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210 Shaftesbury Avenue, London, WC2H 8DP

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12727-65

Revision: F1

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1.0 NON-TECHNICAL SUMMARY

1.1. CampbellReith was instructed by London Borough of Camden, (LBC) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 210 Shaftesbury Avenue, London WC2H 8DP (planning reference 2018/0575/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 RSK Environment with supporting documents prepared by Bennetts Associates, Michael Jackson Consulting and Southern Testing Laboratories. The BIA authors' qualifications are in accordance with CPG Basements.

1.5. The current building on site houses a theatre which is three storeys in height with a basement excavation. This sloping basement houses the theatre seating to the west and the stage and associated back stage areas to the east. The proposed work involves the widening of the existing basement footprint to facilitate the construction of a larger bar area which would extend beneath Bloomsbury Street, in addition to the widening of the basement southwards beneath the pavement to High Holborn. The building is located within the Bloomsbury Conservation Area and is Grade II listed.

1.6. BGS records indicate the site to be underlain by the Lynch Hill Gravel Member overlying the London Clay. However, it considered likely that only limited (if any) deposits of the Lynch Hill Gravel Member remain on site following the excavation of the present basement in 1911. The site investigation undertaken in 2013 by Southern Testing Laboratories Limited identified Made Ground underlain by the London Clay Formation. Appropriate interpretative geotechnical information is presented.

1.7. Groundwater was not encountered during the 2013 site investigation, nor in the recent trial pitting works inspecting the existing foundations. The final results of the trial pitting works should be considered, once concluded. If necessary, a revised impact assessment should be presented.

1.8. Notwithstanding the above, it is understood that the proposed development will comprise the extension of the existing basement horizontally outside the existing perimeter and therefore there is the potential for granular deposits of the Lynch Hill Gravel Member to be encountered during

the proposed excavation and construction works. However, considering the underlying unproductive strata, and the assessment that any diverted subterranean flows will be negligible, whilst groundwater may need to be managed for the temporary works, the proposed development will not impact the wider hydrogeological environment.

1.9. The proposed basement extension will be in close proximity to a Crossrail tunnel which is located 8.00m south of the site (running along High Holborn) at an approximate depth of 14.00m below ground level. Utility assets, including Thames Water assets, are present below the adjacent highways.

1.10. Outline structural information is provided. The proposed basement will require the installation of a contiguous bored piled wall around the perimeter of the site in addition to a series of piles to take up the load of the existing theatre's façade, which will be propped to avoid damage impacts during the works.

1.11. The Ground Movement Assessment (GMA) predicts Category 0 (Negligible) damage to the neighbouring properties with negligible movements to the highways and Crossrail tunnel. Final consultations with TFL and utility asset owners should be undertaken in advance of the works and Asset Protection Agreements entered into, as required.

1.12. A structural monitoring strategy should be agreed under Party Wall and Asset Protection Agreements (as required), including trigger levels and contingency measures, to ensure construction is controlled and impacts are maintained within the predicted limits.

1.13. The proposed scheme will not increase the proportion of impermeable area given the existing site conditions comprise the building and hardstanding. The proposed development will not impact the wider hydrological environment.

1.14. The current Environment Agency and Camden SFRA data indicates that the site is at "very low" risk of flooding. The flood risk protection measures proposed, including emergency evacuation routes, should be implemented.

1.15. The BIA meets the criteria of CPG Basements.

1.16. This audit considers the assessments presented in regard to the currently proposed contiguous piled wall. The BIA indicates that the structural scheme may be changed in the future, with the contiguous piled wall being replaced by a secant plied wall. If this occurs, the GMA and damage assessment should be repeated and re-submitted to LBC, TFL and the affected utility asset owners.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 14 March 2018 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 210 Shaftesbury Avenue, London WC2H 8DP, Camden Reference 2018/0575/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): Basements.
- 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: "Various alterations to theatre building (Sui Generis) including basement extensions, creation of new entrance fronting Princes Circus, installation of LED screens, alterations to canopy, external lighting to façade, replacement of plant at roof level, installation of pavement lights and delivery hatch as well as minor alterations to façade and doors."

2.6. LBC's Planning Portal confirms that the site lies within Bloomsbury Conservation Area and the building is Grade II listed.

2.7. CampbellReith accessed LBC's Planning Portal on 3rd April 2018 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment dated November 2017 (ref 371647-01(01)) by RSK Environment Ltd including:
    - Factual Site Investigation Report dated January 2013 (ref J11265) by Southern Testing Laboratories Limited.
- Existing and proposed plans and elevations (ref 1702) by Bennetts Associates.
- Design and Access Statement dated December 2017 by Bennetts Associates.
- Basement Construction Method Statement dated November 2017 (ref 2714/MJ) by Michael Jackson Consulting.
- Draft Construction Management Plan dated February 2018 by Bennetts Associates.
- Response from Historic England dated February 2018.

