CampbellReith
consulting engineers

# The Bull & Last Public House
# 168 Highgate Road
# London
# NW5 1QS

## Basement Impact Assessment
## Audit

For

London Borough of Camden

Project Number: 12066-50
Rev: D1

October 2015

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## Document Details

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## 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 the Bull & Last Public House, London NW5 1QS (planning reference 2015/4094/P). The basement is considered to fall with 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 review it against an agreed audit check list.

1.4. The BIA has been prepared by an individual who is a chartered structural engineer but additional information is required to verify proof of expertise in engineering geology.

1.5. It is proposed that sheet piling will be used to retain the highway with a reinforced concrete underpinning technique adopted for the two other new walls for the extended basement.

1.6. It is accepted that the development will have no adverse effect on drainage or run off as there is no increase in impermeable area. A Flood Risk Assessment and enquiries to Thames Water have confirmed that the site has a low risk with respect to flooding.

1.7. It is accepted that the basement will be founded within the London Clay which has a very low permeability thus the groundwater flow is unlikely to be significantly affected. It is not proposed to remove any trees, hence the risk of shrink-swell in the London Clay remains unchanged.

1.8. It is acknowledged that the basement proposals will result in the foundations being deepened to below those of neighbouring properties. This has been recognised in the proposed methodology comprising underpinning and a sheet piled retaining wall. A building damage assessment suggests Category 0 (negligible) to Category 1 (very slight) damage may occur to the surrounding structures.

1.9. For a basement of this depth on a site, ground movements and resultant building damage are highly dependent on the construction sequence and methodology. The ground movement assessment assumes certain criteria which can only be confirmed on inspection of the detailed construction drawings. It is therefore recommended that such an inspection is undertaken under party wall arrangements once the detailed construction drawings are available.

1.10. Queries and requests for clarification or further information are summarised in Appendix 2.

## 2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 2nd September 2015to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Bull & Last Public House, Camden Reference 2015/4094/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 proposals as: **2015/4094/P** as "*works to the existing pub to provide bed and breakfast units with associated loft conversion, demolition of the existing kitchen to create a side extension and associated basement to create two flats and basement excavation to existing pub*".

2.6. CampbellReith accessed LBC's Planning Portal on 4th September and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (BIA) Part 1 Reference P3075 issue 1
- BIA Part 2 appendixes A to E inclusive including Structural Drawings
    - P3075 BIA01 P1 Proposed Basement GA
    - P3075 BIA 02 P1 Proposed Ground Floor GA
    - P3075 BIA 10 P1 Proposed Section AA
    - P3075 BIA 11 P! Proposed Section BB
    - & Construction Method Statement
- BIA Part 3
- BIA Part 4
- BIA Part 5
- Desk Study & Ground investigation report reference J15145 dated July 2015
- Flood Risk Assessment reference 1466/RE/07-15/01
- Ground Movement Assessment Part 1 reference J15145 August 15
- Ground Movement Assessment Part 2
- Ground Movement Assessment Part 3
- Existing and Proposed Plans comprising
    - WMG Studio drawing ref BALP_PA_000
    - WMG Studio drawing ref BALP_PA_001
    - WMG Studio drawing ref BALP_PA_002
    - WMG Studio drawing ref BALP_PA_003
    - WMG Studio drawing ref BALP_PA_004
    - WMG Studio drawing ref BALP_PA_005
    - WMG Studio drawing ref BALP_PA_006
    - WMG Studio drawing ref BALP_PA_007
    - WMG Studio drawing ref BALP_PA_0008

