CampbellReith
consulting engineers

Flat 1, 28 Canfield Gardens
NW6 3LA

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 13398-04
Revision: D2

February 2020

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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 Flat 1, 28 Canfield Gardens, NW6 3LP (planning reference 2017/0859/P). The basement is considered to fall within Category B as defined by the Terms of Reference.

1.2. An 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 in June 2017. The current audit is for the additional documentation submitted by the applicant in January 2020.

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 BIA was prepared by Site Analytical Services Ltd. The authors' qualifications are in accordance with LBC guidance. The Flood Risk Assessment was prepared by Sanderson Associates (Consulting Engineers) Ltd; however, the qualifications of the authors are not provided.

1.5. It is proposed to deepen an existing low-headroom basement beneath the full footprint of the three storey mid-terrace property and create two lightwells, at the front and rear of the property. It is noted that the development proposal has changed from what was audited in 2017.

1.6. It is stated, based on historic plans, that that the adjacent Nos. 26 and 30 have basements to similar depths as No. 28.

1.7. A ground investigation has established a variable depth of Made Ground, below which lies London Clay in which the basement will be founded. Perched groundwater may be encountered in the Made Ground.

1.8. Acceptable structural engineering information has been provided to support the construction of the basement and lightwells.

1.9. A Ground Movement Assessment (GMA) has been undertaken which predicts a damage Category of 1 (Very Slight) to neighbouring structures. However, further clarification is sought, as the predicted settlements appear to be in excess of the values adopted for the assessment.

1.10. The BIA submitted initially failed to recognise that the property lies within the Goldhurst Local Flood Risk Zone and a Flood Risk Assessment was requested. This has been addressed in the revised BIA. However, as 1.2, the authors' qualifications should be provided.

1.11. The audit of the previous BIA requested further details on proposed attenuation drainage due to an increase in impermeable surface area. The revised BIA indicates that impermeable surface area will be reduced and that SUDS may be adopted. A final drainage design should be agreed with LBC and Thames Water.

1.12. It was requested that nearby utilities were located to ensure viability of the lightwell construction at the front of the property. A utility survey report dated October 2019 is now available for review. The BIA indicates ground movements in the vicinity of utilities will be small. Asset protection agreements should be agreed with asset owners, as required.

1.13. It is accepted that the surrounding slopes to the development are stable, that there are no known ponds or wells in close proximity and that the site is outside the Hampstead pond chain catchment area.

1.14. Queries and matters requiring further information or clarification are discussed in Section 4 and summarised in Appendix 2. Until the additional information requested has been provided, the criteria of CPG Basements has not been met.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 19 May 2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Flat 1, 28 Canfield Gardens, London NW6 3LA (planning reference 2017/0859/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. The current audit is for the additional documentation submitted by the applicant in January 2020.

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;

d) 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: "Enlargement of existing basement level, including front and rear lightwells". The property lies within the Swiss Cottage Conservation Area.

2.6. CampbellReith accessed LBC's Planning Portal on 23 May 2017 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment by Site Analytical Services Ltd and Appendices dated December 2016:
- Engineering Impact Assessment & Construction Method Statement/Sequence of work by Martin Redston Associates dated 16 January 2017.
- Design & Access Statement by Treatment (Architecture) Ltd undated.
- Report on a Phase 1 Risk Assessment by Site Analytical Services Ltd date December 2016.
- Architectural Existing & Proposed Floor Plans and Sections by Treatment Architecture Ltd dated June 2016, nos. 01-14.
- Martin Redston Associates drawings nos. 01A & 02.
- Comments and objections to the proposed development from local residents and residents' associations.

