

Bacton Low Rise, Gospel Oak,
London NW5

Basement Impact Assessment
Audit

For
London Borough of Camden

Project Number: 12466-34

Revision: F1

April 2017

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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 Bacton Low Rise, Gospel Oak, London NW5 (planning reference 2016/5358/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 involves the demolition of the existing four-storey blocks of flats arranged around three courtyards with the construction of new seven-storey concrete framed structures arranged around two courtyards and a central pedestrian street. The proposed basement is beneath the new pedestrian square and will house the plant room to accommodate the mechanical and electrical services of the development. The proposed basement is single storey and approximately 30m long, 22m wide and 5m deep.
- 1.5. The development site covers a large area. For the avoidance of doubt, this audit is only concerned with the area of the proposed basement and the area within the proposed basement's zone of influence.
- 1.6. The BIA has been prepared by Momentum Consulting Engineers Ltd with supporting documents prepared by Rolton Group Limited. The authors' qualifications are in accordance the requirements of CPG4.
- 1.7. Information within the BIA is broadly in line with the aspects recommended of a desk study within the GSD Appendix G1.
- 1.8. The BIA states that the site lies directly on designated unproductive strata, the London Clay. Groundwater has been detected between 1.59 and 4.76m bgl. Further longer term groundwater monitoring should be undertaken to inform temporary works contingency planning, control measures and waterproofing design.
- 1.9. The BIA identified a former tributary of the River Fleet that flowed north to south in close proximity to the site. It is understood that this was culverted in the late nineteenth century and the route has been completely severed by the Railway in a deep cutting to the north of the site.

The original BIA did not acknowledge the potential hydrogeological or stability impacts should the presence of superficial deposits on the site be encountered during the development.

The revised BIA further assesses these potential risks and impacts and advises further site investigation. It is recommended this is undertaken and reported within a Basement Construction Plan (BCP).

- 1.10. The original site investigation and geotechnical interpretation reports do not acknowledge the presence of superficial deposits related to the Fleet and identify Made Ground overlying London Clay. Reworked / alluvial deposits appear to be present in some boreholes. It is accepted that these are thin deposits and should not impact stability of the proposed piled foundation solutions. Planning to mitigate potential groundwater flow in these deposits in the temporary and permanent cases should be allowed for.

The revised BIA further assesses these potential risks and impacts and advises further site investigation. It is recommended this is undertaken and reported within a BCP.

- 1.11. The original BIA stated that the site had not been identified as having the potential for flooding. However, the site is located within the Maitland Park Local Flood Risk Zone, as defined by LBC and therefore, in line with CPG4, a detailed Flood Risk Assessment is required. The Environment Agency data indicate a low – medium surface water flood risk both on site and in the adjacent Wellesley Road.

The revised submission includes a flood risk assessment which concludes that the flood risk is low and that any surface water will flow around the basement development due to the site topography.

- 1.12. Attenuation SUDS is proposed that would reduce offsite discharge by 90%, including allowance for a 1 in 100 year storm event and a 30% allowance for climate change. This would be a benefit to the wider hydrological environment.
- 1.13. Indicative pile lengths and diameters have been provided for the proposed basement retaining walls and outline construction drawings have been presented including temporary works and propping arrangements. Insufficient geotechnical interpretation was originally presented. Design parameters in line with guidance provided within the GSD Appendix G3 should be provided for review.

In the revised submissions, geotechnical parameters are presented which are accepted.

- 1.14. A conceptual site model was requested which identifies ground and groundwater conditions, extent and form of the proposed basement, proximity of sensitive buildings and infrastructure, and annotated identifying potential risks, impacts and mitigation measures.

In the revised submissions, this has been presented.

- 1.15. In the original BIA a suitable ground movement assessment (GMA) and damage impact assessment for buildings within the zone of influence was presented based on CIRIA C580, including for the Grade 1 listed St Martin's Church. Damage Category 1 (Very Slight) was predicted for all buildings. Suitable structural monitoring proposals were outlined, during construction. In line with CPG4, where Category 1 damage is identified additional contingency mitigation measures should be proposed, and these were requested.

