

51 Gower Street
London, WC1E 6HJ

Basement Impact Assessment
Audit

For
London Borough of Camden

Project Number: 12466-26

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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 51 Gower Street, London WC1E 6HJ (planning reference 2016/4975/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 (BIA) for potential impact on land stability and local ground and surface water conditions arising from basement development in accordance with LBC's policies and technical procedures.
- 1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and reviewed it against an agreed audit check list.
- 1.4. The BIA has been prepared by several firms of engineering consultants lead by Croft Structural Engineers. The authors of the submitted documents possess suitable qualifications that comply with the requirements of CPG4.
- 1.5. It has been confirmed that the development site is within a conservation area. There are listed buildings in the locality of the site. It is understood that they are more than 6m from the boundary of the site.
- 1.6. The proposal includes the demolition of the existing garages to the rear of 51 Gower Street and the construction of a new one storey house plus a single storey basement. The existing masonry walls to the rear of the site, between 51 and 53 Gower Street, and along Ridgmount Garden will be retained. The proposed development will be within the footprint of the existing garage plot.
- 1.7. It is noted that the site is within 5m of a highway or pedestrian right of way.
- 1.8. A ground investigation was carried out by Ground and Water Ltd in April 2015, which indicates that the site is underlain by 4.1m of Made Ground over the Lynch Hill Gravel, which is present to a depth of 7.6m. Below the Lynch Hill Gravel is the London Clay Formation.
- 1.9. It is noted from the BIA that groundwater was encountered at 6.4m below ground level during the ground investigation works. The subsequent groundwater monitoring indicates that groundwater water is present at approximately 3.5m below ground level. It is recommended that further groundwater monitoring is undertaken to inform both temporary works design and control methodologies, and for permanent structural design and waterproofing considerations.

- 1.10. The existing masonry walls to the rear of the site, and along Ridgmount Garden, will be retained will be underpinned by reinforced concrete walls.
- 1.11. It is noted that the site is within approximately 100m of the entrance to the Deep Shelter Tunnels constructed by the MOD during WW2. The current asset owner should be consulted on the layout of the shelter tunnels, and if they underlie the site, additional impact assessment should be undertaken.
- 1.12. The new basement box will be formed by reinforced concrete walls around the perimeter of the site and the basement slab. The basement slab will be supported on piles. Subsequent to the initial audit, supplementary calculations for the basement walls and basement slab have been provided. These are based on cautious estimates of engineering values and assumptions.
- 1.13. A construction method statement, which includes outline temporary works and construction sequence, has been provided.
- 1.14. It is noted that a full ground movement analysis has been carried out to assess the effect on the surrounding properties. The assessment indicates no greater than Burland Category 1 damage to neighbouring properties and a negligible impact on the public highway. Appropriate mitigation measures and a temporary and permanent works methodology have been provided.
- 1.15. In the revised submissions, structural monitoring outline proposals are presented. It is noted that current proposed trigger levels are greater than the predicted horizontal and vertical movements in the vicinity of 51 and 53 Gower Street, and the highway. In order to ensure damage impact is limited to the maximum predicted, the trigger levels should be linked to the GMA and damage impact assessment. It is accepted that suitable trigger values, mitigation and contingency actions will be agreed under the Party Wall Act and the relevant authority for the adjacent Chenies Street (TFL, The Highways Agency or LBC).
- 1.16. It is accepted that the new development and associated basement is at low risk of flooding.
- 1.17. It is accepted that there are no hydrogeological or hydrological concerns with respect to the development proposals.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 31 October 2016 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 51 Gower Street, London WC1E 6HJ, Camden Reference 2016/4975/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 a detached single storey (above single basement level) dwellinghouse following demolition of existing garages". The Audit Instruction also confirmed the property is adjacent to listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 04 November 2016 and gained access to the following relevant documents for audit purposes:

