

51 Calthorpe Street
London
WC1X 0HH

Basement Impact Assessment
Audit

For
London Borough of Camden

Project Number: 12066-84
Revision: F1

September 2019

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	July 2018	Comment	RMgk12727-84-260718-51 Calthorpe Street D1.doc	R Morley	G Kite	G Kite
F1	September 2019	Planning	VPgk12727-84-100919-51 Calthorpe Street F1.doc	V. Pseneac	G. Kite	G. Kite

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Document Details

Last saved	10/09/2019 12:36
Path	VPgk12727-84-100919-51 Calthorpe Street F1.doc
Author	V Pseneac BSc MSc
Project Partner	E M Brown, BSc MSc CGeol FGS
Project Number	12727-84
Project Name	51 Calthorpe Street
Planning Reference	2018/1142/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 51 Calthorpe Street WC1X 0HH (planning reference 2018/1142/P). The basement is considered to fall within Category C as defined by the Terms of Reference.
- 1.2. The Audit reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development in accordance with LBC's policies and technical procedures.
- 1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and reviewed it against an agreed audit check list.
- 1.4. The BIA and associated reports have been prepared by established firms of engineering consultants who possess suitable qualifications for all aspects of the assessment.
- 1.5. The proposal involves the formation of a basement level beneath an existing lower ground floor to an existing 4 story (including lower ground floor) building, with the underside of the basement at approximately 6.3m below ground level. The basement is proposed to cover the full plan area of the site, whilst the lower ground floor level is to be extended to also cover the majority of the site.
- 1.6. The neighbouring terrace of properties, 45 - 49 Calthorpe Street, are Grade II Listed.
- 1.7. Discrepancies between the structural drawings and the architectural drawing were initially present in terms of the extent of the basement and lower ground floor. Revised BIA information was subsequently provided which showed a co-ordinated set of proposals.
- 1.8. The proposed basement structure consists of a piled basement wall and reinforced concrete walls and slabs, which are typical forms of construction for basements of this scale. The latest BIA information confirmed the piling methodology and wall formation along Calthorpe Street.
- 1.9. The proposal includes industry recognised good practice principles to ensure the basement walls are adequately and stiffly propped at all times during construction.
- 1.10. Outline calculations to substantiate the main basement structure were requested as part of the initial audit. Limited calculations, relating to pile design, have been provided.
- 1.11. A revised ground movement assessment has been provided in the updated submissions. It has been demonstrated that, considering good workmanship, a maximum of Burland Category 1 (Very Slight) damage will impact the neighbouring structures.

- 1.12. Appropriate site investigations have been carried out, with three boreholes of appropriate depth. Limited investigation of the groundwater has also been carried out.
- 1.13. The site has been identified as being located over a geological feature that comprises of up to 21m depth of sands, gravels, and fill material over the underlying clay, which has been caused by the presence of an historic watercourse.
- 1.14. It is accepted that the proposal will not significantly impact groundwater flow, given the proposed piling methodology.
- 1.15. The London Post Office Railway tunnel is located beneath Calthorpe Street to the front of the site. Consultation with Royal Mail (RM) was requested to demonstrate that the potential impacts have been considered and mitigated. This was later provided and the BIA confirmed appropriate measures would be agreed with RM to prevent any impact due to proposals.
- 1.16. An indication of the main works phases, durations, and approximate timeframe for the works has been provided.
- 1.17. An appropriate strategy to limit surface water flows to the existing sewer has been proposed. However, further details are were requested in relation to the proposed buried storage tank. The location of this has been ascertained and the BIA confirmed that there will be no impact on the hydrogeology.
- 1.18. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.
- 1.19. Discussion is presented in Section 4 and a summary of queries is provided in Appendix 2. Considering the updated submissions, the BIA meets the criteria of CPG Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 13th June 2018 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 51 Calthorpe Street WC1X 0HH, planning ref: 2018/1142/P.

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

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

- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Camden Planning Guidance: CPG Basements.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- Local Plan 2017, 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 *"Change of use from offices (Class B1a) to residential (Class C3) to create 8 self-contained flats (2x 1 bed, 2x 2 bed and 4x 3 bed); mansard roof extension to main building; roof extension to rear part of building; creation of internal mezzanine floors; excavation to create basement; associated works."*

The Audit Instruction also confirmed that the neighbouring building, 49 Calthorpe Street, is a Grade II Listed building.

