CampbellReith
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32 Torrington Square
London, WC1E 7JL

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12727-04

Revision: D1

November 2017

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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 Assessment submitted as part of the Planning Submission documentation for 32 Torrington Square, London WC1E 7JL (planning reference 2017/4300/P). The basement is considered to fall within Category C 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 BIA has been prepared by Webb Yates Engineers with supporting documents prepared by BRD Environmental Ltd. The authors' qualifications are not all presented and consequently LBC's requirements have not been demonstrated.

1.5. The proposed work involves the construction of a four storey building plus basement on a currently vacant site between 32 Torrington Square and the Warburg Institute. The building at 32 Torrington Square is Grade II listed and the site lies within the Bloomsbury Conservation Area.

1.6. The site investigation undertaken identifies the Lynch Hill Gravel Formation to be present beneath the site overlying the London Clay Formation. Made Ground was locally encountered.

1.7. The proposed basement will generally be located above the water table with the lift pit locally extending beneath the water table surface. Further investigation should be undertaken in advance of the excavation to confirm the groundwater conditions.

1.8. The site investigation and BIA have been informed by a desk study. However, utility companies have not been approached with regards to underground infrastructure and this should be presented, along with any assessment of impacts, if applicable.

1.9. The construction methodology indicates that the basement is to be formed by a sheet piled retaining wall towards Torrington Square and underpinning along the other development boundaries.

1.10. Resin grouting is proposed to reduce groundwater flow and stabilise soils, and it is recommended that this aspect of the works is subject to a Basement Construction Plan (BCP) once other matters summarised below are adequately addressed.

1.11. The method of installation of sheet piles should be clarified, with the impact of any vibrations on any adjacent structures or infrastructure assets assessed.

1.12. A Ground Movement Assessment (GMA) which predicts Category 0 (Negligible) damage to the neighbouring properties is presented. However, the GMA is not considered to be comprehensive. The GMA should be reviewed once the queries/comments noted in Section 4 are taken into account.

1.13. A structural monitoring strategy should be presented, including trigger levels and contingency measures, to ensure construction is controlled and impacts are limited to within the predicted limits.

1.14. An outline construction programme should be presented.

1.15. The proposed scheme will not increase the proportion of impermeable area given the existing site is currently covered in hardstanding

1.16. The Flood Risk Assessment has identified a surface water flood risk and proposes appropriate mitigation measures.

1.17. The proposed development will not impact the wider hydrogeological environment.

1.18. Non-technical summaries should be presented with any future BIA submissions.

1.19. Queries and matters requiring further information or clarification are discussed in Section 4 and summarised in Appendix 2. Until the additional information and assessments requested are presented, the BIA does not meet the requirements of CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 14 September 2017 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 32 Torrington Square, London WC1E 7JL, Camden Reference 2017/4300/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; and,

c) avoid cumulative impacts upon structural stability or the water environment in the local area;

and evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.

2.5. LBC's Planning Portal describes the planning proposal as: "Restoration of 32 Torrington Square including internal changes together with erection of a 4-storey new annex building (plus basement) within the gap land to the north to accommodate a research facility (Toddler Lab) for Birkbeck, University of London (Class D1 Use)".

2.6. LBC's Planning Portal confirms that the site lies within the Bloomsbury Conservation Area and that the terrace of 27 to 32 Torrington Square is Grade II listed.

