CampbellReith
consulting engineers

# Holy Trinity Church, Finchley Road, London NW3 5HT

## Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12466-75

Revision: F1

September 2017

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## Contents



## Appendix

## 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 Holy Trinity Church, Finchley Road, London NW3 5HT (planning reference 2017/2092/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 proposed development comprises the demolition of the present building on site and construction of a new mid-level building of between two and six storeys, with a single level basement across the whole footprint. The basement excavation is locally deepened for the provision of lift pits and drainage attenuation tanks.

1.5. The BIA has been presented as two documents, prepared by Price & Myers and Geotechnical & Environmental Associates (GEA). The qualifications of the authors from GEA are in accordance with LBC guidance.

1.6. The original BIA included the majority of the information required from a desk study in line with LBC guidance. In the revised submissions, appropriate information concerning nearby utilities and underground infrastructure within the development's zone of influence is provided. A construction programme should be presented within a Basement Construction Plan (BCP).

1.7. It is stated that the proposed development is within 35m of LUL's Finchley Road Station, but outside of any exclusion zone for developments adjacent / above LUL assets. In the revised submissions, correspondence with LUL is presented and it is confirmed that works would only progress in consultation with LUL.

1.8. A site investigation indicates the underlying ground conditions to comprise Made Ground overlying London Clay. The data is presented in an interpretative report broadly in accordance with LBC guidance.

1.9. Inflows of perched water may be encountered during construction, although revised submissions indicate a groundwater level deeper than excavation depth. It is accepted that the development will not impact upon the wider hydrogeological environment.

1.10. It is accepted that the site is not in a Flood Risk Zone and is at low risk of flooding.

1.11. The site is within a Critical Drainage Area (Group 3-010). The development will not increase the impermeable site area. A SUDS assessment has been provided which includes the installation of a cellular attenuation tank and restriction of off-site discharge flows in accordance with the relevant guidance.

1.12. Outline permanent and temporary works proposals have been described. The scheme will utilise open cut excavations, sheet piling and underpinning of adjacent structures. Outline retaining wall design calculations have been presented for the proposed permanent reinforced concrete liner walls. Further assessment of sheet piling, including vibration, is required to demonstrate resultant ground movements and damage impacts to neighbours, and this should be provided within a BCP.

1.13. Temporary dewatering utilising sump pumps is discussed in outline. The revised submissions state that the groundwater has been monitored below proposed excavation depths, although further monitoring will be undertaken up to the time of construction. On the basis of the revised submissions, the stability of the underpinning and open-cut works have been adequately demonstrated. Any change in design groundwater level that may affect these designs and assessments should be presented within a BCP.

1.14. A Ground Movement Assessment (GMA) has been presented which predicts damage impacts of Category 0 to 1 (Negligible to Very Slight) to surrounding structures, in accordance with the Burland Scale. As noted in 1.12, this does not include assessment of sheet piling works, which should be presented within a BCP.

1.15. It is proposed to limit all damage impacts to a maximum of Category 1 by utilising structural monitoring. In the revised submissions, a structural monitoring strategy is presented, including proposed trigger values and contingency actions. Given that sheet piling design and movement assessments will be required to inform the monitoring strategy, this should be provided within a BCP.

1.16. Notwithstanding the comments of 1.13 to 1.15, the new development is likely to increase the differential depth of foundations with surrounding structures. The GMA has assumed reasonably conservative foundation depths of surrounding structures, for the purposes of assessment, and these assumptions should be confirmed prior to construction within a BCP.

1.17. A conceptual site model is presented within the revised submissions.

1.18. Queries and matters requiring further information or clarification are discussed in Section 4 and summarised in Appendix 2. The BIA meets the requirements of CPG4, subject to a BCP being presented that demonstrates a maximum of Category 1 damage to neighbours.