- Design, Access & Planning Statements dated July 2016 by FT Architects.
- Ground Investigation Report dated April 2015 by Ground and Water.
- Ground Investigation Letter Report, which includes water monitoring results, undated by Ground and Water.
- Basement Impact Assessment dated 08 September 2016 by Croft Structural Engineers. This report includes Surface Water BIA, Structural Drawings and Calculations, and Structural Method Statement.
- Groundwater BIA dated 07 September 2016 by H Fraser Consulting.
- Land Stability BIA dated 02 September 2016 by Applied Geotechnical Engineering.
- Architectural drawings by FT Architects include the following:
 - Site plan.
 - Existing plans, sections, and elevations.
 - Proposed plans, sections, and elevations.
- Construction Impact Plan dated September 2016 by FT Architects.
- Construction Management Plan (pro forma) dated 09 September 2016.

2.7. Subsequent to the issue of the initial audit report, further information was provided by Croft Structural Engineers:

- Revised BIA Structural Calculations dated 06 January 2017.
- Revised Structural Monitoring Statement dated 06 January 2017.
- Revised Page 22 of the BIA Report by Croft Structural Engineers.

The additional information is included in Appendix 3.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	See BIA reports.
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	See BIA and Design, Access & Planning Statements.
Are suitable plan/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	See Land Stability BIA Report Section 5.0.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See Groundwater BIA Report Section 3.0.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See BIA Section 1.
Is a conceptual model presented?	Yes	See Groundwater BIA Report Section 4.1.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	See Land Stability BIA Report Section 6.0.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	See Land Stability BIA Report Section 5.0.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	No potential issues identified at Screening.
Is factual ground investigation data provided?	Yes	See Ground Investigation Report.
Is monitoring data presented?	Yes	See Ground Investigation Letter Report.
Is the ground investigation informed by a desk study?	Yes	Presented across a range of documents.
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	No	However, adjacent buildings are not within 6m from the proposed basement.
Is a geotechnical interpretation presented?	Yes	See Ground Investigation Report.
Does the geotechnical interpretation include information on retaining wall design?	Yes	See Ground Investigation Report Section 6.4.
Are reports on other investigations required by screening and scoping presented?	Yes	
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	See Land Stability BIA Section 7.0 and Groundwater BIA Section 5.0.

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	See Land Stability BIA Section 7.0.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	
Has the need for monitoring during construction been considered?	Yes	The BIA states that monitoring would be required as part of Party Wall agreements.
Have the residual (after mitigation) impacts been clearly identified?	Yes	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

- 4.1. The BIA has been prepared by several firms of engineering consultants lead by Croft Structural Engineers. The ground investigation was undertaken by Ground and Water Ltd. The Groundwater BIA, Land Stability BIA, and Surface Water BIA were undertaken by H Fraser Consulting, Applied Geotechnical Engineering, and Croft Structural Engineers respectively. The authors of the submitted documents possess suitable qualifications that comply with the requirements of CPG4.
- 4.2. The proposal includes the demolition of the existing garages to the rear of 51 Gower Street and the construction of a new one storey house above street level and a single storey basement below street level. The existing masonry walls the existing masonry walls to the rear of the site, between 51 and 53 Gower Street, and along Ridgmount Garden will be retained. The existing wall to the rear of 51 Gower Street will be rebuilt. It is not clear if the walls to be retained are listed or not. The proposed development will be within the footprint of the existing garage plot.
- 4.3. It is noted that the site is within 5m of a highway or pedestrian right of way. It is likely that the relevant authority (TFL, The Highways Agency or LBC) will need to be consulted on the proposed works.
- 4.4. It is noted that the site is within approximately 100m of the entrance to the Deep Shelter Tunnels constructed by the MOD during WW2. The current asset owner should be consulted on the layout of the shelter tunnels, and if they underlie the site, additional impact assessment should be undertaken.
- 4.5. A ground investigation was carried out by Ground and Water Ltd in April 2015, which indicates that the site is underlain by 4.1m Made Ground over the Lynch Hill Gravel, which is present to a depth of 7.6m. Below the Lynch Hill Gravel is the London Clay Formation. The new basement will be within the Made Ground and will be supported by a piled foundation.
- 4.6. The ground investigation includes one borehole to 10m below ground level (bgl) and groundwater was encountered at 6.4m bgl. The subsequent water monitoring, undertaken within a new 4m deep window sample borehole, indicates that groundwater at approximately 3.5m bgl, which is approximately 0.5m above the proposed excavation depth. It is recommended that further groundwater monitoring is undertaken to inform both temporary works design and control methodologies, and for permanent structural design and waterproofing considerations.
- 4.7. The Design and Access Statement states that the existing masonry walls to the rear of the site, between 51 and 53 Gower Street, and along Ridgmount Garden will be retained. However, the structural drawing SL-10 indicates that only the existing wall along Ridgmount Gardens will be

