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**51 Gloucester Crescent,
London, NW1 7EG**

**Basement Impact Assessment
Audit**

For
London Borough of Camden

Project Number: 12466-87
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Contents

1.0 Non-technical summary 1
2.0 Introduction 3
3.0 Basement Impact Assessment Audit Check List..... 5
4.0 Discussion 8
5.0 Conclusions 11

Appendix

- Appendix 1: Residents Consultation Comments
- Appendix 2: Audit Query Tracker
- Appendix 3: Supplementary Supporting Documents

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 Gloucester Crescent, NW1 7EG (planning reference 2017/2864/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 BIA was undertaken by Soil Consultants Limited (SCL) with Stephen Buss Environmental Consulting Ltd (SBEC) reviewing the Surface Water and Subsurface Flow. The authors' qualifications are in accordance with LBC guidance. A Structural Engineer's Report and Construction Method Statement has been produced by Sinclair Johnston & Partners Limited (SJP).
- 1.5. The existing property comprises a two-storey detached residential house that currently has no basement. The site is located within the Primrose Hill Conservation Area, and although numbers 50 to 51A are not listed, the neighbouring properties are Grade II listed. It is proposed to construct a single level basement beneath the whole of the existing building footprint.
- 1.6. The BIA has confirmed that the proposed basement will be founded within London Clay, a suitable founding stratum. An indicative assessment of heave is presented, including mitigation measures.
- 1.7. It is likely that the ground water table will be encountered during basement foundation excavation. The Structural Engineer's Report proposes a resin grout treatment of the Made Ground to stabilise it and prevent water ingress during underpinning, with trials on site proposed in advance. The Engineer should confirm the suitability of the treatment prior to the underpinning commencing.
- 1.8. Structural designs and drawings are presented in the Structural Engineer's Report to demonstrate the viability of the proposal, including discussion of temporary propping details and a construction sequence with an indicative bay sequence.
- 1.9. A Ground Movement Assessment (GMA) was performed by SCL although it only considers numbers 50 and 51A Gloucester Crescent. The GMA should be updated to also consider 22

Regent's Park Terrace (a Grade II listed property) and the public highway. The full excavated depth of 4.50m should be considered in the analysis. The GMA should consider the effect of lateral movement due to construction of the proposed basement and provide a Damage Assessment.

- 1.10. The Structural Engineer's Report notes that damage impacts of no worse than Category 2 (Slight) can be expected. As noted in 1.9, a detailed GMA and damage impact assessment for all structures and the highway within the zone of influence should be considered. In line with LBC guidance, where Category 1 or a higher damage category is identified, the BIA should provide mitigation measures.
- 1.11. It should be confirmed that the geotechnical parameters used for analysis have considered the proposed grouting treatment.
- 1.12. An outline methodology and guidance for monitoring structural movements during construction, is provided. It should be reviewed based on the outcome of the updated GMA, with trigger values proposed that will ensure damage impacts to neighbours are within acceptable limits. It should be confirmed that the structural monitoring regime will be adopted in advance of any grouting works on site.
- 1.13. An outline construction programme should be presented.
- 1.14. It is accepted that there will be no impact to the wider hydrogeological and hydrological environments.
- 1.15. It is accepted that there are no slope stability concerns regarding the basement development.
- 1.16. Queries and requests for clarification are discussed in Section 4 and summarised in Appendix 2. Until the additional information is presented, the BIA does not meet the criteria of CPG4.

2.0 INTRODUCTION

- 2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 27 June 2017 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 51 Gloucester Crescent, NW1 7EG (2017/2864/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;
 - 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 "*Excavation of a new basement below dwellinghouse (Class C3) including front and rear lightwells.*"

The Audit Instruction also confirmed the site is adjacent to several Grade II listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 3 July 2017 and gained access to the following relevant documents for audit purposes:

- Site Investigation Report (Ref. 10067/BM/OT Rev 1) by Soil Consultants Ltd dated 4 May 2017.
- Ground Movement Analysis Report (Ref. 10067A/JRCB/OT Rev 0) by Soil Consultants dated 9 May 2017.
- Surface Water and Subsurface Flow BIA (Ref. 2016-003-033-002) by Stephen Buss Environmental Consulting Ltd dated 20 March 2017.
- Structural Engineer's Report and Construction Method Statement (Ref. 8761 170516 RA by Sinclair Johnston & Partners Ltd dated 16 May 2017.
- Design and Access Statement by Ultra Violet Architects Ltd dated 5 May 2017.
- Arboricultural Impact Assessment by Advanced Tree Services dated December 2016.
- Planning Application Drawings consisting of:
Existing Plans;

Proposed Plans.

