

28 Redington Road,
London NW3 7RB

Basement Impact Assessment
Audit

For
London Borough of Camden

Project Number: 12336-98
Revision: D3

Date: September 2017

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

T: +44 (0)20 7340 1700
F: +44 (0)20 7340 1777
E: london@campbellreith.com
W: www.campbellreith.com

Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	September 2016	Comment	KZjw-12336-98-260916-28 Redington Road-D1.doc	K Zapaniotis	E M Brown	E M Brown
D2	August 2017	Comment	KZrm-12336-98-290817-28 Redington Road-D2.doc	K Zapaniotis	R Morley	R Morley
D3	September 2017	Comment	KZrm-12336-98-110917-28 Redington Road-D3.doc	K Zapaniotis	G Kite	G Kite

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Document Details

Last saved	11/09/2017 14:31
Path	KZrm-12336-98-110917-28 Redington Road-D3.doc
Author	K Zapaniotis, MEng CEng MICE
Project Partner	E M Brown, BSc MSc CGeol FGS
Project Number	12336-98
Project Name	28 Redington Road
Planning Reference	2016/2997/P

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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 28 Redington Road (planning reference 2016/2997/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. This BIA has been prepared by Ross and Partners Consulting Civil and Structural Engineers and the checker has CEng MStructE FICE qualification. It should be demonstrated that the BIA has been reviewed and approved by a Chartered Geologist (CGeol) in respect of groundwater and land stability issues.
- 1.5. A revised BIA, along with supporting documents, was received to address the queries of the initial BIA audit by CampbellReith.
- 1.6. The proposal is to demolish the existing building at No. 28 Redington Road and construct a new residential development arranged over 4 storeys and a basement. To the north the ground level is higher such that the ground floor will also be below ground level, therefore effectively creating a partial two storey basement.
- 1.7. It is indicated in the proposed structural drawings, reports and ground investigation that the preferred construction method for the basement works would be secant piled retaining walls with 250-300mm thick liner walls and a 600mm thick, in-situ, reinforced concrete piled raft at basement as slab. A construction plan, including indicative drawings and a non-technical summary is presented.
- 1.8. A Ground Movement Assessment (GMA) has not been provided for review. The BIA states that damage to neighbouring properties will be limited to Category 2 of the Burland Scale. Assumptions on the levels of the existing foundations have been made, which should be confirmed, and an appropriate GMA should be undertaken. In accordance with LBC guidance, damage should be limited to a maximum of Category 1 .
- 1.9. The revised BIA confirms that the proposed basement slab is to be above the groundwater level, which is accepted. Consideration is given to the prospect of the proposed new basement

creating an obstacle to groundwater flow with provisions for a drainage route created beneath the basement. Further ground water monitoring is to be carried out prior to construction.

- 1.10. It is anticipated that the proposed development will not impact the wider hydrological and hydrogeological environments.
- 1.11. Monitoring and condition surveys are proposed. These should be revised to reflect any additional mitigation proposed so as to limit damage to Category 1 of the Burland Scale.
- 1.12. Queries are discussed in Section 4 and summarised in Appendix 2. The BIA does not meet the criteria of CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 23rd August 2016 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 28 Redington Road, London NW3 7RB, planning reference 2016/2997/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;
- 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 *"Erection of a 4 storey plus basement building (with accommodation at 4th floor level within the roof) to provide 8 flats (1x1 bed, 5x2 bed, 1x3 bed and 1x4 bed) including front balcony and rear roof terraces, hard and soft landscaping and 7 basement car parking spaces with car lift, following demolition of the existing building (Class C3)".* The Audit Instruction also confirmed that the building itself is not listed. The nearest listed building to the site is No. 16 Redington Road.

2.6. CampbellReith accessed LBC's Planning Portal on 29th August 2016 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (BIA, July 2016, rev: E) incorporating Geotechnical and Geo-environmental Desk Study, Factual Report on Ground Investigation and Ground Investigation Report.
- Surface Water Drainage Calculations and Surface Water Pro Forma.
- Jo Cowen Architects Planning Application Drawings consisting of
 - Location plan
 - Existing plans, elevations and sections
 - Proposed plans, elevations and sections
- Camden BIA Audit Form Part ABC.