retained. The walls to be retained will be underpinned by reinforced concrete walls, which form the basement box.

- 4.8. The new basement box will be formed by reinforced concrete walls around the perimeter of the site and the basement slab. The basement slab will be supported on piles. The piles are located away from the basement walls, in the centre of the site. Information on the pile length and piling technique is not available. Following the initial audit, supplementary structural calculations have been provided for the basement walls and the basement slab. These are based on cautious estimates of engineering values and assumptions.
- 4.9. A construction method statement, which includes outline temporary works and construction sequence, has been provided. The temporary works drawing shows horizontal props at high level. On the side of the existing masonry wall to be retained, the section of the basement wall has a reduced thickness and it should be checked that this section of the wall has sufficient capacity for the proposed temporary propping. Dewatering may be required to enable construction.
- 4.10. It is noted that a full ground movement analysis (GMA) has been carried out to assess the effect on the surrounding properties. The assessment has suggested that no greater than Burland Category 1 damage to neighbouring properties and a negligible impact on the public highway. Appropriate mitigation measures and a temporary and permanent works methodology have been provided. The assessment recommends that consideration is given to the preloading of temporary basement wall props, and to the monitoring of prop loads during critical stages of excavation.
- 4.11. The geotechnical parameters adopted for the London Clay in the GMA (Young's modulus) are considered to be optimistic and not appropriate for shallow basement retaining wall assessments. However, due to the site's location remote from other structures (aside from the boundary walls and highway) the conclusions of the GMA and damage assessment are considered reasonable.
- 4.12. In the revised submissions, structural monitoring outline proposals are presented. It is noted that current proposed trigger levels are greater than the predicted horizontal and vertical movements in the vicinity of 51 and 53 Gower Street, and the highway. In order to ensure damage impact is limited to the maximum predicted, the trigger levels should be linked to the GMA and damage impact assessment. It is accepted that suitable trigger values, mitigation and contingency actions will be agreed under the Party Wall Act and the relevant authority for the adjacent Chenies Street (TFL, The Highways Agency or LBC).

- 4.13. Prior to construction the GMA and damage impact assessment should be updated to consider the effects of dewatering, as part of the construction temporary works. Suitable mitigation and control measures should be proposed, including contingency actions.
- 4.14. It is accepted that the new development and associated basement is at low risk of flooding. The flood risk maps from the Environment Agency show that the site is not at risk of flooding from rivers and seas and is at low risk from surface water flooding. The site is not on a street that was reported to have flooded in 1975 or 2002. Appropriate waterproofing, drainage and flood risk protection measures (e.g. raised thresholds) should be adopted in the final design, as recommended in the BIA.
- 4.15. The proposed development may slightly improve upon the site's current completely impermeable footprint with the introduction of a green roof to offer limited rainwater attenuation. Drainage is understood to remain as per the current condition, discharging to sewers, and this should be agreed with LBC and Thames Water, in accordance with the guidance.
- 4.16. It is accepted that there are no hydrogeological or hydrological concerns with respect to the development proposals.

