CampbellReith
consulting engineers

Flat 2, 12 Lyndhurst Gardens
NW3 5NR

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12985-62

Revision: F1

July 2020

Campbell Reith Hill LLP
15 Bermondsey Square
London
SE1 3UN

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

Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	August 2019	Comment	RNemb12985-62- 060819- Lyndhurst Gardens.doc	R Nair	G Kite	E Brown
D2	December 2019	Comment	RNgk12985-62-161219-12Lyndhurst Gardens_D2.doc	R Nair	J Brown	G Kite
F1	July 2020	Final	RNgk12985-62-010720-12Lyndhurst Gardens_F1.doc	R Nair	G Kite	G Kite

Document Details

Last saved	01/07/2020 08:43
Path	RNgk12985-62- 010720- 12Lyndhurst Gardens_F1.doc
Author	R Nair BTech MSc DIC GMICE
Project Partner	E M Brown, BSc MSc CGeol FGS
Project Number	12985-62
Project Name	Flat 2, 12 Lyndhurst Gardens, NW3 5NR
Planning Reference	2019/3147/P & 2019/3147/L

Contents

1.0 Non-technical summary 1
2.0 Introduction 2
3.0 Basement Impact Assessment Audit Check List 4
4.0 Discussion 7
5.0 Conclusions 9

Appendix

Appendix 1: Residents' Consultation Comments
Appendix 2: Audit Query Tracker
Appendix 3: Supplementary Supporting Documents

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 Flat 2, 12 Lyndhurst Gardens, NW3 5NR (planning reference 2019/3147/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. It was proposed to construct a single storey basement underneath the rear half of the property, utilising two-stage underpinning techniques. However, in the revised BIA the construction methodology has been revised to a single stage underpinning. The basement proposal involves a Grade II listed building and is in the neighbourhood of other Grade II listed buildings.

1.5. The BIA has been prepared by Symmetrys with supporting documents prepared by LMB Geosolutions and Card Geotechnics. In the revised submissions it has been demonstrated that the authors hold qualification sin accordance with policy requirements.

1.6. Screening and Scoping assessments have been undertaken, supported by a desk study broadly in accordance with LBC guidance.

1.7. A site investigation has been undertaken. The BIA has confirmed that the proposed basement will be founded within London Clay.

1.8. An indicative construction programme has been presented.

1.9. A revised ground movement assessment considering a single stage of underpinning indicates damage to neighbouring structures will be a maximum of Burland Category 1 (Very Slight).

1.10. Proposals are provided for a movement monitoring strategy during excavation and construction. Updated trigger levels based on the current proposed construction methodology are also included.

1.11. SUDS strategies are proposed to mitigate the impact to the wider hydrological environment.

1.12. The site is identified as being at high risk from surface water flooding. A flood risk assessment and appropriate mitigation measures are presented.

1.13. It is accepted that the development will not impact on the wider hydrogeology of the area.

1.14. Non-technical summaries have been presented.

1.15. Considering the revised submissions, the BIA meets the requirements of CPG: Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 3rd July 2019 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 12 Lyndhurst Gardens, London, NW3 5NR.

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 Basements. March 2018.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- Local Plan Policy A5 Basements.

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;

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 "*Single storey rear extension to replace existing single storey rear extension; two storey side extension to replace existing two storey side extension (smaller footprint); creation of basement below new extensions and part of host building, with side lightwell; removal of upper ground floor bay window and replacement with 3x windows; demolition of detached outbuilding; internal alterations to lower ground floor level*"

2.6. The subject property and the neighbouring properties are Grade II Listed.

2.7. During the initial audit, CampbellReith accessed LBC's Planning Portal and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (Reference: 19050, dated 11 June 2019) prepared by Symmetrys Ltd, including;
    - Structural Engineer's Statement and Calculations by Symmetrys Ltd;
    - Ground Investigation Report dated May 2019 by LMB Geosolutions Ltd;

  - Ground Movement Assessment (Rev 1) dated June 2019 by Card Geotechnics Ltd;
  - SuDS Strategy (Rev A) dated May 2019 by Symmetrys Ltd;
  - Planning Application Drawings;
- Design and Access statement (dated 01 June 2019) prepared by LBMV Architects;
- Arboricultural Survey & Impact Assessment (Reference: AIA/MF/036/19, dated 24 April 2019) prepared by Marcus Foster Arboricultural Design & Consultancy;
- Follow-up Pre-Application Advice (Reference: 2018/2697/PRE, dated 09 October 2018) by LBMV Architects;
- Photographs of the existing structure prepared by LBMV Architects;
- Planning Consultation Responses.