2.7. A number of consultation comments were provided to CampbellReith by Camden on 5th September 2016. These included three technical reports prepared on behalf of neighbours which are considered in this audit. The remaining consultation responses generally echo the issues raised in those technical reports. The consultation responses provided by Camden are detailed in Appendix and the technical reports are listed below:

- First Steps Report for 28 Redington Road by Dr M. H. de Freitas (August 2016), commissioned by No 26 Redington Road.
- Eldred Geotechnics Ltd. reviews of planning application 2016/2997/P to Camden Council with respect to 26 Redington Road and 30 Redington Road and Camden development policy DP27 (August 2016), commissioned by 26 and 30 Redington Road.

2.8 Additional information was provided with regards to further information requested, comprising:

- Revised BIA – Supplementary Basement Impact Assessment Data report– dated August 2017 by Ross and Partners;
- Movement Monitoring Proposals for Adjoining Buildings report – dated August 2017 by Ross and Partners;
- Revised BIA – SUDS report – dated August 2017 by Ross and Partners;
- Interpretative report on Ground Investigation for 28 Redington Road – dated August 2017 by ESG and appended within Ross and Partners revised BIA report.
- Proposed structural, below ground drainage and construction sequence drawings illustrating an anticipated works programme.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	The BIA been prepared by Ross and Partners Consulting Civil and Structural Engineers and the checker has CEng MStructE FICE qualification. Evidence is required to demonstrate that BIA has been checked and approved by a Chartered Geologist.
Is data required by Cl.233 of the GSD presented?	Yes	Updated in revised BIA
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	Updated in revised BIA
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	Updated in revised BIA
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Is a conceptual model presented?	Yes	

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Updated in revised BIA
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Included in previous submission
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Updated in revised BIA
Is factual ground investigation data provided?	Yes	Included in previous submission
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	Included in previous submission
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	No	No investigation of the existing foundations to the neighbouring properties has been carried out. However from the Ross and Partners revised BIA (p.7) it is understood that excavations have been carried out in both 26 and 30 Redington Road although levels are not provided.
Is a geotechnical interpretation presented?	Yes	Included in previous submission
Does the geotechnical interpretation include information on retaining wall design?	Yes	Retaining wall design parameters are available in ESG report – appended in revised Ross and Partners BIA.
Are reports on other investigations required by screening and scoping presented?	Yes	Confirmation of neighbouring foundation levels outstanding.
Are the baseline conditions described, based on the GSD?	Yes	Included in previous submission

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	Yes	Considered in revised BIA. Foundation levels to be confirmed.
Is an Impact Assessment provided?	Yes	Updated in revised BIA
Are estimates of ground movement and structural impact presented?	No	A site specific Ground Movement Assessment is required. The ground movement assessment should also review the likely ground movement in the short and long term due to the proposed basement. Damage to be limited to Category 1 Burland Scale.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	Revised BIA. Further assessment required.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Further detail is required once impact assessment is completed.
Has the need for monitoring during construction been considered?	Yes	Updated in revised BIA
Have the residual (after mitigation) impacts been clearly identified?	Yes	Updated in revised BIA
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Site specific Ground Movement assessment required.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Revised BIA
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Site specific Ground Movement assessment required.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, site specific Ground Movement assessment required. Damage to be limited to a maximum of Category 1.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

