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Basement Impact Assessment Audit

King's Cross Methodist Church, London, WC1H 8BW

For
London Borough of Camden

Project No.
14291-15

Date
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APPENDICES

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 King's Cross Methodist Church, 58A Birkenhead Street, London, WC1H 8BW (Planning reference 2024/5792/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 has been produced by Geotechnical & Environmental Associates Limited (GEA) and the authors' qualifications meet the requirements of CPG Basements.

1.5 The proposed development includes the partial demolition of the existing building, and the construction of a basement beneath the southwest part of the building. It is proposed that the basement construction is undertaken using a combination of contiguous piled walls and reinforced concrete underpinning.

1.6 Updated screening and scoping assessments are presented, supported by desk study information.

1.7 The BIA confirms that the ground conditions on site comprise Made Ground over London Clay Formation, underlain by the Lambeth Group.

1.8 The BIA considers that it is unlikely to encounter groundwater during construction, and anticipates any flows encountered to be minor and easily manageable. The development should not have an impact on the wider hydrogeological environment.

1.9 The proposed development adopts attenuation SuDS and should not have an impact on the wider hydrological environment. The site should not be subject to flooding.

1.10 Geotechnical parameters to inform retaining wall design have been included within the updated BIA.

1.11 A public utility services search has been undertaken and is provided within the revised BIA.

1.12 Outline structural information and proposed construction sequence have been provided as part of the revised submission.

1.13 Ground Movement Assessment (GMA) undertaken to assess the impact of the basement construction on the neighbouring property walls indicates that the damage will not exceed Burland Category 1 (Very Slight).

1.14 It is understood that a ground movement monitoring scheme is to be adopted to ensure that movements generated are maintained within the predicted limits.

1.15 Based on the revised BIA and the additional information provided, it can be confirmed that the BIA complies with the requirements of CPG: Basements and the Principles for Audit set out in the Basement Impact Assessment (BIA) Audit Service Terms of Reference & Audit Process.

2.0 INTRODUCTION

2.1 CampbellReith was instructed by London Borough of Camden (LBC) on 28th January 2025 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for King's Cross Methodist Church, 58A Birkenhead Street, London, WC1H 8BW (Planning reference 2024/5792/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

- Camden Local Plan 2017 - Policy A5 Basements.
- Camden Planning Guidance (CPG): Basements. January 2021.
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.

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 *"Part demolition, extension and reconfiguration of existing building, including enlargement of lower ground floor, erection of additional storey and new west wing and alterations to east elevation to provide replacement church (Class F1) with ancillary cafe and additional student accommodation (Sui Generis), together with associated plant, cycle and refuse storage."*

2.6 The Audit Instruction confirmed that the following adjacent buildings are listed: 59 Birkenhead Street, 54 to 58 Birkenhead Street and 1 to 5 Crestfield Street.

2.7 CampbellReith accessed LBC's Planning Portal on 17th February 2025 and gained access to the following relevant documents for audit purposes:

- Ground Investigation & Basement Impact Assessment by Geotechnical & Environmental Associates Limited (GEA), Ref. J24145 Rev 2, dated September 2024.
- Design & Access statement by Matthew Lloyd Architects, Ref. KXMC-PL01, dated December 2024.

- Architectural Existing, and Proposed plans and sections by Matthew Lloyd Architects, dated December 2024.
- Demolition plans and sections by sections by Matthew Lloyd Architects, dated January 2025.
- Planning Statement by Pegasus Group, Ref. P20-0063, dated December 2024.
- Planning Consultation Responses.

2.8 Following the initial D1 audit report, the additional information listed below was provided to CampbellReith:

- Ground Investigation & Basement Impact Assessment by Geotechnical & Environmental Associates Limited (GEA), Ref. J24145 Rev 4, dated 24 April 2025.
- Structural Drawings and Construction Sequence by Price & Myers, dated April 2025.
- Existing Structural Drawings and Collated Trial Hole Information by Price & Myers, dated June 2024.

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	
Are suitable plan/maps included?	Yes	Section 2.3 of the BIA
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	Section 3.1.2 of the BIA
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1.1 of the BIA
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1.3 of the BIA
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.0 of the BIA
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.0 of the BIA

Item	Yes/No/NA	Comment
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.0 of the BIA
Is factual ground investigation data provided?	Yes	Section 5 and Appendix A of the BIA
Is monitoring data presented?	Yes	Section 5.4 of the BIA
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	
Does the geotechnical interpretation include information on retaining wall design?	Yes	Section 7.1.1 and 9.2.1 of the BIA.
Are reports on other investigations required by screening and scoping presented?	Yes	
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	Section 12.0 of the BIA
Are estimates of ground movement and structural impact presented?	Yes	GMA provided
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	

Item	Yes/No/NA	Comment
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	
Has the need for monitoring during construction been considered?	Yes	Section 10.2 of the BIA
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	
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	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1 The Basement Impact Assessment (BIA) has been produced by Geotechnical and Environmental Associates Limited (GEA) and the authors' qualifications meet the requirements of CPG Basements.

