CampbellReith
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Middlesex Hospital Annex, 44 Cleveland Street, London W1T 4JT

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12466-49

Revision: D1

March 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 Middlesex Hospital Annex, 44 Cleveland Street, London W1T 4JT (planning reference 2017/0414/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 site consists of North House, South House and the Grade II listed Middlesex Hospital Annexe (the Union Work House) located in the centre of the site with two wing buildings at the rear. The basement of the Union Work House building is to be deepened and extended. It is proposed to demolish the wings at the rear and construct a mid-rise building with single storey basement. The new basement will be approximately 2m deeper than the existing basement.

1.5. The BIA, Phase I Geotechnical and Geo-Environmental Desk Study and the Structural and Civil Engineering Report have all been prepared by AECOM Limited. The credentials of the authors of the reports have not been established in line with CPG4 guidelines.

1.6. Information within the BIA is broadly in line with the aspects recommended of a desk study within the LBC guidance. Thames Water have provided an Asset Location Search report and information regarding BT tunnels, London Underground and Crossrail tunnels are included within the BIA. The Structural and Civil Engineering Report recommends further information is obtained from Utility companies with regards to underground infrastructure.

1.7. The BIA states that the site is likely to be underlain by Made Ground over Lynch Hill Gravel. A site investigation, in accordance with the LBC guidance, should be undertaken to confirm ground and groundwater conditions. The thickness of any Made Ground and the groundwater level should be assessed in terms of stability and hydrogeological impacts.

1.8. A site investigation should provide sufficient insitu strength / density data to confirm bearing capacity for foundation design and stiffness parameters for ground movement assessments. Groundwater conditions should be considered in regards to both temporary and permanent

works designs. Groundwater monitoring should be undertaken as required to inform temporary works, contingency planning and control of construction, and waterproofing design.

1.9. Geotechnical data should be presented in an interpretative report in accordance with the LBC guidance, including a conceptual site model.

1.10. Insufficient structural information has been provided. Outline retaining wall design and temporary works sequencing, propping and methodologies should be presented.

1.11. A Ground Movement Assessment (GMA) should be provided which should address both the excavation and construction methodology effects and assess the damage impact on all of the structures within the zone of influence.

1.12. An outline methodology and guidance for monitoring structural movements during construction is presented. This should be revised to reflect the actual ground / structural movements predicted.

1.13. An outline construction management plan has been provided. An outline construction programme should be presented.

1.14. The proposed development incorporates an attenuation SUDS scheme which reduces peak discharge flow rate in accordance with relevant guidance. The scheme offers benefit to the wider hydrological environment.

1.15. Queries and matters requiring further information or clarification are discussed in Section 4 and summarised in Appendix 2. In accordance with the BIA's own conclusions and recommendations, additional investigation and assessments are required. Until the additional information requested has been provided the requirements of CPG4 have not been met.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 25 January 2017 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Middlesex Hospital Annex, 44 Cleveland Street, London W1T 4JT, Camden Reference 2017/0414/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;

d) 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: "Refurbishment of and alterations to the existing former Workhouse Building (Grade II listed) and North and South Houses (fronting onto Cleveland Street) to provide 12x residential units (Class C3); demolition of part of South House and buildings at rear of Workhouse Building and redevelopment to provide a part 4, part 5, part 8 storey building comprising 4,535sqm of commercial floor space (Class B1) and 38x

residential units (Class C3); and associated works including opening up of Bedford Passage, creation of public open space, landscaping works, and partial demolition of front boundary wall."