2.8. The following revised document was provided to CampbellReith by email on the 14th of November 2019:

- Basement Impact Assessment (Reference 19050 (Rev. D.), dated November 2019) prepared by Symmetrys Ltd.

2.9. The following revised documents were provided to CampbellReith by email in March 2020:

- Basement Impact Assessment (Reference 19050 (Rev. F.), dated March 2020) prepared by Symmetrys Ltd.
- Ground Movement Assessment (Rev 3) dated March 2020 by Card Geotechnics Ltd.

2.10. The following document was provided to CampbellReith by email in June 2020:

- Damage Category Assessment, dated 12th June 2020, by Card Geotechnics Ltd.

CampbellReith
consulting engineers

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Refer Section 2.1 of the BIA.
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 plan/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	
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	Surface water flood risk noted
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Flood risk assessment (Reference 72205R1, dated 23rd September 2019) presented within Appendix 6 of the revised Basement Impact Assessment Document as requested.
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	
Is a geotechnical interpretation presented?	Yes	SI Report / GMA
Does the geotechnical interpretation include information on retaining wall design?	Yes	SI Report / GMA
Are reports on other investigations required by screening and scoping presented?	Yes	Flood risk assessment (Reference 72205R1, dated 23rd September 2019) presented within Appendix 6 of the revised Basement Impact Assessment Document as requested.
Are the 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	

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	Refer to section 4.9 and 4.10 of this BIA.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	FRA submitted. Refer to 4.14 of this BIA.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	FRA and mitigation measures are described in Appendix 5 SUDS strategy which includes a FRA.
Has the need for monitoring during construction been considered?	Yes	Provided within the updated submissions.
Have the residual (after mitigation) impacts been clearly identified?	Yes	FRA and SUDS proposals included. Ground movement mitigation measures proposed.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Provided within the updated submissions.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Provided within the updated submissions.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Provided within the updated submissions.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The revised Basement Impact Assessment (BIA) has been carried out by Symmetrys Ltd, supported by input from LMB Geosolutions and Card Geotechnics, using individuals whose qualifications are in accordance with LBC guidance.

4.2. The LBC Instruction to proceed with the audit identified that the basement proposal involved a Grade II listed building and the BIA confirms this. The property is also adjacent to other Grade II listed buildings.

4.3. The host property is a four-storey detached building understood to be sub-divided into flats. It has no existing basement. The application is for the refurbishment of Flat 2 which is a 2-bed flat located on the eastern side of the building at ground and first floor level, with private access to a rear garden. It is proposed to construct a new single storey rear extension at ground floor level with a new basement (formed at approximately 3.40m to 3.90m below ground level (bgl)) towards the rear half of the property, extending into the garden.

4.4. It is noted that no development is proposed beneath the west of the property (beneath Flat 1). The BIA has confirmed that the neighbouring buildings (No.10 and No.14) do not have basements. A Network Rail Tunnel is located 28m bgl and 2.50m beyond the proposed footprint of the new basement and under the rear garden.

4.5. Screening and Scoping assessments have been undertaken, supported by a desk study broadly in accordance with LBC guidance.

4.6. A site specific ground investigation has been carried out, followed by groundwater monitoring on one occasion. From the borehole log provided it is understood that the ground conditions comprise Made Ground over a thin layer of Head Deposits / weathered London Clay underlain by London Clay. Groundwater was found within the London Clay strata at approximately 4.30m bgl.

4.7. Interpreted geotechnical parameters are presented within the ground investigation report and ground movement assessment (GMA).

4.8. A two-stage underpinning was the proposed method of basement construction in the BIA and GMA revisions Rev A to Rev E, propped in the temporary and permanent cases, and founded within the London Clay. Drawings were also provided within Appendix A of the BIA revisions indicating the sequence of the proposed works. An indicative construction programme is provided within Section 2.3.10.

