a culverted tributary of the River Fleet, the Highgate Brook, some 70m to the southwest. The site is not directly underlain by an aquifer.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	The nearest surface water body is an on-site landscaped pond, with the man-made Highgate Ponds some 75m to the southwest of the site.
Is a conceptual model presented?	Yes	Design basis description adequate.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Hydrogeology screening identified no significant risks associated with groundwater. However, monitoring revealed the presence of localised perched water.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	The proposed development is not within an area of Flood Risk. A detailed Flood Risk Assessment is not required.
Is factual ground investigation data provided?	Yes	Site investigation factual and interpretative reports as per GSD G2 and G3 are presented.
Is monitoring data presented?	Yes	5 rounds of groundwater monitoring were carried out.
Is the ground investigation informed by a desk study?	Yes	The BIA contains sufficient Desk Study information.
Has a site walkover been undertaken?	Yes	Reference is made to a Site Walkover Survey in the BIA.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Conservative assumptions of the Little House foundations made for GMA purposes (shallow).
Is a geotechnical interpretation presented?	Yes	Design parameters and assumptions are presented and discussed in the BIA.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Reinforced concrete retaining walls are proposed and design parameters suggested.
Are reports on other investigations required by screening and scoping presented?	Yes	Arboricultural Report by Crown Consultants.

Item	Yes/No/NA	Comment
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	Conservative assumptions of the Little House foundations made for GMA purposes (shallow).
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	A quantitative GMA is presented for neighbouring properties, but not for buried utilities or adjacent basements. Slope stability of batter should be addressed.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	Impact assessment considers flood risk, groundwater issues, drainage and land stability. Slope stability of batter considered in February 2018 supplementary information.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Slope stability of batter considered in February 2018 supplementary information.
Has the need for monitoring during construction been considered?	Yes	To be reviewed following updated GMA / slope stability assessment.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Slope stability of batter considered in February 2018 supplementary information.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Slope stability of batter considered in February 2018 supplementary information and GMA to be reviewed accordingly.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	The basement proposal causes no change to impermeable areas.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Slope stability of batter considered in February 2018 supplementary information.

Item	Yes/No/NA	Comment
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	Slope stability of batter considered in February 2018 supplementary information and GMA reviewed accordingly.
Are non-technical summaries provided?	Yes	One non-technical summary is provided.

4.0 DISCUSSION

4.1. The proposed development involves creation of a new 2 storey structure with a basement in place of the existing single storey garage, a lower ground floor rear/side extension to the north of the pool house and various external alterations. This Audit report is concerned with impacts arising from the basement development only, with regards to stability, hydrological and hydrogeological impacts. It is proposed to use the new basement as a plant / utility room, the ground floor will remain a garage and the first floor will be utilised as a bedroom.

4.2. The BIA has been prepared by Geotechnical & Environmental Associates, with supporting documents prepared by Soup Architects and an over-arching Planning Report by Elliott Wood Partnership. The BIA combined authors' qualifications are in accordance with LBC's requirements for comment on surface flow and flooding, subterranean flow and land stability.

4.3. Reference desk study information provided within the BIA is in accordance with the GSD Appendix G1. This includes including the provision of historical mapping, a preliminary UXO risk assessment, Arboriculture Survey and details of a site walkover, which enable conditions at and local to the site to be described according to the guidance in Appendix G of the GSD.

4.4. In accordance with the GSD Cl.233, the location of underground infrastructure and utilities / services are identified in the supplementary information supplied. An outline construction programme was also provided at this time. It's noted that an objection to the Construction Management Plan has been raised by WSP on behalf of neighbouring residents, the scope of which is beyond that of this Audit.

4.5. The BIA identified that the nearest watercourse to the site is a culverted tributary of the River Fleet some 70m to the southwest. The site is not underlain by an aquifer and shallow groundwater in hydraulic continuity was not anticipated at the site. However, groundwater monitoring proved the presence of localised perched water, probably relating to localised silt and sand partings within the London Clay.

4.6. The BIA identifies the site to be within an area of very low flood risk. A site-specific flood risk assessment is not required.