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	
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 5, Table 6. A Crossrail operated tunnel is located 8.00m south of the site (running along High Holborn) at an approximate depth of 14mbgl. The site is outside the tunnel exclusion zone.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA report – Section 5, Table 4.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA report – Section 5, Table 5.
Is a conceptual model presented?	Yes	Provided in sufficient detail in the text description of the site and potential impacts.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA report, Section 6.3.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA report, Section 6.1.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	N/A	No issues identified in Screening process.
Is factual ground investigation data provided?	Yes	Southern Testing Laboratories Ltd report, Appendix B of BIA.
Is monitoring data presented?	No	No groundwater recorded during the site investigation and no subsequent monitoring undertaken.
Is the ground investigation informed by a desk study?	No	The 2013 ground investigation was not informed by a desk study. A desk study has subsequently been undertaken and is included within the RSK BIA report.
Has a site walkover been undertaken?	Yes	Walkover undertaken by RSK Environment Ltd. During this walkover three groundwater pumps were identified within the basement area that have been in operation since the theatre was constructed in 1911.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	A search of the Camden Planning Portal by RSK has indicated the presence of at least single storey basements beneath all the adjacent surrounding buildings.
Is a geotechnical interpretation presented?	Yes	Southern Testing Laboratories Ltd report (Appendix B of BIA), Appendix B and C.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Geotechnical design parameters presented in Section 8.3 of the BIA Report.

Item	Yes/No/NA	Comment
Are reports on other investigations required by screening and scoping presented?	Yes	GMA, outline structural information
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 8.
Are estimates of ground movement and structural impact presented?	Yes	GMA provided for nearby sensitive structures (Sovereign House, 167 High Holborn and Berkshire House), highways (Grape Street, High Holborn and Bloomsbury Street) and the nearby Crossrail tunnel within Section 8 of BIA report.
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?	Yes	Retention system for Grade II listed façade, structural monitoring, flood risk protection measures.
Has the need for monitoring during construction been considered?	Yes	Full scheme to be agreed under Party wall and Asset Protection Agreements.
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	

Item	Yes/No/NA	Comment
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 2?	Yes	Negligible (Category 0) damage indicated.
Are non-technical summaries provided?	Yes	Non-technical summary provided at beginning of BIA report.

4.0 DISCUSSION

4.1. The BIA has been prepared RSK Environment with supporting documents prepared by Bennetts Associates, Michael Jackson Consulting and Southern Testing Laboratories. The BIA authors' qualifications are in accordance with CPG4 guidelines.

4.2. The current building on site houses a theatre which is three storeys in height with a basement excavation which slopes down from a single storey level on the western elevation, at 20.80m AOD, down to 18.20m AOD on the eastern elevation. This sloping basement houses the theatre seating to the west and the stage and associated back stage areas to the east. The building is located within Bloomsbury Conservation Area and is Grade II listed.

4.3. The BIA indicates that the proposed work involves the widening of the existing basement footprint to facilitate the construction of a larger bar area which would extend beneath Bloomsbury Street, in addition to the widening of the basement southwards beneath the pavement to High Holborn. The proposed basement will have a finished floor level (FFL) of approximately 20.55mAOD and will require the installation of a piled wall around the perimeter of the site in addition to a series of piles to take up the load of the existing theatre's façade and allow temporary propping and protection during the works.

4.4. The proposed basement extension will be in close proximity to a Crossrail tunnel which is located 8.00m south of the site (running along High Holborn) at an approximate depth of 14.00m below ground level. Utility assets, including Thames Water assets, are present below the adjacent highways.

4.5. BGS records indicate the site to be underlain by the Lynch Hill Gravel Member overlying the London Clay. A site investigation undertaken in January 2013 identified Made Ground underlain by the London Clay. Groundwater was not encountered during the 2013 site investigation (see also 4.8).

4.6. Interpretative geotechnical information in accordance with the GSD Appendix G3 is presented. The BIA has been informed by a desk study broadly in accordance with the GSD Appendix G1.

4.7. The present basement excavation slopes down from a single storey level on the western side at 20.80mAOD (FFL) to 18.20mAOD (FFL) on the eastern side. Based on the information obtained from publically available borehole records, and the information contained within the GSD, it is assumed that the interface with the Lynch Hill Gravel Member (classified as a Secondary A Aquifer) and the underlying London Clay Formation (classified as Unproductive Strata) is at 4m bgl, at an approximate elevation of 20.00mAOD. It is therefore considered likely that only limited, if any, deposits of the Lynch Hill Gravel Member remain on site following the excavation of the present basement. Notwithstanding the above, it is understood that the proposed development

will comprise the extension of the existing basement horizontally outside the existing perimeter. It is therefore possible that in undertaking these proposed excavation and construction works that granular deposits of the Lynch Hill Gravel Member may well be encountered.

4.8. A walkover undertaken by RSK Environment Ltd in October 2017 identified three groundwater pumps that are understood to have been in operation since the theatre was constructed in 1911. It is understood that in the past these pumps have failed and as such an accumulation of groundwater has occurred at the lowest basement level. Although the ingress of groundwater has occurred in the past discussions with the estates manager highlighted that the volumes were never significant enough to impact the long-term operation of the theatre. Additional trial pitting works to inspect the existing foundations on site were ongoing at the time of writing the BIA report. Of the pits completed TP3 was the deepest and was undertaken on the southern elevation at basement level. The pit revealed masonry corbelled footings overlying a mass concrete pad/strip extending to a depth of 1.50m. The pad was observed to be founded on the Lynch Hill Gravel and was dry at the time of inspection. The final results of the trial pitting works should be provided once concluded.