2.6. CampbellReith accessed LBC's Planning Portal on 20 February 2017 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment of Middlesex Hospital Annex (ref 60516144) dated 15 December 2016 by AECOM Ltd.
- Phase 1 Geotechnical and Geo-environmental Desk Study Report (ref 60516144/DS/002) by AECOM Ltd.
- Structural and Civil Engineering Report dated December 2016 by AECOM Ltd.
- Flood Risk Assessment of Middlesex Hospital Annex (ref 60516144) dated 21 December 2016 by AECOM Ltd.
- Stormwater Runoff Attenuation Strategy (ref 60516144) dated December 2016 by AECOM Ltd.
- Historic Building Structural Engineering Report (ref 60516144) dated September 2016 by AECOM Ltd.
- Existing and proposed plans, elevations and sections dated January 2017 by Llewlyn Davies.
- Construction Management Plan (ref PC/P1615 CMP) dated January 2017 by Crosby Transport Planning Ltd.
- Preliminary Ecological Assessment (ref 4624) dated December 2016 by The Ecology Consultancy.
- Design and Access statement dated January 2017 by Llewlyn Davies (design team: Temple, Aecom, Arup, Crosby Transport Planning, Urban counsel, Delva Pateman Redlar).
- 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	The author's qualifications for the BIA have not been provided in accordance with CPG4 guidelines.
Is data required by Cl.233 of the GSD presented?	No	Desk study information is broadly in line with the information required by the GSD Appendix G1. An Asset Location Search report produced by Thames Water is provided within the Flood Risk Assessment report. The Structural and Civil Engineering report advises that all utility assets are located and assessed. Outline construction programme required.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	No	The BIA is based on assumptions – outline temporary and permanent works proposals required.
Are suitable plans/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	BIA report section 8.3. The Screening process identifies the presence of worked ground from historical mapping.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA report section 8.2 and Section 6 of the Structural and Civil Engineering Report (Proposed Surface Water Drainage). The site is underlain by Lynch Hill Gravel which is classified as a Secondary A Aquifer and the proposed extension of the basement is envisaged to extend beneath the water table surface within these deposits.

Item	Yes/No/NA	Comment
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	The site is at very low risk to low risk of surface water flooding. The site is not located within a Camden Local Flood Risk Zone and did not flood during 1975 or 2002.
Is a conceptual model presented?	No	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Scoping recommends a ground investigation and underground services search.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Scoping recommends groundwater monitoring to provide information on groundwater levels in the shallow aquifer.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	A Flood Risk Assessment has been provided which confirms the site is not at risk of flooding. Outline SUDS proposals presented.
Is factual ground investigation data provided?	No	Within section 3 of the BIA, reference is made relating to historical exploratory holes in the BGS archives in close vicinity to the site. The findings of a number of ground investigations undertaken in the vicinity of the site have also been provided. However, site specific data should be provided.
Is monitoring data presented?	No	
Is the ground investigation informed by a desk study?	N/A	No ground investigation provided.
Has a site walkover been undertaken?	Yes	As part of the Phase I Geotechnical and Geo-Environmental Desk Study and the Historic Building Structural Engineering Report in 2016.

Item	Yes/No/NA	Comment
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Section 2 of the Structural and Civil Engineering report confirms the following basements in the adjacent buildings: Sainsbury Welcome Centre (2 levels of basement), Astor College (single storey basement) and Middlesex House (single storey basement). Figure 2 of the BIA report provides the indicative outline for basement structures surrounding the site and estimated basement levels where these are evident from publically available information.
Is a geotechnical interpretation presented?	No	No site investigation provided or geotechnical data presented.
Does the geotechnical interpretation include information on retaining wall design?	No	Section 9 of the BIA report and Section 3 of the Structural and Civil Engineering report indicate the intention to provide design information in the future.
Are reports on other investigations required by screening and scoping presented?	No	Site investigation, GMA structural information etc. required.
Are baseline conditions described, based on the GSD?	No	
Do the base line conditions consider adjacent or nearby basements?	No	Adjacent basements identifies but no assessments made.
Is an Impact Assessment provided?	No	Section 9 of the BIA report states that 'following the completion of the ground investigation, a revised site-specific ground model will be developed and characteristic soil parameters derived for use in the Impact Assessment'.
Are estimates of ground movement and structural impact presented?	No	No structural calculations or GMA provided.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	No impact assessment submitted.

