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253 - 255 Camden High Street
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Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12336-52
Revision: D1

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Contents

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 253 - 255 Camden High Street, London NW1 7BU (planning reference 2016/0821/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 is the combining of two existing retail units into one unit with the creation of additional retail space at basement and ground floor level. The proposal involves lowering of the existing reduced height lower ground floors by approximately 1m to create a full height, single storey basement along the full footprint of the property. At the rear of the property at 255 Camden High Street, an extension will be constructed in the existing yard area to comprise a basement and ground floor level. Sheet piling will be installed within the courtyard to allow excavation in advance of constructing the permanent reinforced concrete basement walls.

1.5. The BIA has been prepared by Card Geotechnics Limited. The authors' qualifications are in accordance with LBC's requirements.

1.6. A desk study broadly in accordance with the GSD Appendix G1 has been provided for the proposed development. However, the appendices should be provided for review, including all historical mapping, Envirocheck and ground investigation information.

1.7. Limited ground investigation has been undertaken due to access constraints. A geotechnical interpretation and a conceptual model are presented, which references historical BGS borehole records. In advance of the main works the Contractor should undertake additional exploratory holes to identify the extent and levels of Made Ground, Alluvium and perched groundwater.

1.8. The BIA indicates the site to be at low risk of surface water flooding or impacting the wider surface water flow environment, which is generally accepted. During the ground investigation, perched water was encountered within the Made Ground at around 0.5m below ground level (bgl) which is stated as being the result of a local damaged sewer discharge. No assessment of surface water flooding risk related to this incident has been presented.

1.9. The BIA discusses the hydrogeological environment in terms of Made Ground overlying London Clay, designated as Unproductive Strata. The presence of Alluvium across the site has not been discussed in terms of wider hydrogeological impact. The Contractor will need to undertake additional exploratory holes in advance of the construction which should investigate the extent of Alluvium and whether any local groundwater is perched within it. Whilst the presence of groundwater is likely to be low impact to the development, mitigated both during the construction and in the long term by following best practise, potentially the development may cut-off a Secondary Aquifer and impact the wider area. This requires further assessment.

1.10. The BIA indicates that the proposed basement construction will utilise traditional underpinning techniques. A structural design by Walsh Associates is referenced and should be provided for review. Reference is made to the installation of a sheet pile retaining wall, however no details are presented. A preliminary methodology, sequence and temporary propping arrangement should be provided in relation to the proposed sheet piling and considered within the ground movement assessment.

1.11. The BIA indicates that there are London Underground Limited (LUL) Northern Line Tunnels and Home Office Deep Shelter Tunnels beneath and adjacent to the site. The crown level of the closest LUL tunnel is approximately 5m laterally and 7m vertically from the proposed development, and outside of LUL's defined exclusion zone. The crown of the Deep Shelter Tunnels is 16.5m vertically from the proposed development. Although clear of LUL's exclusion zone, discussion with LUL and the Home Office is advisable to confirm there are no impacts on the tunnels.

1.12. A ground movement assessment (GMA) has been undertaken which includes an impact assessment in line with the Burland Scale. However, an identified zone of influence of the proposed development should be provided. Within the zone of influence foundation depths and existing basements should be indicated, and listed structures should be identified. An impact assessment for all structures within the zone of influence should be provided, including the office / commercial buildings to the rear of the property. The GMA should take into accounts movements caused by the installation of sheet piles. It is noted that CPG4 requires that details of proposed mitigation are provided where the predicted damage exceeds category 1.

1.13. The BIA discusses the requirement for survey and monitoring of nearby structures during construction. The GMA should indicate the zone of influence during construction and structures within that zone should be monitored in line with recommendations of the Structural Engineer. For structures along the Party Walls, the monitoring should be agreed under the Party Wall Act.

1.14. It is accepted that there are no land stability impacts caused by slopes at or adjacent to the site.

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

1.16. Until the missing information is provided, it is not possible to conclude that the criteria contained in CPG4 and DP27 have been met.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 18th April 2016 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 259 Camden High Street, London NW1 7BU, Camden Reference 2016/0820/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.