2.7. CampbellReith accessed LBC's Planning Portal on 26 September 2017 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment dated 21 July 2017 (ref J2889-S-RP-0009) by Webb Yates Engineers Ltd including:
    - Phase I Geo-Environmental Desk Study (ref BRD2903-OR1-A) dated April 2017 by BRD Environmental Ltd.
    - Geo-Environmental Site Investigation (ref BRD002903-OR2-B) dated July 2017 by BRD Environmental Ltd.
    - Flood Risk Assessment and Drainage Strategy Report (ref J2889-C-RP-0002) dated 21 July 2017 by Webb Yates Engineers Ltd.
- Proposed and Existing plans dated 17 January 2017 by Bisset Adams.
- Design and Access Statement dated July 2017 (ref BB029-BA-00-RO-Z-Design and Access-SO-P1) by Bisset Adams.
- Construction Management Plan dated July 2017 (ref BB029-BA-Z0-XX-RO-A-0000-CMP-170717) by Bisset Adams.
- Historic Environmental Desk-Based Assessment dated June 2017 (ref 12926) by Pre-Construct Archaeology Ltd.
- Planning Statement dated July 2017 by Turley.
- Heritage Statement dated July 2017 by Turley.
- Comments and objections to the proposed development from local residents.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	See Audit paragraph 4.1.
Is data required by Cl.233 of the GSD presented?	No	Information on underground infrastructure and an outline construction programme not presented.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	BIA and supporting documents.
Are suitable plans/maps included?	Yes	Information within the Desk study and BIA report is broadly in line with the information required by GSD Appendix G1.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	As above.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA report – Section 2.1, Appendix B2.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA – Section 2.1, Appendix B1.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA – Section 2.1, Appendix B3. See Audit paragraphs 4.12 to 4.14.
Is a conceptual model presented?	Yes	BIA, Figure 3.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA, Section 2.2.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA, Section 2.2.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA, Section 2.2. See Audit paragraphs 4.12 to 4.14.
Is factual ground investigation data provided?	Yes	BIA report Section 8 and Appendix E (Geo-Environmental Site Investigation dated July 2017 by BRD Environmental Ltd.)
Is monitoring data presented?	Yes	BIA report Section 8 and Appendix E (monitoring records in Appendix 2 of Geo-Environmental Site Investigation dated July 2017 by BRD Environmental Ltd.)
Is the ground investigation informed by a desk study?	Yes	BIA report Section 8 and Appendix D (Phase I Geo-Environmental Desk Study dated April 2017 by BRD Environmental Ltd.)
Has a site walkover been undertaken?	Yes	Desk study
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Presence of basements beneath 32 Torrington Square and at the adjacent Warburg Institute indicated.
Is a geotechnical interpretation presented?	Yes	BIA report Section 8.2 and Appendix E (Geo-Environmental Site Investigation dated July 2017 by BRD Environmental Ltd.)
Does the geotechnical interpretation include information on retaining wall design?	Yes	Geotechnical design parameters presented. Retaining wall design outlined in Structural Calculations by Webb Yates Engineers (BIA report Section 9.22 and Appendix H).

Item	Yes/No/NA	Comment
Are reports on other investigations required by screening and scoping presented?	Yes	Ground movement assessment provided as Appendix I and J of BIA (Structural Calculations by Webb Yates Engineers). Flood Risk Assessment and Drainage Strategy Report provided as Appendix F by Webb Yates Engineers. However, GMA incomplete.
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	BIA report – Section 9
Are estimates of ground movement and structural impact presented?	Yes	Ground movement assessment provided for 32 Torrington Square and the Warburg Institute. However, GMA incomplete.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Not proven	A temporary works sequence indicating propping is presented in BIA, Section 9.2.1 and in Appendix E (Appendix 1 of Geo-Environmental Site Investigation dated July 2017 by BRD Environmental Ltd.) However, GMA to be updated and mitigation considered, as required.
Has the need for monitoring during construction been considered?	No	See Audit paragraph 4.14.
Have the residual (after mitigation) impacts been clearly identified?	No	GMA and damage impact assessment to be updated as per Audit paragraph 4.10
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	See Audit paragraphs 4.6, 4.7, 4.10 and 4.11.

Item	Yes/No/NA	Comment
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	BIA, Appendix F (Flood Risk Assessment and Drainage Strategy Report dated 21 July 2017 by Webb Yates Engineers Ltd.)
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Structural stability to be reviewed (GMA / damage impact assessment / BCP).
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	Negligible (Category 0) damage indicated although GMA is considered to be incomplete, see Section 4.
Are non-technical summaries provided?	No	

4.0 DISCUSSION

4.1. The BIA has been prepared by Webb Yates Engineers with supporting documents prepared by BRD Environmental Ltd. The authors' qualifications are not all presented and consequently the requirements of CPG4, Section 3 have not been demonstrated.