## 2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 2 May 2017 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Holy Trinity Church, Finchley Road, London NW3 5HT, Camden Reference 2017/2092/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: "Erection of 6 storey building (including excavation of ground floor level) to provide a Christian community centre (Class D1), including worship space and performance venue (450 seat auditorium), café, flexible community space, recording studio, employment readiness training facilities, sheltered residential accommodation for vulnerable 16-18 year olds at 4th floor (2 x 2-bed flat & 1 x 3-bed flats) and theological student accommodation at 5th floor level (1x1bed flat and 1x2 bed

flat) with rear and side roof terraces at 5th and 3rd floor level, balconies at 5th and 4th floor level, associated bin store, cycle store and substation following demolition of existing church."

The Audit Instruction also confirmed the proposal did not involve a listed building nor was it a neighbour of a listed building. LBC's Planning Portal confirmed that the site does not lie within a Conservation Area.

2.6. CampbellReith accessed LBC's Planning Portal on 19th May 2017 and gained access to the following relevant documents for audit purposes:

- Construction Method Statement (ref 22247) dated December 2016 by Price & Myers.
- Site Investigation and Basement Impact Assessment (ref J16072) dated December 2016 by GEA Ltd (provided as an appendix to the Price & Myers Construction Method Statement).
- Flood Risk Assessment (ref 22247) dated November 2016 by Price & Myers (provided as an appendix to the Price & Myers Construction Method Statement).
- Draft Construction Management Plan dated December 2016.
- Design and Access Statement dated April 2017 by Haworth Tompkins.
- Application Drawings - Existing and Proposed plans of elevations, floor plans and sections dated March 2017 by Haworth Tompkins.
- Comments and objections to the proposed development from local residents.

2.7. CampbellReith were provided with the following documents for review in July and August 2017:

- Response Letter dated 14th July 2017 from Lichfields.
- Site Investigation and Basement Impact Assessment (ref J16072) dated 14 July 2017 by GEA Ltd.
- Email dated 23 August 2017 from LBC.

## 3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

| Item | Yes/No/NA | Comment |
|---|---|---|
| Are BIA Author(s) credentials satisfactory? | Yes | The qualifications of the authors of the BIA prepared by GEA are in accordance with CPG4 guidelines. |
| Is data required by Cl.233 of the GSD presented? | Yes | Updated in revised submissions. Construction programme to be provided within BCP. |
| 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 submissions. |
| Are suitable plans/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:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | Yes | BIA Report, Section 3.1.2. Correspondence with LUL re tunnels / assets present beneath Finchley Road to be presented. |
| Hydrogeology Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | No | BIA Report, Section 3.1.1. The screening has not identified a tributary of the Westbourne which flowed within approximately 50m of the site. |
| Hydrology Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | Yes | BIA Report, Section 3.1.3. |
| Is a conceptual model presented? | Yes | Updated in revised submissions. |

| Item | Yes/No/NA | Comment |
|---|---|---|
| Land Stability Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | BIA Report, Section 4. Consultation with LUL should be undertaken re potential impacts to adjacent tunnels. |
| Hydrogeology Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | The BIA did not identify any issues relating to subterranean flow within the screening process. The site investigation has confirmed ground conditions do not include Alluvium which may have been present due to the historical tributary of the Westbourne. |
| Hydrology Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | |
| Is factual ground investigation data provided? | Yes | BIA Report, Section 4. |
| Is monitoring data presented? | Yes | BIA Report, Section 5.3. |
| Is the ground investigation informed by a desk study? | Yes | BIA Report, Section 2. |
| Has a site walkover been undertaken? | Yes | |
| Is the presence/absence of adjacent or nearby basements confirmed? | No | BIA Report, Section 10 – assumes surrounding structures do not have basements and are founded at 0.50m bgl with the exception of 120 Finchley Road which is known to have a double level basement. Accepted this is conservative for GMA. |
| Is a geotechnical interpretation presented? | Yes | BIA Report, Sections 5 and 8. |
| Does the geotechnical interpretation include information on retaining wall design? | Yes | Geotechnical parameters for design presented. To be confirmed within a BCP. |
| Are reports on other investigations required by screening and scoping presented? | Yes | Flood Risk Assessment including SUDS Assessment (Appendix B of Price & Myers report). |

