CampbellReith
consulting engineers

# Syskon Cottage
# 2 Millfield Lane
# London
# N6 6JD

## Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 13693-78

Revision: D1

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## Document History and Status

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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 Syskon Cottage, 2 Millfield Lane, N6 6JD (planning reference 2022/3673/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 Basement Impact Assessment (BIA) has been carried out by Site Analytical Services Ltd., along with input from Curtins Consulting Limited and the individuals concerned in its production have suitable qualifications.

1.5. The BIA has confirmed that the proposed basement will be founded within the London Clay formation to a depth of 2.80m below ground level (bgl).

1.6. Groundwater monitoring indicates the presence of groundwater in the range c.1.20m to c.4.60m bgl. However, the London Clay is an impermeable stratum and the water encountered within the wells are likely to be surface water inflows. It is accepted this will not impact the wider hydrogeology of the area.

1.7. An impact assessment is required for the removal of trees to identify the roots zone of influence.

1.8. The proposed development is not within an area of flooding, however, clarification is required to the change in hard surfacing areas and assessment on existing and post development runoff rates to ensure greenfield runoff rates are achieved.

1.9. The basement will be formed with reinforced concrete retaining walls and slab constructed in bays not exceeding 1m wide and adopting a sequenced construction system.

1.10. A Ground Movement Assessment (GMA) has been undertaken. The ground model parameters should be updated as discussed in Section 4.

1.11. The GMA accounts for movements due to excavation of underpins, however no installation movements are considered within the analysis. An updated assessment along with inputs and outputs for horizontal and vertical contours in XDisp are required.

1.12. A movement monitoring strategy is recommended during construction.

1.13. It is accepted that the proposed development will not impact the stability of the surrounding slopes.

1.14. It cannot be confirmed that the BIA complies with the requirements of CPG: Basements until the queries raised in Section 4 and Appendix 2 are addressed.

## 2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 18/09/2022 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Syskon Cottage, 2 Millfield Lane, London, N6 6JD and Planning Ref No. 2022/3673/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.
- Highgate Neighbourhood Plan

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 *"Construction of basement under the existing house, and below the front, rear and side extensions currently under construction.* **"**

2.6. The Audit Instruction states the 2 Millfield Lane does not involve, nor is a neighbour to, listed buildings. However, it should be noted that south of Milllfield Lane, No. 14 Highgate West Hill is a Grade 2 listed building.

2.7. CampbellReith accessed LBC's Planning Portal on 27 September 2022 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA) by Site Analytical Services Ltd., dated August 2022. Ref No. - 21/34386-2.
- Ground Movement Assessment by Curtins, dated August 2022, Rev V02. Ref No. - 080371-CUR-XX-ZZ-RP-GE-001
- Construction Management Statement, author unknown and undated.
- Architectural Drawings by archplan, dated Nov 2020, consisting of:
    - Location Plan, dated 11th August 2020, Ref: MP/01
    - Existing Plans, dated November 2020, Ref: ML/02 to ML/07
    - Proposed Plans, dated November 2020, Ref: ML/20 to ML/28
- Tree Survey Plan by Arbor Cultural Ltd., dated 17th October 2021, Rev A
- Structural Drawings by Martin Redson Associates, dated 9th December 2021, Sheet No.s RW1, RW2 and RW3.
- Design & Access Statement, author unknown and undated.

## 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 | Within Appendices of Report |
| 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 | Section 3.8 of BIA |
| Hydrogeology Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | No | Section 3.8 of BIA. Q3 would need clarification on the change in impermeable surfaces |
| Hydrology Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | No | Section 3.8 of BIA. As above |
| Is a conceptual model presented? | Yes | Section 6.3 of BIA |
| Land Stability Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | Section 4.0 of BIA |