Item	Yes/No/NA	Comment
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Section 9 of the BIA discusses how further investigation will highlight any requirements for further mitigation. SUDS proposals are presented.
Has the need for monitoring during construction been considered?	No	Appendix C of the Structural and Civil Engineering Report indicates that monitoring will be required but provides no proposals.
Have the residual (after mitigation) impacts been clearly identified?	No	Additional assessments required, as indicated.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	No structural calculations provided. Site investigation, ground movement assessment, damage impact assessments required.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Flood Risk Assessment report, SUDS proposals and Section 6 of the Structural and Civil Engineering Report
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Further consideration of site conditions required. A ground movement assessment is required which should assess the impact on all of the structures within the zone of influence. Hydrogeological impact should be considered.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	No	No ground movement assessment has been provided with the report.
Are non-technical summaries provided?	No	

4.0 DISCUSSION

4.1. The BIA, Phase I Geotechnical and Geo-Environmental Desk Study and the Structural and Civil Engineering Report have all been prepared by AECOM Limited. There appears to be no cross-referencing and as such statements within the three documents repeat some aspects of the requirements. The credentials of the authors of the reports have not been established in line with CPG4 guidelines.

4.2. The site consists of North House, South House and the Grade II listed Middlesex Hospital Annexe (the Union Work House) located in the centre of the site with two wing buildings at the rear. The wings at the rear of the Union Work House are to be demolished with the remaining buildings being retained and refurbished into a mixed-use scheme comprising residential and commercial units. The basement of the Union Work House building is to be deepened and extended. It has been proposed to construct a two to nine storey building with a single storey basement and roof plant following the demolition of the wings at the rear of the Union Work House building. The new basement will be approximately 2m deeper than the existing basement.

4.3. The BIA includes the majority of the information required from a desk study in line with the GSD Appendix G1. An Asset Location Search report by Thames Water is provided and information regarding BT tunnels, London Underground and Crossrail tunnels are included within the BIA. The Structural and Civil Engineering Report recommends further information is obtained from Utility companies with regards to underground infrastructure.

4.4. An underground service tunnel appears to be present on site, associated with the basement of the former Union Workhouse. The tunnel appears to run in a roughly north-south direction between the former Union Workhouse and South House before running in a roughly east-west direction beneath Cleveland Street. Future assessments will need to consider this structure.

4.5. The BIA states that the site is likely to be underlain by Made Ground over Lynch Hill Gravel. A site investigation in accordance with the GSD Appendix G2 and appropriate to the scale of the proposed development should be undertaken to confirm ground and groundwater conditions. The thickness of any Made Ground or Worked Ground, as identified in the BIA, and the presence of any perched groundwater should be assessed in terms of stability and hydrogeological impacts. The groundwater level in the Lynch Hill Gravel (Secondary A Aquifer) should also be assessed for the same impacts.

4.6. A site investigation should provide sufficient insitu strength / density data to confirm bearing capacity for foundation design and stiffness parameters for ground movement assessments. Groundwater conditions should be considered in regards to both temporary and permanent

works designs. Groundwater monitoring should be undertaken as required to inform temporary works contingency planning and control of construction, and waterproofing design.

4.7. Geotechnical data should be presented in an interpretative report in accordance with the GSD Appendix G3, including a conceptual site model.

4.8. The proposed development will not result in an increase in impermeable areas given that the existing site is 100% impermeable. The proposed development incorporates an attenuation SUDS scheme which aims to meet targets set in the National Planning Policy Framework (NPPF). Current peak discharge rate from the site has been calculated as 42.6l/s for a 1:1 year storm event and the scheme proposed reduces peak discharge flows by 50% from existing levels. Based on a 100 year + 20% (for climate change) return period storm event discharge flow is reduced by >80%. The attenuation scheme will comprise underground modular storage units and a hydro-brake restricting flow to 21.5l/s. The scheme offers benefit to the wider hydrological environment.

4.9. Retaining wall design has been referred to in the BIA and the Structural and Civil Engineering report but no outline structural calculations have been provided. Outline retaining wall design information should be presented.

4.10. Outline permanent works designs and a temporary works scheme should be provided including sequencing and propping arrangements. This should reflect the actual site ground and groundwater conditions. The potential for perched water in the Made Ground / Worked Ground and groundwater within the Lynch Hill Gravel should be considered, both in terms of permanent waterproofing grade and in the temporary case, for control of construction. A discussion on options for groundwater protection at basement level are outlined in Section 3 of the Structural and Civil Engineering report.