4.2. The BIA indicates that the proposed work involves the construction of office and research facilities in a building of four storeys plus basement on a currently empty site between 32 Torrington Square and the Warburg Institute. The proposed basement will be at a depth of 4.30m from street level at the part of the basement closest to Torrington Square. The site currently comprises a ramp that leads from Torrington Square to the rear courtyard. The building at 32 Torrington Square is Grade II listed and the site lies within the Bloomsbury Conservation Area.

4.3. The site investigation undertaken identifies the Lynch Hill Gravel Member to be present beneath the site overlying the London Clay. Made Ground was encountered beneath the vehicle ramp and within the small garden of No. 32 Torrington Square. Interpretative geotechnical information in accordance with the GSD Appendix G3 is presented. The site investigation and BIA have been informed by a desk study broadly in accordance with the GSD Appendix G1. However, utility companies have not been approached with regards to underground infrastructure and utility records should be presented, along with any assessment of impacts, if applicable.

4.4. Groundwater was encountered at 4m below ground level (bgl) during the site investigation. Subsequent monitoring has indicated a groundwater level of approximately 2.50m bgl which is assessed in the BIA as perched water within the base of the superficial deposits resting upon the London Clay. The BIA indicates that the proposed basement will generally be located above the water table with the lift pit locally extending beneath the water table surface. It is understood that local excavations below the water table will be enabled by stabilisation of the gravels by injection of resin grouting. Additional dewatering is not currently proposed. As stated in the report, it is recommended that further groundwater monitoring is undertaken in advance of excavation to further inform temporary works contingency planning and control of construction and to assess any variation with seasonal or other weather effects.

4.5. The construction methodology indicates that the basement is to be formed by a sheet piled retaining wall towards Torrington Square and underpinning along the other development boundaries, with permanent reinforced concrete liner walls. Sheet piles are proposed to 14m bgl, with alternate piles to terminate at basement slab level to allow groundwater flow beneath. Two stages of underpinning are planned beneath the existing 32 Torrington Square building's boundary wall with the proposed extension.

4.6. Sequencing and propping information and retaining wall design calculations are provided for review. The method of installation of sheet piles should be clarified, with the impact of any vibrations on any adjacent structures or infrastructure assets assessed.

4.7. Resin grouting is proposed to reduce groundwater flow and stabilise soils, and it is recommended that this aspect of the works is subject to a Basement Construction Plan (BCP). If required, the BCP should also address vibration impacts from sheet piling if the advice of a specialist contractor is necessary to assess impacts and appropriately mitigate risks.

4.8. The proposed development will not impact the wider hydrogeological environment. This should be further confirmed within the BCP, once the volume and extent of grouting has been fully developed.

4.9. An outline construction programme should be presented, in accordance with CL.233, Arup Guidance for Subterranean Development.

4.10. A Ground Movement Assessment (GMA) is presented that considers the movements related to installation of the sheet pile wall and the excavation of the basement behind it. However, movements in relation to the proposed underpinning do not appear to have been assessed. It is noted that two stages of underpinning are proposed below the existing 32 Torrington Square building, and the assessment should be cognisant of this. The damage impact assessment predicts Category 0 damage (Negligible). However, this should be reviewed once movements from both sheet piling and underpinning have been considered. Consideration should be made of any utilities that may be affected, with provision for protecting those assets in consultation with the asset owner.

4.11. The BIA states that a 'comprehensive monitoring scheme has been proposed to survey displacements during construction and appropriate contingency plans have been proposed'. However, no evidence of this has been provided. A structural monitoring strategy should be presented, including trigger levels and contingency actions, to ensure construction is controlled and impacts are limited to those predicted.