| Item | Yes/No/NA | Comment |
|---|---|---|
| Hydrogeology Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | Section 4.0 of BIA. Q3 has not been brought forward however this question is covered under the Hydrology Scoping |
| Hydrology Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | Section 4.0 of BIA. |
| Is factual ground investigation data provided? | Yes | Section 5.0 of BIA |
| Is monitoring data presented? | Yes | Section 5.3 of BIA |
| Is the ground investigation informed by a desk study? | Yes | Sections 2.0 and 3.0 of BIA |
| Has a site walkover been undertaken? | Yes | |
| Is the presence/absence of adjacent or nearby basements confirmed? | Yes | Architectural Drawings and in Design and Access Statement |
| Is a geotechnical interpretation presented? | Yes | Section 6.0 of BIA |
| Does the geotechnical interpretation include information on retaining wall design? | Yes | Section 6.8 of BIA |
| Are reports on other investigations required by screening and scoping presented? | No | |
| Are the baseline conditions described, based on the GSD? | Yes | |
| Do the base line conditions consider adjacent or nearby basements? | Yes | |
| Is an Impact Assessment provided? | Yes | Section 7.0 of BIA |
| Are estimates of ground movement and structural impact presented? | Yes | GMA undertaken by Curtins and presented in Appendix B of BIA |

| Item | Yes/No/NA | Comment |
|---|---|---|
| Is the Impact Assessment appropriate to the matters identified by screening and scoping? | No | Felled tree zone of influence, change in hardstanding need clarification and comparison of existing and post development runoff rates. |
| Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme? | No | As above |
| Has the need for monitoring during construction been considered? | Yes | Considered in Curtins GMA |
| Have the residual (after mitigation) impacts been clearly identified? | No | GMA to be updated, felled tree zone of influence and change in hardstanding. |
| Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained? | No | GMA to be reviewed and updated in line with comments in Section 4.0 |
| Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment? | No | Change in hardstanding to be clarified. |
| Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area? | No | As above |
| Does report state that damage to surrounding buildings will be no worse than Burland Category 1? | Yes | However, GMA to be reviewed and updated. |
| Are non-technical summaries provided? | Yes | |

## 4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by Site Analytical Services Ltd. (SAS), along with input from Curtins Consulting Limited and the individuals concerned in its production have qualifications in accordance with CPG Basements.

4.2. The proposed basement below the property extends to a maximum depth of 2.80m below ground level (bgl). The Design and Access statement and Architectural drawings indicate the presence of a basement at 4 Millfield Lane to a similar depth of the proposed basement construction.

4.3. A ground investigation was carried out by SAS and included 2 boreholes to a depth of 15.00m. The ground conditions identified were Made Ground underlain by London Clay. Three rounds of groundwater monitoring were undertaken in each borehole and results indicate groundwater to be in the range of c.1.20m to c.4.60m bgl. The BIA notes the groundwater encountered is due to a surface water infiltration since the London Clay formation is an impermeable stratum.

4.4. The screening exercise for hydrogeology has identified the Highgate ponds a located 125m south-west of the site and the lost River Fleet located approximately 130m west to south-west of the site.

4.5. The screening exercises for hydrology and hydrogeology have identified there will be an increase in hardstanding onsite. However, in Section 3.5.2.2 and Section 7.2 indicate there will be a decrease in impermeable surfaces. This is contradictory to the screening exercise response and will need to be clarified.

4.6. The screening for Land Stability identifies the removal of 2 trees on site. The BIA indicates that the basement will extend below the zone of influence of these tree roots and that foundations will be designed in accordance with NHBC guidance. The impact that removing these trees may have on neighbouring structures and infrastructure should also be assessed.

4.7. A green roof with a wildflower blanket is proposed as part of the SuDS strategy along with vegetation and soft landscaping. An assessment is required to compare the existing run off rates to the post development runoff rates to ensure greenfield runoff rates are achieved by the SuDS proposed. It is noted the surface water will be directed to the local sewer network on Millfield Lane.

4.8. It is accepted that there are no slope stability concerns regarding the proposed development, and it is not in an area prone to flooding.

4.9. The structural drawings and the Construction Management Statement (CMS) provided indicate the retaining wall will be constructed in stages. The CMS notes the first stage would involve

construction of specific retaining wall sections not exceeding 1m wide, to support the steel structure above. This would be followed by a sequenced construction of the remaining retaining wall sections to form the basement. The retaining wall sections will be constructed using temporary propping. The engineering drawings provided indicate no two adjacent strips will be constructed within 3 days of each other.