2.7. The following additional/revised documents were forwarded to CampbellReith on 21 January 2020, in response to the comments listed in the audit report issued in June 2017:

- Basement Impact Assessment by Site Analytical Services Ltd and appendices dated December 2019;
- Short Heritage Statement by Doyle Town Planning and Urban Design;
- Arboricultural Report by ACS (Trees) consulting dated November 2019;
- Desktop Utility Search report by Groundwise Searches Ltd dated October 2019;
- Construction Management Plan, dated January 2020;
- Flood Risk Assessment Report by Sanderson Associates Ltd dated October 2019;
- Architectural Proposed Plans & Sections by Treatment Architecture Ltd dated September 2019;
- Foundation Plan & Details with temporary propping arrangements by Martin Redston Associates, dated November 2019;
- Existing plans and historic building plans by Doyle Town Planning and Urban Design;
- Survey Plans by Reed Geomatics ltd dated February 2019;
- Response to audit comments by Doyle Design LLP dated January 2019 (Reference 131.1CRAN).

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	FRA authors' qualifications to be provided.
Is data required by Cl.233 of the GSD presented?	Yes	Utility survey report provided; the depth and extent of neighbouring properties 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	Flood Risk Assessment provided.
Are suitable plan/maps included?	Yes	BIA Section 3.
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 Table 1.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Table 1.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Table 1. Impermeable site area response inconsistent with other sections in the BIA; however, comparison of measured survey and proposed layout indicates no increase in impermeable site area.
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.1.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.1.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	FRA provided.
Is factual ground investigation data provided?	Yes	BIA Appendix A.
Is monitoring data presented?	Yes	
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	Refer response letter from Doyle Design LLP, dated January 2020.
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	Retaining wall design parameters provided in BIA Section 6.7. Temporary / permanent propping design / arrangement presented.
Are reports on other investigations required by screening and scoping presented?	Yes	FRA provided.
Are the 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 Section 7.1 but additional information requested.
Are estimates of ground movement and structural impact presented?	Yes	BIA, Appendix B.

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	However, GMA to be clarified.
Has the need for monitoring during construction been considered?	Yes	Discussed in principle in BIA Section 7.3.
Have the residual (after mitigation) impacts been clearly identified?	No	GMA to be clarified.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Details of indicative temporary works provided. GMA to be clarified.
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 LBC and Thames Water.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	FRA provided.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	However, GMA to be clarified.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been prepared by Site Analytical Services Ltd (SAS) and the authors' qualifications are in accordance with the requirements of CPG Basements.

4.2. An Engineering Impact Assessment and Construction Method Statement/Sequence of Work (CSM) has been prepared by a firm of Consulting Engineers, Martin Redston Associated (MRA).

4.3. In the revised submissions, a Flood Risk Assessment (FRA) has been prepared by Sanderson Associates (Consulting Engineers) Ltd; however, the qualifications of the authors are not provided.

4.4. The existing building is a three storey mid-terrace property, probably built in the late 19th century, and now sub-divided into flats. It is proposed to extend an existing low-headroom basement beneath the full footprint of the building by deepening an area adjacent to No. 26 by 1.175m, deepening an area adjacent to No. 30 by 2.70m and creating two lightwells, at the front and rear of the property, by excavating 1.50m below ground level to match the deepened area adjacent to No. 30. It is noted that the development proposal is different from what was audited in 2017. It is stated, based on historic plans, that Nos. 26 and 30 have basements to similar depths as No. 28.

4.5. A ground investigation was carried out by SAS which consisted of two boreholes and identified Made Ground to depths of 0.60m bgl and 2.40m bgl underlain by London Clay to the full depth of the investigation. Groundwater was not encountered during the investigation but monitoring was carried out on two occasions with groundwater at 0.53m bgl and 5.78 bgl, the higher level being consistent with perched water within the Made Ground.

4.6. It is intended to deepen the two areas below the footprint of the existing building by traditional underpinning methods. A proposed underpinning layout, sequence and temporary propping arrangement have been provided within the MRA information. Care should be taken that fine materials are not washed through from the Made Ground during excavation.