4.9. The latest revision of the BIA indicates that the proposed method of construction will be single stage underpinning. Supporting documents have been updated accordingly.

4.10. A number of revisions to the GMA were presented indicating damage to neighbouring structures would be a maximum of Burland Category 1 (Very Slight). A number of queries were raised about the assessment methodology and the feasibility of ensuring neighbouring structures would not be impacted beyond policy limits.

4.11. A revised assessment, entitled Damage Category Assessment, was presented in June 2020 which supersedes the previous GMA revisions. The assessment methodology adopts the Rankin criterion of angular distortions. The predicted movements generated by the works are considered to be within the typical range for basement construction of the depth, scale and

construction methodology proposed. The angular distortions predicted are generally in the range of 1/500. Assuming good workmanship and control of the construction process, with appropriate structural monitoring to inform the temporary propping requirements, it is considered feasible that a maximum of Category 1 (Very Slight) damage will be sustained by neighbouring buildings.

4.12. Proposals for a movement monitoring strategy (with updated trigger levels) and visual inspection during excavation and construction are provided within the revised BIA and Damage Category Assessment. Monitoring and inspections should be implemented during the works to ensure the works are closely controlled and movements / angular distortion remain within the predicted range.

4.13. An Arboricultural report has been included as a part of the application. Section 5.5 of the BIA states that two trees in the rear garden are to be felled and the proposed works are also within the protection zone for a third tree. It is stated that necessary planning permission shall be obtained prior to the removal of any trees.

4.14. The impermeable site area will slightly increase as a result of the development. SUDS strategies are proposed to mitigate the impact to the wider hydrological environment, including the use of an attenuation tank and hydrobrake. A final drainage design should be agreed with LBC and Thames Water.

4.15. The site and the surrounding area is identified as being at medium to high risk from surface water flooding. A flood risk assessment (FRA) has been produced by Floodsmart and appropriate mitigation measures and a SUDS strategy are presented, which should be incorporated into the final design.

4.16. It is accepted that the development will not impact on the wider hydrogeology of the area. The BIA has been reviewed by a chartered hydrogeologist (as 4.1).

4.17. Non-technical summaries have been presented.

5.0 CONCLUSIONS

5.1. In the revised submissions, the author qualifications have been demonstrated to be in accordance with LBC guidance.

5.2. The basement will be formed by single stage underpinning. Temporary and permanent structural information is provided.

5.3. A site investigation has confirmed that the proposed basement will be founded within the London Clay. Interpretative geotechnical parameters are presented.

5.4. A revised Damage Category Assessment is presented indicating damage to neighbouring structures will be a maximum of Burland Category 1 (Very Slight).

5.5. The updated structural monitoring strategy has been provided. Monitoring and visual inspection should be implemented to ensure close control of the works.

5.6. SUDS strategies are proposed to mitigate the impact to the wider hydrological environment.

5.7. The site is identified as being at high risk from surface water flooding. A flood risk assessment and appropriate mitigation measures are presented.

5.8. It is accepted that the development will not impact on the wider hydrogeology or hydrology of the area.

5.9. Based on the revised assessments provided, the BIA meets the requirements of CPG: Basements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

No relevant comments

Appendix 2: Audit Query Tracker

CampbellReith
consulting engineers

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA	The qualifications of the authors of the hydrological and hydrogeological assessments should be demonstrated to be in accordance with LBC guidance	Closed	November 2019
2	Land Stability	A ground movement assessment (GMA) is presented indicating damage to neighbouring structures will be a maximum of Burland Category 1 (Very Slight). The assessment requires further clarification, as detailed in Section 4.	Closed	July 2020
3	Land Stability	The monitoring strategy should be updated to be consistent between reports and drawings, following review of the GMA.	Closed	April 2020
4	Hydrology	SUDS strategies are proposed to mitigate the impact to the wider hydrological environment. These should be confirmed by an appropriately qualified author.	Closed	November 2019
5	Hydrology	The site is identified as being at high risk from surface water flooding. Flood risk assessment and appropriate mitigation measures should be presented.	Closed	November 2019
6	Hydrogeology	It is accepted that the development will not impact on the wider hydrogeology of the area, subject to confirmation that the BIA has been reviewed by a chartered hydrogeologist.	Closed	November 2019