4.2 The subject site is not a listed building but is adjacent to listed buildings.

4.3 The property comprises a roughly rectangular shaped area measuring approximately 20.00m by 35.00m and accommodates a two-storey building, with a three-storey section in the northeast part of the site. The building features an existing lower ground floor, approximately 3.20m below ground level, and two lightwells at basement level along the northern and southern extents of the three-storey section. The site is bordered by Birkenhead Street to the northeast and Crestfield Street to the southwest. On the southeast and northwest sides, it is bounded by four-storey terrace buildings that include lower ground floors.

4.4 The proposed development includes the demolition of the structure in the southwest of the site and the extension of the lower ground floor beneath the entire footprint of the building. The third floor of the building is to be demolished and rebuilt in a new configuration. The BIA states that the proposed basement retaining walls will be formed by underpinning the existing walls to the northeast and southeast using a 'hit and miss' approach, along with the installation of contiguous pile walls at the southwest part of the basement excavation.

4.5 Ground investigations undertaken by GEA included a cable percussive borehole to a depth of 30.00m bgl, two window sampler boreholes and seven trial pits. The investigation indicates between approximately 0.22m to 2.20m of Made Ground, followed by the London Clay Formation up to a depth of 24.00m below ground level (bgl), overlying the Lambeth Group. The BIA states that the formation level of the new basement would be within the stiff London Clay Formation, at approximately 4.00m bgl.

4.6 Groundwater was not encountered in any of the boreholes during the ground investigation, and the standpipe installed in the cable percussive borehole was observed to remain dry during the monitoring visits. The BIA notes the presence of perched groundwater at a depth of 0.30m bgl within the Made Ground in trial pit No. 2. Additionally, the BIA identifies that the site lies over an unproductive stratum of the London Clay Formation and states that groundwater is unlikely to occur within this stratum. Any groundwater flows encountered during construction are predicted to be relatively minor and manageable through conventional pumping techniques. There should be no impact to the hydrogeological environment.

4.7 The BIA includes screening and scoping assessments supported by desk study information. Relevant figures and maps from the ARUP GSD and other guidance documents have been referenced within the BIA to support screening questions.

4.8 The screening flowchart identifies that the site is located approximately 90m south of the former River Fleet and is discussed in detail in section 2.5 of the BIA. The BIA states that the historic watercourse has been culverted, and as such, is not considered to increase the flood risk on site. The BIA identifies that the site has a low flood risk from surface waters, sewers, reservoirs and other sources.

4.9 Section 2.1 of the BIA states that the existing building and associated hardstanding occupy the entire site, and that no trees are present.

4.10 GEA considers that the proposed development would not alter the proportion of hardstanding or impermeable surface areas on-site and would therefore have a negligible impact on surface water flows. It is proposed that the existing drainage infrastructure will be utilised wherever possible. Additionally, attenuation SuDS via blue roofs is proposed. However, the drainage strategy should be agreed upon with LBC and Thames Water.

4.11 The BIA states that the proposed basement construction will be carried out using a combination of reinforced concrete underpinning of the party walls to the northeast and southwest of the proposed basement excavation, along with the installation of a contiguous pile wall at the rear of the site. Drawings, including existing plans, proposed plans, and demolition plans, have been provided. The drawings indicate that the proposed basement would extend to the site boundaries near the north and south lightwell areas.

4.12 A construction sequence has been provided in section 8.2 of the BIA. The BIA recommends adequate lateral propping to the underpinned and piled walls at the top level during the basement excavation. Drawings indicating the proposed underpinning works indicate that the boundary walls along the north and south lightwells are to be underpinned to 14.00m OD while the walls along the northwest and southwest sides are to be underpinned to a depth of 13.80m OD.

4.13 Section 2.1 of the revised BIA states that the existing lower ground floor of the building is approximately 3.20m below ground level (15.01m OD). The BIA notes that the new basement excavation is proposed to extend to approximately 14.00m OD, which would result in an excavation depth of around 3.75m beneath the existing building in the southwest part of the site, between 1.00m and 3.00m within the north lightwell, and approximately 0.43m within the south lightwell. Additionally, the information presented with the structural drawings indicates that the boundary brick wall along the south lightwell leans inward between the movement joints, and necessary measures should be taken to ensure the stability of this wall.