4.12. Torrington Square is within Critical Drainage Area (Group 3-003), although this was not identified within the BIA screening or scoping process. The site did not flood in either 2002 or 1975. The Flood Risk Assessment (FRA) has identified that surface water flooding is generally contained within the courtyard, garden area to the rear of the development, and around the perimeter of The Warburg Institute at lower level. Surface water flooding within these areas is low to medium risk, indicated by referenced Environment Agency data.

4.13. The FRA confirms that a new drainage system to deal with any surface water runoff from and around the building will be installed and any drainage connecting directly to the public sewer

from the new proposed basement will be fitted with non-return valves to prevent any surcharge from the public sewer backing up into the building drainage. Surrounding proposed ground levels will also be made to slope away from the building to prevent surface water flows entering into the building. A secondary, emergency exit from the basement will also be installed.

4.14. The proposed scheme will not increase the proportion of impermeable area given the existing site is currently covered in hardstanding. A SUDS design, including use of an attenuation tank, is proposed in line with current guidance.

4.15. The proposed development will not impact the wider hydrological environment.

4.16. Non-technical summaries should be presented with any future BIA submissions.

4.17. Queries and matters requiring further information or clarification are summarised in Appendix 2.

5.0 CONCLUSIONS

5.1. The authors' qualifications should be demonstrated to be in accordance with the requirements of CPG4.

5.2. The Lynch Hill Gravels will be the bearing formation for the proposed foundations, underlying Made Ground. It is accepted that the basement will generally be located above the water table although the contractor confirm groundwater conditions in advance of the construction works.

5.3. The proposed development will not impact the wider hydrogeological environment.

5.4. A utilities search should be presented to identify any sensitive assets within the zone of influence.

5.5. The proposed basement is to be formed by a sheet piled retaining wall towards Torrington Square and underpinning along the other development boundaries. Temporary works sequencing is presented. The method of installation of sheet piles should be clarified, with the impact of any vibrations on any adjacent structures or infrastructure assets assessed.

5.6. Resin grouting is proposed to reduce groundwater flow and stabilise soils, and it is recommended that this aspect of the works is subject to a Basement Construction Plan (BCP).

5.7. The GMA and damage impact assessment should be reviewed once movements from both sheet piling and underpinning have been considered. Consideration should be made of any utilities that may be affected, with provision for protecting those assets in consultation with the asset owner.

5.8. A structural monitoring strategy should be presented to ensure construction is controlled and impacts are limited to within the predicted limits.

5.9. The Flood Risk Assessment confirms appropriate flood risk mitigation measures to be adopted.

5.10. An outline construction programme should be presented

5.11. A SUDS design, including use of an attenuation tank, is proposed.

5.12. The proposed development will not impact the wider hydrological environment.

5.13. Non-technical summaries should be presented with any future BIA submissions.

5.14. Queries and matters requiring further information or clarification are summarised in Appendix 2. Until the additional information and assessments requested are presented, the BIA does not meet the requirements of CPG4.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA Format	BIA authors' qualifications	Open – to be demonstrated as 4.1	
2	Desk Study	Identify underground infrastructure within proposed development's zone of influence	Open – to be provided as 4.3	
3	Groundwater	Further groundwater monitoring should be undertaken.	Contractor to confirm groundwater levels in advance of construction as 4.4	N/A
4	Stability	The method of installation of sheet piles should be clarified, with the impact of any vibrations on any adjacent structures or infrastructure assets assessed.	Open – to be provided as 4.6	
5	Stability	- Resin grouting to reduce groundwater flow and stabilise soils. - Vibration impacts from sheet piling	- It is recommended that this aspect of the works is subject to a Basement Construction Plan (BCP), as 4.7, 4.8 - If the advice of a specialist contractor is necessary, it is recommended to include within a BCP.	- N/A BCP
6	Desk Study	Outline construction programme	Open – to be provided as 4.9	
7	Stability	GMA and damage impact assessment	Open – to be updated as 4.10	
8	Stability	Structural monitoring strategy	Open – to be provided as 4.11	
9	BIA Format	Non-technical summaries	Open – to be provided as 4.16	

Appendix 3: Supplementary Supporting Documents

None

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