In the revised BIA, the GMA has been revised and Damage Category 0 (Negligible) is predicted for all buildings. The proposed structural monitoring is accepted.

- 1.16. A potentially vulnerable brick sewer has been identified within the zone of influence of the site and the BIA states that a "Build Close To" permit will be sought from Thames Water. Thames Water should be contacted in regards to their limits on movement / strain of the asset.

The revised BIA further assesses potential damage to the sewer as Negligible.

- 1.17. Queries and matters requiring further information or clarification are discussed in Section 4 and summarised in Appendix 2. Considering the revised submissions, and the further investigation (and assessment, if required) to be presented within the BCP, the BIA is considered to meet the criteria of CPG4.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 13 December 2016 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for Bacton Low Rise, Gospel Oak, London NW5, Camden Reference 2016/5358/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: "Redevelopment of Bacton Low Rise Estate, Gospel Oak District Housing Office and Vicar's Road workshops following the demolition of all existing buildings to provide within buildings ranging from 2-8 storeys in height a total of 290 Class C3 residential units, comprising 176 market, 10 intermediate and 104 social rent units, 3 employment units (Class B1), new and altered public realm, landscaping, vehicular and pedestrian links/accesses, vehicular and cycle parking, bin storage and associated works."

2.6. CampbellReith accessed LBC's Planning Portal on 30 December 2016 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment of Bacton Low Rise, Phase 2 (ref 2880 RPT Bacton BIA [01]) dated 19 September 2016 by Momentum Consulting Engineers Ltd.
- Basement Impact Assessment of Bacton Low Rise Redevelopment (ref 12-0083, revision B) dated February 2013 by Rolton Group Limited.
- Geotechnical and Geoenvironmental Report of Bacton Low Rise Redevelopment (ref 12-0083 XRP005, revision A) dated November 2012 by Rolton Group Limited.
- Site investigation Report – factual report of Bacton Low Rise Redevelopment (ref PC124991) dated September 2012 by Rolton Group Limited.
- Proposed plans, elevations and sections dated November 2016 by Karakusevic Carson Architects.
- Design and Access statements (ref 307-A-DAS-02-00) dated September 2016 by Karakusevic Carson Architects.
- Drainage Strategy – Managing surface water (ref 2880 RPT Bacton SUDS [00]) dated September 2016 by Momentum Consulting Engineers Ltd.
- Arboricultural Impact Assessment and method statement (ref 550355nfSep16FV02_AIA_AMS) dated September 2016 by Greengage.
- Comments and objections to the proposed development from local residents.

2.7. Following the initial audit, CampbellReith were provided the following relevant documents for audit purposes in March 2017:

- Basement Impact Assessment of Bacton Low Rise, Phase 2, Addendum (ref 2880 RPT Bacton BIA [Addendum]) dated 02 March 2017 by Momentum Consulting Engineers Ltd.
- Preliminary Contract Programme by Rydon Construction.
- Flood Risk Assessment of Bacton Low Rise Redevelopment (ref 12-0083 XRP003, revision A) dated November 2012 by Rolton Group Limited.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Combined the authors of the 2012 and 2016 BIAs have the required accreditation.
Is data required by Cl.233 of the GSD presented?	Yes	Information within the BIA is broadly in line with the information required of a desk study in line with the GSD Appendix G1. Utility companies have not been approached with regards to underground infrastructure
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 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: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Updated in revised submission.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Updated in revised submission.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Updated in revised submission.

Item	Yes/No/NA	Comment
Is a conceptual model presented?	Yes	Updated in revised submission.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Updated in revised submission. Further SI and assessment (as required) to be presented in BCP.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Updated in revised submission. Further SI and assessment (as required) to be presented in BCP.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Updated in revised submission.
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	Only two rounds of groundwater monitoring in September and October 2012 presented. Further groundwater monitoring should be undertaken to assess for seasonal fluctuations in groundwater elevations and inform temporary works design.
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	As part of ground investigation in 2012.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	The properties within 20m of the basement excavation are St Martin's Church and 113 Wellesley Road both adjacent to the east of the site. Neither of these properties are reported to have basements.
Is a geotechnical interpretation presented?	Yes	Updated in revised submission (may need to be updated within BCP, depending on SI results).