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 Audit Instruction described the planning proposal as: "Conversion of two units into one; rear extension at ground and basement level to provide 355sqm additional retail floorspace (A1) following demolition of existing rear extension".

2.6. CampbellReith accessed LBC's Planning Portal on 28 April 2016 and gained access to the following relevant documents for audit purposes:

· Basement Impact Assessment (ref CG/18648, Draft, Revision 1) dated February 2016 by Card Geotechnics Limited.

- Site Location Plan, Existing Plans and Elevations, Proposed Plans and Elevations, Demolition Plans dated between October 2015 and January 2016 (Revision P1) by Barr Gazetas.
- Design and Access Statement dated February 2016 (Revision A) by Barr Gazetas.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	The author's qualifications are in accordance with CPG4 guidelines for all sections.
Is data required by Cl.233 of the GSD presented?	Yes	A desk study broadly in line with the GSD Appendix G1 has been provided. However, reference is made to appendices that have not been provided for review.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	
Are suitable plan/maps included?	No	Mapping from the Desk Study appendices should be provided for review.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	No	Mapping from the Desk Study appendices should be provided for review.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	However, pending additional review of Desk Study appendices.
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	

Item	Yes/No/NA	Comment
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	However, pending additional review of Desk Study appendices.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Yes, however the ground investigation has encountered Alluvium which has not been considered in the screening or scoping.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Yes, however the ground investigation has encountered shallow groundwater attributed to a damaged local sewer. No evidence for this has been presented. No assessment has been made of the flood risk associated with the damaged sewer.
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	However, Desk Study appendices to be provided.
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Lower ground floors at 249 and 261 Camden High St identified. Tunnel structures below and adjacent the site identified, at depth. Other structures may be within the development's zone of influence, and once established the presence or basements should be confirmed.
Is a geotechnical interpretation presented?	Yes	However, bearing capacities have not been presented in line with GSD Appendix G3.
Does the geotechnical interpretation include information on retaining	No	A structural design by Walsh Associates is referenced but not

Item	Yes/No/NA	Comment
wall design?		provided for review.
Are reports on other investigations required by screening and scoping presented?	No	Desk Study appendices to be provided.
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	Lower ground floors at 249 and 261 Camden High St identified. Tunnel structures below and adjacent the site identified, at depth. Other structures may be within the development's zone of influence, and once established the presence or basements should be confirmed.
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	However, a zone of influence of the proposed development should be presented to ensure all potentially impacted structures e.g. Arlington House, Glass Building, office buildings to rear, etc, are assessed.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	However, requires additional assessment of Alluvium / GMA.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	However, pending additional review of Desk Study appendices and additional assessment of Alluvium / GMA.
Has the need for monitoring during construction been considered?	Yes	Movement monitoring is discussed and recommended for the adjacent structures / Party Walls. The tunnels are not recommended to be monitored.
Have the residual (after mitigation) impacts been clearly identified?	Yes	Discussion on contractor workmanship in relation to residual damage categories is presented.

Item	Yes/No/NA	Comment
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	No zone of influence of the development has been presented and therefore additional assessment may be necessary. Assumes that further investigation does not reveal wider / thicker expanses of Made Ground and / or Alluvium, and review of the Desk Study appendices identifies no further issues.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	The proposed basement is largely beneath current areas of hardstanding and additional run-off should not be expected.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Not proven. Assessment requires zone of influence to be considered. The potential wider presence of Alluvium should be considered.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. A desk study has been presented. However, appendices have not been presented for review and as such it is not possible to conclude that all impacts have been identified and assessed. The appendices should be provided, including historical mapping, ground investigation and Envirocheck information, in order to complete the BIA Audit.

4.2. The BIA indicates that "an assessment will need to to be undertaken to confirm if the existing infrastructure has sufficient capacity to take increased drainage". However, given that the change in impermeable areas across the site due to the proposed development is negligible, and that there will be "no significant changes in peak drainage outflows expected", the development should have no adverse impact on surface water flow and flooding.