## 3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

| Item | Yes/No/NA | Comment |
|---|---|---|
| Are BIA Author(s) credentials satisfactory? | Yes | The report and supporting documents has been prepared by a Chartered Structural Engineer together with Chartered Geologists with FGS standing. |
| 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 | BIA Part 2. |
| Are suitable plan/maps included? | Yes | BIA Parts 1, 2, 3, 4 & 5. |
| Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail? | Yes | BIA and architect's drawings. |
| Land Stability Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | Yes | BIA Part 4. |
| Hydrogeology Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | Yes | BIA Part 3. |
| Is a conceptual model presented? | Yes | Desk Study and Ground Investigation Report prepared by GEA. |
| Land Stability Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | BIA Part 1 section 4.02. |

| Item | Yes/No/NA | Comment |
|---|---|---|
| Hydrogeology Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | Ref Report by Evans Rivers & Coastal Ltd within the BIA. |
| Hydrology Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | Ref Report by Evans Rivers & Coastal Ltd within the BIA. |
| Is factual ground investigation data provided? | Yes | |
| Is monitoring data presented? | Yes | Desk Study and Ground Investigation Report. |
| 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 | But full extent and location of adjacent basements to be confirmed. |
| Is a geotechnical interpretation presented? | Yes | Yes ref Ground Investigation Report Part 2 section 7 |
| Does the geotechnical interpretation include information on retaining wall design? | Yes | |
| Are reports on other investigations required by screening and scoping presented? | Yes | FRA presented as separate report from Evans Rivers and Costal Ltd. |
| Are 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 | |
| Are estimates of ground movement and structural impact presented? | Yes | Ground Movement Assessment Parts 1 2 & 3 indicate negligible to |

| Item | Yes/No/NA | Comment |
|---|---|---|
| | | slight damage (Burland Categories 0 to 20) to adjoining properties. |
| Is the Impact Assessment appropriate to the matters identified by screen and scoping? | Yes | Issues raised will be mitigated during final design stage. |
| Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme? | Yes | Mitigation measures considered in principle including movement monitoring and non-return valves on drainage network. To be developed in final design. |
| Has the need for monitoring during construction been considered? | Yes | Party wall will be monitored, confirmed in Construction Statement within BIA part 2. |
| Have the residual (after mitigation) impacts been clearly identified? | Yes | Ref Ground movement report Parts 1 2 & 3. |
| Has the scheme demonstrated that the structural stability of the building and neighbouring properties maintained? | Yes | The scheme has demonstrated both temporary and permanent support for surrounding structures. |
| 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 | Yes no increase in hard landscaping. GMA demonstrates predicted damage in neighbouring properties does not exceed Burland Category 2. |
| Does report state that damage to surrounding buildings will be no worse than Burland Category 2? | Yes | As above. |
| Are non-technical summaries provided? | Yes | |

## 4.0 DISCUSSION

4.1. The BIA has been carried out by an established firm of consultants. The lead author is a Chartered Structural Engineer who was supported by a Chartered Civil Engineer and a Chartered Geologist who is also a Fellow of the Geological Society.

4.2. The proposed development comprises the deepening of an existing basement under the existing Public House and extending the basement out under the proposed new annex.

4.3. The construction of the new basement will incorporate three well established construction techniques namely traditional underpinning, reinforced concrete underpinning and sheet piling

4.4. It is accepted that there is no significant adverse impact of surface water flows and the risk of flooding. There is no appreciable change to the area of hard surfacing. Although Highgate Road has flooded in the past, an enquiry to Thames Water has not identified any flooding event at the site itself. A Flood Risk Assessment has confirmed that the site is not in an area recognised to be prone to flooding.

4.5. The site is not at risk of flooding from rivers or sea as defined by the Environmental Agency, however Highgate Road and Woodsome Road have been identified as streets that flooded in 1975. As a consequence the proposals include the adoption of a non-return valve on the outfall drainage to the combined sewer.

4.6. The deepening of the existing basement will be formed into the London Clay as will the new basement to the annex. It is acknowledged that the new basement area, which comprises approximately a third of the overall site area, will remove the Made Ground over the London Clay. The nearest former watercourse lies 150m to the East of the site and is described as an historical tributary to the river Fleet. It is suggested that any ground water flow would be towards this historic watercourse however the London Clay is classified as an Unproductive Stratum. It has a very low permeability and the depth of the proposed single storey basement is considered to have no significant effect on ground water flow.

4.7. The site is considered to be generally flat with gradients of less than 7 degrees and thus is considered stable. The extent of the basements within the adjoining properties is not fully defined but their existence is recognised within the proposals. It is acknowledges that the basement proposals will deepen the foundations to below that of the neighbouring properties and a Ground Movement Assessment has been carried out. Full details of such existing structures should be identified prior to construction as these may modify the current proposals.