2.6. CampbellReith accessed LBC's Planning Portal on 26/06/18 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (BIA), RM/CS/P12-385/22 Rev D Final, Create Consulting Engineers.
- Existing and proposed planning application drawings, BrooksMurray Architects
- Design & Access Statement, Feb 2018, BrooksMurray Architects
- Flood Risk assessment, CS/CC/P12-385/21, Create Consulting Engineers
- Groundwater Monitoring Statement, Feb 2018, Create Consulting Engineers
- Heritage Statement, Sept 2012, The Architectural Historic Practise Limited
- Planning Statement, Feb 2018
- Demolition Plans, BrooksMurray Architects
- Construction Management Plan, Feb 2018, Create Consulting Engineers
- Planning Comments relevant to the scope of this audit

2.7. CampbellReith received a number of relevant documents for audit purposes between September 2018 and June 2019:

- Basement Impact Assessment (BIA), RM/CS/P12-385/22 Rev G, Rev H and Rev I, Create Consulting Engineers.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	
Is data required by Cl.233 of the GSD presented?	Yes	
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	Updated in the revised submissions
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	An appropriate justification statement has generally been provided for 'no' answers. Data sources are generally referenced
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	An appropriate justification statement has generally been provided for 'no' answers. Data sources are generally referenced
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	An appropriate justification statement has generally been provided for 'no' answers. Data sources are generally referenced
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	A scoping statement identifying the potential impact has been identified for all items carried through from screening

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	A scoping statement identifying the potential impact has been identified for all items carried through from screening
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	A scoping statement identifying the potential impact has been identified for all items carried through from screening
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	Data sources other than the site specific SI have been referenced
Has a site walkover been undertaken?	Yes	Photos indicating a site walkover have been provided.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	The neighbouring Holiday Inn has been confirmed as containing a basement level.
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	Yes	Flood risk assessment, ground movement assessment
Are the baseline conditions described, based on the GSD?	Yes	
Do the baseline conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	Updated in the revised submissions

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	All items identified by screening and scoping have been considered.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Mitigation measures are considered within the impact assessment where appropriate.
Has the need for monitoring during construction been considered?	Yes	An outline movement monitoring strategy in line with the latest GMA has been provided.
Have the residual (after mitigation) impacts been clearly identified?	No	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Original GMA has been amended to reflect the current scheme more accurately. Location of Attenuation Tank has been confirmed.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Surface water discharge is to be attenuated to a greenfield run off rate.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	A revised GMA has been submitted. Hydrogeological impacts are negligible due to the adoption of contiguous piled foundations.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Updated in latest submissions.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

- 4.1. The BIA has been prepared by engineering consultants Create Consulting Engineers Ltd using individuals who possess suitable qualifications for all aspects of the assessment.
- 4.2. A report on the ground investigations has been produced by A F Howland Associates, which includes geotechnical factual information as well as geotechnical interpretation.
- 4.3. The existing building consists of a three storey Victorian building containing an existing lower ground floor level. The building structure is understood to consist of load bearing masonry and unspecified suspended floors.
- 4.4. The proposal involves the formation of a basement level beneath the existing lower ground floor level, along with an additional storey added at roof level, providing a building of 5 storeys in total. The proposed use of the building is to be mixed residential and office space, with office space at the current lower ground level, and proposed basement level. The underside of the basement is indicated at approximately 6.3m below ground level (bgl).
- 4.5. The existing lower ground floor level is proposed to extend towards the property boundary at the front, forming larger light wells as well as additional enclosed space. To the west, the courtyard wall at lower ground floor level is proposed to be relocated up to the western boundary, increasing the courtyard area. The proposed basement level is to extend beneath the entire footprint of the site, therefore up to the boundary with the public Highway to the south, and beneath the extended courtyard wall to the west which is to the boundary with 49 Calthorpe Street.
- 4.6. The immediately adjacent terrace of properties, 45, 47, and 49 Calthorpe Street, are Grade II Listed. It is understood that 51 Calthorpe Street and 49 Calthorpe Street have separate boundary walls and do not share a party wall. The site is also located within the Bloomsbury Conservation Area.
- 4.7. The BIA was not initially produced bespoke for the current proposal and instead referred to a proposal which was made under a separate planning application. The BIA was subsequently revised a number of times to reflect the proposed scheme.
- 4.8. The proposed basement structure is to be formed by a contiguous piled retaining wall, which is shown as installed within the boundary of the existing lower ground floor. A new suspended RC floor slab to the lower ground floor is proposed to cantilever over the piled wall to the perimeter to support the existing foundations to the building. The contiguous piled wall is to be lined with an RC wall, and a suspended basement slab is proposed at basement level and extended lower ground floor level towards the south of the property.

