CampbellReith
consulting engineers

28 Maresfield Gardens
London, NW3 5SX

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12466-33
Revision: F1

March 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

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Author	G Kite, BSc MSc DIC FGS
Project Partner	E M Brown, BSc MSc CGeol FGS
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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 Maresfield Gardens, London NW3 5SX (planning reference 2016/5374/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. The proposed development involves the excavation of a basement and the construction of a lower ground floor extension to the rear.

1.5. The BIA has been prepared by a number of sources: Vincent & Rymill, Ground and Project Consultants Ltd, Ground and Water Ltd and H Fraser Consulting Ltd. The original BIA was not presented in a single, coherent format, and some information was contradictory between the reports. This has been revised in the updated submission.

1.6. A desk study has been presented, broadly in accordance with aspects recommended in the GSD Appendix G1.

1.7. The original BIA identified that a mainline railway tunnel is located 20m north of the property running along Nutley Terrace. In the revised submission, Network Rail has confirmed the development will not impact their assets.

1.8. The BIA states that the site lies directly on designated unproductive strata, the London Clay. It is accepted that there should be no impact to the wider hydrogeological environment.

1.9. The risk of surface water flooding is accepted as being low and no nearby streets flooded in 1975 or 2002. Suitable drainage and flood risk protection measures are presented in the revised submissions.

1.10. The proposed basement will result in an increase in the proportion of hard surface/paved areas. In the revised submission, suitable drainage proposals have been provided, and maximum discharge flow rates should be agreed with LBC and Thames Water.

1.11. A site investigation confirmed the presence of London Clay below 0.6m to 0.9m of clayey Made Ground. In the revised BIA, groundwater monitoring indicates that the perched groundwater level is present at approximately 1.4m below ground level. Further, longer term groundwater monitoring should be undertaken to inform temporary works contingency planning, control measures and waterproofing design.

1.12. In the original BIA a ground movement assessment (GMA) and damage impact assessment was presented, although not in sufficient detail. In the revised BIA the calculations confirm damage impacts of Category 0 (Negligible). At detailed design stage, when structural loads including tension pile capacity have been finalised, the GMA and damage impact assessment should be reviewed and confirmed.

1.13. An outline methodology and guidance for monitoring ground / structural movements during construction has not been provided. A suitable structural monitoring strategy linked to the ground movements predicted and limiting damage to Category 0 should be secured by a condition of planning.

1.14. In the revised BIA, the bearing capacity at formation level is appropriate for the loads proposed in the structural calculations.

1.15. An outline temporary works methodology is presented, including underpinning sequencing and temporary propping arrangements. In the revised BIA, contingency measures to control groundwater during construction have been considered.

1.16. Queries and matters requiring further information or clarification are discussed in Section 4 and summarised in Appendix 2. With the updated information provided in the revised submissions, the BIA meets the criteria of CPG4 and DP27.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 25 November 2016 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 28 Maresfield Gardens, London NW3 5SX, Camden Reference 2016/5374/P.

2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development.

2.3. A BIA is required for all planning applications with basements in Camden in general accordance with policies and technical procedures contained within:

- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Camden Planning Guidance (CPG) 4: Basements and Lightwells.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.

2.4. The BIA should demonstrate that schemes:

a) maintain the structural stability of the building and neighbouring properties;

b) avoid adversely affecting drainage and run off or causing other damage to the water environment; and,

c) avoid cumulative impacts upon structural stability or the water environment in the local area;

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: "Excavation of single storey basement with rear lightwell; erection of rear extension at lower ground floor level; erection of front dormer; alterations to front and rear alterations including hard and soft landscaping works."

2.6. CampbellReith accessed LBC's Planning Portal on 6th December 2016 and gained access to the following relevant documents for audit purposes:

· Basement Impact Assessment dated September 2016 by Vincent & Rymill.

- Ground Investigation (ref GWPR1761) dated September 2016 by Ground and Water Ltd.
- Basement Impact Assessment: Groundwater Report (ref 30164R1D1) dated September 2016 by H Fraser Consulting.
- Basement Impact Assessment: Land Stability dated September 2016 by Ground & Project Consultants Ltd.
- Planning and Design & Access Statement dated September 2016 by Martin Robeson Planning Practice.
- Arboricultural Impact Assessment (ref GWA/28MFG/A1A/01a) dated September 2016 by Landmark Trees.
- Construction Traffic Management Plan dated September 2016 by Traffic Management London Ltd.
- Various existing and proposed plans and sections dated August 2016 by Greenway Architects.
- Consultation responses to the proposed development from local residents.