4.14 The revised BIA states that the geotechnical parameters adopted in the GMA are based on the site investigation, and outlines the geotechnical parameters adopted in the GMA in Section 7.1 and 9.2 of the BIA. The BIA assumes a bulk density of 17kN/m^3 for the Made Ground and 19.5kN/m^3 for the London Clay Formation, estimating a net unloading of between 8.50kN/m^2 and 68kN/m^2 due to the proposed basement excavation.

4.15 It is understood that the neighbouring buildings have lower ground floors similar to that of the existing building. This information is presented in a figure within Section 2.3 of the BIA; however, the BIA notes that the floor levels of these buildings are unknown. The BIA notes that the foundations of the neighbouring structures are assumed to be at a depth of 1.00m bgl for the GMA.

4.16 A utility services search has been included with the revised BIA. Section 10.3 of the BIA discusses the impacts on existing buried services and states that all known nearby services are located below the pavement of Crestfield Street.

4.17 The BIA identifies that the neighbouring buildings and the road pavements of Birkenhead Street and Crestfield Street would be affected by the proposed construction, and a Ground Movement Assessment (GMA) has been undertaken. The ground movements arising from the excavation and construction of the proposed basement has been estimated using Oasys suite of geotechnical modelling software PDisp and XDisp.

4.18 The demolition plans for the lower ground floor and ground floor indicate that the area beneath the north lightwell will be excavated and deepened. Construction sequence drawings and trial pit logs provided within Appendix D of the revised BIA show that the existing foundations of the north lightwell boundary wall are at approximately 14.50m OD. Additionally, the cross-section drawings note that much of the raised levels within the lightwells comprises fill. The GMA considers underpinning to a depth of approximately 14.00m OD beneath the north and south lightwells.

4.19 Section 9.2 of the BIA provides the stiffness parameters for the various strata adopted within the GMA and states that these parameters have been derived from the site investigation data.

4.20 It is noted that the value of Young's Modulus used in the GMA have been derived from the empirical relationships E_u = 2000 x SPT N value, for granular soils, and E_u = 500C_u for cohesive soils. The revised BIA notes that the parameters for the Lambeth Group has been derived assuming it to be cohesive in nature. The GMA adopts a horizontal rigid boundary of 70.00m bgl (-52.25m OD) corresponding to the base of the Lambeth Group.

4.21 The BIA states that the proposed loads for the new structure within the lower ground floor have been adopted from structural load drawings by Price & Myers. It is understood that these loads have been included in the PDisp assessment as polygonal loads. The BIA also states that the dimensions of the loads were unknown at the time of the analysis and were therefore modelled to reduce the bearing pressure to 150kN/m². The PDisp input data indicates that rectangular column loads with pressures ranging from 132kN/m² to 165kN/m² have been applied in the model. Although this is slightly inconsistent with the stated approach, it is not anticipated to affect the outcome of the building damage assessment.

4.22 Appendix D of the updated BIA presents the results of the Ground Movement Analysis, including settlement contour plots as well as the input and output data for both short-term and total ground movements.

4.23 Overall (total) ground movements have been calculated after offsetting heave movement. This is not considered to be conservative, however it is noted that the predicted ground movements used in the Building Damage Assessment do not include the heave reduction.

4.24 The PDisp input data indicates that a polygonal load, labelled "Southwest Wall Load" has been applied along the southwest boundary of the model, representing the retaining wall section along Crestfield Street. A loading pressure of 31kN/m² has been applied at a depth of 14.00m OD. Section 9.2 of the revised BIA states that this loading corresponds to liner wall loads along the proposed piled retaining wall.

4.25 The horizontal and vertical ground movements resulting from the proposed basement construction are estimated using CIRIA C760 curves. Section 9.1.2 of the BIA discusses the results of the GMA, and states that vertical and horizontal movements of 0mm to 4mm are anticipated due to the underpinning works and the installation of the bored piled wall. Additionally, the GMA predicts vertical movements of 1mm to 6mm and horizontal movements of 1mm to 10mm from combined installation and excavation movements.

4.26 The GMA models the proposed basement excavation as a rectangular excavation with a depth of 3.75m. The revised BIA accounts for the ground movements generated due to underpinning beneath the north and south boundary walls, and the associated basement excavations. CIRIA curves corresponding to the installation of a planar diaphragm wall have been applied to estimate the ground movements arising from the underpin installation.

4.27 While CIRIA C760 is intended for use with embedded retaining walls, it is acknowledged that it can also predict ground movements in the range of those expected for a single lift of underpinning undertaken using good workmanship practices. Industry experience indicates that vertical and horizontal movements of between 5mm and 10mm should be anticipated per lift of underpinning.

4.28 The XDisp inputs indicate that the proposed basement construction has been modelled in two stages: one representing the basement underpinning and contiguous piled wall installation and the other representing the basement excavation. The model considers a surface level of 17.75mOD across the site, except within the north and south lightwells, where surface levels of 14.75mOD and 15.00mOD have been used respectively.