Appendix 3: Supplementary Supporting Documents

Updated Damage Category Assessment, 12th June 2020, Card Geotechnics

25 Years Providing Ground Solutions

4 Godalming Business Centre
Woolsack Way, Godalming
Surrey, GU7 1XW
Telephone: 01483 310600
cgl@cgl-uk.com
www.cgl-uk.com

12 June 2020

Graham Kite
CampbellReith
Raven House
29 Linkfield Lane
Redhill
Surrey

RH1 1SS

Your ref: 12985-62

Our ref: CG/28992A

Please reply to: Richard Ball/Amir Abbasi

Dear Mr. Kite,

12 Lyndhurst Gardens – Damage Category Assessment

Background

CGL produced a Ground Movement Assessment (GMA) for a property at 12 Lyndhurst Gardens, Camden, London[1] ("the site").

Campbell Reith, as part of a BIA Audit for the site, highlighted a concern regarding limiting lateral movements stated (2mm to 4mm) in order to keep damage impacts to neighbouring structures within Category 1 (Very Slight).

This Letter report has been prepared to provide an addendum assessment, and supersedes the assessment included within the CGL GMA[1].

Assessment

We have reviewed our assessment and would note that whilst the limiting lateral movements are low within our report, it is CGL's experience that substantial lateral movements do not materialise in underpinning works where ground loss is controlled during pin excavation and the underpins are effectively propped to restrict rotational movements. Therefore, in line with previous experience on underpinning sites elsewhere within Camden we would note that the horizontal strain criterion is potentially overly onerous for situations such as this, and on review the Rankin criterion of an angular distortion might be more appropriate.

An assessment has been provided for Wall C-C', shown on Plate 1 below. Predicted movements along this wall section (party wall with Flat 1, 12 Lyndhurst Gardens) show maximum settlement values of 12mm, giving an angular distortion of 1/666 across the building width (8m) for Flat 1. Allowing for a typical 5mm construction movement (compression of dry pack/movement of loose bricks etc.) would result in total predicted settlement of some 17mm, and a 1/470 angular distortion assuming that Flat 1 is 8m wide perpendicular to its underpinned wall.

This would fall into Rankin Risk Category 2, with an associated description of building risk of 'slight: possible superficial damage which is unlikely to have structural significance'. This description is consistent with that for Burland category 1 to 2 (Very Slight to Slight), noting however that the predicted movements at Lyndhurst Gardens re very much towards the lower end of the range offered by Rankin (Limiting settlement of 10mm to 50mm, with maximum building slope of 1/500 to 1/200) for this Risk Category.

[1] CGL (March 2020). 12 Lyndhurst Gardens, Camden, London. Ground Movement Assessment. Revision 3. Ref CG/28992A

Card Geotechnics Limited
Registered in England and Wales No. 2993862
Registered Office at
4 Godalming Business Centre, Woolsack Way
Godalming, Surrey, GU7 1XW

On this basis, we would propose to adopt the above criterion, in the expectation/requirement of the basement underpinning being constructed in a controlled and appropriate manner with a good standard of workmanship and appropriate propping.