2.7. CampbellReith were provided with the following relevant documents for audit purposes on 15th February 2017:

- Ground Investigation and Basement Impact (ref GWPR1761 V3.01) dated February 2017 by Ground and Water Ltd.
- Proposed Basement Plan and Section (Drawings 02 and 03) dated September 2016 by Vincent & Rymill.

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	Updated in revised submission. Location of utility assets to be conformed prior to construction.
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	Updated in revised submissions.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	Updated in revised submissions.
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?	No	The screening has not identified the presence of nearby 'Lost Rivers', which is discussed elsewhere in the reports. However, it is accepted that these are culverted.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Updated in revised submissions.
Is a conceptual model presented?	Yes	Updated in revised submissions.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Updated in revised submissions. Assessments assume lower ground floors in adjacent properties.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Updated in revised submissions. Groundwater control proposed during construction.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Updated in revised submissions. SUDS proposals and upstands to mitigate against low surface water flood risk.
Is factual ground investigation data provided?	Yes	Ground and Water Ltd report.
Is monitoring data presented?	Yes	Updated in revised submissions.
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	Not discussed within the BIA. A site walkover was undertaken in August 2014 prior to the site investigation.
Is the presence/absence of adjacent or nearby basements confirmed?	No	Lower ground floors assumed in adjacent properties.
Is a geotechnical interpretation presented?	Yes	Updated in revised submissions.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Updated in revised submissions.
Are reports on other investigations required by screening and scoping presented?	Yes	Network Rail consultations / further groundwater monitoring presented in revised submission.
Are baseline conditions described, based on the GSD?	Yes	Updated in revised submissions.

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	Yes	Updated in revised submission.
Is an Impact Assessment provided?	Yes	Updated in revised submissions.
Are estimates of ground movement and structural impact presented?	Yes	Updated in revised submissions.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	Updated in revised submissions.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Groundwater control, attenuation SUDS, raised thresholds, suitable temporary works presented. Structural monitoring strategy to be provided.
Has the need for monitoring during construction been considered?	No	Movement monitoring is discussed but no proposals or recommendations are provided. To be secured as a condition of planning to limit movement to that predicted.
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	However, structural monitoring strategy to be secured as a condition of planning to limit damage impact to Category 0, as predicted.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Updated in revised submissions.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Updated in revised submissions.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	Updated in revised submissions.

Item	Yes/No/NA	Comment
Are non-technical summaries provided?	No	However, revised BIA format is more coherent.

4.0 DISCUSSION

4.1. The BIA has been prepared by a number of sources: Vincent & Rymill, Ground and Project Consultants Ltd, Ground and Water Ltd and H Fraser Consulting Ltd. The original BIA was not presented in a single, coherent format, but this has been corrected in the revised submissions. The authors' qualifications are in accordance with the requirements of CPG4.

4.2. The proposed scheme involves excavating a single storey basement with a rear lightwell and the erection of a rear extension at lower ground floor level with alterations to the hard and soft landscaping of the site.

4.3. The BIA includes the majority of the information required from a desk study in line with the GSD Appendix G1. In the original BIA, utility and transportation companies have not been approached with regards to underground infrastructure. The BIA identified that a mainline railway tunnel is located 20m north of the property running along Nutley Terrace. In the revised submission, Network Rail has confirmed the development will not impact their assets. Utility assets should be located prior to construction and the BIA updated if any are within the zone of influence of the development.

4.4. A site investigation confirmed the presence of London Clay below 0.6m to 0.9m of clayey Made Ground.

4.5. The BIA identified the old course of the headwaters of the River Tyburn approximately 100m east of the site, and the old course of the headwaters of the River Westbourne approximately 200m west of the site. It is accepted that these are unlikely to impact upon the site.