- 4.9. Reference was made to a secant piled wall on some of the structural sketches, which was not consistent with the main BIA document. It referenced a contiguous piled wall being proposed. The BIA was subsequently amended and it confirmed that a contiguous piled wall would be adopted throughout the basement. It also confirmed the suitability of the piling type and methodology for use in the geological conditions that have been identified.
- 4.10. Top down construction is proposed, with piling to be undertaken first and then formation of the lower ground slab at the head of the piled wall forming a permanent prop. Excavation of the basement level is then carried out via openings within the lower ground slab, with temporary plunge columns supporting the lower ground slab in the temporary case. Once the required excavation level is reached the basement slab is to be constructed, along with any internal load bearing elements, with the basement slab providing a permanent prop to the base of the piled wall.
- 4.11. The use of top down construction is recognised as an effective method of controlling ground movements associated with wall deflections during the construction phase, given that a permanent prop is proposed to the head of the wall prior to excavation, which is maintained through to the permanent case without the need to install or remove temporary propping to the head of the wall.
- 4.12. An appropriate geotechnical interpretation has been provided within the Report on Ground Investigations, with engineering properties for retaining wall design provided.
- 4.13. No structural calculations were provided for the main structural elements of the basement structure as part of the original BIA submission. However, outline calculations relating to pile capacities have subsequently been provided. It is noted that the BIA will need to be revisited should the length of the piles, currently proposed as 12m, significantly change during the detailed design stage.
- 4.14. A ground movement assessment (GMA) has been presented which looked at horizontal and vertical movements which are likely to be caused by the installation of the piles and basement excavation. The most recent GMA was undertaken broadly in accordance with the empirical methodology outlined in C760.
- 4.15. The BIA confirmed the hotel building to the east is on piled foundations and that the basement proposals are unlikely to impact on it. It is acknowledged that the structures most sensitive to damage are the terraced properties (nos. 45, 47 and 49) located to the East of the development.

- 4.16. It is accepted that the construction methodology to be adopted should limit ground movements, assuming good workmanship, limiting damage to a maximum of Burland Category 1 (Very Slight).
- 4.17. A site specific investigation has been carried out in April and November 2015. This consisted of 3 boreholes to depths of between 15.00m bgl and 22.25m bgl. All 3 boreholes were monitored for groundwater, with one return monitoring reading taken for all 3 installations.
- 4.18. The geotechnical conditions are identified as highly variable and uneven across the site, with Made Ground of thicknesses between 5.00m and 8.00m. A sloping band of sandy clay was identified beneath the Made Ground in places of up to approximately 4.0m thick, overlaying a steeply sloping band of sandy gravel up to 10.0m thick, overlaying Clay bedrock. Groundwater is identified within the permeable strata beneath the Made Ground, at levels varying between 4.65m bgl, and 10.91m bgl during monitoring, with a conclusion reached that the equilibrium groundwater level is approximately 7.41m bgl (10.86 mAOD).
- 4.19. The geology has been identified as a fluvial scour feature, or Drift-Filled Hollow, associated with the former River Fleet. This geological feature has increased the depth of superficial deposits above the clay bedrock, with a significant depth of granular and other drift deposits. It is stated that groundwater is believed to be static and that 'competent ground water flows were not recorded', given the small difference between the stabilised groundwater levels across the site.
- 4.20. While the BIA has identified via Screening and Scoping that the basement may be below the groundwater table, following the site investigations the conclusion has been drawn that the basement is likely to be above the equilibrium groundwater level, which is approximately 1m below the proposed basement structure. Given the limited groundwater monitoring carried out, the significant depth of permeable deposits, and the sloping bedrock profile that would likely be associated with a fluvial scour feature, it is felt that groundwater flows could be significant during the wetter months, with high variability in the groundwater levels. Whilst the impact to groundwater flow is not discussed, other than to indicate the basement is anticipated as being above the groundwater level, it is noted that contiguous piling is proposed for the basement wall which would allow groundwater flow beneath the basement. It is therefore accepted that any impact on groundwater is not likely to be significant.
- 4.21. The BIA has identified that the London Post Office Railway tunnel is located beneath Calthorpe Street, some 16m bgl. It is indicated that to mitigate the impact on the tunnel, piling is to be excluded from the boundary with Calthorpe Street. The latest revision BIA has confirmed that the basement proposals would be submitted to the Royal Mail Group for review, in order to agree on any measures required to prevent any impact on the tunnel, before any works commence on site.