| Item | Yes/No/NA | Comment |
|---|---|---|
| Are baseline conditions described, based on the GSD? | Yes | However, adjacent foundation depths assumed. |
| Do the base line conditions consider adjacent or nearby basements? | Yes | Assumptions made regarding founding depths of adjacent properties. Accepted these are conservative for GMA. |
| Is an Impact Assessment provided? | Yes | BIA Report, Section 12. |
| Are estimates of ground movement and structural impact presented? | Yes | BIA Report, Sections 9, 10 and 11. Updated in revised submissions. Embedment depth of sheet piles should be confirmed and effects of vibration assessed within a BCP. |
| Is the Impact Assessment appropriate to the matters identified by screen and scoping? | Yes | To be confirmed within BCP. |
| Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme? | Yes | Temporary propping discussed in Price & Myers Report, Section 4. Monitoring and trigger levels are discussed in GEA BIA Report, Sections 10. Mitigation to be confirmed within a BCP. |
| Has the need for monitoring during construction been considered? | Yes | BIA Report, Section 10. To be confirmed within a BCP. |
| Have the residual (after mitigation) impacts been clearly identified? | Yes | Should be reconsidered, as applicable, and confirmed within a BCP. |
| Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained? | Yes | Outline information sufficient. However, to be confirmed within a BCP that a maximum of Burland Category 1 damage will be sustained by neighbouring structures. |
| Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment? | Yes | The development will not increase the impermeable area and a SUDS assessment is included within the Flood Risk Assessment (Appendix B of Price & Myers report). |
| Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area? | Yes | Outline information sufficient. However, to be confirmed within a BCP that a maximum of Burland Category 1 damage will be sustained by neighbouring structures. |

| Item | Yes/No/NA | Comment |
|---|---|---|
| Does report state that damage to surrounding buildings will be no worse than Burland Category 2? | Yes | Outline information sufficient. However, to be confirmed within a BCP that a maximum of Burland Category 1 damage will be sustained by neighbouring structures. |
| Are non-technical summaries provided? | Yes | BIA Report, Section 12.2. |

## 4.0 DISCUSSION

4.1. Two principal documents have been provided for review. The Construction Method Statement, prepared by Price & Myers, which includes a flood risk assessment and proposed basement construction sequence. An appendix of this document provides the BIA prepared by Geotechnical & Environmental Associates (GEA) which includes the desk study, screening and scoping, site investigation, impact assessment, ground movement assessment and the monitoring strategy. The qualifications of the authors of the BIA prepared by GEA are in accordance with CPG4 guidelines.

4.2. The GEA BIA has generally been taken as the lead document for the purposes of this audit, unless otherwise stated.

4.3. The site is currently occupied by a church. The proposal for the site is to demolish the church and construct a new building which will be stepped in elevation, with six storeys at the west on Finchley Road, two storeys at the east and a single level basement. The basement excavation is locally deepened for the provision of lift pits and drainage attenuation tanks.

4.4. The BIA includes the majority of the information required from a desk study in line with the GSD Appendix G1. In the revised submissions, appropriate information concerning nearby utilities and underground infrastructure within the development's zone of influence is provided.

4.5. A construction programme should be presented within a Basement Construction Plan (BCP).

4.6. A site investigation was undertaken by GEA in April 2016 comprising one 20m borehole, two window sampler boreholes, three shallow trial pits and the installation of three groundwater monitoring standpipes. The ground conditions comprise Made Ground overlying the London Clay. Groundwater was not encountered during drilling but on two subsequent monitoring visits was recorded between 1.10m bgl and 1.40m bgl. The data is presented in an interpretative report broadly in accordance with the GSD Appendix G3.

4.7. The original BIA indicated that groundwater is likely to be encountered within the basement excavation. Inflows of perched water may be encountered from within the Made Ground and the London Clay. The BIA recommends that further trial excavations are undertaken to confirm the likely groundwater conditions and to inform temporary works designs, as the presence of groundwater may cause instability during construction. The BIA states that 'it is essential for the ground works contractor to have a contingency plan in place to deal with any such instability and groundwater flows'.

