CampbellReith
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17, 18 and 19 Park Square East, London SW

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 13398-14
Revision: F2

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Appendix

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 Assessments submitted as part of the Planning Submission documentation for 17, 18 and 19 Park Square East, London NW1 4LH (planning references 2020/0801/P, 2020/0802/P and 2020/0804/P). The basement for No.'s 17 and 19 are considered to fall within Category B, and No. 18 is considered to fall into Category C, as defined by the Terms of Reference. Due to the configuration of the properties, this BIA audit report will cover the applications for all three sites.

1.2. The Audit reviewed three Basement Impact Assessments (BIAs) 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 BIAs have been produced by individuals who hold suitable qualifications.

1.5. The BIA has confirmed that the proposed basements will be founded within the Lynch Hill Gravel.

1.6. It is accepted that basement foundation excavation is unlikely to have a significant impact on the hydrogeology or the slope stability of the area.

1.7. A Flood Risk Assessment has been compiled for the three properties and it is accepted that the development will not have a significant impact on the hydrology of the area.

1.8. The revised ground movement assessment considers the impact of the development on adjacent highways and utilities, in addition to the host and adjoining properties.

1.9. The damage category assessment for all three properties indicates a maximum Burland Category 1 (very slight) for the development.

1.10. The revised submissions indicate sacrificial trench sheeting and temporary propping will be used to ensure the stability of the excavations in the Lynch Hill Gravels, and control ground movements affecting the Grade I Listed properties.

1.11. The BIAs recommend that pre-condition surveys of the neighbouring properties be undertaken and a system of monitoring of adjoining structures be established before the works start.

1.12. If the pile lengths of the finalised scheme are significantly longer than indicated in the BIA, it is recommended that the ground movement assessment be updated to confirm that acceptable movements are still anticipated and that damage is limited to no greater than Burland Category 1.

1.13. Based on the revised submissions, the proposal adheres to the requirements of the CPG Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 27 March 2020 to carry out an Audit on the Basement Impact Assessments (BIAs) submitted as part of the Planning Submission documentation for three properties; Nos. 17, 18 and 19 Park Square East, London NW1 4LH. Nos. 17 and 19 Park Square East are defined as Category B basements and No 18, Category C. It was agreed with LBC that a single audit report would be prepared.

2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the Basement Impact Assessments for potential impact on land stability and local ground and surface water conditions arising from basement developments.

2.3. A BIA is required for all planning applications with basements in Camden in general accordance with policies and technical procedures contained within

- Camden Local Plan 2017 - Policy A5 Basements.
- Camden Planning Guidance: Basements. March 2018
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.

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 proposals as follows:

- No. 17 – *"Change of use from institutional use (sui generis) to residential (Class C3) to form a self-contained dwelling over basement, ground and upper storeys, excavation of existing vaults, extension at ground floor level to provide a single storey rear extension, internal refurbishment and associated works."*
- No. 18 – *"Change of use of building from institutional use (sui generis) to be used as Offices (Class B1), extension at roof level to provide new third floor, internal subdivision, infilling, refurbishment and associated works."*

- No. 19 – *"Change of use from institutional use (sui generis) to residential (Class C3) to form a self-contained dwelling over basement, ground and upper storeys, excavation of existing vaults, extension at ground floor level to provide a single storey rear extension, internal refurbishment and associated works."*

2.6. The Audit Instruction confirms all three properties are Grade 1 listed buildings, as are their immediate neighbours.

2.7. CampbellReith accessed LBC's Planning Portal on 02 April 2020 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (BIA) reports for each property by CET Infrastructure Ltd, comprising:
    - No. 17 (reference 1038915, v2, dated January 2020);
    - No. 18 (reference 1038915, v0, dated January 2020);
    - No. 19 (reference 1038915, v2, dated January 2020).
- Phase 1 Preliminary Risk Assessment report that covers all three properties in a single report by CET Infrastructure Ltd, reference 1038915, v2, dated November 2019.
- Geotechnical Report for each property by CET Structures Ltd, comprising:
    - No. 17 (reference 1038915, v0, dated January 2020);
    - No. 18 (reference 1038915, v0, dated January 2020);
    - No. 19 (reference 1038915, v0, dated January 2020).
- Planning Application Drawings for all three properties, by Marek Wojciechowski Architects Ltd, consisting of Location Plans, Existing Plans, Demolition Plans and Proposed Plans.
- Construction Method Statement (CMS) for each property by Form Structural Design, comprising:
    - No. 17 (reference 193206, revision P1, dated February 2020);
    - No. 18 (reference 193206, revision P1, dated February 2020);
    - No. 19 (reference 193206, revision P1, dated February 2020).
- Flood Risk Assessment (FRA) report that covers all three properties in a single report by Form Structural Design, document reference 193206/001, revision A, dated 24.10.19.
- Structural drawings for each property by Form Structural Design.
- Planning Statement for each property by Montagu Evans, all dated February 2020.