Item	Yes/No/NA	Comment
Does the geotechnical interpretation include information on retaining wall design?	Yes	Indicative plied retaining wall information provided.
Are reports on other investigations required by screening and scoping presented?	Yes	Updated in revised submission.
Are baseline conditions described, based on the GSD?	Yes	Groundwater levels should be confirmed by longer term monitoring and / or by the contractor in advance of the works.
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	However, these should include assessment of the brick sewer.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	Updated in revised submission. Further SI and assessment (as required) to be presented in BCP.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Updated in revised submission (to be further reviewed, as required, in BCP).
Has the need for monitoring during construction been considered?	Yes	
Have the residual (after mitigation) impacts been clearly identified?	Yes	Updated in revised submission (to be further reviewed, as required, in BCP).
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Updated in revised submission.

Item	Yes/No/NA	Comment
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Updated in revised submission.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Updated in revised submission (to be further reviewed, as required, in BCP).
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	Updated and mitigated to Category 0.
Are non-technical summaries provided?	No	However, the BIA is written so as to be understandable.

4.0 DISCUSSION

- 4.1. The proposed development involves the demolition of the existing four-storey blocks of flats arranged around three courtyards with the construction of new seven-storey concrete framed structures arranged around two courtyards and a central pedestrian street. The proposed basement is beneath the new pedestrian square and will house the plant room to accommodate the mechanical and electrical services of the development. The proposed basement is single storey and approximately 30m long, 22m wide and 5m deep.
- 4.2. The development site covers a large area. For the avoidance of doubt, this audit is only concerned with the area of the proposed basement and the area within the proposed basement's zone of influence.
- 4.3. The BIA has been prepared by Momentum Consulting Engineers Ltd with supporting documents prepared by Rolton Group Limited. The authors' qualifications are in accordance the requirements of CPG4.
- 4.4. Reference information provided within the BIA is broadly in line with the aspects recommended of a desk study within the GSD Appendix G1.
- 4.5. The BIA states that the site lies on Made Ground overlying designated unproductive strata, the London Clay. The London Clay is identified as the bearing formation for the proposed foundations.
- 4.6. The BIA identified a former tributary of the River Fleet that flowed north to south in close proximity to the site. The original site investigation and geotechnical interpretation reports do not acknowledge the presence of superficial deposits related to the Fleet but identify Made Ground overlying London Clay. In some boreholes the identified 'Made Ground' comprises material consistent with reworked / alluvial deposits. It is accepted that these are thin deposits and should not impact stability of the proposed piled foundation solution for the basement. However, river deposits are variable in thickness and composition and the Contractor should have contingency plans in place should deeper / softer deposits be encountered.

The revised BIA further assesses these potential risks and impacts and advises further site investigation by the Contractor to comprise a series of trial pits across the site. The BIA discusses options the Contractor may adopt to mitigate alluvial deposits, if encountered. It is recommended the further investigation, assessment and mitigation requirements are presented within a Basement Construction Plan (BCP).

- 4.7. It is understood that the River Fleet was culverted in the late nineteenth century and the route has since been completely severed by the railway in a deep cutting to the north of the site. The

original BIA did not acknowledge the potential hydrogeological impacts should the presence of superficial deposits on the site be encountered during the development. Superficial Deposits are channelised in nature and more permeable than London Clay, and therefore become preferential pathways for water flow if the deposits become saturated. Planning to mitigate potential groundwater flow in these deposits in the temporary and permanent cases should be allowed for.

The revised BIA further assesses these potential risks and impacts and advises further site investigation. It is recommended this is undertaken and reported within a BCP.