4.29 Section 9.1.1 of the BIA states that the piled retaining walls are assumed to have a toe depth of 8.00m bgl for the assessment. The updated BIA states that an embedment depth of 4.00m below the base of the excavation is adequate for a fully propped wall. Installation curves for ground movements associated with the contiguous piled walls have been applied between levels of 17.75m OD and 10.00m OD. This is broadly consistent with the toe depth of 8.00m bgl.

4.30 The results of the Building Damage Assessment are presented in section 10 of the BIA. The damage assessment estimates a maximum damage category of Burland Category 1 (Very Slight) to the neighbouring buildings.

4.31 Additionally, the GMA includes a sensitivity analysis to account for movements associated with underpinning, assuming vertical and horizontal movements of 5mm for single stage underpin installation. Vertical and horizontal movement curves labelled "5mm Movement Curve" derived from the CIRIA curve for an excavation in front of a high stiffness wall in stiff clay has been used. The associated building damage assessment also estimates a maximum damage category of Category 1 (Very Slight) on the Burland Scale.

4.32 The BIA indicates that a movement monitoring scheme, including appropriate action trigger levels and contingency measures, will be implemented to ensure that ground movements generated during construction remain within the predicted limits.

5.0 CONCLUSIONS

5.1 The qualifications of the individuals concerned with the production of the BIA are in accordance with LBC guidelines.

5.2 Updated screening assessments are presented, supported by desk study information. The ground conditions have been confirmed through a site investigation.

5.3 The BIA has confirmed that the ground conditions on site comprise Made Ground over London Clay Formation, underlain by the Lambeth group.

5.4 It is understood that the site has a low flood risk from all sources.

5.5 The BIA concludes there should be no impacts to the hydrological and hydrogeological environments.

5.6 Outline structural information and a construction sequence of the proposed works have been provided as part of the revised submission.

5.7 A public utility services search has been undertaken and is provided within the revised BIA.

5.8 A Ground Movement Assessment (GMA) has been undertaken using PDisp and XDisp software. The GMA concludes that the adjacent buildings will not suffer any damage greater than Category 1 (very Slight) on the Burland Scale.

5.9 It is understood that a ground movement monitoring scheme would be adopted to ensure that ground movements generated are within the predicted limits.

5.10 Based on the revised BIA and the supporting documents, it can be confirmed that the BIA complies with the requirements of CPG: Basements and the Principles for Audit set out in the Basement Impact Assessment (BIA) Audit Service Terms of Reference & Audit Process.

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Appendix 1

Consultation Responses

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Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Cullerne Bown	Unknown	02/02/2025	Extent of basement excavation and potential damage to party walls	See section 4.12 – 4.13 and 4.30 – 4.31.

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Appendix 2

Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA	Justifications should be provided where a "No" response has been recorded.	Closed	13/05/2024
2	Land stability	Clarifications about the presence of trees on site are requested.	Closed	13/05/2024
3	Land stability	An outline sequence of construction, including detailed sketches of the proposed temporary and permanent works are requested. The depth of the proposed excavation and ground levels has been used inconsistently across the GMA/BIA.	Closed	13/05/2024
4	Land stability	Geotechnical parameters used inconsistently. Unloading pressures estimated inconsistently across the BIA/GMA.	Closed	13/05/2024
5	BIA	Utility plans and confirmation of consultation with relevant asset owners are requested.	Closed	13/05/2024
6	Land stability	GMA should consider the excavation beneath the north lightwell and demonstrate how the boundary walls are to be retained.	Closed	13/05/2024
7.	Land stability	Anticipated depth of geological units used inconsistently across the BIA/GMA. Clarifications regarding the stiffness parameters adopted for the Lambeth Group are requested.	Closed	13/05/2024
8.	Land stability	Clarifications regarding the loadings used in PDisp are requested. Structural load drawings are requested for review.	Closed	13/05/2024
9.	Land stability	PDisp Input and output data for short term movements are requested.	Closed	13/05/2024

Query No	Subject	Query	Status	Date closed out
10.	Land stability	Overall (total) ground movements calculated after offsetting heave movements.	Closed	13/05/2024
11.	Land stability	Clarifications regarding the loading on the contiguous piled wall section in PDisp	Closed	13/05/2024
12.	Land stability	Clarification regarding re-entrant corners are requested. Surface levels are used inconsistently within XDisp and PDisp. Outline calculations for the adopted pile lengths are requested. Corner stiffening has been adopted for the installation curves to be reviewed.	Closed	13/05/2024
13.	Land stability	Clarifications regarding the sensitivity analysis are requested. The damage category for the neighbouring structures should be updated following revisions to the GMA.	Closed	13/05/2024

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Appendix 3

Supplementary Supporting Documents

None

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