2.8. The following additional documents were provided to CampbellReith in June 2020 in response to the initial audit report and the queries summarised in Appendix 2:

- Basement Impact Assessment (BIA) reports for each property by CET Infrastructure Ltd, comprising:
    - No. 17 (reference 1038915, v2, rev 3, dated June 2020);

  - No. 18 (reference 1038915, v0, rev 3, dated June 2020);
  - No. 19 (reference 1038915, v2, rev 3, dated June 2020).
- Geotechnical Report for each property by CET Structures Ltd, comprising:
  - No. 17 (reference 1038915, v2, Rev 1, issued June 2020);
  - No. 18 (reference 1038915, v2, Rev 1 issued June 2020);
  - No. 19 (reference 1038915, v2, Rev 2 issued June 2020).
- Construction Method Statement (CMS) for each property by Form Structural Design, comprising:
  - No. 17 (reference 193206, revision P3, dated 3 June 2020);
  - No. 18 (reference 193206, revision P2, dated 12 May 2020);
  - No. 19 (reference 193206, revision P2, dated 12 May 2020).
- Flood Risk Assessment (FRA) report that covers all three properties in a single report by Form Structural Design, document reference 193206/001, revision C, issued June 2020.

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	Construction Method Statement also provided for all three properties.
Are suitable plan/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	
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Is a conceptual model presented?	Yes	For all three properties this is presented textually in Section 3.6 and updated in Section 5.3 to account for site investigation findings.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	Two groundwater monitoring rounds carried out.
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	The sites form part of a terrace of similar properties with single basement/lower ground floor, and vaults to the front.
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	Yes	A flood risk assessment is 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	

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	Revised submission now includes impact to adjacent roads and utilities.
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	
Has the need for monitoring during construction been considered?	Yes	
Have the residual (after mitigation) impacts been clearly identified?	Yes	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	
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	
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. All three of the Basement Impact Assessments (BIAs) have been carried out by CET Infrastructure by individuals holding suitable qualifications.

4.2. The properties at Nos. 17, 18 and 19 form part of a terrace of properties. The LBC Instruction to proceed with the audit identified that all three properties are Grade I listed buildings, as are the adjoining properties to the north and south.

4.3. All three properties have four above-ground storeys with a single basement level. Nos. 17 and 19 have a similar profile to the adjoining properties in the terrace and the basements each occupy the same area as the above-ground levels. To the rear of both properties is a lightwell servicing the basement and a small open courtyard at ground level.

4.4. The footprint of No. 18 is considerably larger than that of Nos. 17 and 19. It comprises a similar size portion of the terrace with a large, approximately triangular area to the rear that opens to Peto Place. The basement of No. 18 is only located at the front of the property, and extends to the rear the same distance as the basements of the adjoining properties.

4.5. Each of the properties has two vault rooms that extend to the front of the properties, below the pavement of Park Square East.

4.6. It has been confirmed that the adjoining properties at Nos. 16 and 20 have basements similar to those at Nos. 17 to 19. The foundations of these basements have been assumed to be at 25.4m OD.

4.7. The proposed basement developments comprise the following:

- In all three properties the vault floors at the front of the properties will be lowered by 1.20m. The existing vault walls will be supported by underpins. For property Nos. 17 and 19 it is proposed to form openings between the two vault rooms and the nearest vault belonging to No. 18, to form three interlinked basement rooms per property.
- The basements of Nos. 17 and 19 will both be extended to the rear to occupy the full footprint below their respective courtyards. An extension at ground level, overlying approximately two thirds of the basement extension area, is also proposed in both properties.
- The existing basement in No. 18 will be extended towards the rear, below the large triangular area. The existing building walls will be supported with underpins and the rear of the new basement extension will be constructed using a contiguous pile wall.
- A new basement to the rear of No. 18 to house a new UKPN substation. This basement will be formed predominantly outside the footprint of the building, below an existing area of hardstanding. The external walls will be formed by a contiguous pile wall and the areas adjoining No. 18 will be formed by underpinning.