- 4.22. An indication of main works phases, durations, and approximate timeframe for the works has been included in the Construction Management Plan.
- 4.23. An outline movement monitoring strategy has been provided which includes details of the frequency of readings and trigger levels. These appear to be consistent with movements predicted during construction and the strategy should be implemented if the damage to neighbouring structures is to be limited to a maximum of Category 1 (Very Slight) on the Burland Scale.
- 4.24. It is proposed to provide a 10.5m³ attenuation tank in order to limit surface water discharge to 5 l/s in accordance with the London Plan. Whilst no details of the tank's location was initially provided, subsequent revised BIA information indicated the tank to be located under the bin store/cycle area within the extended lower ground floor. There will be no impact to the wider hydrological environment.
- 4.25. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.

5.0 CONCLUSIONS

- 5.1. The BIA authors possess suitable qualifications for all aspects of the assessment.
- 5.2. A factual and interpretative geotechnical report has been produced by a geotechnical engineering consultant, with engineering properties for retaining wall design provided.
- 5.3. Discrepancies between the structural drawings and the architectural drawings were noted during the initial BIA review in terms of geometry, layout, structures and construction methodology. These have been clarified with the provision of revised BIA information.
- 5.4. Structural calculations to demonstrate the structural feasibility of the main basement retaining structure were requested. Only calculations relating to pile capacity have been received and accepted.
- 5.5. A revised ground movement assessment indicates a maximum of Category 1 damage (Very Slight) to neighbouring structures, considering the proposed structural methodology, sequencing and good workmanship.
- 5.6. The groundwater level is determined at 1m below the underside of the proposed basement structure. It is accepted that whilst limited monitoring of groundwater has been carried out, the proposed construction method is unlikely to significantly impact on groundwater flows.
- 5.7. Evidence of consultation with Royal Mail, demonstrating that the potential impacts have been considered and mitigated, had been originally requested. This has now been provided.
- 5.8. An indication of main works phases, durations, and approximate timeframe for the works has been included in the Construction Management Plan.
- 5.9. An appropriate SUDs strategy including provision of an attenuation tank has been proposed. However, the location of the tank was not initially clear but this has now been confirmed.
- 5.10. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.
- 5.11. Considering the updated submissions, the BIA meets the criteria of CPG Basements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Hargreaves	58 Polhill Avenue	-	<ul style="list-style-type: none">• Structure borne vibration• Ground borne vibration• Ground movements induced by excavations• Piling operations close to flank wall of No 49	Section 4.
Mahoupe	49 Calthorpe Street	29/05/18	<ul style="list-style-type: none">• Discrepancies in the BIA as to piling method• Discrepancies/inconsistencies in GMA calculations	Section 4.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Stability	Consistency is required between the architectural drawings and the structural proposal (as 4.7 – 4.10, 4.14). Outline structural calculations to be provided.	Closed – drawings amended and limited calculations, relating to pile capacities, have been presented.	March 2019
2	Stability	A ground movement assessment is required which is bespoke to the proposal, with consistency between the architectural layout and the dimensions taken in the assessment.	Closed – A revised GMA has been provided.	August 2019
3	Stability	Location and construction details of the proposed attenuation tank, the implications of which to be included within the construction method statement and/or ground movement assessment.	Closed- Location of the proposed attenuation tank confirmed. Outline details provided.	March 2019
4	Stability	Consultation with the Royal Mail Group on asset protection requirements for their tunnel assets should be provided. Asset protection agreements to be entered into, if applicable.	Note Only	N/A
5	Stability	Movement monitoring strategy to be reviewed following update of the GMA, to ensure that appropriate trigger levels are specified.	Closed – Movement monitoring strategy revised in accordance with the GMA.	March 2019
6	Stability / Hydrogeology	Clarification as to piling type proposed and consistency amongst submitted documents. Further details as to piling methodology is required and its suitability for use in the geotechnical conditions identified.	Closed – Contiguous piles were confirmed as the principal solution for the construction of the basement. Their use is appropriate for the conditions identified with minimal impact on hydrogeology.	March 2019

Appendix 3: Supplementary Supporting Documents

Note that the supplementary information included the revised BIA (rev. I) which is available on the LBC online planning portal.

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