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 SCL are in accordance with CPG4 guidelines.
Is data required by Cl.233 of the GSD presented?	No	Outline construction programme should be presented.
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	
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	BIA Section 7.1.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for !No! answers?	Yes	Surface Water and Subsurface Flow BIA.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for !No! answers?	Yes	Surface Water and Subsurface Flow BIA.
Is a conceptual model presented?	Yes	BIA Section 6 and Section 8.6.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 7.2.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Surface Water and Subsurface Flow BIA.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	N/A	No issues carried forward from screening.
Is factual ground investigation data provided?	Yes	BIA Section 5.
Is monitoring data presented?	Yes	BIA Section 5.3.
Is the ground investigation informed by a desk study?	Yes	BIA Section 1.
Has a site walkover been undertaken?	Yes	BIA Section 3.2.
Is the presence/absence of adjacent or nearby basements confirmed?	Incomplete	Table 1 confirms that Nos. 50 and 51A do not have basements. An assessment is required for 22 Regent's Park Terrace.
Is a geotechnical interpretation presented?	Yes	BIA Section 6. However, it should confirm that effects of the proposed grouting have been considered.
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA Section 6.1 and GMA Section 5.1.
Are reports on other investigations required by screening and scoping presented?	Yes	Site Investigation completed.
Are the baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	No	Assessment required for 22 Regent's Park Terrace.
Is an Impact Assessment provided?	Yes	Ground movement analysis report by SCL. However, this requires updating.

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	No	Estimates of ground movement are presented for Nos. 50 and 51A, but no assessment is made for the public highway or 22 Regent's Park Terrace. The damage impact assessment on neighbouring properties is not quantified.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	The effect of the proposed basement on the public highway and 22 Regent's Park Terrace has not been assessed.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Structural impact not quantified. Mitigation to be presented as necessary.
Has the need for monitoring during construction been considered?	Yes	BIA Section 7.4 and SER Section 4.0. However, this should be updated to reflect GMA and ensure damage impacts are maintained within CPG4 guidelines. Monitoring to be adopted in advance of proposed grouting works.
Have the residual (after mitigation) impacts been clearly identified?	No	Additional assessments required, as indicated above.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Damage impact assessments to be confirmed, as indicated above.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Surface Water and Subsurface Flow assessments.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Not proven. To be determined based on damage impact assessment.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, damage impact assessments to be confirmed, noting requirement to mitigate impacts.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

- 4.1. The BIA has been prepared by Soil Consultants Limited (SCL) with Stephen Buss Environmental Consulting Ltd (SBEC) reviewing the Surface Water and Subsurface Flow. The qualifications of the authors of the BIA are in accordance with CPG4 guidelines. A Structural Engineer's Report and Construction Method Statement has been produced by Sinclair Johnston & Partners Limited (SJP).
- 4.2. The existing property is located at 51 Gloucester Crescent and comprises a two-storey detached residential house that currently has no basement. The site is located within the Primrose Hill Conservation Area, and although numbers 50 to 51A are not listed, the neighbouring properties are Grade II listed.
- 4.3. It is proposed to construct a single level basement beneath the whole of the existing building footprint. The basement extends marginally beyond the footprint of the existing structure with proposed front and rear lightwells beneath areas of existing hardstanding. A total excavation depth to approximately 4.50m bgl is anticipated.
- 4.4. The existing ground floor perimeter walls will be underpinned with reinforced concrete walls cast in a hit-and-miss sequence, which will be cast integrally with the basement slab. The reinforced concrete slab will act as a raft at basement level and support loads from the new basement and loadbearing retaining walls above.
- 4.5. A site specific ground investigation was performed by SCL and identified a variable depth of Made Ground (4.2 to 4.5m below ground level) underlain by London Clay. The proposed basement will therefore be founded in London Clay.
- 4.6. Groundwater monitoring recorded groundwater levels within the Made Ground at a depth of 2.30m bgl, and it is acknowledged in the BIA Report that underpinning will only be possible if groundwater can be adequately controlled. Water bearing granular Made Ground is considered a risk to stability during underpinning and suitably treated Made Ground should provide appropriate mitigation. The Structural Engineer's Report proposes low-pressure resin grouting to stabilise soil below the water table and reduce groundwater inflows in advance of and during excavation. It further proposes trial excavations using the resin to be undertaken prior to the works commencing. The trials should be completed to the satisfaction of the Engineer and if unsuccessful alternative construction methods should be proposed, in which case impact assessments should be reviewed and updated.
- 4.7. Although the proposed basement will extend beneath the perched water table within the Made Ground, it is accepted that there will be no impact to the wider hydrogeological environment.