4.8. The revised submissions state that the groundwater has been monitored below proposed excavation depths, although further monitoring will be undertaken up to the time of

construction. On the basis of the revised submissions, the stability of the underpinning and open-cut works have been adequately demonstrated. Any change in design groundwater level that may affect these designs and assessments should be presented within a BCP.

4.9. It is accepted that the development will not impact upon the wider hydrogeological environment.

4.10. The Screening and Scoping assessments are generally accepted. A tributary of the historic River Westbourne is indicated to have flowed within approximately 50m of the site, which has not been noted within the BIA. However, the site investigation has confirmed the ground conditions and not identified any Alluvium which may have been associated with the tributary.

4.11. It is stated that the proposed development is within 35m of LUL's Finchley Road Station, but outside of any exclusion zone for developments adjacent / above LUL assets. In the revised submissions, correspondence with LUL is presented and it is confirmed that works would only progress in consultation with LUL.

4.12. The Flood Risk Assessment identifies that Finchley Road did flood in 2002. However, current Environment Agency and Camden SFRA data indicate that the section of Finchley Road in front of the site is at "low" to "medium" risk of flooding, and that the water depth will be less than 300mm. The map shows that whilst small areas of the site are at "low" risk of flooding (between 0.1% and 1%) the majority of the flood water will be confined to the main road channel. Furthermore there are no records of flooding at this site. The risk of sewer flooding has also been assessed as low. The flood risk assessment presented is accepted, assuming that standard flood risk protection measures are adopted during construction.

4.13. The site is within a Critical Drainage Area (Group 3-010). The development will not increase the impermeable site area. A SUDS assessment has been provided which includes the installation of a cellular attenuation tank and restriction of off-site discharge flows to 5l/s. This is in accordance with LBC guidance, and provides a benefit to the wider hydrological environment.

4.14. Outline permanent and temporary works proposals have been described. Permanent works structural drawings are provided and a sketch outline temporary works sequencing is presented. The scheme will utilise open cut excavations, sheet piling and underpinning of adjacent structures. Outline retaining wall design calculations have been presented for the proposed permanent reinforced concrete liner walls. The temporary works information indicates propping of sheet piled and underpinned walls.

4.15. The revised submissions provide clarity to proposed underpinning and open cut excavations. Further assessment of vibration caused by sheet piling is required to demonstrate resultant ground movements and damage impacts to neighbours, and this should be provided within a BCP.

4.16. A Ground Movement Assessment (GMA) was originally presented that generally predicted damage impacts of Category 0 to 1 (Negligible to Very Slight) to surrounding structures, increasing to Category 2 (Slight) for one wall of an adjacent structure, in accordance with the Burland Scale.

4.17. In the revised submissions, the assessments predict damage to neighbouring structures to be a maximum of Category 1 on the basis of limiting horizontal movements whilst underpinning to a maximum of 5mm. Considering the proposed depth of underpinning and confirmed ground conditions, this is considered achievable.

4.18. The effects of sheet piling, including vibrations, have not been assessed in terms of potential ground movement and damage to neighbours, and these should be presented in a BCP, noting the requirement to limit damage to neighbours to a maximum of Category 1.

4.19. The revised submissions clarify the limited depth and extent of battered excavations. Whilst the current proposals demonstrate adequate stability, any changes in depth or extent of open cut excavations should be re-assessed and presented within a BCP.

4.20. It is proposed to limit all damage impacts to a maximum of Category 1 by utilising structural monitoring and the Observational Method during construction phasing. In the revised submissions, a structural monitoring strategy is presented, including proposed trigger values and contingency actions. This will need to be confirmed in a BCP following assessments made for sheet piling works.

4.21. Notwithstanding the comments above, the new development is likely to increase the differential depth of foundations with surrounding structures. The GMA has assumed reasonably conservative foundation depths of surrounding structures, for the proposes of assessment, and these assumptions should be confirmed prior to construction within a BCP.