- 4.8. Groundwater has been detected between 1.59 and 4.76m bgl. Further longer term groundwater monitoring should be undertaken to inform temporary works contingency planning, control measures and waterproofing design.
- 4.9. A conceptual site model was requested which identifies ground and groundwater conditions, extent and form of the proposed basement, proximity of sensitive buildings and infrastructure, and annotated to identify potential risks, impacts and mitigation measures.

In the revised submissions, this has been presented. This should be updated, as required, within the BCP following the additional site investigation.

- 4.10. The original BIA stated that the site had not been identified as having the potential for flooding. However, Environment Agency data indicate a low – medium surface water flood risk both on site and in the adjacent Wellesley Road. The site is located within the Critical Drainage Area Group 3-003 and the Maitland Park Local Flood Risk Zone, as defined by LBC, and therefore in line with CPG4, a detailed Flood Risk Assessment was requested.

The revised submission includes a flood risk assessment which concludes that the flood risk is low and that, should any surface water flooding occur, this should flow around the basement development due to the site topography.

- 4.11. Indicative pile lengths and diameters have been provided for the proposed basement retaining walls and outline construction drawings have been presented including temporary works and propping arrangements. Insufficient geotechnical interpretation was originally presented. Design parameters in line with guidance provided within the GSD Appendix G3 was requested for review.

In the revised submissions, geotechnical parameters are presented which are accepted. These should be updated, as required, within the BCP following the additional site investigation.

- 4.12. In the original BIA a suitable ground movement assessment (GMA) and damage impact assessment for buildings within the zone of influence was presented based on CIRIA C580,

including for the Grade 1 listed St Martin's Church. Damage Category 1 (Very Slight) was predicted for all buildings. Suitable structural monitoring proposals were outlined, during construction. In line with CPG4, where Category 1 damage is identified additional contingency mitigation measures should be proposed, and these were requested.

In the revised BIA, the GMA has been revised and Damage Category 0 (Negligible) is predicted for all buildings. The proposed structural monitoring is accepted. Should further site investigation identify a significant change in ground conditions, the GMA and damage impact assessment should be updated and presented within the BCP.

A potentially vulnerable brick sewer has been identified within the zone of influence of the site and the BIA states that a "Build Close To" permit will be sought from Thames Water. Thames Water should be contacted in regards to their limits on movement / strain of the asset and an outline damage assessment should be presented, in conjunction with the GMA already undertaken, to indicate whether further mitigation works are likely to be required to protect the asset.

The revised BIA further assesses potential damage to the sewer as Negligible.

- 4.13. Across the site as a whole (the proposed basement area and wider site area) the proposed development will result in a decrease of impermeable areas from the current condition, from 80% to 70% of total site area. An attenuation SUDS scheme is proposed which aims to meet targets set in the National Planning Policy Framework (NPPF) and reduces peak discharge flows by 90% from existing levels, based on a 100 year + 30% (for climate change) return period storm event. The attenuation scheme will comprise underground modular storage units, green roofs and hydro-brakes restricting flow to 40.0l/s. The scheme offers benefit to the wider hydrological environment.
- 4.14. Queries and matters requiring further information or clarification are summarised in Appendix 2.

5.0 CONCLUSIONS

- 5.1. The proposed basement is located beneath the new pedestrian square basement, comprising a single storey and approximately 30m long, 22m wide and 5m deep. For the avoidance of doubt, this audit is only concerned with the area of the proposed basement and the area within the proposed basement's zone of influence.
- 5.2. The BIA has been prepared by Momentum Consulting Engineers Ltd with supporting documents prepared by Rolton Group Limited. The authors' qualifications are in accordance the requirements of CPG4.
- 5.3. Information within the BIA is broadly in line with the aspects recommended of a desk study within the GSD Appendix G1.
- 5.4. The BIA states that the site lies directly on designated unproductive strata, the London Clay. Groundwater has been detected between 1.59 and 4.76m bgl. Further longer term groundwater monitoring should be undertaken.
- 5.5. The original BIA did not acknowledge the potential hydrogeological or stability impacts should the presence of superficial deposits on the site be encountered during the development. The revised BIA recognises the potential risks and impacts. Further site investigation and assessment should be undertaken, which should be presented in a Basement Construction Plan (BCP).
- 5.6. The revised BIA presents a flood risk assessment which concludes that flood risk is low and risk is mitigated further by site topography, with any surface water flowing away from the basement.
- 5.7. Attenuation SUDS is proposed that would reduce offsite discharge by 90%. This would be a benefit to the wider hydrological environment.
- 5.8. Indicative pile lengths and diameters have been provided for the proposed basement retaining walls and outline construction drawings have been presented including temporary works and propping arrangements.
- 5.9. Geotechnical parameters have been presented in the revised submissions. These may need updating following further site investigation.
- 5.10. The revised submission presents a conceptual site model. This should be updated, if required, following the additional site investigation and presented in the BCP.

