CampbellReith
consulting engineers

135-149 Shaftesbury Avenue, London, WC2 8AH

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12727-42
Revision: D1

April 2018

Campbell Reith Hill LLP
Friars Bridge Court
41-45 Blackfriars Road
London
SE1 8NZ

T:+44 (0)20 7340 1700
E:london@campbellreith.com
W:www.campbellreith.com

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Author	G Kite, BSc MSc DIC FGS
Project Partner	E M Brown, BSc MSc CGeol FGS
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Project Name	135-149 Shaftesbury Avenue
Planning Reference	2017/7051/P and 2018/0037/L

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 135-149 Shaftesbury Avenue, London WC2 8AH (planning reference 2017/47051/P and 2018/0037/L). 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 Geotechnical & Environmental Associates Limited with supporting documents prepared by Price & Myers. The authors' qualifications are in accordance with LBC guidance.

1.5. The proposed work involves the demolition of the existing seven-storey building whilst retaining the building façade and subsequently constructing a new eleven-storey hotel with a new level of basement in addition to the existing double storey basement. The building is Grade II listed.

1.6. The site investigation identified the underlying ground conditions as Made Ground underlain by the Lynch Hill Gravel Formation and the London Clay Formation.

1.7. The deepening of the basement should be within the London Clay and it is therefore unlikely that groundwater will be encountered. However, continued groundwater monitoring is recommended within the BIA to inform construction planning.

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

1.9. The site investigation and BIA have been informed by a desk study broadly in accordance with LBC guidance.

1.10. The proposed basement is to be formed by secant bored pile retaining walls from the existing basement level and the piles will be set back in plan from the existing reinforced concrete retaining walls.

1.11. A Ground Movement Assessment (GMA) predicts Category 1 (Very Slight) to 0 (Negligible) damage to the neighbouring properties is presented. Impacts to the retained Grade II Listed façade of the existing building have not been assessed. However, given that the façade is to be propped and monitored during the proposed works, it is accepted that this can feasibly be maintained within Category 1 (Very Slight).

1.12. Impacts to the nearby Crossrail tunnel has been assessed to be negligible. Thames Water assets are identified within the zone of influence of the works but have not been assessed. Thames Water should be contacted in regards to their asset protection agreements, impacts assessed and suitable mitigation should be proposed, if required.

1.13. An outline structural monitoring strategy is presented to ensure construction is controlled and impacts are limited to within the predicted limits. At detailed design stage, trigger levels based on the GMA should be provided to the Contractor and the Contractor should prepare a suitable contingency response action plan.

1.14. The proposed scheme will not increase the proportion of impermeable area given the existing site is currently covered in hardstanding. There is no impact on the wider hydrological environment.

1.15. The Flood Risk Assessment confirms that the site is at low risk of flooding. However, Shaftesbury Avenue is classified as being at high risk. Standard flood risk mitigation measures, such as elevated thresholds, emergency evacuation stairways and suitable drainage, should be adopted within the final design.

1.16. Queries and matters requiring further information or clarification are discussed in Section 4 and summarised in Appendix 2. The BIA meets the requirements of CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 15 January 2018 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 135-149 Shaftesbury Avenue, London WC2 8AH, Camden References 2017/7051/P and 2018/0037/L.

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: "The comprehensive refurbishment of the existing Grade II listed building and the provision of a new two storey roof extension and new basement level, providing a new four-screen cinema (Class D2) and spa (sui generis) at basement levels, a restaurant/bar (Class A3/A4) at ground floor level, a 94-bed hotel (Class C1) at part ground and first to sixth floors and associated terrace and bar (Class A4) at roof level, together with associated public realm and highways improvements".

2.6. LBC's Planning Portal confirms that the site does not lie within a Conservation Area and the building is Grade II listed.

2.7. CampbellReith accessed LBC's Planning Portal on 10th February 2018 and gained access to the following relevant documents for audit purposes:

- Construction Method Statement and Basement Impact Assessment dated December 2017 (ref 25916) by Price & Myers including:
    - Ground Investigation and Basement Impact Assessment Report dated December 2017 (ref J17183) by Geotechnical & Environmental Associates Limited.
    - Proposed Structure Drawings by Price & Myers.
    - Assumed Sequence of Construction Drawing by Price & Myers.
    - Typical Basement and Foundation Calculations by Price & Myers.
- Drainage and SuDS Strategy Report dated December 2017 (ref 25916) by Price & Myers.
- Proposed drawings and elevations dated December 2017 by Jestico + Whiles.
- Design and Access Statement dated December 2017 by Jestico + Whiles.
- Building Condition Report dated August 2017 (ref HA190L) by Hallas & Co.
- Comments and objections to the proposed development from local residents.