4.8. A Phase I Desk Study has been undertaken covering all three properties in one report, and a site walkover visit was carried out.

4.9. A site investigation was carried out and comprised 3 no. deep boreholes. BH01 was carried out in the courtyard area of No. 18, BH02 was carried out within the basement of No. 19 and BH03 was carried out in the external courtyard of No. 17.

4.10. From the site investigation a ground model was compiled for all three properties, comprising Made Ground to a minimum level of 28.20m OD, over Langley Silt extending to a minimum level of 25.78m OD (2.42m thick). Below this, Lynch Hill Gravel was recorded to a minimum level of 20.60m OD (5.18m thick), with London Clay encountered below this to at least 7.65m OD.

4.11. In addition to the boreholes undertaken by CET, Appendix B of the Construction Method Statement (CMS) presents the records of 8 No. foundation inspection trial pits carried out at the site by Soil Consultants in 2015, and 2 No. trial pits undertaken by RSK in 2019, however these records are not referenced in any of the BIAs.

4.12. The site is described as generally flat and ground level is identified in the BIA as 29m OD. It is accepted that no slope stability issues are presented by the development.

4.13. A risk of surface water flooding has been identified for the site. A flood risk assessment (FRA) has been carried out, which considers the three properties together. It concludes that the identified surface water flooding risk is low due to the absence of habitable space within the basement spaces.

4.14. The BIA identifies an increase in the area of hardstanding at Nos. 17 and 19, of 40m^2 per property (80m^2 in total) and references the FRA for details of the mitigation measures associated with this reduction. The FRA indicates attenuation tanks and a hydro brake will be included in the development to limit flows entering the sewer system. It is accepted that the developments will not impact the hydrology of the area.

4.15. The BIAs identify the site to be underlain by a Secondary A Aquifer within the Lynch Hill Gravels. Two rounds of groundwater monitoring were carried out as part of the ground investigations. Water levels were recorded at between 23.00mOD and 21.65mOD. The deepest excavation from any of the properties is identified as 23.80m OD, for the underpins in the vault areas. This is above the highest recorded groundwater level and it is noted that the monitoring was carried out in the winter months. Based on the groundwater monitoring data, it is accepted that the proposed development is unlikely to have a significant impact on the hydrogeology of the area.

4.16. It has been confirmed that all underpinning will be seated on the Lynch Hill Gravel. Underpinning will be carried out using a 'hit and miss' sequence and excavated in bays not exceeding 1m width.

4.17. The development for No. 18 will use contiguous pile wall construction in addition to underpinning. Piles are indicated in the BIA to found at 22.20m OD, which, based on the ground model, is within the Lynch Hill Gravel. The maximum excavation in front of the pile wall is indicated to be 25.00m OD for the central basement extension and 25.40m OD for the UKPN basement. The Geotechnical Report for No. 18 provides a preliminary assessment of the load carrying capability for a 350mm diameter contiguous pile wall. The CMS provides details of the temporary propping arrangement to support the piles retaining walls during construction.

4.18. A ground movement assessment (GMA) is presented in Section 7 of each BIA. Table 7-3 presents the soil parameters used in the PDisp analysis. The revised BIA submissions also provide confirmation of the Poisson's Ratio used in the drained and undrained conditions.

4.19. The PDisp analysis has been undertaken in four stages for Nos. 17 and 19, and in five stages for No. 18; the additional stage being the construction of pad foundations within the basement extension area. The revised BIAs provide PDisp input data for each property.

4.20. In addition to the PDisp analysis, vertical ground movements due to excavation of in front of the wall have been calculated in accordance with CIRIA C760. The CIRIA movements have been combined with the results from PDisp for use in the GMA. Where low settlement values were predicted, a minimum value of 5mm has been adopted for the vertical movement, in line with industry experience. Horizontal movements have been adjusted pro-rata from an assumed value of 5mm movement for a 3.5m deep excavation.