5.0 CONCLUSIONS

- 5.1. The BIA has been prepared by several firms of engineering consultants lead by Croft Structural Engineers. The authors of the submitted documents possess suitable qualifications that comply with the requirements of CPG4.
- 5.2. It has been confirmed that the development site is within a conservation area. There are listed buildings in the locality of the site. It is understood that they are more than 6m from the boundary of the site. The existing masonry walls to the rear of the site, between 51 and 53 Gower Street, and along Ridgmount Garden will be retained.
- 5.3. It is noted that the site is within 5m of a highway or pedestrian right of way. It is likely that the relevant authority (TFL, The Highways Agency or LBC) will need to be consulted on the proposed works.
- 5.4. It is noted that the site is within approximately 100m of the entrance to the Deep Shelter Tunnels constructed by the MOD during WW2. The current asset owners should be consulted on the layout of the shelter tunnels, and if they underlie the site, additional impact assessment should be undertaken.
- 5.5. The new basement will be within the Made Ground and will be supported by a piled foundation.
- 5.6. It is recommended that further groundwater monitoring is undertaken to inform both temporary works design and control methodologies, and for permanent structural design and waterproofing considerations.
- 5.7. The Design and Access Statement states that the existing masonry walls to the rear of the site, between 51 and 53 Gower Street, and along Ridgmount Garden will be retained. The walls to be retained will be underpinned by reinforced concrete walls.
- 5.8. The new basement box will be formed by reinforced concrete walls around the perimeter of the site (which underpin the boundary masonry walls) and the basement slab. The basement slab will be supported on piles. Following the initial audit, supplementary structural calculations have been provided for the basement walls and the basement slab. These are based on cautious estimates of engineering values and assumptions.
- 5.9. A construction method statement, which includes outline temporary works and construction sequence, has been provided.
- 5.10. It is noted that a full ground movement analysis has been carried out to assess the effect on the surrounding properties. The assessment has suggested that no greater than Burland Category 1 damage to neighbouring properties and a negligible impact on the public highway.

Appropriate mitigation measures and a temporary and permanent works methodology have been provided.

- 5.11. In the revised submissions, structural monitoring outline proposals are presented. It is noted that current proposed trigger levels are greater than the predicted horizontal and vertical movements in the vicinity of 51 and 53 Gower Street, and the highway. In order to ensure damage impact is limited to the maximum predicted, the trigger levels should be linked to the GMA and damage impact assessment. It is accepted that suitable trigger values, mitigation and contingency actions will be agreed under the Party Wall Act and the relevant authority for the adjacent Chenies Street (TFL, The Highways Agency or LBC).
- 5.12. It is accepted that the new development and associated basement is at low risk of flooding.
- 5.13. It is accepted that there are no hydrogeological or hydrological concerns with respect to the development proposals.

Appendix 1: Residents' Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status/Response	Date closed out
1	BIA Content	Further groundwater monitoring.	See 4.6. This should be ongoing to inform detailed design and assessment.	N/A
2	Stability	Provide further calculations for basement walls and basement slabs. Provide information on the proposed piled foundation. Provide propping information in regards props indicated at high level on reduced thickness retaining walls (next to masonry boundary walls).	Closed	12/01/2017
3	Stability	Dewatering effects on ground movement and damage impact	See 4.13. Prior to construction the GMA and damage impact assessment should be updated to consider the effects of dewatering. Suitable mitigation and control measures should be proposed, including contingency actions. To be agreed with the Engineer.	N/A
4	Stability	Structural monitoring / control measures.	In order to ensure damage impact is limited to the maximum predicted, the monitoring trigger levels should be linked to the GMA and damage impact assessment. Suitable trigger values, mitigation and contingency actions will be agreed under the Party Wall Act and the relevant authority for the adjacent Chenies Street (TFL, The Highways Agency or LBC).	N/A

Appendix 3: Supplementary Supporting Documents

Revised BIA Structural Calculations dated 06 January 2017

Revised Structural Monitoring Statement dated 06 January 2017

Revised Page 22 of the BIA Report by Croft Structural Engineers