2.8. Following discussions with Price and Myers, the following information was presented to CampbellReith in March 2018:

- Movement Monitoring Specification.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	The qualifications of the authors of the reports prepared by Price & Myers and GEA Ltd are in accordance with CPG4 guidelines.
Is data required by Cl.233 of the GSD presented?	No	Information on underground infrastructure 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	
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	GEA report – Section 3.1.2
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	GEA report – Section 3.1.1
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	GEA report – Section 3.1.3
Is a conceptual model presented?	Yes	Appendix of GEA report.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA, Section 4 and 10. The basement is within 5m of the highway and presence of utilities should be confirmed, and impacts assessed if relevant.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	No issues identified in Screening process. The existing basement extends through the Lynch Hill Gravel and into the London Clay so the additional level deepening of the basement will not extend into the groundwater.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	No issues identified in Screening process.
Is factual ground investigation data provided?	Yes	GEA report, Section 4 and Appendix.
Is monitoring data presented?	Yes	GEA report, Section 5.5 and Appendix.
Is the ground investigation informed by a desk study?	Yes	GEA report, Section 2.
Has a site walkover been undertaken?	Yes	Walkover undertaken by GEA and also by Hallas & Co (authors of the Building Condition Report). Hallas & Co noted flooding in the basement area.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	A search of the Camden Planning Portal by GEA has not indicated the presence of basements beneath the adjacent surrounding buildings.
Is a geotechnical interpretation presented?	Yes	GEA report, Sections 8 and 9.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Geotechnical design parameters presented. Retaining wall design outlined in Section 8 of BIA report and Appendix D of Price & Myers report.

Item	Yes/No/NA	Comment
Are reports on other investigations required by screening and scoping presented?	Yes	Ground movement assessment provided as Part 3 of the GEA Report. Drainage and SuDS Strategy Report provided.
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	GEA report, Section 10.
Are estimates of ground movement and structural impact presented?	Yes	Ground movement assessment provided for nearby sensitive structures (121-125, 151, 158 to 166a Shaftesbury Avenue, Nos 1 and 2 St Giles Passage and No 21 New Compton Street) within Section 9 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	A temporary works sequence indicating propping is presented in Appendix C of the Price & Myers report. Monitoring of ground movements is discussed in Section 9.3.2 of the BIA report however this does not include trigger levels and contingency actions.
Has the need for monitoring during construction been considered?	Yes	An outline structural monitoring strategy is presented.
Have the residual (after mitigation) impacts been clearly identified?	Yes	BIA Report, Section 11.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Construction methodology, temporary works, structural calculations etc. provided.

Item	Yes/No/NA	Comment
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	The development will not increase the impermeable area. Site drainage will be designed to maintain the existing situation. Attenuation SuDS are considered as CPG4 3.51 within the Drainage and SuDS Strategy report prepared by Price & Myers.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Construction methodology, temporary works, structural calculations provided. It is accepted that the development will not materially change run-off from the current site arrangements.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	Very Slight (Category 1) damage indicated.
Are non-technical summaries provided?	Yes	GEA report, Section 10.2

4.0 DISCUSSION

4.1. The BIA has been prepared by Geotechnical & Environmental Associates Limited with supporting documents prepared by Price & Myers. The qualifications of the authors of the reports prepared by GEA Ltd and Price & Myers are in accordance with CPG4 guidelines.

4.2. The BIA indicates that the proposed work involves the demolition of the existing seven-storey steel framed commercial building whilst retaining the building façade and subsequently constructing a new eleven-storey hotel, cinema and restaurant/bar, including a new level of basement in addition to the existing double storey basement. It is understood the existing 8.7m deep basement will be extended to a maximum depth of 14.0m below ground level (bgl). The building at 135-149 Shaftesbury Avenue is Grade II listed.

4.3. The site investigation undertaken in October 2017 identified Made Ground underlain by Lynch Hill Gravel overlying the London Clay. 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.