4.6. The BIA states that the site lies directly on a designated unproductive stratum, the London Clay. It is accepted there should be no impacts to the wider hydrogeological environment. However, seepage flows within the London Clay may impact the site during construction and should be considered (see 4.9). In the revised BIA limited discussion on sump pumping as a groundwater control methodology is presented and the Contractor should ensure groundwater is controlled during construction to prevent risk of instability of the excavations.

4.7. The risk of surface water flooding is accepted as being low. The BIA states that no nearby streets flooded in 1975 or 2002. Environment Agency data indicates a surface water flow route across the site in the event of a flood event, and this should be appropriately mitigated against. Suitable drainage and flood risk protection measures should be proposed. In the revised BIA, suitable drainage is proposed, with raised upstands to the basement roof to provide attenuation storage. Raised thresholds and lightwell upstands are proposed.

4.8. The proposed basement will result in an increase in the proportion of hard surface/paved areas. In the revised BIA outline drainage plans are provided, proposing attenuation SUDS designed for a 1:100 year storm event with an allowance of 30% for climate change. Calculations are not provided for review, and proposed discharge flow rates should be agreed with Thames Water and LBC.

4.9. Groundwater monitoring data suggests that perched groundwater level is present approximately 1.4m below ground level (bgl), based on updated monitoring presented in the revised BIA. Retaining wall calculations make allowance for groundwater at 1m bgl. Further longer term groundwater monitoring should be undertaken to inform temporary works contingency planning, control measures and waterproofing design.

4.10. In the revised BIA, the bearing capacity at formation level is appropriate for the loads proposed in the structural calculations, which assume a bearing pressure of 125kPa. Appropriate geotechnical parameters are presented.

4.11. An outline temporary works methodology is presented, including underpinning sequencing and temporary propping arrangements. In the revised BIA, Contingency measures to control groundwater during construction are discussed (see 4.6) and should be prepared by the Contractor.

4.12. The BIA notes the potential for heave of the underlying clay, with heave protection installed below the basement slab and provision of tension piles.

4.13. A ground movement assessment and damage impact assessment has been presented, which has been updated in the revised submissions. The GMA is based upon CIRIA C580, which is intended for predicting movements generated by basements with piled retaining walls, although is accepted as appropriate for other wall types if applied conservatively. The GMA undertaken indicates predicted vertical and horizontal movements and a zone of influence, and is considered appropriate for outline design and planning assessment, with movements broadly as expected for the depth of basement proposed.

4.14. Heave movements have not been calculated within the GMA. It is accepted that it is the designer's intention that the effects of heave be mitigated to a negligible effect. However, at detailed design stage, when structural loads including the proposed capacity of the tension piles have been finalised, the GMA should be reviewed including heave calculations, which should be combined with the calculations for installation of the retaining walls and excavation effects.

4.15. The damage impact to adjacent structures is stated as being Category 0, 'Negligible'. This assumes negligible heave effects and provision of stiff propping throughout the construction process and warns of instability if excavations are not supported. The damage impact

assessment should be reviewed with the ground movement assessment at detailed design stage (to include the incorporation of heave effects, as 4.14). If damage impacts greater than those currently predicted (Category 0) are calculated, then this should feedback to the design process and further mitigation (e.g. reduction of heave effects) will be required.

4.16. Considering shear strengths are soft to firm in the upper soil profile, good workmanship by an experienced contractor adopting the correct methodology, sequence and stiff propping is considered absolutely necessary. The outline temporary works scheme indicates that soil above the existing foundations will be excavated and battered back, with stiff propping from foundation level down. The Contractor should ensure that any excavations below foundation level are always supported and that battered slopes are stable and adequately protected against rain / surface water.

4.17. An outline methodology and guidance for monitoring ground / structural movements during construction was requested but has not been provided. A suitable structural monitoring strategy linked to the ground movements predicted and limiting damage to Category 0, as predicted, should be secured by a condition of planning. The monitoring strategy should include trigger values and contingency action plans.

5.0 CONCLUSIONS

5.1. The original BIA was not presented in a single, coherent format, and some information was contradictory between the reports. This has been revised in the updated submission. The authors' qualifications are in accordance with the requirements of CPG4.

5.2. The original BIA identified that a mainline railway tunnel is located 20m north of the property running along Nutley Terrace. In the revised submission, Network Rail has confirmed the development will not impact their assets.