- 4.1. The initial Basement Impact Assessment (BIA) has been carried out in 2016 by Mott Macdonald with separate reports for ground investigation and cone penetration testing being prepared by Environmental Scientifics Group Ltd (ESG).
- 4.2. A revised BIA, along with supporting documents, was received in August 2017 to address the queries of the initial BIA Audit performed by CampbellReith. This revision includes BIA, SUDS and Movement Monitoring reports by Ross and Partners and an Interpretative Report on Ground Investigation by ESG. The BIA has been prepared by Ross and Partners Consulting Civil and Structural Engineers and the checker has CEng MStructE FICE qualification. It should be demonstrated that the BIA has been reviewed and approved by a Chartered Geologist (CGeol) in respect of groundwater and land stability issues.
- 4.3. The site is located within Redington and Frognal Conservation Area. The existing building is an early 20th century house with accommodation arranged over lower ground, raised ground floor first and second floors.
- 4.4. The proposed development comprises of the demolition of the existing building to construct a new residential development arranged over 4 storeys above ground and a basement.
- 4.5. Structural drawings have been now submitted and it is understood that current proposals allow for the footprint of the new structure to be extended significantly into the rear garden with a new perimeter retaining secant piled wall to form the basement walls, with a suspended RC basement slab.
- 4.6. Construction sequence, temporary and permanent works drawings have been prepared by Ross and Partners to demonstrate that basement proposals are feasible. Retaining wall calculations using geotechnical parameters given by ESG were provided, with no stiffness values. A separate movement monitoring report has been submitted in support of the revised BIA report; however estimates of the likely ground movement in the short and long term due to the proposed basement have not been included. It is noted that Ross and Partners state (p.12 of revised BIA) that any adjacent building damage as a result of the proposed works is anticipated to be limited to Category 2 of the Burland Scale. A site specific Ground Movement Assessment (GMA) is required. LBC policies requires that damage to neighbouring structures must be limited to a maximum of Category 1. This has not been demonstrated.
- 4.7. Basement works to adjacent properties were identified. The revised BIA report indicates that the relationship between the presumed, existing foundation to No. 30 and the proposed basement of No. 28 will not be of concern. At the boundary to No. 26, it makes allowances for the existing flank wall to be retained in the temporary and permanent conditions. Evidence has

not been presented for the assumed foundation levels of the neighbouring properties. These should be confirmed and used within a GMA in order to confirm the magnitude of any impacts.

- 4.8. It is reported that the residents of No. 30 Redington Road experienced problems with groundwater ingress in 2010 and had the premises tanked. Any proposal to address a design solution for No. 28 Redington Road will also have to address and prevent movements which will result in damaging the seal of this tanking. It is acknowledged that condition surveys of the neighbouring properties will be commissioned before the works starts on site.
- 4.9. The site investigation undertaken by ESG has identified that the existing lower ground level is underlain by Made Ground and layers of Bagshot Formation, Claygate Member and London Clay from 3.4 mbgl (or 98.00m AOD) to 6.7 mbgl. Whilst groundwater was encountered between 7.4 mbgl 12mbgl, further monitoring confirmed water to be present within the London Clay Formation and at an average level of 95.76m OD. At 96.02m AOD, the proposed basement slab level seems to be above the site's groundwater level. Consideration is also given to the prospect of the proposed new basement creating an obstacle to groundwater flow with provisions for a permeable drainage blanket beneath the basement floor slab. This approach should be confirmed as being practical in conjunction with a secant piled wall retaining wall. Notwithstanding the above, hydrogeological impacts are not anticipated, given that flow should be able to divert around the basement.
- 4.10. The ground investigation report also considers the shrink-swell potential of London Clay due to removal of overburden pressures and recommends that the new slab is suspended and cast on an anti-heave medium.
- 4.11. The BIA confirms that there would be no significant concern with respect to the potential presence of a spring located 50m south of the site. It states that this is no longer shown on subsequent editions of the OS map and it is likely to have been culverted. However it is recommended that further ground water monitoring is carried out prior to construction to better understand groundwater flow. It is accepted and agreed that further water monitoring should be carried out prior to construction in order to further inform the construction method and detailed design.
- 4.12. Reference to the ESG site investigation report also confirms that the inflow of surface waters to adjacent properties is considered unlikely to change significantly and the overall risk to slope stability is low. However, this should be confirmed with reference to a site specific GMA.
- 4.13. The previous audit report requested that the proposed basement should be designed and constructed to be waterproof, given the presence of groundwater table on site. The ESG report considers the risk/impact of the proposed basement on groundwater and recommends a secant piled wall where only the reinforced (male) piles will be extended to an appropriate depth

beneath the basement floor. In doing that, the basis of the design is the premise that suitable stiffness and lateral ground support to the basement walls can be provided whilst allowing groundwater to flow between adjacent piles. Suitable lateral support (e.g. deflections of the pile wall) should be demonstrated within the GMA.