4.4. Groundwater was not encountered during drilling. The shallowest depth at which groundwater has been monitored is 4.39m bgl during November 2017. The BIA states that groundwater is likely to be present within the Lynch Hill Gravel and therefore the deepening of the existing basement within the London Clay is unlikely to encounter significant groundwater ingress. The BIA recommends that groundwater monitoring is continued to confirm water levels. Shallow inflows of localised perched water are likely to be encountered from within the Made Ground which should be adequately controlled through sump pumping. The BIA states that it would be prudent, once access is available, to carry out a number of trial excavations to depths as close to the full basement depth as possible to provide an indication of the likely groundwater conditions. It should be noted that the Building Condition Report produced by Hallas & Co has identified flooding within the plant room in the current basement levels.

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

4.6. The construction methodology indicates that the perimeter of the existing basement will be piled in order to support the façade retention structure. The internal structure of the building will then be demolished prior to the third level of basement being constructed by means of secant bored piled retaining walls set back from the existing reinforced concrete retaining walls within the existing basement. Following completion of the basement and slab at ground floor level, the superstructure will be constructed.

4.7. Sequencing and propping information and retaining wall design calculations are provided for review.

4.8. A Ground Movement Assessment (GMA) is presented that considers the movements relating to the proposed basement construction and the effect on nearby sensitive structures (121-125, 151, 158 to 166a Shaftesbury Avenue, Nos 1 and 2 St Giles Passage and No 21 New Compton Street). For the structures assessed, Category 0 to 1 (Negligible to Very Slight) damage is predicted in accordance with the Burland Scale.

4.9. Impacts to the retained Grade II Listed façade of the existing building have not been assessed. However, given that the façade is to be propped and monitored during the proposed works, it is accepted that this can feasibly be maintained within Category 1 (Very Slight).

4.10. The proposed basement extension will be in close proximity to a Crossrail tunnel. The GMA indicates that the proposed development will have a negligible effect on the tunnel.

4.11. Consideration should be made of any utilities that may be affected, with provision for protecting those assets in consultation with the asset owner, including entering into asset protection agreements, where applicable.

4.12. An outline structural monitoring strategy is presented to ensure construction is controlled and impacts are limited to within the predicted limits. At detailed design stage, trigger levels based on the GMA should be provided to the Contractor and the Contractor should prepare a suitable contingency response action plan

4.13. The current Environment Agency and Camden SFRA data indicates that the site is at low risk of flooding (between 0.1% and 1%) however Shaftesbury Avenue is classified as being at high risk of flooding. Shaftesbury Avenue did not flood in 1975 or 2002. Standard flood risk mitigation measures, such as elevated thresholds, emergency evacuation stairways and suitable drainage, should be adopted within the final design.

4.14. 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 occupies the entire site footprint. All surface water run-off is from the roof, which is assumed to discharge unrestricted via rainwater pipes to the public sewer. The Drainage and SuDS Strategy outlines the various options for SuDs on the proposed site including rainwater harvesting, infiltration techniques and attenuation techniques. However, it is proposed that the surface water flow regime will remain unchanged due to space constraints and the underlying impermeable London Clay.

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

5.0 CONCLUSIONS

5.1. The authors' qualifications are in accordance with the requirements of CPG4.

5.2. The site investigation identified the underlying ground conditions as Made Ground underlain by the Lynch Hill Gravel Formation and the London Clay Formation.

5.3. The formation level should be within the London Clay. It is accepted that the deepening of the existing basement is unlikely to encounter significant groundwater inflows although continued groundwater monitoring is recommended by the BIA to confirm water levels.

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

5.5. The proposed basement is to be formed by secant bored pile retaining walls from the existing basement level and the piles will be set back in plan from the existing reinforced concrete retaining walls. Temporary works sequencing is presented.

5.6. For the structures assessed within the GMA, Category 0 to 1 (Negligible to Very Slight) damage is predicted in accordance with the Burland Scale. Given that the façade is to be propped and monitored during the proposed works, it is accepted that this can feasibly be maintained within Category 1 (Very Slight).

5.7. Impacts to the nearby Crossrail tunnel has been assessed to be negligible. Thames Water assets are identified within the zone of influence. Thames Water should be contacted in regards to their asset protection agreements, impacts assessed and suitable mitigation should be proposed, if required.

5.8. An outline structural monitoring strategy is presented to ensure construction is controlled. At detailed design stage, trigger levels based on the GMA should be provided to the Contractor and the Contractor should prepare a suitable contingency response action plan.