4.7. The rear and front lightwells are to be formed by 1.0m wide sections of excavation with reinforced concrete retaining walls and base slab. Calculations having been provided for their design. An indicative temporary works plan was requested including sequencing and propping arrangements. Indicative drawings with typical sequence of underpinning propping have been provided, as 4.6.

4.8. A Ground Movement Assessment (GMA), revised to reflect the changes in the proposed development, has been undertaken by Fairhurst Consulting Engineers, included as Appendix B

of the BIA. An assessment of ground movements within and surrounding the excavation has been undertaken using OASYS geotechnical modelling software programmes PDisp and Xdisp. Soil parameters used, based on the site specific ground investigation, and assumptions made in the assessment are generally conservative and are accepted. The assessment considered heave, horizontal movement and vertical settlement broadly based on the proposed construction methodology.

4.9. A Damage Assessment based on the revised GMA and the recommendations of CIRIA C580 was performed for neighbouring properties Nos. 26 and 30. The assessments predicted a maximum damage category of 1 (Very Slight) for both Nos. 26 and 30 Canfield Gardens. However, its noted that the range of settlement and heave predicted is not reflected in the damage assessment, which appears to have excluded the movements predicted from the PDisp analysis. For example, Walls 4 and 7 are indicated in the damage assessment to settle by approximately 2mm to 4mm whilst the PDisp analysis suggests settlement in these areas in the range of approximately 7mm to 15mm. The assessment methodology should be clarified and the damage assessment reviewed / updated.

4.10. It's also noted that whilst the Party Walls are likely to be approximately 14m in height, as adopted in the assessment and indicated on the measured survey, the front and rear facades of the subject property and neighbours are shorter and this should be reflected in the assessment.

4.11. Given that other flats are contained within the subject property, the damage assessment should explicitly assess potential damage to the subject property itself, as well as neighbouring structures.

4.12. It was requested that nearby utilities were located to ensure viability of the lightwell construction at the front of the property. A utility survey report dated October 2019 is now available for review. The BIA indicates ground movements in the vicinity of utilities will be small. Asset protection agreements should be agreed with asset owners, as required.

4.13. The GMA recommends that a ground movement sensitivity monitoring plan is set out at design stage, including trigger levels based on the GMA with appropriate actions as necessary. This should be implemented.

4.14. It was noted previously that the Screening and Scoping exercise was correct, except for the questions regarding drainage. Whilst the BIA correctly stated that Canfield Gardens flooded in the 2002 flood event, it also flooded in the 1975 event. The Canfield Gardens lies within the Goldhurst Local Flood Risk Zone and, as such, a Flood Risk Assessment (FRA) was requested. This is now available and it states that the site can be developed without increasing flood risk to the site and surrounding area. In addition, mitigation measures are proposed to further reduce

the risk of the proposed basement flooding. As 4.3, the qualifications of the FRA authors should be provided.

4.15. It was noted that the initial BIA Screening responses contradict each other (Surface Water Q.'s 2 and 3) with regard to increases in area of hardstanding and paving. The audit of the previous BIA requested further details on proposed attenuation drainage due the increase in impermeable surface area. The revised BIA Screening indicates that impermeable surface area will be reduced and that SUDS may be adopted. There is some contradiction within the BIA, as Section 7.4 indicates impermeable site area may increase.

4.16. Comparing the measured survey drawing of the existing site arrangements with the proposed site arrangements, impermeable site area appears to be broadly unchanged and possibly reduced. The Doyle Design LLP letter of 20th January 2020 indicates the intention to use permeable paving which reduce the impermeable site area. It is not clear how the overall development would reduce the current outflow of surface water from the site, but there should not be an increase. A final drainage design should be agreed with LBC and Thames Water.