4.3. The Regent's Canal and culverted River Fleet are both indicated as being within 250m of the proposed development. However, the BIA notes that a damaged local sewer is likely to be the cause of the shallow perched groundwater encountered in the exploratory holes and therefore the proposed development is unlikely to impact any regional shallow groundwater regime. No evidence is presented regarding the presence of damaged sewers to confirm this assessment. Further, if a damaged sewer is a likely source of discharge locally then assessment should be made of its potential flood risk and impact to the proposed development.

4.4. The BIA indicates that Alluvium on site may be related to an "unmapped tributary of the River Fleet". The potential for the wider presence of Alluvium across the site cannot be ruled out by the limited ground investigation currently undertaken. Perched water within the thin layers of Made Ground and Alluvium are likely to yield relatively small volumes, if encountered. However, whilst the BIA suggests that local flows encountered during site investigation were the result of a damaged sewer it has not ruled out the possibility of it actually being perched groundwater related to the Alluvium. The groundwater flooding vulnerability maps indicate that this type of flooding occurs where superficial deposits outcrop or are very near surface, and therefore assessing the potential risk and impact should be undertaken.

4.5. The BIA does not address the Alluvium as potentially being present across the wider site footprint. The Alluvium is designated a Secondary (undifferentiated) Aquifer. The proposed basement structure could cut-off the groundwater flow through the Alluvium and cause a wider hydrogeological impact. This should be addressed in the BIA and further investigation by the Contractor designed to assess this.

4.6. The contractor should make provision for suitable trial excavations to be undertaken in advance of the main works to investigate the presence of deeper Made Ground, Alluvium and groundwater across the site. As part of the Contractor's further investigation of the site it is

advisable to install a shallow monitoring well within the Alluvium and make further assessments based on those observations.

4.7. The contractor should make suitable contingency plans to deal with any perched water encountered during construction. In the long term, the permanent structure will require suitable waterproofing to be provided in line with best practise.

4.8. The BIA states that a sheet piled retaining wall will be installed around the perimeter of the courtyards to allow for the excavation to basement level before construction of the permanent reinforced concrete basement walls. Whilst the use of "appropriate propping" is referenced no additional structural methodology is provided. Reference is made to structural design by the engineers Walsh Associates but this has not been presented for review. In order to assess the potential impacts the type and embedment length of the sheets should be provided, plus details of construction sequencing, propping arrangements and recommendations to contractors, including planning for perched groundwater.

4.9. In regards to the proposed underpinning, suitable outline discussions on construction methodology and recommendations for undertaking underpinning is provided in the BIA. This should be presented alongside the structural design by Walsh Associates, including sketches of the sequence and propping scheme proposed.

4.10. Results of a ground movement assessment (GMA) are provided, which has been undertaken in accordance with CIRIA 580. Whilst the GMA states it has taken into account movements induced by the construction of underpins, no allowance seems to have been made for the installation of sheet piles, which should be included in the assessment.

4.11. The GMA assesses the tunnel structures as well as the adjoining property / party walls. Mitigation in terms of limiting underpin lateral deflections is discussed with reference to relevant building damage categories. It is considered unlikely that lateral deflection could be limited to <0.5mm. However, deflection <5.5mm should be achievable and therefore a damage Category 2 'Slight' should be achievable. This should be reviewed, however, in conjunction with any additional movements assessed to be caused by sheet piling.

4.12. The GMA does not provide a predicted zone of influence of the proposed development and therefore it cannot be determined that a full assessment of all structures potentially impacted has been completed. The office / commercial buildings at the rear of the property, plus other nearby structures, have not been assessed, and the BIA should clearly identify which structures are within the zone of influence and present the impacts to them.