5.9. Standard flood risk mitigation measures, including emergency evacuation staircases, should be adopted within the final design.

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

5.11. The BIA meets the requirements of CPG4.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Crossrail Ltd	25 Canada Square, London E14 5LQ	Not provided	The development site red-line boundary is outside of safeguarded limits. The proposed site is approximately 26m to the south of the Crossrail westbound running tunnel which is itself approximately 17m below the ground surface at this location. The development houses recreational facilities, cinema and spa, at basement levels which could be affected by ground borne noise and vibration from the railway. Crossrail suggest that the developer consider implementing measures to mitigate against the possible risk of ground borne noise and vibration.	N/A
Woodward	Flat 17, 45 New Compton Street, London WC2H 8DF	5th February 2018	The digging work proposed to the basement may damage the newly built structure in the Phoenix Garden.	See 4.9
Ryley	Chair of the committee of trustees of The Phoenix Garden (situated on the other side of New Compton Street from the proposed development).	5th February 2018	We have concerns as to the effects of such large scale works and excavations directly on our new garden building. We are concerned as to any damage to our new building arising from the excavations, both from vibration directly arising and from vehicle movements.	See 4.9
Palm-Gold	17 Pendrell House New Compton Street	7th February 2018	Concerns about earth removal process impacting on the new adjacent Phoenix Garden building.	See 4.9

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	Groundwater	Further groundwater monitoring should be undertaken.	Contractor to confirm groundwater levels in advance of construction as 4.5	N/A

Appendix 3: Supplementary Supporting Documents

Movement Monitoring Specification

MOVEMENT MONITORING

To be read with Preliminaries/General conditions.

NOTE Where changes have been made to the standard NBS clauses these are identified as follows:-

123* = The wording of the NBS clause has been changed or added to
123x = An additional clause

GENERALLY

100x NEIGHBOURING WALL MONITORING
- Visual inspection: Contractor to carry out daily. Look for evidence of movement, distress or vandalism.
- Accidental loading: Protect structure from impact damage by plant and site operations.

110x MOVEMENT MONITORING- 135-149 SHAFTESBURY AVENUE
- Method: Electronic monitoring of targets fixed at relevant locations. Targets to be attached as shown on enclosed sketch.
- Accuracy of reading: $\pm$1mm
- Critical movements:
  - Trigger values: To be confirmed
  - Action values: To be confirmed
- Precautions: Take as follows if movements reach critical values:
  - Trigger: Review situation, assess possible causes and submit proposals. Inform engineer.
  - Action: Temporarily suspend works and revise working procedures to limit further movements. Inform engineer immediately.

110x MOVEMENT MONITORING- 125 SHAFTESBURY AVENUE
- Method: Electronic monitoring of targets fixed at relevant locations. Targets to be attached as shown on enclosed sketch.
- Accuracy of reading: $\pm$1mm
- Critical movements:
  - Trigger values: To be confirmed
  - Action values: To be confirmed
- Precautions: Take as follows if movements reach critical values:
  - Trigger: Review situation, assess possible causes and submit proposals. Inform engineer.
  - Action: Temporarily suspend works and revise working procedures to limit further movements. Inform engineer immediately.

111x MOVEMENT MONITORING- PHEONIX GARDENS
- Method: Electronic monitoring of targets fixed at relevant locations. Targets to be attached as shown on enclosed sketch.
- Accuracy of reading: $\pm$1mm
- Critical movements:
  - Trigger values: To be confirmed
  - Action values: To be confirmed
- Precautions: Take as follows if movements reach critical values:
  - Trigger: Review situation, assess possible causes and submit proposals. Inform engineer.

- Action: Temporarily suspend works and revise working procedures to limit further movements. Inform engineer immediately.

112x MOVEMENT MONITORING- 16-45 NEW COMPTON STREET
- Method: Electronic monitoring of targets fixed at relevant locations. Targets to be attached as shown on enclosed sketch.
- Accuracy of reading: $\pm$1mm
- Critical movements:
  - Trigger values: To be confirmed
  - Action values: To be confirmed
- Precautions: Take as follows if movements reach critical values:
  - Trigger: Review situation, assess possible causes and submit proposals. Inform engineer.
  - Action: Temporarily suspend works and revise working procedures to limit further movements. Inform engineer immediately.