4.22. A conceptual site model is presented within the revised submissions.

4.23. Queries and matters requiring further information or clarification are summarised in Appendix 2.

## 5.0 CONCLUSIONS

5.1. The qualifications of the authors are in accordance with CPG4 guidelines.

5.2. A site investigation has confirmed the underlying ground conditions to comprise Made Ground overlying London Clay. The revised submissions state that the groundwater has been monitored below proposed excavation depths, although further monitoring will be undertaken up to the time of construction. Any changes to design groundwater level should be presented within a BCP.

5.3. In the revised submissions, correspondence with LUL is presented and it is confirmed that works would only progress in consultation with LUL.

5.4. It is accepted that the site is at low risk of flooding.

5.5. The proposed SUDS offers benefit to the wider hydrological environment.

5.6. It is accepted that the development will not impact the wider hydrogeological environment.

5.7. Outline permanent and temporary works proposals have been described. Further assessment of sheet piling, including vibration, is required to demonstrate resultant ground movements and damage impacts to neighbours, and this should be provided within a BCP.

5.8. A Ground Movement Assessment (GMA) has been presented which predicts damage impacts of Category 0 to 1 (Negligible to Very Slight) to surrounding structures. Assessment of sheet piling works should be presented within a BCP, confirming a maximum of Category 1 damage.

5.9. A structural monitoring strategy is presented in the revised submissions, including proposed trigger values and contingency actions. Given that sheet piling design and movement assessments will be required to inform the monitoring, this should be confirmed or revised within a BCP.

5.10. A construction programme should be presented within a BCP.

5.11. Queries and matters requiring further information or clarification are summarised in Appendix 2. The BIA meets the requirements of CPG4, subject to a BCP being presented that demonstrates a maximum of Category 1 damage to neighbours.

# Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

| Surname | Address | Date | Issue raised | Response |
|---|---|---|---|---|
| Samadianpour | Flat 12, Alban House | 6th May 2017 | Concerns about proposed excavation impacting Alban House (adjacent to proposed site). | 5.2, 5.7 - 5.9 |

# Appendix 2: Audit Query Tracker

Audit Query Tracker

| Query No | Subject | Query | Status/Response | Date closed out |
|---|---|---|---|---|
| 1 | Desk Study | Identify underground infrastructure within proposed development's zone of influence. Assess impacts, if applicable. | Closed | July 2017 |
| 2 | Land Stability | Proximity of Underground assets requires consultation with LUL. | Closed | July 2017 |
| 3 | Land Stability | Further monitoring to confirm groundwater conditions. | Open | N/A - to be undertaken in advance of construction |
| 4 | Land Stability | Provide outline temporary dewatering proposals and contingencies to maintain stability | Closed | July 2017 – to be revised, if required, following longer term groundwater monitoring. |
| 5 | Land Stability | Confirm temporary works strategy:<br>- extent and batter angles of open excavations; underpinning stability;<br>- depth of sheet piling and effects of vibration. | - Closed<br>- Open | - August 2017<br>- A final design and ground movement / damage assessment should be provided within a BCP. |
| 6 | Land Stability | GMA and damage impact assessment – to be updated based on temporary works strategy, considering site specific, reasonably conservative values. | Open | To be confirmed within a BCP. GMA provided in regards to underpinning is accepted but does not include assessment for sheet piling. |
| 7 | Land stability | Structural monitoring scheme to be outlined, including trigger values and methodologies | Open | To be updated and revised, as applicable, based on response to query 5 and presented within BCP. |
| 8 | Land Stability | Adjacent foundation depths to be confirmed | Open | To be confirmed prior to construction, within a BCP as a condition of planning. Accepted that current depths used for assessment are conservative. |

| | | | | |
|---|---|---|---|---|
| 9 | BIA | Conceptual site model – providing context of the development and highlighting potential risks and impacts | Closed | July 2017 |

# Appendix 3: Supplementary Supporting Documents

Response Letter dated 14th July 2017 from Lichfields

Site Investigation and Basement Impact Assessment (ref J16072) dated 14 July 2017 by GEA Ltd

Email dated 23 August 2017 from LBC

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