4.7. The BIA states that the site lies on Made Ground overlying designated unproductive strata, the London Clay. The Claygate Member is shown on geological mapping to the northwest of the site boundary, and is classified as a Secondary 'A' Aquifer. The Claygate Member was not encountered on site during the investigation.

4.8. The site investigation comprised 1 cable percussive borehole to 15.00m below ground level (bgl); 2 window sample holes to 7.45m bgl; and 7 hand-dug foundation inspection pits. An

additional trial pit was dug and details included in the February 2018 supplementary information. The strata sequence encountered comprised Made Ground to between 1.30m and 2.00m bgl over localised Head Deposits to between 2.00m and 2.70m bgl (where encountered), overlying London Clay to 15.00m bgl, the full depth of exploration. Associated sampling and in-situ and laboratory testing was undertaken on the soils encountered. Three groundwater monitoring standpipes to 5.00m and 6.00m bgl were installed and 5 follow-up monitoring visits undertaken. A rising head test was also undertaken in one borehole. The BIA includes factual and interpretative geotechnical information which forms the basis for the determined ground conditions and geotechnical parameters, in line with the GSD Appendix G3. The firm Head Deposits or London Clay are identified as the bearing formation for the proposed basement foundations, with a formation level at 2.80m bgl.

4.9. The screening and scoping stage has identified the potential for seasonal shrink swell subsidence in the London Clay at the site. However, the BIA has identified that the new basement foundations will extend to a depth beyond that of any desiccated soils, in accordance with NHBC guidelines.

4.10. The revised BIA submitted states that trees are not required to be felled as part of the proposal, although pile design and general works should take the recommendations of the arboricultural report by Crown Consultants into consideration to avoid damage to existing trees. The Crown Arboricultural Report states that root protection zones will not be impacted by the proposed development. This report contains a Tree Works Schedule in Section 8.1 and recommendations for pile design and restrictions on general works activities.

4.11. It's noted that an objection has been raised by Elliott Consultancy Ltd (Arboricultural Consultants), which disputes the conclusion of the Crown report. It is recommended that the issues are reviewed by LBC's Tree Protection Officer. Tree protection is beyond the scope of this Audit.

4.12. The scheme utilises: temporary support to the existing garden retaining walls during demolition of the existing garage structure; excavation to basement level with battered slopes; installation of piles; a suspended slab; and reinforced concrete basement walls. The void outside the basement walls is to be back filled to create a French drain, with the superstructure constructed on the basement box. Construction methodology and sequencing is updated in the revised submissions. Geotechnical design parameters are presented based on the ground conditions encountered during the site investigation.

4.13. Temporary works and propping arrangements have been revised, including sketches of sequencing. Requirements for temporary dewatering during construction and permanent waterproofing are discussed. The revised information submitted proposes a batter angle of 45°, and assessment on stability of the battered slope is provided. This revised slope angle is

considered appropriate considering the proposed underpinning and propping arrangements of the adjacent structure, the use of appropriate groundwater control, the thickness of Made Ground and Head Deposits and the presence of perched groundwater.

4.14. The supplementary information includes a revised Ground Movement Assessment (GMA) linked to an estimated damage impact assessment, which indicates the maximum damage predicted for adjacent properties, namely The Little House, remains at Burland Category 0 (Negligible). It is stated that no other properties or sensitive infrastructure lie within the 8 m zone of influence of the proposed basement excavation.

4.15. The structural monitoring proposed includes trigger values in order to ensure damage impacts are limited. These have been reviewed with the revised submissions, and the values and mitigation steps for Amber and Red movement classification are considered appropriate.

4.16. The BIA indicates there will be no increase in impermeable site area due to the proposed basement development (this does not consider other extension works at the property), and proposes utilising the existing site drainage system, with insertion of a French drain around the new basement allowing the free passage of surface water around and beneath the basement slab. The basement development is not considered to impact the wider hydrogeological or hydrological environments.