- 4.8. Structural designs and drawings are presented in the Structural Engineer's Report to demonstrate the viability of the proposed construction. These include outline structural calculations for the retaining walls, steel beams, and basement slabs with consideration of bearing pressure and heave. Temporary propping details are discussed and a construction sequence with an indicative bay sequence is also presented. Further details of the proposed resin grouting works should be provided, including how the works are controlled to prevent excessive ground movements. Sketches to confirm stiff propping arrangement of the underpinning works should be provided.
- 4.9. Geotechnical design parameters are presented in the BIA and Ground Movement Analysis Report. It is noted that the design parameters for Made Ground are presented as a homogenous cohesive deposit, although layers of granular material are indicated on the exploratory hole logs and discussed in the site investigation report. It is assumed that the design parameters presented account for the treatment by resin grouting, but this should be confirmed.
- 4.10. A Ground Movement Assessment (GMA) was performed by SCL to assess the effects that construction of the proposed basement will have on neighbouring properties. The GMA only considers numbers 50 and 51A Gloucester Crescent. The GMA should also assess the effects that the proposed development will have on 22 Regent's Park Terrace (a Grade II listed property), and the public highway.
- 4.11. The GMA considers a total excavation depth to 4.00m bgl. Based on the proposed construction methodology presented in the Structural Engineer's Report, and the depth of Made Ground encountered, the full excavation depth of 4.50m should be used in the analysis.
- 4.12. The GMA states "*As the ground movements in this regard are largely confined to the vertical direction, the response has been modelled using the closed-form solution for vertical loading of an elastic half-space originally formulated by Boussinesq*", and "*...when the basement is excavated, lateral deflection of the underpinning could result in significant vertical movements beneath the neighbouring foundations.*" It is not clear why movements would be confined to the vertical direction. Related to this, the GMA neither quantifies nor considers the effect of lateral movement due to construction of the proposed basement.
- 4.13. The GMA does not provide a Damage Assessment, but concludes with the anticipated movements expected to occur. The Structural Engineer's Report notes that damage impacts of no worse than Category 2 (Slight) can be expected. In line with CPG4, where Category 1 or a higher damage category is identified, the BIA should provide mitigation measures to address ground movement. The GMA should be revised to address the issues raised, and present a full damage impact assessment for all structures within the zone of influence.

- 4.14. An outline methodology and guidance for monitoring structural movements during construction, including proposed trigger values and contingency actions, is provided in the Structural Engineer's Report. These should be reviewed based on the outcome of the updated GMA, with trigger values proposed that will ensure damage impacts to neighbours are within acceptable limits. It should be confirmed that the structural monitoring regime will be adopted in advance of any grouting works on site.
- 4.15. A services/infrastructure search was conducted, and no sensitive assets were identified in the zone of influence of the basement.
- 4.16. It is accepted that the development will not affect the hydrogeological setting as no known ponds, springlines or wells are in close vicinity to the site and that the site is outside the Hampstead Pond chain catchment area.
- 4.17. It is accepted that there are no slope stability concerns regarding the basement development.
- 4.18. The site is located within the Critical Drainage Area Group 3-010 but is not located within a Local Flood Risk Zone and is at very low risk of flooding. The proposed development will not impact the wider hydrological environment.
- 4.19. Queries and matters requiring further information or clarification are summarised in Appendix 2.