4.13. The GMA has considered stress change caused by the proposed development on the underlying tunnels. The stress changes have been indicated to be negligible and as such will have no impact. Monitoring of the tunnels has not been recommended. Although the proposed development is clear of LUL's exclusion zone, discussion with LUL is advisable to confirm there are no impacts on the tunnels or that LUL do not require monitoring of the tunnels. Similar discussions with the Home Office are advisable in regards to the Deep Shelter Tunnels.

5.0 CONCLUSIONS

5.1. The BIA has been prepared by Card Geotechnics Limited. The authors' qualifications are in accordance with LBC's requirements.

5.2. A desk study broadly in accordance with the GSD Appendix G1 has been provided for the proposed development. However, the appendices have not been presented. The appendices should be provided for review, including all historical map, Envirocheck and ground investigation information.

5.3. Limited ground investigation has been undertaken due to access constraints. The presence of Alluvium and potential for groundwater within the Alluvium has been identified, the impacts of which have not been fully assessed. Potentially the proposed development could have a wider hydrogeological impact if it cuts-off groundwater flow within the Alluvium, and this should be identified and discussed in the BIA. In advance of the main works the Contractor should undertake additional exploratory holes to identify the extent and depth of Made Ground, Alluvium and perched groundwater.

5.4. The BIA notes that a damaged local sewer is likely to be the cause of the shallow perched groundwater encountered in the ground investigation. Evidence should be presented regarding the presence of damaged sewers to support this assessment. If a damaged sewer is a likely source of discharge locally then assessment should be made of its potential flood risk and impact to the proposed development.

5.5. Additional groundwater monitoring should be undertaken within the Alluvium. Should this, in conjunction with the extent of the Alluvium identified by additional exploratory holes, indicate interaction and potential cut-off of a Secondary Aquifer by the proposed basement, then the impact assessment will need to be further revised.

5.6. A structural design by Walsh Associates is referenced and should be provided for review. This should include sketches of the sequence and propping schemes proposed (underpinning and sheet piling); calculations regarding bearing capacities of the soils; retaining wall calculations; recommendations to contractors, including contingency measures to control the ingress of perched water, if encountered.

5.7. A ground movement assessment (GMA) has been undertaken which includes an impact assessment in line with the Burland Scale. However, an identified zone of influence of the proposed development should be provided. An impact assessment for each structure within the zone of influence should be presented, including an indication of foundation depths, existing basements and identification of any listed structures. It is noted that CPG4 requires that details

of proposed mitigation are provided where the predicted damage exceeds category 1. For structures along the Party Walls, appropriate monitoring should be agreed under the Party Wall Act. Monitoring of other structures may also be required, in line with the recommendations of the Structural Engineer. The GMA should consider the effects of sheet piling.

5.8. The underlying tunnels are unlikely to be impacted by the proposed development. It is recommended that discussions with the asset owners are undertaken to confirm this assessment and any requirement they may have for monitoring during construction.

5.9. It is accepted that there are no land stability impacts caused by slopes at or adjacent to the site.

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

5.11. Until the additional information is provided, it is not possible to conclude that the criteria contained in CPG4 and DP27 have been met.

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	The desk study appendices should be provided for review, including all historical map, Envirocheck and ground investigation information.	Open	
2	BIA	Additional exploratory holes recommended to identify extent and thickness of Made Ground and Alluvium, and identify groundwater within the Alluvium.	Open	To be addressed prior to construction within BCP.
3	Hydrogeology	Impact of Alluvium as a Secondary Aquifer should be assessed, including impact to wider hydrogeological environment.	Open	
4	Land Stability	Structural design / methodology by Walsh Associates should be provided for review, including bearing capacities, retaining wall information, sketches of propping arrangements and construction sequences, recommendations for the contractor.	Open	
5	Land Stability	Ground movement assessment - a zone of influence should be identified. The presence of basements / nearby Listed structures should be identified. Impact assessments should be presented for all structures within the zone of influence. The effects of sheet piling should be considered and presented.	Open	
6	Surface Flow and Flooding	An assessment of any impact due to the damaged sewer on the proposed development should be provided.	Open	

Appendix 3: Supplementary Supporting Documents

None

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