4.8. The London Clay is prone to shrink-swell and subsidence due to the impact of vegetation. The BIA has stated that no trees are to be removed and it is therefore accepted that the proposals will not alter the status quo.

4.9. The London Clay is not classified as an aquifer and therefore does not support flows of groundwater. It is accepted that there will be no adverse impact on groundwater flows.

4.10. The ground movement predictions based on the X-Disp and P-Disp Oasys analysis, indicate that the ground movements due to the combined effect of the underpinning and basement excavation will be less than 3mm vertically and 5mm horizontally. These soil settlements have been estimated to induce only negligible to very slight damage into the adjoining properties i.e. Burland Category 0 to 1 classification. These results are based on certain assumptions with respect to the construction technique and programme which can only be verified once a contractor has been appointed and the construction methodology has been finalised. It is recommended that this is carried out as part of the Party Wall approval process.

4.11. Monitoring proposals are mentioned within the Construction Method Statement which states that the precise methodology will be developed with the successful contractor who will incorporate the comments and requirements of the Party Wall approval process.

## 5.0 CONCLUSIONS

5.1. 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 the proposed annex to the Bull & Last Public House, 168 Highgate Road, London NW5 1QS (planning reference 2015/4094/P). The basement is considered to fall with Category B as defined by the Terms of Reference.

5.2. 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.

5.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and review it against an agreed audit check list.

5.4. The BIA has been prepared by an individual who is a chartered structural engineer in collaboration with a Chartered Civil Engineer and a Chartered Geologist who is also a Fellow of the Geological Society.

5.5. It is proposed that the perimeter walls to the single level basement will be formed adopting steel sheet piles and reinforced concrete underpinning techniques.

5.6. It is accepted that the development will have no adverse effect on drainage or run off as there is no increase in impermeable area. A Flood Risk Assessment and enquiries to Thames Water have confirmed that the site has a low risk with respect to flooding.

5.7. It is accepted that the basement will be founded within the London Clay which has a very low permeability thus the groundwater flow is unlikely to be significantly affected by the development. It is not proposed to remove any trees, hence the risk of shrink-swell in the London Clay remains unchanged.

5.8. It is acknowledged that the basement proposals will result in the foundations being deepened to below those of neighbouring properties. This has been recognised in the proposed methodology comprising underpinning and a sheet piled retaining wall. A building damage assessment suggests Category 0 (negligible) to Category 1 (very slight) damage may occur to the surrounding structures.

5.9. Ground movement assessments and resultant building damage are highly dependent on the construction sequence and methodology. It is therefore recommended that scheme specific basement construction design and specification is reviewed by the Engineering Geologist who prepared the analysis to confirm that the assumptions made in the theoretical analysis are

indeed implemented by the contractor during construction. This may be completed during the Party Wall award process. Detailed Monitoring Proposals, based on the final Ground Movement Assessment, should also be agreed at this stage.

# Appendix 1: Residents Consultation Comments

Residents Consultation Comments

| Surname | Address | Date | Issue raised | Response |
|---|---|---|---|---|
| Griffin and Gunn | 1 Hillside Highgate Road NW5 1QT | 12.8.15 | Subsidence/shrink-swell Ground Movement and shallow foundations. Groundwater | Refer to 4.8 to 4.11 |
| Penn | 3a Woodsome Road London NW5 1RX | 17.8.15 | Subsidence/shrink-swell surface water flooding | Refer to 4.8 to 4.11 |

# Appendix 2: Audit Query Tracker

Audit Query Tracker

| Query No | Subject | Query | Status | Date closed out |
|---|---|---|---|---|
| 1 | Stability | Final design and construction design and specifications to be compared and verified with the assumption made within the Ground movement Analysis | To be closed out as part of Party Wall award | N/A |
| 2 | Stability | Detailed monitoring specification for the adjoining propertied, once agreed is required | As above | N/A |
| 3 | Stability | Construction sequence for current scheme is generic | As above | N/A |

# Appendix 3: Supplementary Supporting Documents

None