5.0 CONCLUSIONS

- 5.1. The BIA authors' qualifications are in accordance with CPG4 requirements.
- 5.2. The BIA has confirmed that the proposed basement will be founded within London Clay, a suitable founding stratum.
- 5.3. It is likely that perched groundwater will be encountered during basement construction. The Structural Engineer's Report proposes a soil stabilisation treatment (resin grouting) to be trialled prior to the works commencing. The trials should be completed to the satisfaction of the Engineer and if unsuccessful alternative construction methods should be proposed, in which case impact assessments should be reviewed and updated.
- 5.4. It should be confirmed that the geotechnical parameters used for analysis have considered the proposed grouting treatment.
- 5.5. Structural designs and discussion of temporary works are presented in the Structural Engineer's Report. Further details of the proposed resin grouting works should be provided, including how the works are controlled to prevent excessive ground movements. Sketches to confirm stiff propping arrangement of the underpinning works should be provided.
- 5.6. An outline construction programme should be provided.
- 5.7. The Ground Movement Assessment (GMA) should be updated to consider 22 Regent's Park Terrace (a Grade II listed property) and the public highway. The full excavated depth of 4.50m and lateral movements should be considered in the analysis. In line with CPG4, where Category 1 or a higher damage category is identified, the BIA should provide mitigation measures to address ground movement.
- 5.8. The outline methodology and guidance for monitoring structural movements presented should be reviewed based on the outcome of the updated GMA, with trigger values proposed that will ensure damage impacts are within acceptable limits. It should be confirmed that the structural monitoring regime will be adopted in advance of any grouting works on site.
- 5.9. It is accepted that the development will not impact the wider hydrogeological or hydrological environments.
- 5.10. It is accepted that there are no slope stability concerns regarding the basement development.
- 5.11. Queries and requests for clarification are discussed in Section 4 and summarised in Appendix 2. Until the additional information is presented, the BIA does not meet the criteria of CPG4.

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Appendix 1: Residents| Consultation Comments

Residents Consultation Comments

Surname	Address	Date	Issue raised	Response
[REDACTED]	[REDACTED] Regent's Park Terrace, London, NW1 7ED	13/06/2017	Stability concerns.	See response in Section 4.10 - 4.14.
[REDACTED]	[REDACTED] Gloucester Crescent, London, NW1 7EG	22/06/2017	Stability concerns. Hydrology concerns.	See response in Section 4.10 - 4.14. See response in Section 4.6 - 4.7 and 4.16.
[REDACTED]	[REDACTED] Regent's Park Terrace, London, NW1 7ED	28/06/2017	Stability concerns.	See response in Section 4.10 - 4.14.
[REDACTED]	[REDACTED] Regent's Park Terrace, London, NW1 7EE	29/06/2017	Stability concerns.	See response in Section 4.10 - 4.14.
[REDACTED]	[REDACTED] Station Road, Cambridge, CB1 2JD	06/07/2017	Stability concerns. Hydrology concerns.	See response in Section 4.10 - 4.14. See response in Section 4.6 - 4.7 and 4.16.
Primrose Hill CAAC	[REDACTED] Pancras Square, London, N1C 4AG	06/07/2017	Stability concerns. Construction management plan details.	See response in Section 4.10 - 4.14. See response in Section 4.1 and 4.14.
[REDACTED]	[REDACTED] Dakhill Avenue, London, NWs 7RD	09/07/2017	Green space.	See response in Section 4.3 and 4.16.
[REDACTED]	[REDACTED] Oval Road, London, NW1 7EA		Stability concerns.	See response in Section 4.10 - 4.14.

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Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA Format	Outline Construction programme to be provided.	Open - as paragraph 233 of the GSD	
2	Stability	Geotechnical parameters	Open - parameters for Made Ground should be confirmed as having considered the proposed resin grouting treatment.	
3	Stability	Consideration of 22 Regent's Park Terrace	Open - foundation depth / basement depth should be ascertained and GMA / damage impact assessment for the property undertaken.	
4	Stability	Temporary works proposals	Open - further details of the proposed resin grouting works should be provided, including how the works are controlled to prevent excessive ground movements. Sketches to confirm stiff propping arrangement of the underpinning works should be provided.	
5	Stability	GMA / damage impact assessment to be updated	Open - as comments provided in 4.10 to 4.13.	
6	Stability	Movement monitoring strategy to be updated	Open - as 4.14, including confirmation that monitoring will be undertaken whilst grouting is undertaken.	

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Appendix 3: Supplementary Supporting Documents

None

London



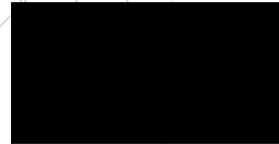
Birmingham



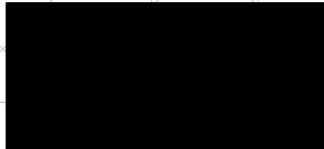
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