113x MOVEMENT MONITORING- 151 SHAFTESBURY AVENUE
- Method: Electronic monitoring of targets fixed at relevant locations. Targets to be attached as shown on enclosed sketch.
- Accuracy of reading: $\pm$1mm
- Critical movements:
  - Trigger values: To be confirmed
  - Action values: To be confirmed
- Precautions: Take as follows if movements reach critical values:
  - Trigger: Review situation, assess possible causes and submit proposals. Inform engineer.
  - Action: Temporarily suspend works and revise working procedures to limit further movements. Inform engineer immediately.

120x CRACK MONITORING
- Method: Micrometer measurements between 3 studs glued to wall adjacent to crack
- New or extending cracks: Mark extent and record date. Report and make proposals for additional monitoring points.
- Period of monitoring: Until cracks are made good.

130x FREQUENCY OF MONITORING
- Initial readings: Commence readings as soon as survey points have been established and carry out at least 6 monitoring visits over two months before any structural work begins.
- Frequency of subsequent monitoring: Weekly until the major basement structure and ground floor slab are completed, and then fortnightly for a further six visits afterwards, thereafter monthly until permission to cease monitoring is given.
- Increase frequency of readings:
  - If movements are accelerating.
  - If the trend of movements changes unexpectedly.
  - On request of the Engineer.
- Submit results to Engineer in tabulated and graphical form each week (a maximum of 24 hours after measurements have been taken). If movement to trigger values occurs submit results immediately.

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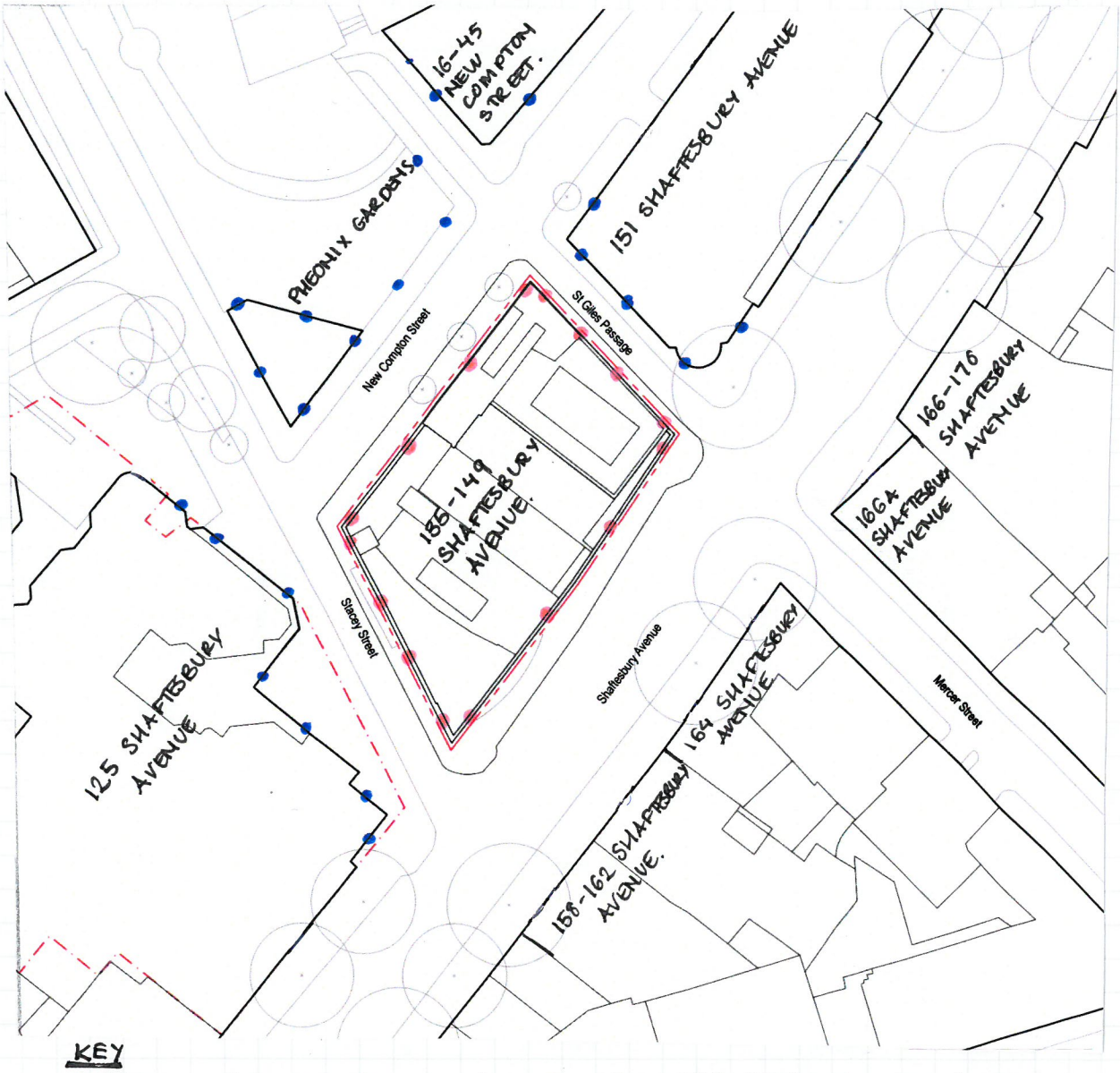
Consulting Engineers