4.17. A conceptual site model is not presented although the combined Planning Report and BIA is written coherently and generally identifies ground and groundwater conditions, extent and form of the proposed basement, proximity of sensitive buildings, and identifies potential risks, impacts and mitigation measures. The temporary works involving the battered slopes proposed were revised in 2018 and impacts and mitigation requirements clarified satisfactorily.

5.0 CONCLUSIONS

5.1. The proposed development involves creation of a new 2 storey structure with a basement in place of the existing single storey garage, a lower ground floor rear/side extension to the north of the pool house and various external alterations.

5.2. This report is concerned with stability, hydrological and hydrogeological impacts arising from the basement development only.

5.3. The BIA authors' qualifications are in accordance with LBC's requirements.

5.4. The location of underground infrastructure/services has been confirmed and an outline construction programme presented in the supplementary information. Objections to the CMP are noted for the attention of LBC (but are beyond the scope of this Audit).

5.5. The BIA identifies the site to be within an area of very low flood risk. A site-specific flood risk assessment is not required.

5.6. The site is underlain by Made Ground overlying Head Deposits and London Clay. Perched groundwater has been identified. Appropriate groundwater control will be required as part of the temporary works.

5.7. An Arboricultural Report by Crown Consultants has been submitted within the supplementary information provided. It's noted that an objection has been raised which disputes the conclusion of the Crown report. It is recommended that the issues are reviewed by LBC's Tree Protection Officer. Tree protection is beyond the scope of this Audit.

5.8. The proposed basement is to be constructed within a battered excavation by formation of a reinforced concrete box founded on piles. The proposed batter angle has been revised, in conjunction with the updated temporary works.

5.9. A Ground Movement Assessment (GMA) is presented which calculates damage will be limited to Category 0 (Negligible) to neighbours. The revised batter angle, in conjunction with the proposed propping and temporary works, is considered to mitigate stability issues.

5.10. The basement proposal does not increase impermeable site area or impact the wider hydrological or hydrogeological environment.

5.11. The BIA meets the requirements of CPG4.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Baxter	Unknown	September 2017	Concerned that temporary works have not been designed in sufficient detail to mitigate damage impacts on surrounding properties. Concerned that GMA is muddled in places. Concerned that overflow into the Millfield Lane ditch during construction works will adversely impact the Highgate Ponds.	5.8 – 5.9
Nexus Planning on behalf of City of London Corporation	Riverside House, 2A Southwark Bridge Rd, SE1 9HA	04 October 2017	Concerned that the impacts of the proposal to groundwater and surface flows have not been considered sufficiently in relation to the Hampstead Heath Bathing Ponds, in particular the Kenwood Ladies Pond which is only 75m away from Wallace House. Concerned that insufficient detail is presented on the Surface Water Management System, and how it will control run off during and following construction without harming the ponds, seeing as it discharges into the chain of ponds.	5.10
Matchett	Lichfields, St. Nicholas Street, Newcastle, NE1 1RF	07 February 2018	Concerned that the health of trees will be affected by the works, and provides an arboricultural consultant report that comments on the arboriculture works carried out by the applicant's consultants.	5.7
Fitzroy Park Residents Association	Dancers end, Fitzroy Park N6 6HT	18 December 2017	Concerned that the Construction Management Plan submitted with the original BIA does not sufficiently limit potential damage to pavements in the Fitzroy Park area.	5.4

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA – GSD CL.233	Underground services information. Outline Construction programme.	Provided in supplementary information.	March 2018
2	Stability	Temporary works methodologies to be confirmed, including batter angles and slope stability analysis.	Provided in supplementary information.	March 2018
3	Stability	GMA and Damage Impact Assessment to be updated, to consider slope stability analysis, actual dimensions of excavation works and proximity of structures, suitable method of analysis.	Updated by GEA.	March 2018
4	Stability	Structural monitoring requirements, to be reviewed following completion of suitable slope assessment / GMA.	Provided in supplementary information, Section 10.0 of Engineering Planning Report.	March 2018
5	Stability	A conceptual site model including dimensioned plans / sections to be provided to demonstrate stability impacts considered and appropriately mitigated.	Provided in supplementary information.	March 2018

Appendix 3: Supplementary Supporting Documents

None

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