- 4.14. The revised BIA further recommends that: a) any groundwater encountered during construction will be controlled via local sumps and pumps within the water resisting construction formed by the secant piled wall b) the concrete for the basement lining walls and basement slab will be watertight and c) drained cavity system will be provided inside the perimeter retaining wall for waterproofing.
- 4.15. It is indicated in the provided Sustainable Urban Strategy (SUDS) strategy report by Ross and Partners that all surface and foul water from the basement is to be pumped to the ground floor drainage and drained to the public sewers. The existing surface water drainage will be replaced but the final discharge to the sewer and proposals will also utilise an attenuation tank.
- 4.16. A root excavation report was conducted to find evidence of root growth at three locations on site, with the extent of these deemed to be insignificant to the proposed development.
- 4.17. An outline movement monitoring strategy has been produced. This is accepted as appropriate, however it should be reviewed following the GMA to ensure that trigger levels are appropriate to the movements predicted, and control construction to ensure a maximum of Category 1 damage to neighbouring structures.
- 4.18. Construction sequence drawings accompanied by a construction sequence plan, appended in the revised BIA report, outline an anticipated site works programme.

5.0 CONCLUSIONS

- 5.1. The BIA has been prepared by Ross and Partners Consulting Civil and Structural Engineers and the checker has CEng MStructE FICE qualification. It should be demonstrated that the BIA has been reviewed and approved by a Chartered Geologist (CGeol) in respect of groundwater and land stability issues.
- 5.2. The proposal is to demolish the existing building and construct a new residential development arranged over 4 storeys and a basement.
- 5.3. The construction method for the basement works would be secant piled retaining walls with 250-300mm thick liner walls and a 600mm thick piled, in-situ, reinforced concrete piled raft at basement as slab. A construction plan, including indicative drawings and a non-technical summary is presented.
- 5.4. In the revised submission, no GMA has been included. It is however stated that any damage to neighbouring properties will be limited to Category 2 of the Burland Scale. A site specific GMA and damage impact assessment is required. Damage to neighbouring structures must be limited to a maximum of Category 1.
- 5.5. Further water monitoring is to be carried out prior to construction to further inform the construction method and the detailed design.
- 5.6. It is anticipated that the proposed development will not impact the wider hydrological or hydrogeological environments.
- 5.7. Monitoring and condition surveys are proposed. These should be revised to reflect a GMA (when completed) including any additional mitigation proposed so as to limit damage to Category 1 of the Burland Scale.
- 5.8. Attenuation SUDS has been considered.
- 5.9. Queries are summarised in Appendix 2. The BIA does not meet the criteria of CPG4.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issues raised	Response
Eldred Geotechnics Ltd Review of planning application 2016/2997/P to Camden Council with respect to 30 Redington Road and Camden development Policy DP27.	Consulting Engineers 11A Woodside, Chelsfield, Orpington, Kent, BR6 6RJ.	30.08.16	-Application documents of 2016/2997/P do not satisfy the specific policy requirements. -Outbuildings and external areas to No. 30 Redington Road at risk of being damaged from the proposed works. -Risk of flooding from incomplete surface water drainage assessment and lack of details regarding attenuation. -Inadequate information and interpretation of ground and groundwater conditions places unacceptable risk of damage by subsidence and/or groundwater flood to No. 30 Redington Road.	GMA outstanding. It is anticipated that any damage to neighbouring properties will be limited to Category 2 of the Burland Scale. Assumptions have been made on the foundation levels of the neighbouring properties. These need to be confirmed and the GMA to be informed and modelled. Any damage predicted needs to be assessed in accordance with LBC guidance. According to the BIA, the property is not located in an area subject to flooding. BIA SUDS report submitted. Ground investigation submitted. Construction plan and structural design submitted attempt to mitigate risk of damage. Also refer to section 4.0 of this audit report.
Eldred Geotechnics Ltd Review of planning application 2016/2997/P to Camden Council with respect to 26 Redington Road and Camden development Policy DP27.	Consulting Engineers 11A Woodside, Chelsfield, Orpington, Kent, BR6 6RJ.	30.08.16	-Application documents of 2016/2997/P do not satisfy the specific policy requirements. -No. 26 Redington Road at high risk of being damaged from the proposed works. -Option for retaining wall shown in architects drawings considered as unacceptable design solution to proposed scheme. -Potential changes to groundwater regime	Retaining wall design parameters available in ESG report. Ross and Partners retaining wall design incorporates these parameters. The ESG report considers the risk/impact of the proposed basement on groundwater and recommends a secant piled wall where only the reinforced (male) piles will be extended to an appropriate depth beneath the basement floor allows for a permeable drainage blanket beneath the basement floor slab. Rest as above. Also refer to section 4.0 of this