4.10. The basement will be founded within the London Clay and a structural loading plan with loads is provided.

4.11. A Ground Movement Assessment (GMA) has been undertaken by Curtins and is presented in Appendix B of the BIA. Ground movements within the area of the proposed excavation have been estimated using PDisp and the expected movements and impact assessment of the area around the site and surrounding structures have been estimated using XDisp.

4.12. The Young's Modulus for the London Clay has been calculated using a multiple of 330 x cu and a ratio of 0.6 is used for drained parameters. The Poisson ratio for the London Clay in the long term is taken as 0.4, which is not considered an appropriately conservative engineering value and should be revised.

4.13. Undrained and Drained conditions are analysed in PDisp. The resulting movements generated indicate a maximum heave of 28mm being generated in the undrained case and a maximum of 38mm of heave and settlements of 4mm occurring locally in the drained case.

4.14. Ground movements outside the basement have been estimated using XDisp software, which is based on CIRIA C760. While the CIRIA C760 approach is intended for piled retaining walls, we accept that the predicted ground movements are within the range typically anticipated for underpinning techniques carried out with good control of workmanship.

4.15. The Xdisp analysis assumes a high support stiffness and only movements due to excavation are used in assessment. Movements due to installation of the underpins should also be considered in the assessment. Typically, minimum movements (horizontal and vertical) of 5mm are expected at the wall for a single lift of underpinning.

4.16. A full XDisp input and output should be submitted for review as part of the updated assessment. The predicted horizontal and vertical ground movements at the basement should be clearly presented in the GMA.

4.17. The basement of 4 Millfield Lane is not considered within the assessment, in order to maintain conservatism.

4.18. Proposals are provided for a movement monitoring strategy during construction.

## 5.0 CONCLUSIONS

5.1. The Basement Impact Assessment (BIA) has been carried out by Site Analytical Services Ltd., along with input from Curtins and the individuals concerned in its production have suitable qualifications.

5.2. The BIA has confirmed that the proposed basement will be founded within the London Clay formation to a depth of 2.80m below ground level (bgl).

5.3. Groundwater monitoring indicates the presence of groundwater in the range c.1.20m to c.4.60m bgl. However, the London Clay is an impermeable stratum and the water encountered within the wells are likely to be surface water inflows. It is accepted that the development will not impact on the wider hydrogeology of the area and is not in an area subject to flooding.

5.4. An impact assessment is required for the removal of trees to identify the roots zone of influence

5.5. Clarification is required regarding the change in hard surfaced areas and an assessment comparing the existing runoff rates with post development runoff is required to show that greenfield runoff rates are achieved.

5.6. The basement is to be formed with reinforced concrete retaining walls and slab. The retaining walls will be constructed in two stages and in bays not exceeding 1m wide. The first stage would involve a construction of retaining walls to support the steel structure above. In the second stage the remainder of the retaining wall sections would be constructed following a sequencing system to prevent adjacent bays being excavated within 3 days of one another.

5.7. A GMA is undertaken however the ground model parameters will need to be reviewed for the Poisson ratio of London Clay in drained conditions.

5.8. The GMA accounts for movements due to excavation of the basement, however no installation movements are considered within the analysis. An updated assessment along with XDisp inputs and outputs are required.

5.9. A movement monitoring strategy is recommended during construction.

5.10. It is accepted that the development will not impact the stability of the surrounding slopes.

5.11. It cannot be confirmed that the BIA complies with the requirements of CPG: Basements until the queries raised in Section 4 and Appendix 2 are addressed.

# Appendix 1: Consultation Responses

None

# Appendix 2: Audit Query Tracker

Audit Query Tracker

| Query No | Subject | Query | Status | Date closed out |
|---|---|---|---|---|
| 1 | Hydrology and Hydrogeology | Clarification on the change in hardstanding. | Open – See 4.5 | |
| 2 | Land Stability | Provide an impact assessment for felled trees in accordance with NHBC. | Open - See 4.6 | |
| 3 | Hydrology | Provide an assessment on existing and post development runoff rates. | Open – See 4.7 | |
| 4 | Land Stability | London Clay soil parameters to be updated. | Open – See 4.11 | |
| 5 | Land Stability | Ground Movement Assessment to be updated to include installation movement curves<br><br>Full XDisp input and output to be provided. | Open – See 4.14 | |

# Appendix 3: Supplementary Supporting Documents

None

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