Job No 25916 Page SK10 Ver

Date 8/3/18. Eng BR. Chd

Job SHAFTESBURY AVENUE

135-SHAFTESBURY AVENUE & SURROUNDING BUILDINGS MONITORING POINTS



KEY

● DENOTES 3No. MONITORING POINTS. ONE AT TOP OF EXISTING RETAINING WALL, ONE 3m ABOVE GROUND LEVEL, ONE AT TOP OF WALL.

● DENOTES 2No. MONITORING POINTS. ONE AT BASE OF WALL, ONE AT TOP.

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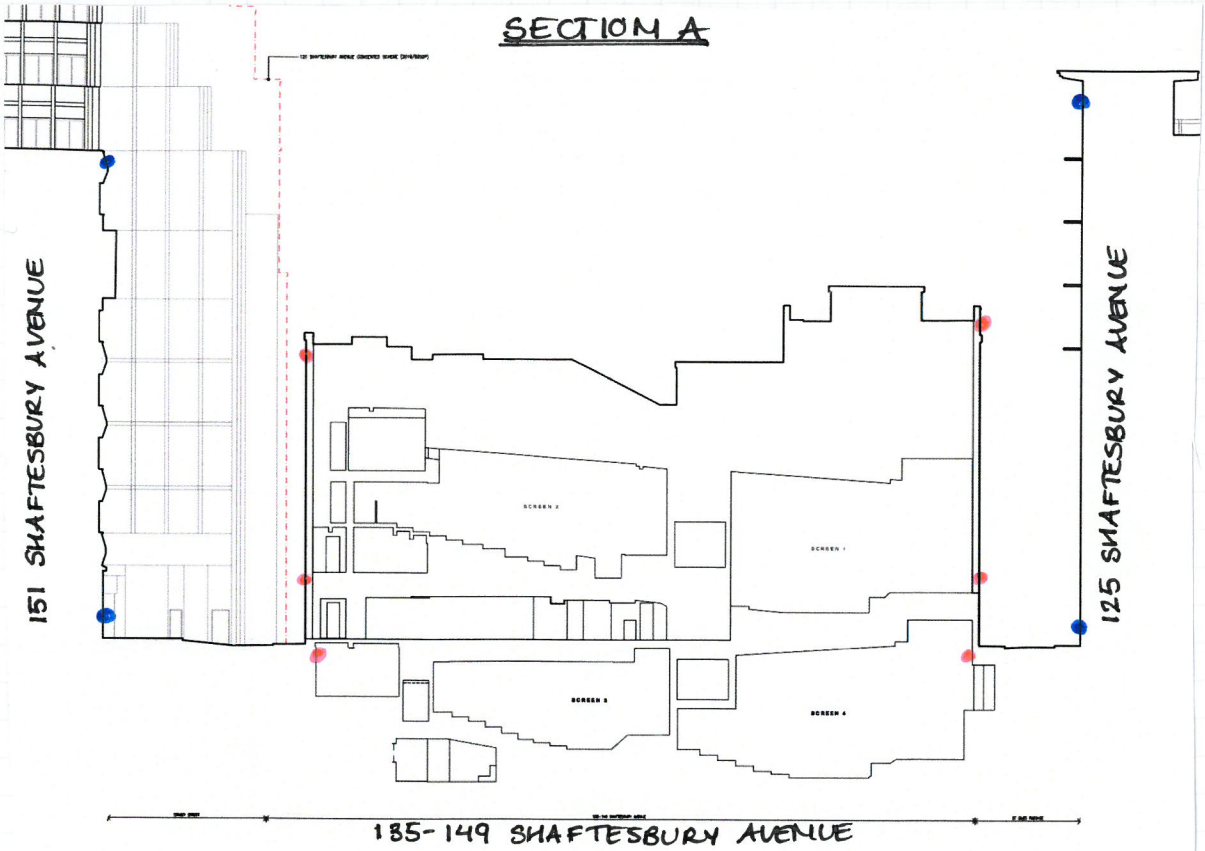
Job No 25916 Page SK11 Ver