4.9. Given the density of existing basement developments that bound the site and within the local area, the underlying unproductive strata, and the assessment that any diverted subterranean flows will be negligible, whilst groundwater may need to be managed for the temporary works, the proposed development will not impact the wider hydrogeological environment.

4.10. Outline structural information is provided. The proposed basement will require the installation of a contiguous bored piled wall around the perimeter of the site in addition to a series of piles to take up the load of the existing theatre's façade, which will be propped to avoid damage impacts during the works. Following the installation of the temporary support, the basement box will be constructed from reinforced concrete, with concrete slabs at basement and ground floor levels, forming rigid propping in the permanent condition. It is proposed to support the structure on piled foundations.

4.11. A Ground Movement Assessment (GMA) is presented that considers the movements relating to the proposed basement construction and the effect on nearby sensitive structures (Sovereign House, 167 High Holborn and Berkshire House), highways (Grape Street, High Holborn and Bloomsbury Street) and the nearby Crossrail tunnel. For the structures assessed, Category 0 (Negligible) damage is predicted in accordance with the Burland Scale. Final consultations with TFL and utility asset owners should be undertaken in advance of the works and Asset Protection Agreements entered into, as required.

4.12. This audit considers the assessments presented in regard to the currently proposed contiguous piled wall. The BIA indicates that the structural scheme may be changed in the future, with the

contiguous piled wall being replaced by a secant plied wall. If this occurs, the GMA and damage assessment should be repeated and re-submitted to LBC, TFL and the affected utility asset owners.

4.13. The BIA refers to an outline monitoring strategy. This should be agreed under Party Wall and Asset Protection Agreements (as required), including trigger levels and contingency measures, to ensure construction is controlled and impacts are maintained within the predicted limits.

4.14. The current Environment Agency and Camden SFRA data indicates that the site is at "very low" risk of flooding (less than 0.1%). However, High Holborn has areas classified as being at "medium" risk of flooding. None of the surrounding roads flooded in 1975 or 2002. The flood risk protection measures proposed, including emergency evacuation routes, should be implemented.

4.15. The site is not within a Critical Drainage Area and not within a Local Flood Risk Zone. The development will not increase the impermeable site area as the existing building and hardstanding occupies the entire site footprint. It is proposed that the existing drainage connection to the public combined sewer will be retained and reused. The proposed development will not impact the wider hydrological environment.

5.0 CONCLUSIONS

5.1. The BIA authors' qualifications are in accordance with CPG Basements.

5.2. The building is located within the Bloomsbury Conservation Area and is Grade II listed.

5.3. The site investigation identified Made Ground underlain by the London Clay Formation. Appropriate interpretative geotechnical information is presented.

5.4. Groundwater was not encountered during the 2013 site investigation, nor in the recent trial pitting works inspecting the existing foundations. The final results of the trial pitting works should be considered, once concluded. Whilst groundwater may need to be managed for the temporary works, the proposed development will not impact the wider hydrogeological environment.

5.5. Outline structural information is provided. The proposed basement will require the installation of a contiguous bored piled wall around the perimeter of the site in addition to a series of piles to take up the load of the existing theatre's façade, which will be propped to avoid damage impacts during the works.

5.6. The Ground Movement Assessment (GMA) predicts Category 0 (Negligible) damage to the neighbouring properties with negligible movements to the highways and Crossrail tunnel. Final consultations with TFL and utility asset owners should be undertaken in advance of the works and Asset Protection Agreements entered into, as required.

5.7. A structural monitoring strategy should be agreed under Party Wall and Asset Protection Agreements (as required), including trigger levels and contingency measures, to ensure construction is controlled and impacts are maintained within the predicted limits.

5.8. The proposed scheme will not increase the proportion of impermeable area given the existing site conditions comprise the building and hardstanding. The proposed development will not impact the wider hydrological environment.

5.9. The current Environment Agency and Camden SFRA data indicates that the site is at "very low" risk of flooding. The flood risk protection measures proposed, including emergency evacuation routes, should be implemented.

5.10. The BIA meets the criteria of CPG Basements.

5.11. This audit considers the current assessments. The BIA indicates that the structural scheme may be changed in the future. If this occurs, the GMA and damage assessment should be repeated and re-submitted to LBC, TFL and the affected utility asset owners.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Historic England	4th Floor, Cannon Bridge House, 25 Dowgate Hill, London EC4R 2A	13th February 2018	The site is located within an area of archaeological interest and therefore the Greater London Archaeological Advisory Service recommend a Desk Based Assessment and an Archaeological Field Evaluation.	N/A

Appendix 2: Audit Query Tracker

None

Appendix 3: Supplementary Supporting Documents

None

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