5.3. The BIA states that the site lies directly on designated unproductive strata, the London Clay. It is accepted that there should be no impact to the wider hydrogeological environment.

5.4. The risk of surface water flooding is accepted as being low. Suitable drainage and flood risk protection measures are presented in the revised submissions.

5.5. The proposed basement will result in an increase in the proportion of hard surface/paved areas. In the revised submission, suitable drainage proposals have been provided, and maximum discharge flow rates should be agreed with LBC and Thames Water.

5.6. Longer term groundwater monitoring should be undertaken to inform temporary works contingency planning, control measures and waterproofing design.

5.7. In the revised BIA the calculations confirm damage impacts of Category 0 (Negligible). At detailed design stage, when structural loads including tension pile capacity have been finalised, the GMA and damage impact assessment should be reviewed and confirmed.

5.8. An outline methodology and guidance for monitoring ground / structural movements during construction has not been provided. A suitable structural monitoring strategy linked to the ground movements predicted and limiting damage to Category 0 should be secured by a condition of planning.

5.9. In the revised BIA, the bearing capacity at formation level is appropriate for the loads proposed in the structural calculations

5.10. An outline temporary works methodology is presented. In the revised BIA contingency measures to control groundwater during construction have been considered.

5.11. Queries and matters requiring further information or clarification are summarised in Appendix 2. With the updated information provided in the revised submissions, the BIA meets the criteria of CPG4 and DP27.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Com30ments

Surname	Address	Date	Issue raised	Response
Williams for and on behalf of Netherhall Neighbourhood Association	Little House A, 16A Maresfield Gardens	14th November 2016	… 3 its proximity within 1 metre of No 26 will have risk of structural damage to the structure of the adjoining building. 4 The Basement Impact Study shows a different plan for the new basement to that shown in the submitted plan. It makes no reference to the basement projecting south to abut the boundary with No 26 (with no plan showing the relationship with adjacent building structures) and does not address the excavation being 1m away from the adjoining building at No 26. It fails to argue that the new basement would not cause damage to the structure of the adjoining buildings.	4.13 – 4.17
Osband	Little House A, 16A Maresfield Gardens	30th November 2016	….. it will be too near the boundary of no. 26 and this may have structural implications for no. 26……	4.13 – 4.17

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA	The BIA should be presented as a single, coherent report with supporting documents appended (to avoid inconsistency / contradiction between documents). To include non-technical summaries.	Closed.	Feb 2017
2	Hydrogeology	In accordance with the BIA's own recommendations, long term groundwater monitoring should be undertaken.	Open – the baseline should be confirmed by longer term monitoring and/or by the contractor in advance of the works.	N/A (additional monitoring provided Jan 2017)
3	Land Stability	The works should be undertaken in consultation with Network Rail.	Closed – No impact confirmed by NR.	Feb 2017
4	Land Stability	Ground movement assessment and damage impact assessment calculations to be provided. Structures within the zone of influence should be identified, along with basements / listed buildings / utilities / underground infrastructure.	Open – the calculations of movement and assessment of damage to be reviewed and confirmed as Category 0 at detailed design stage. Structural monitoring to limit damage to predicted Category 0 to be secured by condition of planning.	N/A - to be secured by condition of planning.
5	Surface Water Flow	A drainage strategy should be presented in line with CPG4 3.51. Flood risk protection measures should be detailed.	Closed – attenuation SUDS proposed.	Feb 2017 – off-site discharge flow rates should be agreed with Thames Water and LBC.
6	Land Stability	Geotechnical parameters to be confirmed. Structural calculations to adopt presented parameters.	Closed.	Feb 2017
7	Land Stability / hydrogeology	Residual risk and temporary groundwater control measures to be presented.	Closed.	Feb 2017

Appendix 3: Supplementary Supporting Documents

Ground Investigation and Basement Impact (ref GWPR1761 V3.01) dated February 2017 by Ground and Water Ltd

Proposed Basement Plan and Section (Drawings 02 and 03) dated September 2016 by Vincent & Rymill

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

Campbell Reith Hill LLP. Registered in England & Wales. Limited Liability Partnership No OC300082
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