Date 8/3/18 Eng BR Chd

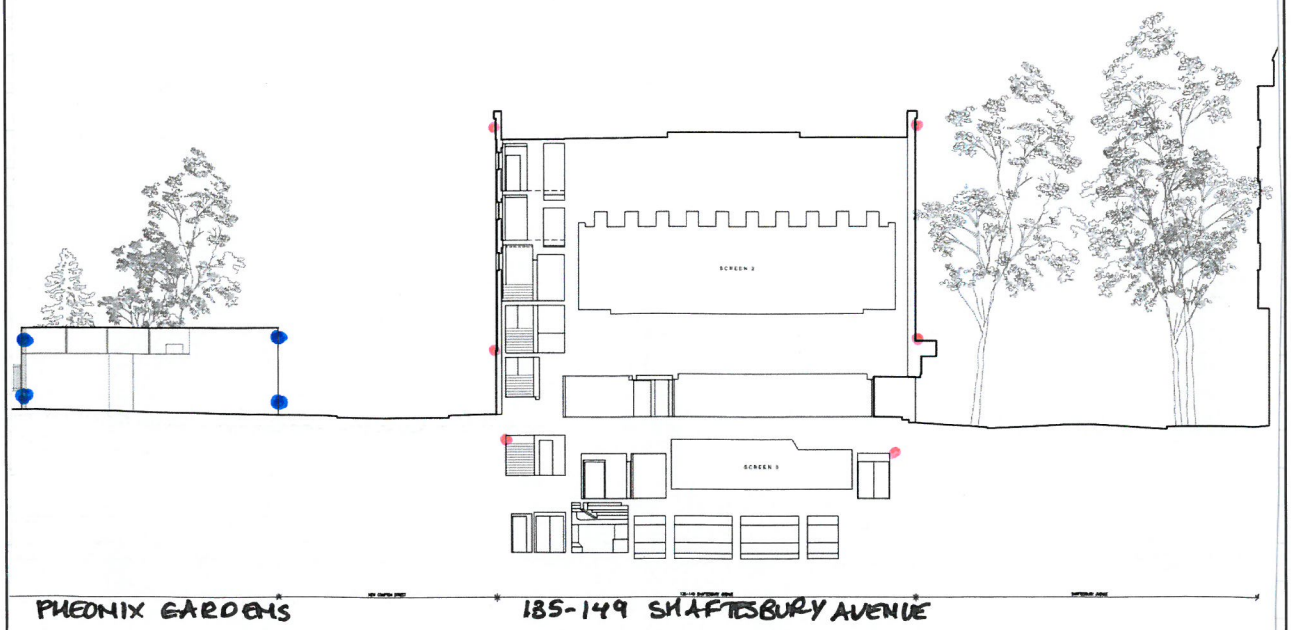
Job SHAFTESBURY AVENUE

TYPICAL SECTIONS

SECTION A



SECTION B



London

Friars Bridge Court
41- 45 Blackfriars Road
London, SE1 8NZ

T: +44 (0)20 7340 1700
E: london@campbellreith.com

Birmingham

Chantry House
High Street, Coleshill
Birmingham B46 3BP

T: +44 (0)1675 467 484
E: birmingham@campbellreith.com

Surrey

Raven House
29 Linkfield Lane, Redhill
Surrey RH1 1SS

T: +44 (0)1737 784 500
E: surrey@campbellreith.com

Manchester

No. 1 Marsden Street
Manchester
M2 1HW

T: +44 (0)161 819 3060
E: manchester@campbellreith.com

Bristol

Wessex House
Pixash Lane, Keynsham
Bristol BS31 1TP

T: +44 (0)117 916 1066
E: bristol@campbellreith.com

UAE

Office 705, Warsan Building
Hessa Street (East)
PO Box 28064, Dubai, UAE

T: +971 4 453 4735
E: uae@campbellreith.com