4.21. A damage category assessment (DCA) is presented in Section 8 of the BIAs. The maximum damage category calculated is shown to be Category 1 (very slight) for all properties. The revised BIA submissions consider ground movements affecting utilities and the public highways at the front and rear (No. 18 only) of the properties. It is accepted that the amount of movement estimated will not significantly impact these assets.

4.22. If the pile lengths of the finalised scheme are significantly longer than indicated in the BIA, it is recommended that the ground movement assessment be updated to confirm that acceptable movements are still anticipated and that damage is limited to no greater than Burland Category 1.

4.23. The revised CMS for No. 17 has removed the heel from the retaining wall/underpin section drawing. The revised CMS reports and the structural drawings provided for the developments now show that temporary propping and trench sheeting will be used in the construction of the underpins, to maintain stability within the Lynch Hill Gravels.

4.24. All three BIAs recommend that pre-condition surveys of the neighbouring properties be undertaken and that a system of monitoring of adjoining structures be established before the works start.

5.0 CONCLUSIONS

5.1. The BIAs have been produced by individuals who hold suitable qualifications.

5.2. All three properties are Grade I Listed, as are the adjoining terrace of properties. The BIA confirms that the adjoining properties have basements

5.3. The BIA has confirmed that the proposed basement will be founded within the Lynch Hill Gravel, which is a Secondary A Aquifer.

5.4. Groundwater monitoring was undertaken on two occasions and the highest water level recorded was approximately 0.8m below the deepest excavation for the basements. It is accepted that basement foundation excavation is unlikely to have a significant impact on the hydrogeology of the area.

5.5. The site and surrounding area are generally flat and it is accepted that the proposals will not impact the slope stability of the area.

5.6. A Flood Risk Assessment has been compiled for the three properties, which addresses the high risk of surface water flooding identified for the sites and details mitigation measures to account for the loss of hardstanding. It is accepted that the development will not have a significant impact on the hydrology of the area.

5.7. The revised ground movement assessment considers the impact of the development on adjacent highways and utilities, in addition to the host and adjoining properties.

5.8. The damage category assessment for all three properties indicates a maximum Burland Category 1 (very slight) for the development.

5.9. The revised submissions indicate sacrificial trench sheeting and temporary propping will be used to ensure the stability of the excavations in the Lynch Hill Gravels, and control ground movements affecting the Grade I Listed properties.

5.10. If the pile lengths of the finalised scheme are significantly are significantly longer than those indicated in the BIA, the ground movement assessment should be updated to confirm acceptable movements are still anticipated and that damage is limited to no greater than Burland Category 1.

5.11. The BIAs recommend that pre-condition surveys of the neighbouring properties be undertaken and a system of monitoring of adjoining structures be established before the works start.

5.12. Based on the revised submissions, the proposal adheres to the requirements of the CPG Basements.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
	General	The Authors' qualifications do not fully comply with the requirements.	Closed	08/06/2020
1	Hydrology	Further clarification is required regarding mitigation measures to prevent flooding of lightwells.	Closed	08/06/2020
2	Stability	Clarification of the founding level for the underpins in the vaults of No. 18 is required and BIAs to present consistent levels throughout.	Closed	08/06/2020
3	Stability	Further justification is required to the pile length chosen for the contiguous walls in No. 18.	Closed	08/06/2020
4	Stability	Clarification of the geometries, loading/unloading combinations, ground model and parameters used in the PDisp analysis is required.	Closed	17/06/2020
5	Stability	The Damage Category Assessment (DCA) should be updated to consider the maximum excavation depths. Ground movements due to construction are to be revised. Consideration of the impact of the UKPN basement construction to adjacent buildings to the rear of No. 18 should be included. Further information is required to support the off-sets applied to some of the DCAs and the associated displacement graphs should be updated as necessary. Further information is required regarding what measures will be implemented to ensure the stability of the excavations and control ground movements.	Closed	17/06/2020
6	Stability	Consideration of the impact to public highways is required.	Closed	08/06/2020
7	Stability	Structural drawings by Form require some clarifications as discussed in Section 4.	Closed	08/06/2020

Appendix 3: Supplementary Supporting Documents

None

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