4.11. No Ground Movement Assessment (GMA) or damage impact assessment calculations have been presented for review and therefore there is no information on the indicative zone of influence of the development. The presence or absence of other nearby basements, underground structures listed buildings and foundation depths of structures within that zone should be confirmed.

4.12. A GMA should therefore be provided which should address both the excavation and construction methodology effects and assess the damage impact on all of the structures within the zone of influence. In line with CPG4, where Category 1 or a higher damage category is identified, the BIA should provide mitigation measures to address ground movement.

4.13. An outline discussion for monitoring structural movements during construction is presented within the Structural and Civil Engineering report. This should be revised to reflect the actual

ground / structural movements predicted and provide outline details of methodology, trigger values and contingency actions to maintain stability within acceptable limits.

4.14. An outline construction management plan has been provided. An outline construction programme should be presented.

4.15. It is accepted that the site is at low risk of flooding and a Flood Risk Assessment has been provided.

4.16. Assessments should be reviewed once the additional information required has been presented, and the impact assessment and mitigation proposals updated, as required.

4.17. Non-technical summaries should be provided within any revisions to the BIA submitted.

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

5.0 CONCLUSIONS

5.1. The qualifications of the authors have not been established and therefore these need to be confirmed to ascertain that they meet the LBC requirements.

5.2. The BIA includes the majority of the information required from a desk study in accordance with LBC guidance. The Structural and Civil Engineering Report recommends further information is obtained from utility companies with regards to underground infrastructure

5.3. A site investigation in line with the GSD Appendix G2 should be undertaken to confirm ground and groundwater conditions.

5.4. Interpretative geotechnical information should be provided in accordance with the GSD Appendix G3, including a conceptual site model.

5.5. Retaining wall design has been referred to but no structural calculations have been provided. Outline retaining wall design information should be presented.

5.6. An outline permanent and temporary works scheme should be provided including methodologies, sequencing and propping arrangements proposed. This should include groundwater control proposals.

5.7. A GMA should be provided indicating the effects of the excavation and the construction methodology, the zone of influence and the damage impact to structures within that zone.

5.8. An outline discussion for monitoring structural movements during construction is presented. This should be revised to reflect the actual ground / structural movements predicted and include proposed methodology, trigger values and contingency actions.

5.9. It is accepted that the site is at a low risk of surface water flooding. The proposed attenuation SUDS scheme offers benefit to the wider hydrological environment.

5.10. Assessments should be reviewed once the additional information required has been presented, and the impact assessment and mitigation proposals updated, as required. Non-technical summaries should be provided within any revisions to the BIA submitted.

5.11. Queries and matters requiring further information or clarification are summarised in Appendix 2. In accordance with the BIA's own conclusions and recommendations, additional investigation and assessments are required. Until the additional information requested has been provided the requirements of CPG4 have not been met.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	Author's qualifications	The author's qualifications for the BIA have not been established in accordance with CPG4 guidelines.	Open – to be provided as 4.1	
2	Stability	Utility infrastructure to be confirmed	Open – to be provided as 4.3 to 4.4	
3	Site investigation	No site investigation or interpretative geotechnical information, no groundwater monitoring, in line with GSD G2 / G3	Open – to be provided as 4.5 to 4.7	
4	Stability	Retaining wall designs, permanent and temporary works proposals, groundwater control	Open – to be provided as 4.9 to 4.10, 4.4	
5	Stability	Ground Movement Assessment and Damage Assessment	Open – to be provided as 4.11 to 4.12, 4.4	
6	Stability	Structural monitoring proposals	Open – to be provided as 4.13	
7	BIA Format	Impact assessments should be updated and presented for issues carried through scoping and clarified by site investigation, GMA etc.	Open – to be provided as 4.16	
8	BIA Format	Impact mitigation measures (stability, hydrogeology)	Open – to be provided as 4.16	
9	BIA Format	Construction programme	Open – to be provided as 4.14	
10	BIA Format	Non-technical summaries	Open – to be provided as 4.17	

Appendix 3: Supplementary Supporting Documents

None

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