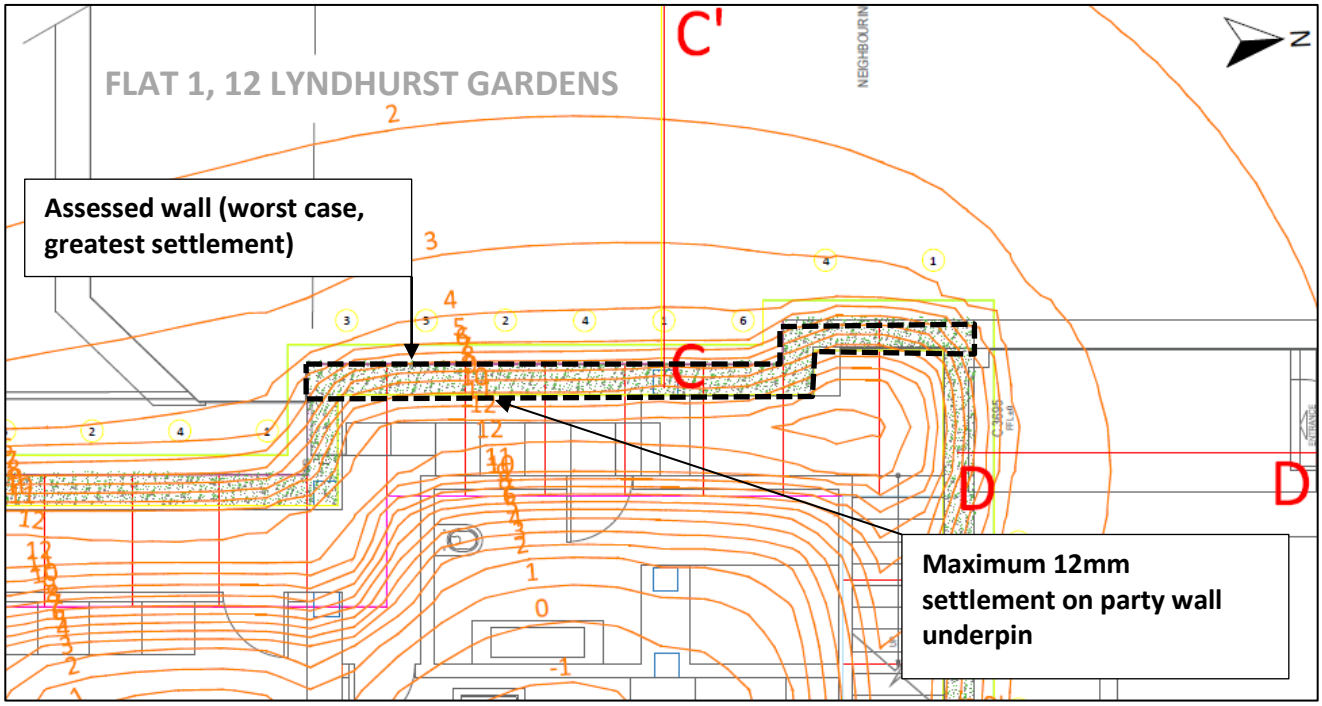

Plate 1: Showing Section C-C' (Across Flat 1), Showing Maximum 12mm Settlement Beneath Underpins

Monitoring

A formal monitoring strategy should be implemented on site in order to observe and control ground movements during construction.

The system should operate broadly in accordance with the 'Observational Method' as defined in CIRIA Report 185[2]. Monitoring can be undertaken by installing survey targets to the top of the wall and face of the structure. Baseline values should be established prior to commencement of works. Monitoring of these targets should be carried out at regular time intervals and the results should be analysed to determine if unacceptable horizontal translation of the wall or tilt/settlement of the neighbouring walls is occurring. Regular monitoring of these targets will allow ground movement trends to be detected in a timely manner such that mitigation strategies may be implemented if required

Trigger Limits

Whilst the underpins are not expected to move laterally – provided that adequate temporary works are provided during construction – trigger limits for restricting movements have been provided by Symmetrys, the Structural Engineers for the project. These are considered suitably protective of the adjacent properties, combined with visual inspections of the neighbouring properties for signs of movement/superficial damage. Trigger limits are summarised below for horizontal/vertical movements:

+/- 5mm – Amber, all parties notified

[2] Nicholson, D., Tse, Che-Ming., Penny, C., The Observational Method in ground engineering: principles and applications, CIRIA report R185, 1999.

+/- 8mm – Red, work stops and working practices/movements reviewed.

Conclusion

Assessments undertaken for the party wall with Flat 1, 12 Lyndhurst Gardens, indicates predicted settlement of some 17mm, and a 1/470 angular distortion. Horizontal movements for well-constructed underpin foundations tend to be low, therefore the Rankin criterion has been adopted, giving rise to a predicted damage category of 0 to 1 (negligible to very slight) and monitoring trigger limit values are provided.

Yours sincerely,

Richard Ball, Technical Director
Card Geotechnics Limited

London

15 Bermondsey Square
London
SE1 3UN

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