			not considered.	audit report.
First Steps Ltd	Consulting Engineers Unit 17, Hurlingham Studios, Ranelagh Gardens, London, SW6 3PA.	27.08.16	<ul style="list-style-type: none"> - Ground stability concerns. - Understanding of groundwater regime lacking. - Impact of secant piled wall to site's hydrogeology not considered. - Comments on BIA slope stability assessment and various comments on BIA submission. 	As above and also refer to section 4.0 of this audit report.
Redington Frogna! Neighbourhood Forum		30.08.16	<p>Numerous concerns were raised over adequacy of BIA including:</p> <ul style="list-style-type: none"> • Qualifications of authors ? • No damage assessment • No engineering calculations • No assessment of cumulative impacts • Lost river 	<p>According to the BIA, the authors are appropriately qualified.</p> <p>Retaining wall design and calculations submitted.</p> <p>The proposed construction methodology, using secant piled retaining wall, attempts to minimise/mitigate risk caused by construction activities. However, GMA has not been completed yet.</p> <p>Refer to above and section 4.0 of this audit report.</p>
Ashmount Management Company	30 Redington Road, Hampstead, London, NW3 7RB.	31.08.16	Echoes concerns raised by Eldred and First Steps.	As above.
Zimmerman	26 Redington Road	31.08.16	Echoes concerns raised by Eldred and First Steps.	As above.

Scheinmann Conway Corners Panayiotou Sanai Bharwani McDouagh Aleskseev	Various	Various	Echoes concerns raised by Eldred and First Steps.	As above.
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Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	General / BIA	Author details and qualifications for the relevant sections of the BIA to be provided to confirm they are in accordance with CPG4.	Open – CGEol review / approval required.	
2	General/BIA	Screening, scoping and investigation to be completed.	Closed – Addressed in revised BIA	Aug 17
3	General / BIA	Works programme not included.	Closed – Construction plan illustrating outline works provided.	Aug 17
4	Stability	Structural proposals for the construction of basement to be submitted. Design information and structural proposals for the remaining sub- and superstructure to be confirmed.	Closed – Revised submission included temporary and permanent works drawings including construction plan.	Aug 17
5	Stability	Ground movement assessment required with building damage assessments for all potentially affected structures.	Open – GMA required, mitigation measures to be proposed and damage re-assessed. Level of adjacent foundations to be confirmed and modelled into GMA	
6	Stability	Concerns to the stability of a side wall adjoining No 26 Redington Road.	Closed – Revised submission includes temporary works drawings and construction plan.	Aug 17
7	Stability	Slope stability concerns regarding the proposed development.	Closed – Addressed in revised BIA	Aug 17
8	Groundwater	Details of groundwater will be controlled and stability will be maintained during construction need to be submitted.	Closed – Secant retaining wall	Aug 17

9	Groundwater	Consider the presence of neighbouring basement and the presence of nearby spring lines and near surface water is also to be confirmed. Local and cumulative effects of basement to be assessed.	Closed – however, GMA and levels of existing adjacent building foundations required.	Aug 17
10	Surface water	Technique (SUDS etc.) for attenuation of surface water from site and below ground drainage design information required. Refer to section 4.11 of this document.	Closed – Addressed in BIA-SUDS report	Aug 17

Appendix 3: Supplementary Supporting Documents

None

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

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A list of Members is available at our Registered Office at: Friars Bridge Court, 41- 45 Blackfriars Road, London SE1 8NZ
VAT No 974 8892 43