4.17. It is accepted that no known ponds or wells are in close proximity to the site and the site is outside the Hampstead Pond chain catchment area. However, the site location is very close (within 5m) of a tributary of the 'lost' River Westbourne and a further assessment of this proximity was requested. It is now stated in the revised BIA that by 1896, the river which reduced in flow to for a ditch/stream has either been culverted, and still running beneath the roads, or has been removed as it is no longer needed. The previous audit report commented that although Alluvium has not been identified in the site investigation, relating to the 'lost' river, contingencies should be considered within the temporary works plan should this be encountered during construction. Response to the same is now included under Section 7.2 of the revised BIA and a discussion on the same is provided in the letter report from Doyle Design L.L.P dated January 2020.

4.18. The BIA has shown that the surrounding slopes to the development are stable

4.19. A conceptual site model (CSM) has been updated to indicate the existing and proposed development foundation levels in the context of the ground and groundwater conditions and neighbouring structures.

5.0 CONCLUSIONS

5.1. The qualifications of the authors of the Flood Risk Assessment should be provided.

5.2. The basement will be founded within the London Clay. Perched groundwater may be encountered in the Made Ground. Contingencies in the event of encountering Alluvium have been considered.

5.3. Acceptable structural engineering information has been provided to support the construction of the basement and lightwells.

5.4. A Ground Movement Assessment (GMA) has been undertaken which predicts a damage Category of 1 (Very Slight) to neighbouring structures. However, further clarification is sought, as the predicted settlements appear to be in excess of the values adopted for the assessment.

5.5. A Flood Risk Assessment has been provided in the revised submission. However, as 5.1, the authors' qualifications should be provided.

5.6. The revised BIA indicates that impermeable surface area will not increase. A final drainage design should be agreed with LBC and Thames Water.

5.7. A utility survey report dated October 2019 is now available for review. The BIA indicates ground movements in the vicinity of utilities will be small. Asset protection agreements should be agreed with asset owners, as required.

5.8. It is accepted that the surrounding slopes to the development are stable, that there are no known ponds or wells in close proximity and that the site is outside the Hampstead pond chain catchment area.

5.9. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the additional information requested has been provided, the criteria of CPG Basements has not been met.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
O' Hegarty	48 Canfield Gardens (CRASH)	29/03/17	Risk of flooding to No. 30.	See 4.9 to 4.13.
Woolf	Flat 3, 30 Canfield Gardens	29/03/17	Potential damage.	See 4.6 to 4.13.
Wakefield	Flat 1, 30 Canfield Gardens	13/04/17	Subsidence problems, flooding problems.	See 4.6 to 4.13.
Vaziri-Tabar	Flat 2, 23 Compayne Gardens	14/04/17	Risk of flooding, subsidence problems.	See 4.6 to 4.13.
Newman	Flat 3, 22 Canfield Gardens	17/04/17	Risk of subsidence, underground streams.	See 4.10 to 4.13.
Fairhazel Co-operative	23 Compayne Gardens	13/04/17	Risk of flooding, lost river, past and future subsidence, ground movement.	See 4.6 to 4.13.
Coles	Flat 3B, 66 Fairhazel Gardens	12/04/17	Structural damage.	See 4.6 to 4.13.
Parham	57c Canfield Gardens	14/04/17	Flood risk, subsidence problems.	See 4.6 to 4.13.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Hydrology	Site within flood risk zone.	Open – Assessment provided, however authors' qualification to be stated and should be as per requirements of CPG, as 4.3.	
2	Hydrology	Impermeable site area, drainage and flood mitigation to be assessed.	Closed, pending presentation of FRA author qualifications.	February 2020
3	Stability	Services search to be undertaken.	Closed – Survey provided.	February 2020
4	Stability	Indicative temporary works scheme required for lightwell retaining walls.	Closed– Sequencing and propping outlined. Contingencies for encountering softer Alluvium provided.	February 2020
5	Stability	Establish levels of adjoining basements.	Closed – Presence confirmed.	February 2020
6	BIA	Conceptual Site Model	Closed – CSM updated.	February 2020
7	Stability	Ground Movement Assessment	Open - To be reviewed / revised as 4.8 to 4.11	

Appendix 3: Supplementary Supporting Documents

None

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