- 5.11. The revised BIA includes a ground movement assessment and damage impact assessment predicting Category 0 (Negligible) damage to surrounding structures. This should be revised, if required, following further site investigation and presented in the BCP.
- 5.12. A potentially vulnerable brick sewer has been identified within the zone of influence of the site. Thames Water should be contacted in regards to their limits on movement / strain of the asset. The revised BIA predicts Negligible damage impact.
- 5.13. Queries and matters requiring further information or clarification are summarised in Appendix 2. Considering the revised submissions, and the further investigation (and assessment, if required) to be presented within the BCP, the BIA is considered to meet the criteria of CPG4

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Mr T Wiggett	Chair of Gospel Oak District Management Committee	23 September 2016	Fully supportive of technical designs aspect and minor amendment proposals currently being submitted in relation to Phase 2 of the development.	N/A
Kuznetsov	150 Bacton, Haverstock Road NW5 4PS	17 October 2016	Numerous issues raised including need for Flood Risk Assessment and the presence of the River Fleet.	5.5 - 5.7

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA	Conceptual Site Model	Open - A conceptual site model should be presented which identifies ground and groundwater conditions, extent and form of the proposed basement, proximity of sensitive buildings and infrastructure, annotated identifying potential risks, impacts and mitigation measures.	March 2017
2	BIA	Impact Mitigation Measures	Open – In response to GMA / damage assessment and BIA, best practise / requirements to mitigate impacts and contingency measures should be provided.	March 2017 (note: depending on additional SI results, this may need to be updated within BCP)
3	Hydrogeology	Groundwater	Open - The baseline should be confirmed by longer term monitoring and / or by the contractor in advance of the works.	N/A - ongoing
4	Hydrogeology / Land Stability	Presence of former tributary of River Fleet within 100m of the property.	Open – identified 'Made Ground' is consistent with alluvial / reworked material in some boreholes. Consideration should be given to potential impacts, mitigation measures and contingency actions.	N/A – further SI and assessment proposed, to be presented in a BCP.
5	Hydrology	Location of the site within the Maitland Park Local Flood Risk Zone as defined by LBC	Open – Flood Risk Assessment required in line with CPG4 (section 3.48).	March 2017
6	Land Stability	Geotechnical Parameters	Open – Geotechnical design parameters should be presented in line with the GSD Appendix G3.	March 2017
7	BIA	Construction Programme	Open – An outline construction plan should be provided.	March 2017

9	Land Stability	Ground Movement Assessment and Damage Assessment	Open – Thames Water should be contacted in regards to limits on movements / strain. The GMA / damage impact assessment should be updated to include predicted damage to the sewer and mitigation measures.	March 2017
10	Land Stability	Piled retaining wall design	Open – Further clarification is required regarding the design of the piled retaining wall that supports the new buildings.	March 2017

Appendix 3: Supplementary Supporting Documents

Basement Impact Assessment of Bacton Low Rise, Phase 2, Addendum (ref 2880 RPT Bacton BIA [Addendum]) dated 02 March 2017 by Momentum Consulting Engineers Ltd.

Preliminary Contract Programme by Rydon Construction.

Flood Risk Assessment of Bacton Low Rise Redevelopment (ref 12-0083 XRP003, revision A) dated November 2012 by Rolton Group Limited.

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